United Nations | Department of Economic and Social Affairs

FUTURE OF THE WORLD

POLICY BRIEF NO 111

Wildfires – a growing concern for sustainable development

I. Introduction

The past year (2020-21) has been one of global crises on many fronts, from the far-reaching impacts of COVID-19 pandemic to wildfire[1] outbreaks of an unprecedented scale and duration. In Australia, bushfires in 2019-2020 were one of the worst bushfire seasons in history (Government of Australia, 2020). In the United States, the West Coast wildfires reached record highs in 2020 (GLF, 2020). In the Amazonian and Siberian regions, wildfires in 2020 were the worst experienced in a decade (Newdaily, 2020). In early 2021, Nepal experienced one of the country's worst wildfire seasons in almost a decade (Phys.org News, 2021).

All of these wildfires took a heavy toll on people and the environment in many countries around the world, from loss on human lives and property to the destruction of huge tracts of land and forests. The aftermath was marked by huge economic losses, countless losses of wildlife and habitat, in addition to a marked increase in Greenhouse Gas (GHG) emissions.

News of these recent wildfires attracted worldwide attention to the devastating impacts of wildfires on the ecosystems and people and the need to address them effectively. The recurring incidence of these disasters also raised questions on how the global community could prevent future wildfires, and their bearing on the achievement of the Global Forest Goals (GFGs)[2] and Sustainable Development Goals (SDGs) and other development goals.

At present, despite their obvious adverse impacts, investments and actions to mitigate the risk and impacts of wildfires have not been sufficient to meet this growing threat. To assist countries in their efforts to reduce the risks and impacts of wildfires, this policy brief provides an overview of current trends, impacts and underlying factors, as well as suggestions on measures that could be taken in this regard.

Summary

» This policy brief reviews trends and impacts of wildfires on sustainable development, in all its environmental, economic and social dimensions. It provides an analysis of the key drivers of wildfires and proposes measures to reduce the risk and impacts of future wildfires.

II. Current Trends

Over the past decade, there has been a surge in the incidence of large and uncontrolled fires on all vegetated continents, irrespective of national capacities in firefighting or fire-management strategies. Wildfires affect all biomes, from forests and savannahs to grasslands and tundra. Globally, over 400 million hectares of land are affected by fire every year, 70% of which occurs in savannahs and grasslands. Of this, 100 million hectares of the land burned is in forests, which is equivalent to 3% of the world's forest area (François-Nicolas Robinne, 2020).

While the total land area burnt has declined over the past decades, this decline has been mainly due to reduced occurrence of fire in grasslands and savannahs. Historically grasslands and savannahs have been more prone and accustomed to wildfires (Doerr SH, 2016). Fires are now occurring more frequently and severely in ecosystems like tropical forests, which previously rarely experienced fires. This increase of wildfires in ecosystems that are not adapted to fire, could have immense impacts on the biodiversity, ecosystem services, human well-being, livelihoods and national economies which are dependent on them (IUFRO, 2018).

In April 2020, the number of fire alerts around the world was up by 13% compared to 2019, which was at the time considered a record year for fires (WWF, 2020). While there are different views on the future trend of wildfires, scientists generally agree that future climate conditions will be more conducive to fire. This means that in the future we can expect greater number of fires, longer fire seasons, increased GHG emissions, and more high-intensity and extreme fires (IUFRO, 2018).

III. Impacts of wildfires

The publicly recognized costs of wildfires are usually based on direct economic costs to the public sectors, including fire suppression costs, asset loss, loss of lives and insurance costs. However, wildfires also have broad and long-lasting impacts on the economic, social and environmental aspects of development. Traditionally, such costs have not been factored into the costs of fires, as they are difficult to assess and quantify. Underestimating the full costs of wildfires has often led to less political attention and inadequate budget allocations being devoted to address wildfires. A full

1 This brief uses the terms wildfire to refer to an unplanned fire that has burnt a natural area such as a forest, grassland, or prairie.

2 More information about the Global Forest Goals of the UN Strategic Plan for Forests is available at: https://www.un.org/esa/forests/wp-content/uploads/2019/04/Global-Forest-Goals-booklet-Apr-2019.pdf

Authors: Yan Lang and Hossein Moeini-Meybodi, United Nations Forum on Forests Secretariat in UN DESA. For further information, contact undesa@un.org, or visit www.un.org/development/desa/publications/

assessment of the impacts of wildfires and their associated costs is thus critical in devising effective programs to reduce the risk and impacts of future wildfires.

a. Economic impacts

- Wildfires have direct economic costs such as asset losses and firefighting costs. Wildfires also have indirect economic costs through their impact on economic activities and reduced asset values. While global statistics on such economic impacts are not available, countries have reported a significant increase in wildfire damage costs in recent decades (François-Nicolas Robinne, 2020). It is important to note that the indirect and long-term costs of wildfires, are usually higher than the direct and short-term costs and tend to accrue over time. These costs are often missed from the total damage costs of wildfires.
- Indirect economic costs of wildfires include reduced income from tourism, impacts on productivity of forest industries, devalued real estate, health expenditures, and the costs of post-fire rehabilitation of ecosystems and residential areas. An analysis of the direct, indirect, long-term and post-fire costs of wildfires in the United States showed that the true cost that communities, businesses and governments actually bear, could be double to 30 times higher than the official estimate of large wildfire costs (Association for fire ecology, 2015). A survey conducted during Australia's bushfires in January 2020 revealed that 26% of Australian businesses were affected by the bushfires (Ryo Morgan, 2020).

b. Social impacts

- Wildfires have major short-term and long-term social implications, which include increased fatality, destruction of homes and infrastructures, and negative impacts on physical and mental health of people. From 1980 to 2021, the Georeference Emergency Events Database (EM-DAT) reported 2,805 direct fatalities, 8,540 injuries and 7 million people impacted by wildfires (François-Nicolas Robinne, 2020). The most widespread health issue caused by fires is respiratory illnesses. The air pollutants caused by fire can spread far beyond the original site of the fire and impact other continents and regions. Globally, fire emissions are responsible for 5-8% of the 3.3 million premature deaths each year from poor air quality (Lelieveld J., 2015). Along with increased eye irritation and corneal abrasions, psychological effects, post-traumatic stress disorder (PTSD), depression, and insomnia are other serious health problems caused by wildfires. Contamination of drinking water in affected watersheds from ash runoff also affects the health of local communities. These social and health impacts often last much longer than the fire and significantly increase the adverse consequences and costs of fires.

c. Ecological impacts

- The impact of wildfires on ecosystems is two-fold. On the one hand, controlled fires can play a role in maintaining biodiversity and promoting regeneration in savannas, temporal and boreal forests. On the other hand, severe and uncontrolled fires cause extreme degradation and loss of biodiversity.
- Catastrophic wildfires kill, injure and displace wildlife and destroy their habitat. These fires pollute the air and water, change the local climate, and increase global warming. The change in global fire patterns can change the habitat of some species, causing declines in their population, and pushing them towards becoming endangered. Some of the dense forests lost to fire are old-growth forests, which can be hundreds of years old, losing them has irreversible impacts on biodiversity, climate and the natural ecosystem as a whole.
- Even though forests make up only 10% of the total area burned, due to their high carbon storage capacity forest fires are responsible for one-quarter of all fire-related carbon dioxide emissions (WWF, 2020). Furthermore, as 75% of freshwater resources originate from mountains and forested watersheds, wildfires can have severe impacts on water quality and compromise municipal water supplies.

Drivers of wildfires

Wildfires are driven by a combination of climate, vegetation and land use factors which vary across regions. Along with temperature, precipitation, wind and atmospheric moisture, the natural climate is the best predictor of regional fire activity for a short period of time (IUFRO, 2018). At present, wildfires are greatly shaped and driven by the impacts of climate change and human activities which together increase the scope, costs and impacts of wildfires on communities and ecosystems.

a. Climate change

- Climate change exacerbates many of the factors that create perfect fire conditions and is considered as a leading driver of wildfires. Global projections indicate a longer dry season, more extreme droughts and a general increase in global aridity, resulting in drier vegetation and a longer fire season (IUFRO, 2018). Scientific studies also indicate that in dryness-limited systems, such as forests, fire frequency and severity will likely increase, as has been witnessed over the last two decades (Andela et al, 2017).
- Climate change and wildfires are mutually reinforcing. The historical increase in GHG emissions from human activities has led to more fire-prone climate patterns. This in turn has resulted in increased occurrence of large and severe fires, with greater GHG emissions. The increased level of GHGs further accelerates climate change, threatens the balance of ecosystems, and causes more areas affected by fires. Eventually, this

vicious cycle could go beyond the resilient capacity of ecosystems and cause irreversible changes to ecosystems and human lives (François-Nicolas Robinne, 2020).

b. Human activities

- Human activities influence fire in three ways namely by: providing ignition sources, modifying land use and natural vegetation, and using fire to manage natural ecosystems and agriculture. Various scientific studies suggest that 70-90% of fire are started by people (François-Nicolas Robinne, 2020). In recent history, the transition to industrial economies has been characterized by the conversion of forests into agricultural or pastoral land. This transition has increased fire-prone areas, such as proximity of allocated agricultural frontiers and human residence, leading to huge fire events and increased costs and impacts of wildfires (David M., 2009).
- Natural ecosystem and agricultural management measures have direct impacts on increasing wildfire risks. Historically, fire suppression measures dominated forest and fire management plans, contributing to the pile up of fuels. While such plans reduced the number of small fire incidents, they increased the risks of megafires due to the accumulation of combustible vegetation. As old-growth forests were replaced with dense plantations, these areas became more prone to fire spreading. In many areas, fire continues to be a cost-effective and practical method used to clear land for agriculture and pastures. However, climate change and extreme weather conditions make these fires more uncontrollable.
- In 2020, the COVID-19 crisis exacerbated the situation, as resources for forests and fire management were diverted to other needs, and forest patrol and enforcement activities were restricted. This gave rise to an increase in illegal burning to clear forests for agricultural and pastoral uses and may have contributed to the rise of fire incidents. With the COVID-19 recovery measures still unfolding, this trend may continue.

IV. Measures to curb Wildfires

The devastating impact of wildfires on people's lives and ecosystems along with the growing frequency and intensity of these fires, requires concreted action at all levels. The following are important measures for developing and implementing efficient policies and strategies to reduce the risks of wildfires and to minimize their impacts and the scope of associated damage and costs.

a. Devising comprehensive strategies for Wildfire management

- Wildfires management strategies should be developed in a comprehensive manner and include all aspects related to risk mitigation and prevention, fire suppression and post-disaster recovery plans. Sustainable and integrated landscape-level planning also plays a critical role in the success of such strategies. Prevention, suppression and recovery are the main components of wildfire management. However, historically there has been a greater focus on suppression, rather than taking prevention and mitigation measures, which are more cost-effective. Although increased investment in mitigation has occurred in many countries, much more work should be done to increase investment in preventive measures.

b. Applying scientific and sound traditional knowledge

- The scientific community can contribute significantly to improve wildfire early warning systems by using the most advanced technologies and developing more science-based landscape and forest management strategies. Greater use of modern technologies in monitoring, detecting and controlling fires, such as through remote sensing and real-time alarming system, can help in this regard. Land use, forests and fire management should be based on sound scientific data. Similarly, the traditional knowledge, experiences and practices of local communities and indigenous peoples could be also beneficial to enhance the efficiency of wildfire management strategies.

c. Promoting a synergetic agenda for climate and forests

- Climate change, unsustainable land use and illegal deforestation caused by human induced wildfires, are among the key drivers of wildfires, and it is imperative to include actions to address these drivers in strategies to curb wildfires. Nationally Determined Contributions (NDCs) under the Paris Agreement, and Voluntary National Contributions (VNCs) to achieve the Global Forest Goals of the UN Strategic Plan for Forests (UNSPF) are important means to simultaneously advance a synergetic forest-climate agenda to reduce the risks of wildfires.
- Countries have an opportunity, through their NDCs and VNCs, to acknowledge the threats that fires pose to the future health and resilience of forest ecosystems, that serve as carbon sinks and offer nature-based solutions to climate change. In addition, member States affected by wildfires could consider announcing joint VNCs with other countries in their region, to combat forest fires both as a means to advance climate actions and as a means of advancing achievement of the Global Forest Goals, in particular Global Forest Goal 1 on reversing the loss of forest cover.

d. Taking effective action at the national level

- It is particularly important to include sustainable land use, sustainable forest management and fire management in various national development strategies and action plans, including strategies and plans on climate change adaptation and mitigation, and biodiversity conservation. Sufficient investment and budget should also be in place to support implementation of such strategies and plans. Such integrated planning would reduce the risks and potential adverse impacts

of wildfires caused by human activities and climate change. Furthermore, countries should prioritize fire mitigation and prevention in addition to fire suppression. In this respect, Integrated fire management (IFM)[3] ,which is well developed and implemented in several countries, provides a good example of methodology to be used at the national and local level.

e. Involving people and stakeholders

- Effective implementation of wildfires management strategies is largely dependent on the active participation by stakeholders in all stages of their preparation and implementation. Engagement of indigenous peoples and local communities, scientific experts, and the private sector is particularly important in this regard. Specifically, indigenous peoples and local communities should be involved in the development and implementation of sustainable land use, forest and fire management plans, and fire adaptation plans. Incentives should be provided to local communities and the private sector to preserve their forests rather than converting them to other land uses for quick economic returns. Social media can be a useful communication tool in engaging stakeholders and in raising public awareness on wildfire facts.

f. International collaboration

- International cooperation is critical for effective and concerted global actions to curb wildfires, due to transboundary impacts of large-scale wildfires and different capacities of countries in dealing with wildfires. There are many examples of global and regional collaborative initiatives such as Global Wildland Fire Network and its regional networks; Regional Fire Management Resource Centres (RFMRCs) and Regional Fire Monitoring Centers (RFMCs). It is imperative to strengthen existing collaborative initiatives and to support new initiatives to promote technological collaboration and exchange of scientific data, capacity development and training in fire management and research.

REFERENCES

- Association for Fire ecology, International Association of wildland fire and the Nature Conservancy, 2015. Reduce Wildfire Risk or we'll continue to pay more for fire disasters,
- David M. J. S. Bowman, et al. Fire in the Earth System. Science 2009.
- Doerr SH, Santı´n C. 2016 Global trends in wildfire and its impacts: perceptions versus realities in a changing world. The Royal Society, 2016.
- François-Nicolas Robinne (2020). Impacts of disasters on forests, in particular forest fires, March, 2020.
- International Union of Forest Research Organizations (IUFRO), 2018. Global Fire Challenges in a Warming World. Occasional Paper No. 32. IUFRO, Vienna, 2018.
- Global Landscapes Forum (2020). World on fire 2020: California and the Amazon, 2020
- Government of Australia, Parliament of Australia (2020). 2019–20 Australian bushfires—frequently asked questions: a quick guide, 12 March 2020.
- Lelieveld, J., Evans, J.S., Fnais, M., Giannadaki, D. and Pozzer, A., 2015. The contribution of outdoor air pollution sources to premature mortality on a global scale. Nature, 525(7569), pp.367-371.
- N. Andela,1,2* D. C. Morton,1 L. Giglio, etc. 2017. A human-driven decline in global burned area. Science, 2017
- Newdaily (2020). The 'lungs of the Earth' are burning: 2020 Amazon rainforest fires the worst in a decade, Oct 4, 2020.
- Phys.org News, Nepal hit by worst wildfires in almost a decade; 2021.
- WWF, 2020. Fires, Forests and Future: A crisis ranging out of control? WWF, Morges, 2020.
- Roy Morgan, 2020. Today 26% of Australian businesses have been affected by bushfires - Australia needs to support businesses in the Accommodation and Food services industries with Visitors and Tourists. Australia, January 24, 2020

3 Integrated fire management (IMF) aims at a focus-shift from suppression to prevention, preparedness, and post-disaster recovery; a goal whose success heavily relies on working with local communities. Based on the IFM framework, several major recommendations to reducing fire disaster risks can be made: learning to live with local fire conditions; reducing the vulnerability of highly valued resources and assets; acknowledging traditional fire knowledge; adopting a responsible, science-informed, proactive fire strategy; promoting good governance; promoting capacity building for local communities; promoting collaboration and knowledge sharing; promoting long-term monitoring and data collection; promoting new technologies and innovative approaches to fire risk management.