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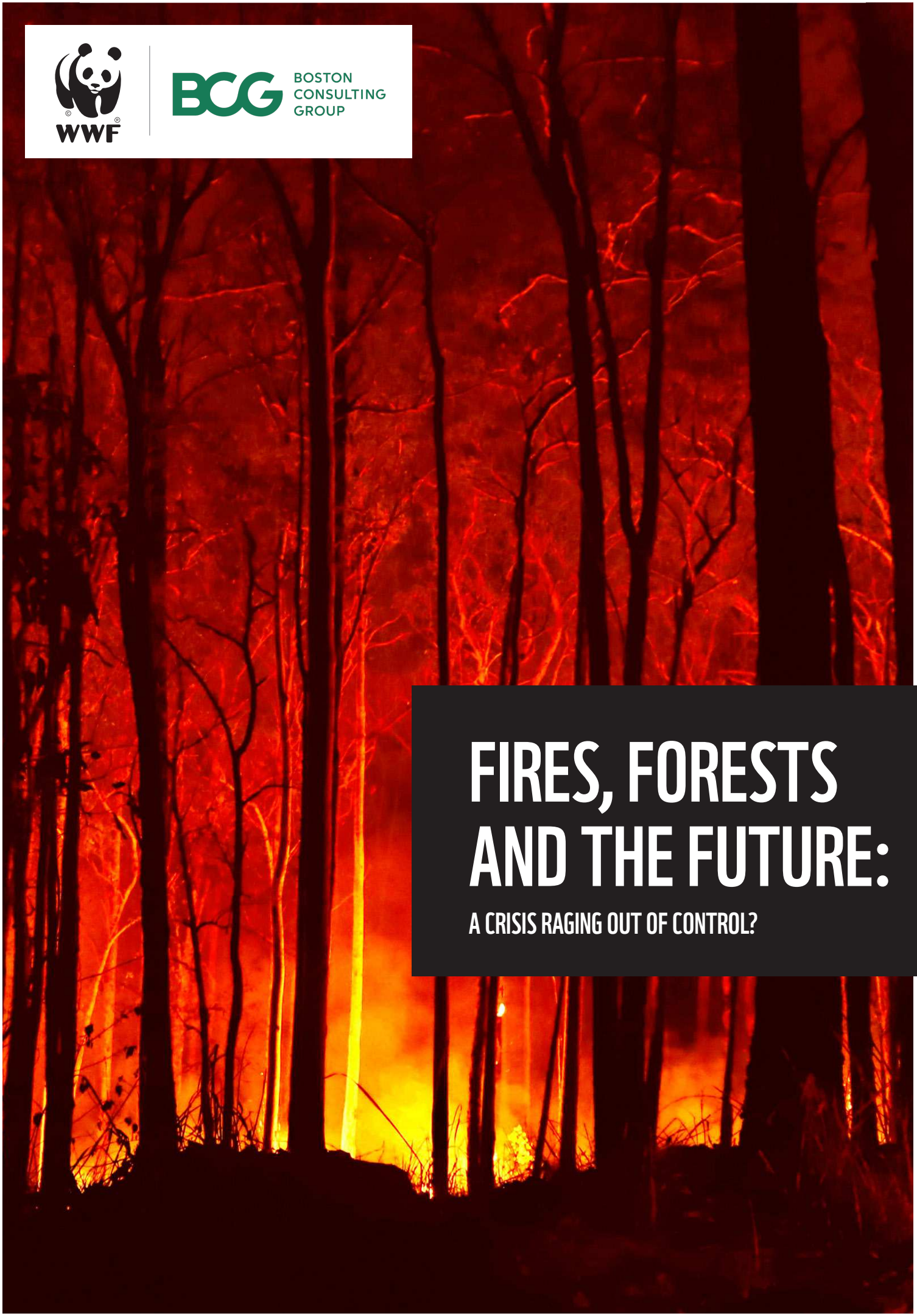
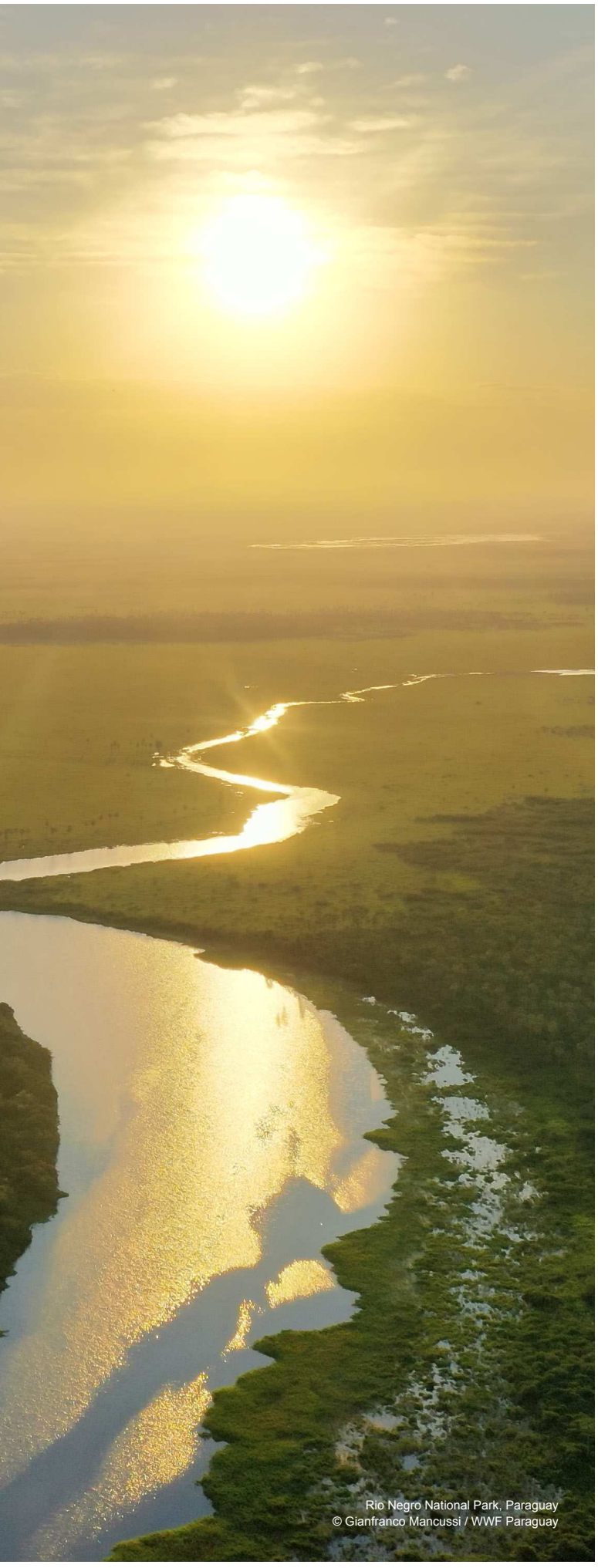


FIRES, FORESTS AND THE FUTURE:

A CRISIS RAGING OUT OF CONTROL?



Rio Negro National Park, Paraguay
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Cover photo: Bushfire in Bowraville, NSW, November 2019
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INTRODUCTION

2020 has been a year like no other. COVID-19 is a truly global event with social and economic implications that will change the world forever. As the international community focuses its attention on fighting the pandemic, another crisis is unfolding around the world.

FIRE COUNTS ACROSS THE GLOBE WERE UP BY

13%

COMPARED TO LAST YEAR

This one is taking place in forests, where the latest fire seasons have been raging with unprecedented ferocity, from the Amazon to the Arctic: in April 2020, the number of fire alerts across the globe were up by 13% compared to last year – which was already a record year for fires.[1] Persistent hotter and drier weather due to climate change, and other human factors such as land conversion for agriculture and poor forest management are the main drivers behind the increase.

Climate change and wildfires mutually reinforce each other, and the fires burning today in many parts of the world are bigger, more intense, and last longer than they used to. If current trends continue, there will be devastating long-term consequences. A greater number of more intense fires will release millions of extra tonnes of carbon, decimate biodiversity, destroy vital ecosystems, impact economies and people, threaten property and livelihoods, and cause severe long-term health problems for millions around the world.

It is estimated that humans are responsible for around 75% of all wildfires,[2] and much of the increase in fire incidents during 2020 can be directly linked to human actions. This means solutions are in our grasp too. There's no magic bullet that will fix the issue overnight, but there are ways forward if behaviours of the past are changed.

Proactivity and commitment must be at the heart of a global response to fires that needs to play out at local, sub-national, national and regional levels. Preventing fires before they occur is paramount, and far preferable in all respects to only suppressing them when they are burning. Good intentions and commitments need to be followed up by real and effective actions on the ground.

This report takes a deeper dive into fire trends and what they mean for people and the planet, and sets out some recommendations to address the key causes.

HUMANS ARE RESPONSIBLE FOR

75%

OF ALL WILDFIRES

Amazon Fires, Porto Velho in Brazil © Michael Dantas

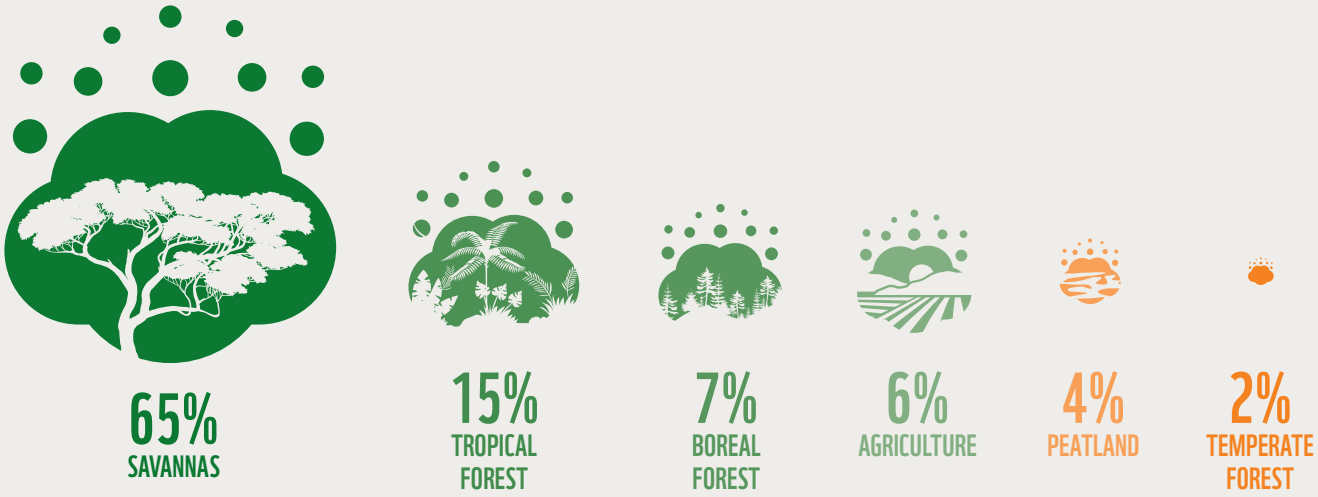
1. THE ISSUE

Wildfires affect all biomes, from forests and savannahs to grasslands and tundra.

Brazilian Amazon 2019 Fires © Michael Dantas / WWF-Brasil

Based on records from 2000-2015, 85% of the surface area burned globally each year is located in tropical savannahs,[3] which make up 19% of total land cover.[4] Even though forests make up only 10% of the total area burned,[5] their higher carbon storage capacity means that they are responsible for one quarter of all fire-related carbon dioxide emissions. Forest fires in all biomes are responsible for nearly a quarter of all emissions from fires. Tropical forests are less resilient to fire, and their carbon storage contribution makes them an urgent priority for preventative action.[6]

SHARE OF ANNUAL CO_2 EMISSIONS RELEASED DURING FIRES



Source: van der Werf, et al. (2017) Global fire emissions estimates during 1997–2016, *Earth Syst. Sci. Data*, 9, 697–720, https://doi.org/10.5194/essd-9-697-2017

FIRES AND NATURAL CYCLES

Wildfires triggered naturally – usually by lightning strikes – play an important role in natural cycles, maintaining biodiversity and regenerating forests, grasslands and shrublands in many different ecosystems (although this is not the case in tropical rainforests). They clear old vegetation, return nutrients to the soil and allow sun to reach the forest floor. In some forests, fires occur naturally every dry season.[7] Burning light ground cover reduces potential fuel loads, preventing more serious fires from taking hold, clearing the ground and aiding seed growth. Some trees, such as sequoias in the US[8], eucalypts in Australia[9], and pines in southern Europe,[10] depend on fire to trigger seed release and regenerate. Deliberate burns are sometimes used by park rangers for this very reason.

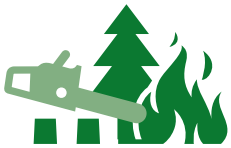
In Australia, for example, Indigenous cultural fire management is used to maintain the diversity and abundance of vegetation and wildlife, and store carbon in landscapes. The use of small-scale mosaic cultural burns also reduces the likelihood of larger fires during hotter and drier months. This practice also underpins multi-million-dollar carbon farming contracts between Indigenous Rangers, governments and larger polluting industries. Carbon farming entails farming that reduces greenhouse gas emissions or captures and holds carbon in vegetation and soils.[11] Since 2006, this method has abated more than 5 million tons of carbon across 18 million hectares of tropical savannahs and woodlands.[12]

Batemans Bay, NSW
© WWF-Australia / Leonie Sii

Fires should not, therefore, be suppressed completely in areas where they are part of the natural cycle, rather they should be controlled as far as possible and their effects on ecosystems managed. In fact, too much fire suppression can have negative impacts on animal and plant species that are adapted to natural fire regimes. Around 1% of Sweden's forest land used to be burned yearly, but when the country began systematic suppression of forest fires in the late 19th century, it resulted in weaker trees that suffered higher mortality even at low fire intensity.[13] In North America, excessive fire suppression in some areas has been linked to a decline in grizzly bear numbers:[14] berry-producing shrubs are a key food source, and the shrubs need fires to proliferate – suppressing these fires mean fewer shrubs, producing less food for grizzly bears.

The real problem, though, is when fires get out of control, and when this happens, the damage can be catastrophic. For example, 98% of the burned area in forests managed by the US Forest Service between 1970 and 2002 was due to just 1.1% of the total number of fires recorded: a single runaway wildfire can be next to impossible to stop.[15]

THE HUMAN FACTOR



SLASH AND BURN

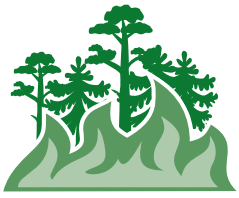
BURNING RUBBISH

ARSON

An increasing share of wildfires are due to human activity, intentional or otherwise. This is estimated to be responsible for 75% of all wildfires in recent years.[16]

In the Northern Hemisphere, most fires are caused by negligence (e.g. burning rubbish and debris, industrial accidents, agricultural overspill etc.), and arson is also sometimes to blame. In Europe, negligence causes 95% of fires; in the US, 84%.[17] The most at-risk locations are so-called 'wildland-urban interfaces', where significant populations live in or near forests. In more remote forest areas, lightning is more likely to be responsible – in Canada's British Columbia, only 40% of wildfires are traced back to human origins.

INDUSTRIAL ACCIDENTS



CONTROLLED FIRES

In tropical and subtropical regions, forest fires are mostly intentionally set for land-use change, clearing and preparing new areas for cultivation. "Slash and burn" is a farming method used in many countries, especially in Southeast Asia and Africa, where trees are cut and burnt to expand arable land while enriching its soil with ashes and nutrients. Controlled fires are also used deliberately on a much larger scale in commercial agriculture, clearing the ground for palm oil plantations in Indonesia and cattle ranches in Brazil – and these fires frequently run out of control. In the Brazilian Amazon, fires are also part of a pattern of increasing encroachment into public and Indigenous Peoples' lands.

SNAPSHOTS OF 2020: ALREADY A YEAR OF EXTREMES

SIGNIFICANT RISE

Deforestation in the first four months of 2020 suggests the area burnt could surpass the figures for all of 2019, reversing a trend of continued falls in recent decades.[23]

30%

The worst wildfires in the Chernobyl area's history began to burn in April, while fires across the country have increased 30% this year.[26]

2nd HIGHEST

2019 saw the second highest level of forest fires on record;[24] 2020 is projected to affect an area at least as large, if not larger. For an idea of scale, each year fires destroy three times the amount of forest lost to industrial logging in Russia. Siberia has just experienced its hottest April ever recorded.[25]

RUSSIA

UKRAINE

THAILAND

COLOMBIA

BOLIVIA

BRAZIL

35%

Deforestation drove a 35% increase in fires from January to April 2020 compared to last year.[22]

Forest loss in the first six months of the year totalled 307,000 hectares, 26% more than the same period in 2019.[18] Increasing deforestation is likely to result in intense fires in the Amazon biome, especially in government-controlled lands[19]– the number of fires in the Brazilian Amazon hit a 13-year high in June, at the beginning of the dry season.[20] In July, 6,803 outbreaks of fires were detected in the Amazon,[21] 28% more than the same period in 2019.

28%

20%

The worst wildfires for decades swept through Northern Thailand in April, destroying up to 20% of the forested area and causing 'critical levels' of air pollution in Chiang Mai.[27]

AUSTRALIA

1/5 ALL TREES

The 2019-2020 fire season was the worst in the country's history.[28] A fifth of the entire temperate broadleaf and mixed forest biome was destroyed,[29] equivalent to an area nearly the size of England.[30]

Fire in the urban area of Humaitá, at the South of Amazonas.
© Michael Dantas / WWF-Brasil

COVID-19: FANNING THE FLAMES

The COVID-19 pandemic is impacting many of the world's forests. As some governments divert resources to the frontline fight against the virus, forest patrols and enforcement have been scaled back or stopped altogether. As a result, some countries have seen an increase in deforestation and outbreaks of fires.

In the case of Brazil, COVID-19 appears to have helped the regime's stated intention to open the Amazon for business; environment minister Ricardo Salles was recorded telling colleagues to "take advantage of the fact that the attention of the press is on the pandemic to approve infra-legal reforms of deregulation of the environment."[31]

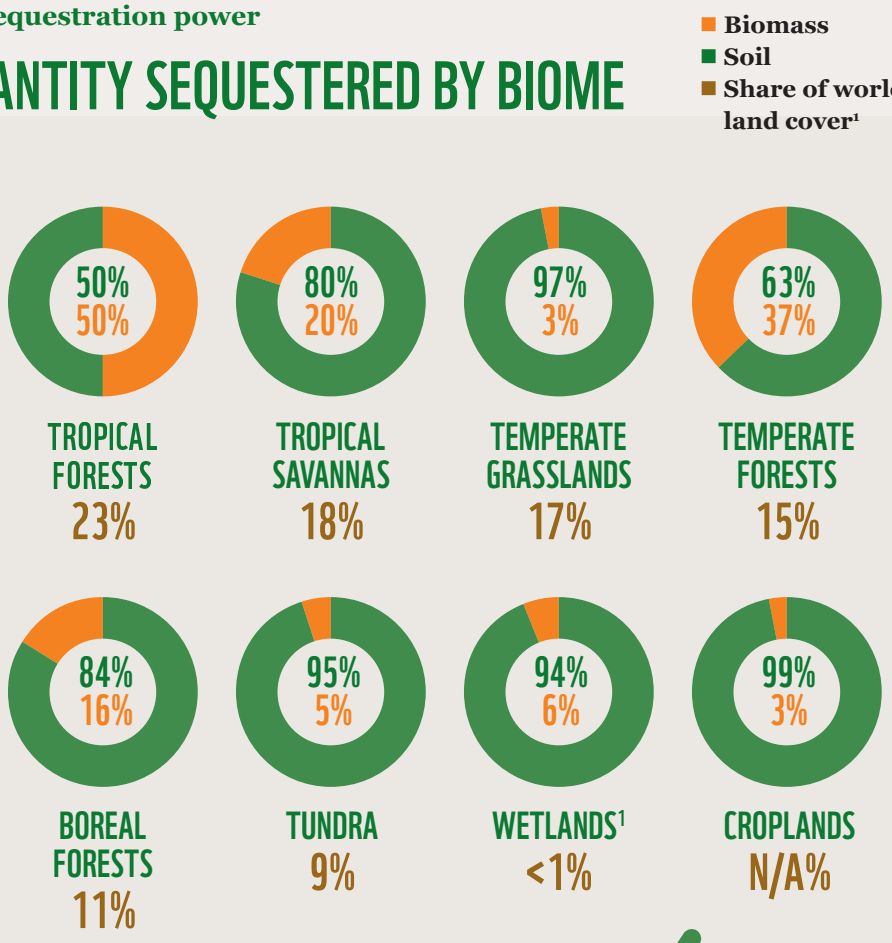
Fire prevention resources themselves have also been scaled back. In the US, for example, the Forest Service Chief has stated that due to the pandemic, fire resources will be used "only when there is a reasonable expectation of success in protecting life and critical property and infrastructure."[32]

Not all biomes have the same sequestration power

AVERAGE CARBON QUANTITY SEQUESTERED BY BIOME

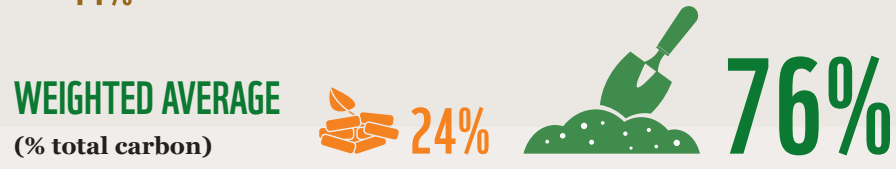
(t CO_2 per ha)

- Quantity & location (biomass, soil) of CO_2 highly depends on biomes
- Quantity of CO_2 released also depends on fires' severity: severity increases release of CO_2 sequestered in soil
- Among biomes with high sequestration capabilities, some are not resilient to fires (e.g. wetlands and tropical forest). In those landscapes, fire is not a natural phenomenon, but a consequence of human activities.



Note : Unit chosen is t CO_2, while some sources & reports use t C : 1t C = 3,66 t CO_2. The figure does not add up to 100% as deserts and inhabited areas are excluded

1. Wetlands include all ecosystems permanently or seasonally flooded. Source: Carbon Sequestration in forests (US Congress Research Service ; 2007)



2: CHANGING CLIMATE, WORSENING TRENDS

SURFACE BURNED

FREQUENCY

SEVERITY

Regardless of whether fires start naturally or are deliberately set, their overall impact on forests has been growing in recent decades. By examining three factors – surface burned, frequency and severity – the growing influence of climate change becomes obvious.

The carbon released into the atmosphere by fires further increases global heating, and the vicious circle gets worse. This establishes a positive feedback loop that amplifies the role of extreme hot dry weather in generating more frequent intense fires that in turn generate increased forest carbon emissions. As has been modelled for the Amazon rainforest,[33] ongoing deforestation and global heating is projected to reach tipping points that would cause even the largest intact forest biomes to switch from net sink to net source of billions of tonnes of sequestered forest carbon.

SURFACE BURNED

THE AREA OF FOREST LOST TO FIRES GLOBALLY HAS BEEN STEADILY DECLINING, BUT UNLESS MORE IS DONE TO FIGHT THE EFFECTS OF CLIMATE CHANGE, THE GLOBAL CURVE COULD BEND BACK UPWARDS

The area of land burned globally has actually been steadily declining since it started to be recorded in 1900, and in this century (2000-2016) the annual area burned has averaged 3.4 million km^2, or just over 2% of the global land surface.[34]

But the picture varies around the world, and today figures suggest that unless more is done to fight the effects of climate change, the global curve could bend back upwards. In North America, fewer but more severe wildfire occurrences have led to recent increases in annual area burned, which some estimates put at 5.3% and 4.1% per year (1997-2016) in Canada and the US respectively.[35] Likewise, the enormous wildfires which recently devastated large areas in Australia, Brazil and Russia point upwards as well. Scientists predict climate change will increase the annual area burned worldwide up to levels not seen since the 1950s,[36] but this can be avoided if we adopt more sustainable land use and management practices.

Enormous wildfires which recently devastated large areas in Australia. Wallabi Point, NSW. © Adam Stevenson

FREQUENCY

THE GLOBAL FIRE SEASON LENGTH HAS INCREASED BY

19%

ON AVERAGE

Fire seasons are getting longer, and extreme fire seasons more common. From 1979 to 2013, the global fire season length increased by 19% on average. This increase is particularly severe in east Africa and Brazil, with the forests and savannahs of South America experiencing an average of over one month increase in the fire season.[37]

Climate change is also making fire seasons increasingly unpredictable. Instances of so-called 'outliers' – abnormally long fire seasons – have increased. This leaves less time outside the season for prescribed fires, which makes forest management more complex – and again increases the chances of uncontrolled wildfires occurring. More frequent fires also prevent vegetation growing to a mature size and reaching its full potential for carbon sequestration. Fauna, too, can be affected by fires outside the normal season, as vulnerable young are exposed to danger and nesting sites and food sources are destroyed.

Porto Velho, Brazil, 2019 © Michael Dantas / WWF-Brasil

In Canada's boreal forests, increasingly severe wildfires have changed the local ecosystem in just a few years Boreal Forest, Alberta, Canada © Global Warming Images / WWF

SEVERITY

The impact of fires on ecosystems varies. Light fires may only burn ground vegetation, leaving a thin layer of ash and sometimes acting as a positive regenerative force. But increasing global temperatures and more frequent rain-free days are causing a decline in moisture from soil to treetops,[38] meaning fires are burning much more severely and causing greater damage to humans and nature alike.

In Canada's boreal forests, increasingly severe wildfires have changed the local ecosystem in just a few years – by removing the ground layer of residual organic matter, they've allowed jack pines to grow quickly and dominate the forest, harming other vegetation and diminishing biodiversity.[39]

The word 'unprecedented' is frequently heard today when it comes to fire severity. California provides a striking example: over the last 100 years, five of its 20 most severe wildfires occurred between 1920-2000, another five took place from 2001-2010 – and the remaining 10 all happened in the last 10 years.[40] In the 2019-2020 winter season, California only got half its normal levels of precipitation;[41] while Russia has just come through its warmest winter since records began 140 years ago, beating its 2016 record by 1.3°C.[42]

In the Mediterranean basin, despite a general decreasing trend in the number of fires and burnt area since the 1980s, the dangerous rise of large forest fires (i.e. those that burn more than 500 hectares) continues. Between 2009 and 2018 these represented a mere 0.15% of total fire incidents by number, but they burned 35% of the total fire-affected area.[43]

INCREASING GLOBAL TEMPERATURES AND MORE FREQUENT RAIN-FREE DAYS ARE LEADING TO FIRES BURNING MORE SEVERELY

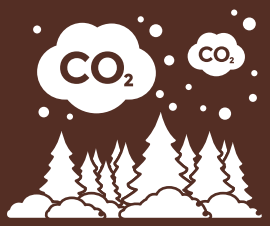
Climate change made the conditions for Australia's unprecedented recent bushfires 30% more likely. Kangaroo Island bushfire aftermath. © WWF-Australia / Sii Studio

CLIMATE CHANGE AND FOREST FIRES: A VICIOUS CIRCLE

Nearly a third – 31% – of the carbon dioxide in forests globally is sequestrated in biomass above the ground, while the remaining 69% is underground.[44] Fires release carbon trapped in vegetation and soils, and as their severity increases, they begin to damage deeper layers of soil, releasing centuries-old 'legacy carbon'.[45]

Often, when forests regrow after burning, they are smaller, younger and drier than before, and, in some ecosystems, their carbon storage capacity is reduced. This results in a net increase in carbon emissions.[46] Depending on species and growth speed, vegetation needs between 25- 250 years to reach its full sequestration potential:[47] as the interval between fires shortens, this becomes harder to achieve.

Much of the increasing impact of forest fires in the Northern Hemisphere is driven by climate change. Meanwhile, increasing emissions from fires in the forests of the global south – where ecosystems sequester the highest amounts of carbon – are driving further global heating. One recent study found that climate change made the weather conditions for Australia's unprecedented recent bushfires 30% more likely.[48] The extreme fires around the world in 2019 – from the Arctic to the Amazon – contributed an estimated one fifth of the global carbon emissions from burning fossil fuels that year (not factoring in carbon drawn back down through regrowth);[49] and so the cycle continues.



GLOBALLY, IN FORESTS

31%

OF CARBON DIOXIDE IS ABOVE THE GROUND, WHILE THE REMAINING

69%

IS UNDERGROUND

CLIMATE CHANGE WORKS DIRECTLY ON THE THREE MAIN 'COMPONENTS' OF A WILDFIRE:

IGNITION

Most naturally induced wildfires in the Northern Hemisphere are caused by lightning strikes, and climate change is increasing the occurrence of severe storms which produce them. In the boreal forests of Alaska and northern Canada wildfires due to lightning increased by 2-5% every year between 1975 and 2014.[50]

ATMOSPHERIC CONDITIONS

In a matter of decades, climate change can modify meteorological and fire patterns. The warming North Pole has reduced the temperature gap with the Equator, slowing Jet Stream flows over the northern hemisphere: this causes both longer wet periods that promote quick vegetation growth, and longer heatwaves that dry the extra vegetation, lower atmospheric humidity, and make ecosystems more fire-prone.[51] Strong winds are also an important factor in some cases; in the serious fires of 2017 in the Iberian Peninsula, flames exceeded 6km/h, a speed three to nine times above the firefighting capacity.[52]

FUEL

Climate change dries soils, exposes vegetation to longer extreme weather events, reduces small-scale regenerative fires and accelerates the spread of pests and disease; all these factors kill trees, leading to an increased accumulation of flammable material. In North America, climate change has promoted the rapid growth and spread of bark beetles, which have destroyed millions of hectares – in 2011, the pest was responsible for an astonishing 59% of all tree mortality in US forests.[53]

3: THE CONSEQUENCES

Globally, fires emit carbon dioxide emissions equivalent to the European Union every year.[54] Their contribution to the climate crisis alone would be more than enough of a reason for the global community to treat their increase as a major threat. But that's not all: wildfires also have severe consequences for human health and wellbeing, biodiversity, and economies around the world.

Indonesia's 2015 fire season led to the closure of schools and affected more than 5 million students.
© Brent Stirton / Getty Images / WWF

HEALTH AND WELLBEING

In terms of direct fatalities, wildfires appear less dangerous than many other disasters. While they kill between 100-400 people each year,[55] they represented only 0.2% of deaths from natural hazards over the last two decades (earthquakes, by comparison, are responsible for more than 50%).[56]

Still, fire emergencies have major short-term impacts on local populations. In 2017, around 550,000 people worldwide had to be evacuated because of wildfires;[57] and it can be a major challenge to meet the basic survival needs of those affected.

Wildfires can hit Indigenous Peoples' lands particularly hard, destroying food and water sources and disrupting their livelihoods and cultural practices. Last year's fires in the Brazilian Amazon affected 148 indigenous territories.[58]

Indonesia's 2015 fire season, meanwhile, led to the closure of schools and affected more than 5 million students,[59] 7% of all the young people in the country.

INDONESIA'S FIRE SEASON LED TO THE CLOSURE OF SCHOOLS AND AFFECTED MORE THAN 5 MILLION STUDENTS

Bushfires in Australia impacted already vulnerable species such as koalas. © WWF-Australia / Douglas Thron

The effects of wildfires linger long after the flames die down, hitting public health and wellbeing far into the future. Every year, there are an estimated 340,000 premature deaths from respiratory and cardiovascular issues attributed to wildfire smoke.[60] Eighty percent of these deaths occur in Southeast Asia and sub-Saharan Africa.[61] Non-fatal illnesses also cause major upheavals: in 2019, almost 1 million Indonesians suffered from respiratory problems caused by smoke from forest and peatland fires.[62] At a time when the world is grappling with the Covid-19 pandemic, wildfire smoke increases the danger of further respiratory illnesses.[63]

Fast-moving, highly destructive debris flows triggered by intense rainfall are one of the most dangerous post-fire hazards. The risk of floods and debris flows after fires increases, due to vegetation loss and soil exposure. Cases of sudden and deadly debris flow are well documented along the western United States, particularly in Southern California.[64] These flows are a risk to life and property because they can occur with little warning, exert great impulsive loads on objects in their path, and may strip vegetation, block drainage ways, and damage infrastructure. A study in Greece following the 2007 Peloponnese fires showed that flood risk increases up to 10 years after the fire and the resulting destruction of vegetation.[65]

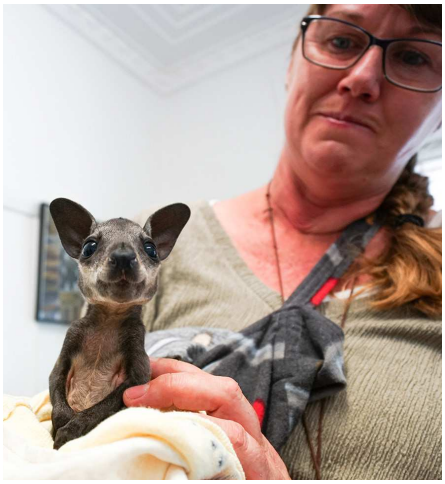
Wildfires can also have significant negative impacts on mental health: recent studies showed that after a major wildlife in Canada, a third – possibly reaching up to 60% – experienced provisional post-traumatic stress disorder.[66]

BIODIVERSITY

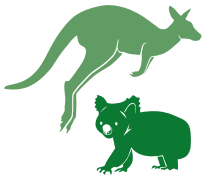
The increasing frequency and severity of wildfires pose a growing threat to biodiversity globally.

In Australia, the catastrophic wildfires in 2019-20 are estimated to have killed or displaced up to 3 billion animals, including already vulnerable species such as koalas.[67] Twenty-six native species, making up 6% of the Australian Environment Protection and Biodiversity Conservation Act List of Threatened Fauna, were pushed closer to extinction as more than 30% of their habitat was burnt.[68] Seven billion plants were also impacted by the fires.[69]

Globally, fires falling outside natural patterns are jeopardizing the survival of wildlife, which are killed or injured through direct contact with smoke and flames or suffer widespread habitat destruction. Borneo's critically endangered orang-utans, whose numbers have fallen by 60% since 1950, are also affected by fires consuming their habitat and food supplies.



© WWF-Australia / Leonie Sii



26

NATIVE AUSTRALIAN SPECIES WERE PUSHED CLOSER TO EXTINCTION AS MORE THAN

30%

OF THEIR HABITAT WAS BURNT

The direct costs of managing fires are usually borne by public authorities, made up of prevention costs to stop fires happening – firefighting patrols, fuel management, community education © APCOB

PROPERTY VALUES DECREASE FROM

10-20%

IN AREAS AFFECTED BY WILDFIRES

Researchers have also found that smoke from fires could lead to weaker immune systems in orang-utans.[70] The 2019 fires in the Amazon, too, took a heavy toll on native animals not adapted to cope with fires, altering food chains and upsetting the balance of ecosystems.[71]

In boreal forests, frequent high-intensity fires are also disrupting natural balances: following extremely severe fires in Russia in 1998, more than 2 million hectares of forests lost their capacity to store carbon, cycle nutrients and perform other ecological functions, for as long as 100 years.[72]

In the tropics and sub-tropics, severe droughts have made tropical rainforests more susceptible to unusual wildfires – when these fires burn, seeds and young trees not naturally protected by thick bark are destroyed.[73] Meanwhile, in the Mediterranean, wildfires as well as altered fire regimes are increasingly affecting ecosystems that have no adaptive traits of post-fire seed dispersal or of natural regeneration, such as black pine and fir forests. This directly affects the extent of these rare forests.[74]

ECONOMIC LOSSES

The economic costs of wildfires are going up all over the world as fires increase in frequency and severity.

On an individual level, fires drastically worsen living conditions, and this has economic consequences: in the US property values decrease from 10-20% in areas affected by wildfires.[75]

The private sector can be severely disrupted too, with companies facing fire-related supply chain interruptions. Some sectors get hit particularly hard: Australia's 2019 bushfires are thought to have cost the country's tourism industry $2.9 billion.[76] Indonesia's fire season also sees multiple tourist trips cancelled every year.

The direct costs of managing fires[77] are usually borne by public authorities. These are made up of prevention costs to stop fires happening (for firefighting patrols, fuel management, community education, etc.) and suppression costs when they break out (equipment and product usage, emergency evacuations, etc). Governments tend to focus on the latter, which has greater immediate visibility yet does not solve the problem in the long run.

But these fire management costs are dwarfed by the losses the fires themselves can cause. While a wide range of figures are quoted in the literature, the central estimate in the US is that total fire costs are 20 times the suppression costs[78]– and these are largely carried by populations and companies.[79] In 2018, the wildfire season cost the US around $50 billion in total[80] – a figure approaching the turnover of Facebook for the same year.[81]

Indonesia's economy has also suffered considerably from wildfires: in 2015, the costs were around $16 billion, equivalent to 1.9% of GDP.[82]

4: NEXT STEPS – URGENT ACTION

Fires in 2020 are on course to be worse than in 2019. Fires are a critical global issue that needs urgent global solutions.

Bushfire in Bowraville, New South Wales, Australia, November 2019 © Adam Dederer

While headlines focus on the Brazilian Amazon, equal attention should be paid to countries like Canada, the US, Australia and Russia. For the last 20 years, these have all seen an increase in the average annual area burnt, with repeated fires leaving little to no time for recovery in between. And some countries are seeing patterns changing with frightening speed – extreme events this year in Russia already suggest its wildfires could be 10 times worse than in 2019.

To have any chance of restricting the rise in global temperatures to 1.5°C in line with the Paris Agreement, more needs to be done to cut carbon emissions from forest fires, by governments, businesses, communities and individuals alike. The best place to start is to focus on the causes and the factors driving them.

RAISE CLIMATE CHANGE AMBITION WORLDWIDE

Current national pledges for emission reductions set us on course for a world that is on average around 3°C warmer than pre-industrial times. The impacts of this are many and varied, but more severe fires in many parts of the world is one of them. The very significant consequences of these fires, as discussed above, provide even more reason for all governments to raise their ambition on climate change mitigation in their Nationally Determined Contributions (NDCs) under the Paris Agreement. In the run-up to the UNFCCC conference in 2021, countries have the opportunity to do so. Moreover, in their national climate plans for mitigation and adaptation they should integrate measures that can reduce the incidence and impact of wildfires in a sustainable way.

3°C

PLEDGES FOR EMISSIONS REDUCTIONS SET US ON COURSE FOR A WORLD THAT IS ON AVERAGE AROUND 3°C WARMER THAN PRE-INDUSTRIAL TIMES

Countries can strengthen their NDCs by including language that:

1. acknowledges the risk of fires to the long-term viability of ecosystems such as forests that serve as carbon sinks and,
2. seeks to manage such risks for the future health and resilience of those ecosystems. Fire risk management could be addressed through management plans that include climate variability and impacts, methodologies or technologies to ensure ecosystem adaptability, etc.

BR-319 highway, on the route between the cities of Porto Velho and Humaitá.
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IMPROVE PARIS AGREEMENT ACCOUNTING FOR EMISSIONS FROM 'NON-ANTHROPOGENIC' FIRES

Greenhouse gas emissions released from fires that are considered natural, or non-anthropogenic, are excluded in states' NDCs under the Paris Agreement. Only deliberately lit fires are included, such as those to deforest land.

All greenhouse gas emissions from 'natural' fires are assumed to be reabsorbed as forests regrow.[83] This assumption of the carbon neutrality of 'natural' forest fires assumes a steady climate that allows natural forest regrowth in the years to centuries following a fire.[84]

But it raises the question of what now is considered 'natural' fire.

As the field of climate attribution develops, greenhouse gas emissions released by fires that are natural versus fires that are amplified by climate change will be increasingly open to quantification.

A growing number of scientists believe that increases in fire frequency, intensity and scale are outstripping the capacity of forests to regrow after fires. When coupled with reduced precipitation, this reduces the capacity of forests to sequester 100% of the carbon emissions released by previous fires, causing net increases in forest carbon emissions. This occurs through resetting the fire-recovery cycle, which prevents sufficient sequestration before subsequent fires, as well as driving droughts, deforestation and forest degradation.

REINVEST IN PREVENTION

Budgetary constraints and political expediency have gradually pushed many countries away from proactivity to reactivity, prioritizing fire suppression over fire prevention.

Over the last decade in the US, for example, the fire management budget has been cut from $6 billion to $4.75 billion, while the focus on suppression has increased from 11% to 55%.[85] Likewise, in the wildfire-prone Mediterranean, only 20% of the total firefighting budget is spent on prevention.[86]

In the long run this approach does not tackle the causes of fires: the more budgets lean towards reactive measures, the worse the consequences of fires become – the same could be said for the long-term costs to human health.

TOO MUCH FOCUS ON SUPPRESSION SHOWS ADVERSE EFFECTS IN FIRES PREVALENCE, CREATING A VICIOUS CIRCLE

Increasing budgets in the short term to get suppression fully under control, and then rebalancing them towards prevention when the situation stabilises, would pay dividends.

Fire prevention requires an active commitment from government at different levels, with increased sub-national involvement. A key intervention is to control land-use change, conversion for agriculture that drives deforestation and boosting sustainable alternatives. And for forest regulations to have an impact, they need to be strictly enforced. Indigenous peoples can also play a critical role in sustainably managing their forests and must be empowered through having control over their lands, support for traditional knowledge and training where needed.

Rewetting drained peatlands is also an important step in fire prevention. Peatlands store 500-600 gigatons of carbon[87] and are strategic for climate change mitigation.[88]

Finally, a proactive policy and management approach is needed when fires do occur: burned areas shouldn't be left to be taken over by opportunistic land-grabbers, but should be rehabilitated and managed sustainably to prevent future fires.

HALT DEFORESTATION

Deforestation and fires go hand-in-hand in the Amazon and many tropical and sub-tropical countries. Expansion of agriculture, tree plantations and illegal and unsustainable logging continue to drive conversion and degradation of natural habitats, thereby increasing the risk of fires.

It is critical to align public and private sector efforts to address commodity-driven deforestation and conversion, and policies that address both production and consumption are urgently needed. There does not need to be a conflict between increasing production of food and other commodities like wood and rubber. These activities can be intensified on already cleared land without venturing further into natural frontiers, thereby disrupting rainfall cycles and leading to drier conditions – as well as facilitating further entry into the frontier by other actors.

REINSTATE FIRE WHERE IT HAS BEEN EXCLUDED

In some temperate and Mediterranean climate regions of the world, maintaining diversity requires reintroduction of fire to fire-dependent landscapes. When carefully managed, this also reduces fuel loads, empowers Indigenous communities, generates better livelihoods, and improves storage of carbon in vegetation and soil.

This needs to occur through careful consultation with landowners and managers, fire authorities, Indigenous communities and fire ecologists.

CLARIFY GOVERNANCE, COORDINATE POLICIES

Fire prevention plays out across many different levels, from government planning to grassroots forest foot patrols. It's crucial for national, regional and local authorities to coordinate between stakeholders (communities, businesses, farmers, cooperatives, Indigenous Peoples etc) to set up effective management regimes, depending on existing policies and the gaps between them.

Well-designed approaches and clear incentives (both monetary and non-monetary)[89] must be in place for initiatives to prevent forest fires, with penalties to deter risky behaviours.

Community awareness and resilience is important, as local communities play an important role in fire prevention and mitigation, both in the short and long term. Public programmes can have a long-term sustainable impact if they're well planned, from spreading awareness through education (school curriculum etc), to increasing empowerment through volunteering (firefighting patrols etc), to improving compliance with regulations in relevant areas (real estate, outdoor activities etc). As an example, in Thailand, WWF and partners have helped set up a Community Forest Fire Protection Unit to support and strengthen the communities' and local administrative organizations' capacity in climate adaptation, nature-based solutions and managing natural resources in a sustainable way. This includes prevention of and preparation for disasters and handling of climate change risks.[90]

AT GOVERNMENT LEVEL, FOCUS SHOULD BE ON TACKLING THE ROOT CAUSES OF FIRES RATHER THAN STRUGGLING WITH THEIR CONSEQUENCES

DRIVE REHABILITATION OF DESTROYED AREAS

- Prevent opportunistic exploitation of burned areas (for agriculture)
- Rehabilitate areas and manage those sustainably

DEVELOP AN ACTIVE PREVENTION STRATEGY

- Shift resources towards prevention, especially educational programs and fuel management activities

CONTROL LAND USE CHANGE

- Halt deforestation-based agriculture, especially in tropical areas
- Preserve integrity of IPLC's owned lands

LEVERAGE LOCAL COMMUNITIES

- Partner with local communities to reduce fire ignition risk, and empower these to sustainably manage their forests

IDENTIFY ALL RISK FACTORS

- Authorities should map all risk factors, and act accordingly (anticipate and prepare ahead of extreme events, such as El Nino)

Alcides Pinto, leader of the Río Blanco community, walks through the forest where the fire burned. This forest is precious to the community, its livelihoods come from the resources provided by the trees. © Kreich / WWF Bolivia

USE THE SCIENCE

A science-based approach is needed to forecast risk and prioritize interventions, which are both critical elements in preventing fires before they need to be suppressed. More use should be made of data analytics and knowledge to develop holistic forecasting and risk assessment tools. These tools should then play a central role in decision-making. Innovation should be encouraged, and new techniques trialled.

Areas for development include science-based diagnostics to identify fire-prone areas, variables affecting ignition, populations at risk, and climate and biodiversity impact. Fire science data on factors like weather, climate, forest carbon hotspots, danger rating, biodiversity and land use can be used to create early warning and monitoring systems tailored to local conditions.

In addition, fire suppression and management methods and technology should be improved, to enable forest fires large or small to be extinguished in a safer and cheaper manner. Innovation, research and development should be encouraged.

When fires do occur, impact assessments and awareness of alternative restoration models should help to prioritize rehabilitative actions. In addition, more data-based assessments are needed on the full accounting of the economic impacts of fires across the social, economic, biodiversity and climate dimensions, as well as a better understanding of approaches to incentivize better use of land.

BRING BUSINESSES ON BOARD

Government action alone will not be enough to address the issue; the private sector has a crucial role to play too. There are many different ways companies can take action: one of the most effective is to set and implement deforestation and conversion-free commitments in line with guidance provided by the Accountability Framework.

Taking these efforts to the next step, companies involved in sectors including agriculture, leisure and tourism, energy and utilities, extractive industries and forestry can also make a difference by insisting on deforestation and conversion-free supply chains, raising standards across the board. What's more, as consumers around the world are increasingly backing sustainable businesses there's a growing economic inventive for companies to ensure they're not contributing to the wildfire crisis.

Broader corporate social responsibility (CSR) activity could include supporting local communities and creating non-profit partnerships for fire prevention and suppression activities; as well as incorporating fire risk reduction into corporate programmes to offset carbon emissions.

Women from the Río Blanco indigenous community in the Chiquitano Dry Forest use trees as a valuable resource. Here is Polonia, the leader of the women's association with a copaiybo tree. © RKreich / WWF Bolivia

INDIVIDUALS: EVERYONE HAS A ROLE TO PLAY

Wildfires are a global problem – and need to be prioritized in public policy and health policy, just as the world has come together to fight COVID-19.

On the most basic level, individuals can take simple precautions not to start accidental blazes – in the US, human negligence has been found to be one of the top three causes of wildfires, and in the Mediterranean, it's responsible for as many as 40% of fires.[91] As increasing areas of the world become 'wildland-urban interfaces', disposing of flammable waste and being careful when burning rubbish really does make a difference.

Citizens can support civil society organizations, too; local communities, volunteers and conservation organisations are doing invaluable fieldwork on fire prevention, but they need more support. As COVID-19 strains emergency budgets supporting these efforts has never been more important. Depending on their location and personal circumstances, some people may even be moved to activism, volunteering as forest watchers or firefighters.

And for those of who don't live in a wildfire hotspot, raising awareness is also crucial: the more people understand about just how big a threat wildfires pose to the future of the planet and people, the more support they'll give to the cause. Being an informed tourist and a sustainable consumer helps too – by being more aware of what's on our plate, and consciously avoiding choices that drive deforestation and land conversion, we can become part of the solution.

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Rio Negro National Park in front of Outquis National Park before wildfires, July 2019 © Gianfranco Mancussi - WWF Paraguay

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