

Working paper No. 6

# FIRES: AN UNDERESTIMATED, PERMANENT THREAT



**ATHENALAB**  
International relations • Security • Defense  
CHILE

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Foto: María Fire, 2 de noviembre de 2019, Santa  
Paula, California.  
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# FIRES: AN UNDERESTIMATED, PERMANENT THREAT

Working paper No. 6 | January 2020





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Santa Olga, Chile, 26 de enero de 2017  
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## 0.1

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### Executive Summary

The mega-fire that broke out in December 2019 in Australia seems to be a tragic example of what can happen if climate change accelerates with devastating consequences. Even countries with an immense state capacity and vast resources can be overwhelmed when facing emergencies of great magnitude, providing a postcard of a future that we would not want to see.

By describing fire as a threat to security, this new ATHENALAB document seeks to warn of the enormous damage to people, private property and ecosystems that fires of great magnitude — especially forest fires — can cause, as well as those directed specifically against critical infrastructure. It is important to note that this is not a scientific analysis, nor does it have pretensions in the field of forestry, where there are renowned experts. It is increasingly clear that, in the forestry field, it is becoming more and more common to see cases of states being forced to deploy enormous resources and take extraordinary measures in emergency situations that cannot be contained by specialized brigades and firefighters.

These types of disasters might be more frequent due to the effects of climate change, to the point that fire seasons no longer coincide directly with summer months, as we have seen after comparing the cases of Australia 2019-2020, California 2018, and Chile and Portugal 2017.

Faced with the threat of large-scale forest fires and those directed specifically against critical infrastructure, we need to improve our warning systems, adopt preventive measures and have the security infrastructure to confront them, as has been done in relation to earthquakes and tsunamis.

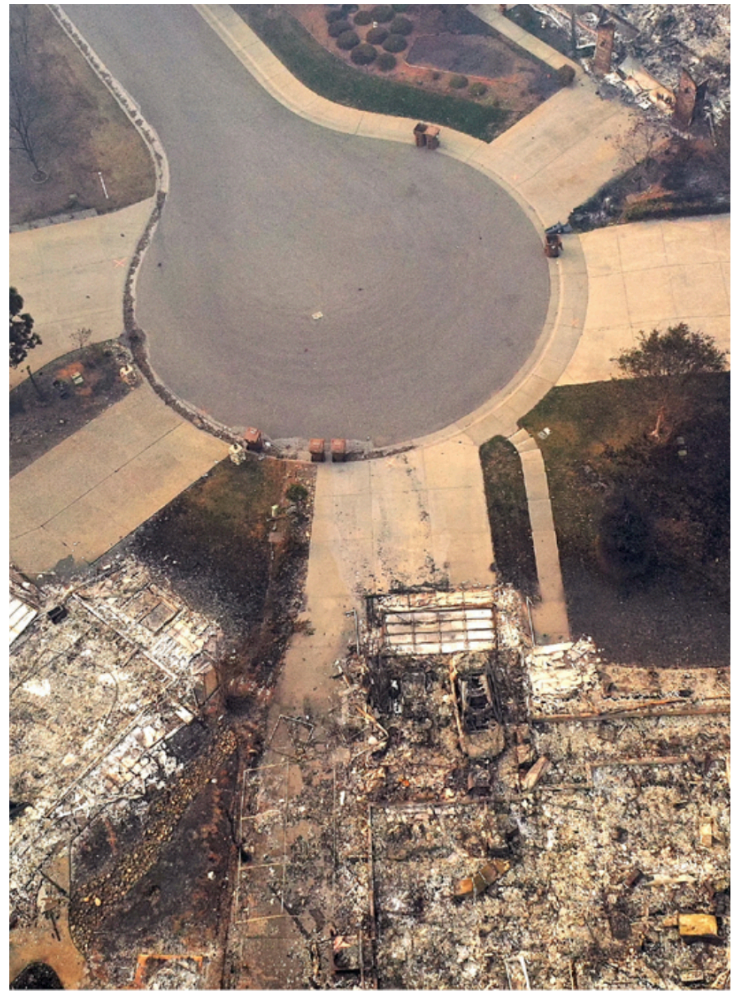
From a security perspective, according to Barry Buzan's multidimensional definition, it is possible to classify forest mega-fires as a phenomenon that directly affects individual and human security. Now, when the magnitude of the disasters produces greater risks and threats, thus forcing the significant mobilization of resources, personnel and institutions, we are in the presence of a phenomenon that compromises national security. In the long run, fire affects development conditions, regardless of whether its origin is intentional or fortuitous.

When analysing Conaf's strategy, a new, more aggressive, coordinated and sophisticated approach can be appreciated both in the budget and number of resources, and in its deployment and employment. This approach reveals a remarkable series of lessons obtained over the past decade.

In spite of everything, fire is still an underestimated phenomenon. Even if and when it is used as a terrorist weapon. Therefore, it must be studied in more depth,

as it has been by the United States and other Western powers.

The neutralization of this threat requires effective coordination between all agencies and other actors, which should be included as a key and relevant factor in the creation of the new “National Civil Protection Agency” to replace ONEMI (National Office of Emergency, of the Ministry of the Interior).



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### Introduction

In many ways, Australia is an exemplary country. This oceanic nation has reached high levels of development for its inhabitants and has managed to overcome the distance that separates it from the great centers of power and markets to position itself as a model for countries that want to build inclusive societies and get out of the middle income trap.

However, the mega-fire that broke out in December 2019 after a long drought and has consumed an area larger than Portugal (at the time of publication), also seems to be a tragic example of the devastating consequences of the acceleration of climate change. Even countries with immense state capacity and vast resources are overwhelmed when facing emergencies of the magnitude of a global ecological crisis (in this case, the smoke crossed the entire Pacific Ocean from Australia to Chile).

*“The fires should be scary enough, but it is the chain reaction of chaos what reveals the true cruelty of climate change: it can become violent against us and everything we think is stable. Houses become weapons, roads become deadly traps, air becomes poison”, warns David Wallace-Wells in his bestseller “The Uninhabitable Earth”<sup>1</sup>.*

However, perhaps because we live with fire everyday (whether for preparing food or heating), we do not think of it as a permanent threat to security, despite its enormous destructive potential. For example, the World Health Organization estimates that no fewer than 180,000 people die each year from fires globally<sup>2</sup>.

By describing fire as a threat to security, this new working document prepared by ATHENALAB seeks to warn of the enormous damage to people, private property and ecosystems that fires of great magnitude — especially forest fires — can cause, as well as those directed specifically against critical infrastructure. It is important to note that this is not a scientific analysis, nor does it have pretensions in the field of forestry, where there are renowned experts.

These disasters have an impact beyond the private sphere, as they affect society as a whole and, therefore, require a consistent and permanent response over time.

In the forestry field, it is becoming more and more common to see cases of states being forced to deploy enormous resources and take extraordinary measures in emergency situations that cannot be contained by specialized brigades and firefighters.

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<sup>1</sup> Wallace-Wells, David (2019). The Uninhabitable Earth. Penguin Random House, London, page 77.

<sup>2</sup> [https://www.who.int/violence\\_injury\\_prevention/burns/en/](https://www.who.int/violence_injury_prevention/burns/en/)



Examples of such responses are to mobilize the Armed Forces, decree states of emergency under a unified command, rent air equipment (tankers and helicopters) from abroad, or receive specialized international aid.

In 2018 there even was a peculiar case in Sweden, when JAS-39 Gripen fighters of the Royal Air Force were used to attack a large fire by launching laser-guided bombs, whose objective was none other than for the explosions to subtract oxygen from the foci of the flames, given the obvious risks of attacking them directly on land, something that the military refers to as area denial<sup>3</sup>. In any case, this unorthodox tactic has not been replicated in other countries, despite the interest it has sparked.

For the purposes of this document, we analysed the mega-fires of Australia 2019, California 2018, and Chile and Portugal 2017. The idea is to compare some similarities and highlight the differences in order to obtain useful lessons, assuming that all are considered historic in terms of the devastation they caused. In addition, these types of disasters might be becoming more frequent due to the effects of climate change, to the point that it becomes increasingly difficult to talk about fire seasons coinciding with the summer season, since the threat remains and manifests itself throughout the year. In the near future, this can also complicate the transport of equipment from one hemisphere to another,

taking advantage of seasonality. Some factors that influence the above are:

- Increase in global temperatures.
- Lack of rainfall, which triggers droughts.
- Decrease in the availability of water resources.
- Human actions and neglect.

Because these large-scale forest fires occurred for different reasons, it is difficult to prove their connection to some type of particular agenda. But the same is not true when the fire is intentionally provoked to be used as a weapon against critical infrastructure, public entities, and means of transportation, taking advantage of an attack that is simple in that it barely requires planning and the fact that the destruction of evidence makes it difficult to persecute its perpetrators.

In this sense, since we are talking about the effects of fire, we must mention the role of fires in the current social uprising in Chile, where dozens of subway stations, supermarkets, local businesses and other facilities in Santiago and other regions have been deliberately burned.

Foreign security and intelligence agencies have been studying the use of fire as a weapon by terrorist groups for years<sup>4</sup>. There is plenty of background, such as the burning of embassies (Benghazi 2012) and hotels (Mumbai 2008). Even the term "pyro-

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<sup>3</sup> <https://www.businessinsider.com/watch-a-gripen-jet-drop-a-gbu-12-bomb-to-stop-a-forest-fire-in-sweden-2018-7>

<sup>4</sup> "Recognizing arson with a nexus to terrorism", at [https://www.dni.gov/files/NCTC/documents/jcat/firstresponderstoolbox/First\\_Responders\\_Toolbox-Recognizing\\_Arson\\_With\\_a\\_Nexus\\_to\\_Terrorism\\_Originally\\_Published-14\\_April\\_20171\\_May\\_2019-survey.pdf](https://www.dni.gov/files/NCTC/documents/jcat/firstresponderstoolbox/First_Responders_Toolbox-Recognizing_Arson_With_a_Nexus_to_Terrorism_Originally_Published-14_April_20171_May_2019-survey.pdf)

terrorism"<sup>5</sup> has been created to describe this type of attack.

Faced with the threat of large-scale forest fires and those directed specifically against critical infrastructure, we need to improve our warning systems, adopt preventive measures to minimise risks, and have the security infrastructure to confront them, as has been done in relation to earthquakes and tsunamis.

A handwritten signature in blue ink that reads "Juan Pablo Toro". The signature is written in a cursive, flowing style.

Juan Pablo Toro  
Executive Director

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<sup>5</sup> Baird, Robert Arthur. "Pyro-Terrorism-The Threat of Arson Induced Forest Fires as a Future Terrorist Weapon of Mass Destruction" (master's thesis, Marine Corps University, 2005), <http://www.dtic.mil/dtic/tr/fulltext/u2/a509220.pdf>.

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### Forest Fires

Global forest resources constitute 30% of land area, with a total of 9.9 billion acres. However, its distribution is very uneven, depending on the geographical and climatic characteristics of each particular continent or region. Of the world's more than 200 countries, only 43 have forest areas that cover more than 50% of their respective total areas. While 64 other countries have forest areas of less than 10% of their total territories. Only Brazil, Canada, China, the United States and Russia combined have more than half of the total forest area of the planet<sup>6</sup>.

On the other hand, deforestation has increased at an alarming rate, as over 32 million acres are lost annually. Between 1990 and 2005, the planet saw its total forest area recede by 3%, representing an average decrease of about 0.2% per year<sup>7</sup>.

From a security perspective, according to Buzan's multidimensional definition<sup>8</sup> it is possible to typify forest mega-fires as a phenomenon that directly affects individual and human security, both for the possible damage to individual or collective physical integrity, and for the harm to basic goods vital

for subsistence or the necessary instruments for economic activities.

Now, when the magnitude of the disasters generates / creates / produces greater risks and threats, thus forcing to use/mobilise significant resources, personnel and institutions, we are in the presence of a phenomenon that compromises national security, because in the long run, fire harms development conditions in a way that requires capacities to be rebuilt, regardless of whether its origin is intentional or fortuitous. That is, it will be subject to an assessment of the level of threat and risk, as long as it significantly affects people's safety, development and well-being. There is no doubt that when the means of different civil, government and military institutions are used, we are facing a phenomenon that indeed poses a threat to national security.

As an example, in Australia, in the context of the forest fires that are currently affecting that country's East Coast - with temperatures above 40°C, former Prime Minister Malcolm Turnbull (2015-2018) said that forest fires "are

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<sup>6</sup> FAO. Food and Agriculture Organization of the United Nations. World Panorama. "The State of the World's Forests". Rome. Page. 64. Available at: <http://www.fao.org/3/a0773s/a0773s08.pdf>

<sup>7</sup> *Ibidem*.

<sup>8</sup> It refers to the definition of Barry Buzan, established in his book *People, States & Fear*, which specifies that security is a multidimensional phenomenon affected by political, military, economic and social factors. See Buzan, Barry. *People, States & Fear: An Agenda for international Security Studies in the Post-Cold War Era*. Colorado, Lynne Rienner Publishers. 1991. Page 19. Additionally, in the Declaration on Security in the Americas, in Mexico in 2003, it was established that political, economic, social, health and environmental aspects are considered threats to security.

a national security issue", and that this is "the consequence of global warming"<sup>9</sup>

When these disasters are intentionally triggered, we could say that fire and subsequent wildfires are being used as a tool for a particular purpose. Hence the seriousness of legal sanctions that exist in the different laws punishing this type of conduct.

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<sup>9</sup> Guardian. <https://www.theguardian.com/australia-news/2019/dec/10/national-security-issue-turnbull-tells-qmorrison-must-step-up-response-to-bushfire-crisis>



Incendios en la Araucanía, febrero 2018  
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### International case review

#### AUSTRALIA 2019 – 2020

Australia is experiencing the most severe drought since rainfall records began in 1900. Meanwhile, average temperatures in recent years have been rising systematically. As an example, January - November 2019 was the second hottest period ever recorded, with an increase of 1.37°C above the average. The period of the highest temperature was the year 2013, reaching 1.38°C above the average<sup>10</sup>.

The current fire — still evolving rapidly by the time this article was written, January 27, 2020 — has been classified as the worst in recent decades. In terms of damages, the most affected state has been New South Wales (today in a State of Emergency), with more than 2,500 houses destroyed, more than 500 damaged, and numerous facilities deteriorated and devastated<sup>11</sup>. To date, 29 people have lost their lives as a product of this situation, and entire villages have been reduced to ashes. Additionally, more than 24.7 million acres have been burned, throughout

the six affected states; more than the surface area of Belgium and Haiti combined.

The situation could be worsened due to the absence of rain, strong winds and high temperatures<sup>12</sup>. Given these factors, Sydney has been victim to a massive amount of smoke as a result of such fires, exceeding risk levels and endangering public health. It is estimated that pollution is 22 times higher than the acceptable level<sup>13</sup>.

We can cite that among the most probable instigators of these mega-fires are natural causes, such as lightning strikes, in the case of the fire that began in the region of Gippsland in late December and traveled more than 20 kilometers in just 5 hours, according to the Emergency Agency of the town of Victoria<sup>14</sup>. On the other hand, there is evidence of the direct human intervention at the onset of fires, as indicated by the arrest of a 19-year-old volunteer firefighter in New South Wales<sup>15</sup>.

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<sup>10</sup> Ibidem.

<sup>11</sup> NSW Australian Rural Fire Service. Available at: <https://www.facebook.com/nswrfs/posts/10157505521245552>

<sup>12</sup> Sydney Morning Herald. Available at: <https://www.smh.com.au/national/nsw/more-than-720-homes-lost-in-nsw-fires-as-sydney-told-to-brace-for-huge-losses-20191211-p53iv5.html>

<sup>13</sup> Sydney Morning Herald. Available at: <https://www.smh.com.au/national/taste-the-ash-see-our-pink-sun-sydney-s-dead-future-is-here-20191210-p53il4.html>

<sup>14</sup> CNN. Yeung Jessie. January 3, 2020. Available at: <https://edition.cnn.com/2020/01/01/australia/australia-fires-explainer-intl-hnk-scli/index.html>

<sup>15</sup> CNN. Griffiths James. November 27, 2019. Available at: <https://edition.cnn.com/2019/11/27/australia/australia-fires-fireman-arson-intl-hnk-scli/index.html>



Regarding resource mobilization, more than 70,000 volunteers from the New South Wales Rural Fire Service, the world's largest fire service, have been employed so far<sup>16</sup>. Significant State means – including the Armed Forces – have been used as well, even warships to evacuate coastal populations and transport food. International assistance has also come from Canada, the United States, Japan, New Zealand, and Singapore<sup>17</sup>.

Total costs are yet to be determined, but they will undoubtedly be proportional to one of the largest natural disasters in decades in Australian territory.

## CALIFORNIA 2018

The forest mega-fire known as “Camp Fire,” which affected northern California between November 8 and 25, 2018, not only became the most lethal and destructive in the history of this state, but also one of the more expensive in terms of destroyed insured goods<sup>18</sup>.

Once this fire was 100% controlled, the spread of which had been worsened by strong winds and very high temperatures, it had killed 88 people and destroyed 13,972 homes, 528 commercial buildings, and 4,293 minor buildings. A total 153,336 acres were consumed by the flames<sup>19</sup>.

It was determined that this mega-fire originated from high-voltage power transmission lines operated by the Pacific Gas and Electricity company<sup>20</sup>, which caused two initial outbreaks later fueled by high temperatures, very dry vegetation and strong winds.

The emergency mobilized a great number of resources at the state level. Initially, the state response was directed by the California Emergency Operations Center, which served as coordinating body for representatives of more than 100 agencies related to shelters, debris removal, schools, firefighters, police, and institutions linked to disasters and their mid- and long-term impact. From all over the state, 8,400 firefighters and 980 fire trucks, 106 excavators, and more than 40 helicopters were mobilized, as well as numerous tankers. Similarly, federal agencies were present, such as the Federal Emergency Management Agency (FEMA), the Office of Disaster Survivors Assistance (DSA) – in charge of making lists to identify people – and the Office of Management and Budget to finance reconstruction<sup>21</sup>.

The cost of the damage was US\$16.5 billion, the highest figure in 2018 related to natural disasters, surpassing even the losses caused by hurricanes Michael and Florence<sup>22</sup>.

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<sup>16</sup> Ibidem. CBS News. McNamara Audrey. January 2, 2020. Available at: <https://www.cbsnews.com/news/australia-fires-fire-map-5-questions-answered-how-many-hectares-have-burnt-where-are-the-fires-burning/>

<sup>17</sup> <https://www.nytimes.com/2020/01/01/world/australia/fires.html>

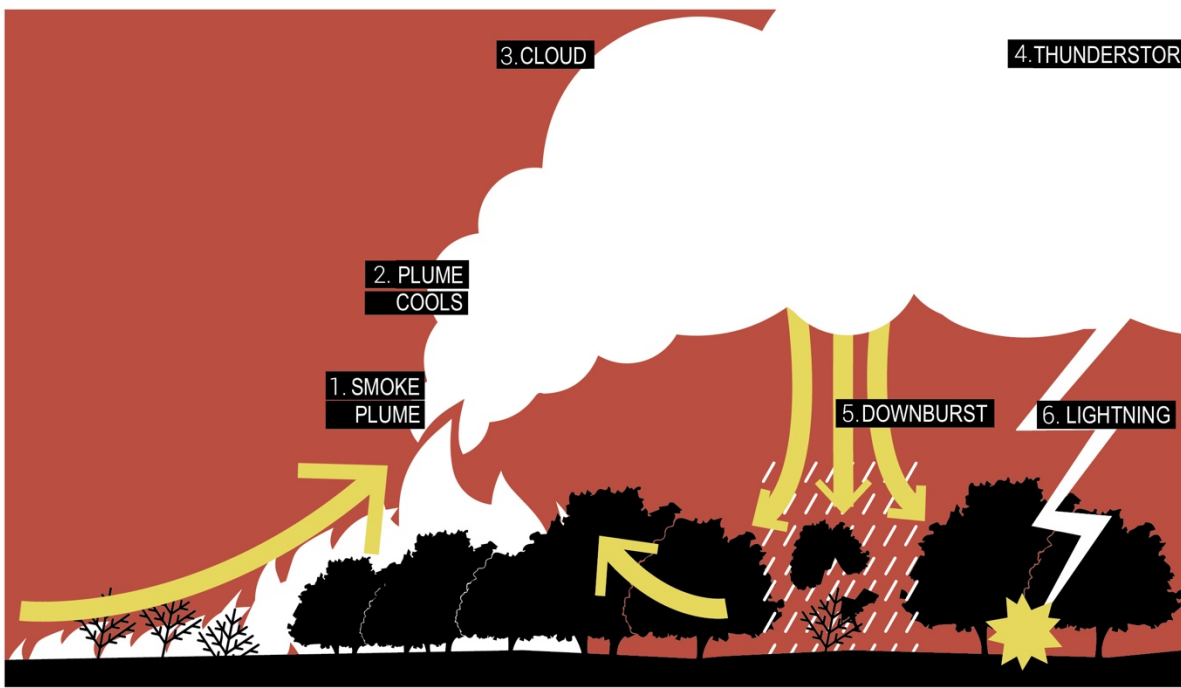
<sup>18</sup> <https://www.latimes.com/local/lanow/la-me-ln-camp-fire-insured-losses-20190111-story.html>

<sup>19</sup> State of California Watershed Emergency Response Team (WERT) – Camp Fire. Final Report. November 29, 2018. Available at: <https://ucanr.edu/sites/Rangelands/files/304942.pdf>

<sup>20</sup> The Verge. Available at: <https://www.theverge.com/2019/5/15/18626819/cal-fire-pacific-gas-and-electric-camp-fire-power-lines-cause>

<sup>21</sup> FEMA: State and Federal Partners Respond to the California Wildfires. November 2018. Available at: <https://www.fema.gov/news-release/2018/11/17/4407/state-and-federal-partners-respond-california-wildfires>

<sup>22</sup> KRCR News, Tuesday, January 8, 2019. Available at: <https://www.fema.gov/news-release/2018/11/17/4407/state-and-federal-partners-respond-california-wildfires>



A diagram showing how pyrocumulonimbus clouds are formed | **Source:** Bureau of Meteorology, Victoria (Australia)

## PORTUGAL 2017

The first super-fire in the northern hemisphere of the sixth generation<sup>23</sup> type, broke out in Portugal, from June 17 to 24, 2017, in the town of Pedrogão Grande, which was affected by strong winds, and the fires were started by a thunderstorm, sparking three independent, gigantic fronts<sup>24</sup>.

As a result of this disaster, which had 156 large active foci and destroyed more than 50,000 hectares in the central and northern part of the country, 65 people died<sup>25</sup>. As in the case of California, a serious drought preceded the

eruption of the fire, creating favorable conditions for its propagation.

It was determined that the most probable origin of this fire was a thunderstorm, in the context of a previous intense heat wave, with temperatures above 40°C<sup>26</sup>.

Regarding forest fires, in Portugal, the National Civil Protection Commission (CNPC, for its Portuguese acronym) is the body responsible for coordination, which every year issues a National Operational Directive (DON)

<sup>23</sup> They are the most violent of the scale and are characterized by presenting "pyrocumululus clouds", in which a column of hot air rises to the atmosphere and collapses, feeding the fire that generated it. Consequently, a "pyrocumulonimbus cloud" is a fire system in which said column of hot air reaches the border of space. See Jim Edwards. "Australian bushfires are so huge they're creating thunderstorms that start more fires." WEF. Available at: <https://www.weforum.org/agenda/2020/01/bushfires-australia-thunderstorms/>

<sup>24</sup> National Geographic. Available at: <https://www.nationalgeographic.es/medio-ambiente/2019/12/incendios-forestales-portugal-futuro-bosques>

<sup>25</sup> Galilea, Sergio. La Tormenta de fuego y la nueva Santa Olga. INAP, Instituto de Asuntos Públicos. Universidad de Chile. Page 17.

<sup>26</sup> Assembly of the Republic (Portugal). Independent Technical Commission, October 2017. Presentation: Análise e apuramento dos factos relativos aos incêndios que ocorreram em Pedrogão Grande, entre 17 e 24 de junho de 2017. Available at: [https://www.parlamento.pt/Documents/2017/Outubro/Relat%C3%B3rioCTI\\_VF%20.pdf](https://www.parlamento.pt/Documents/2017/Outubro/Relat%C3%B3rioCTI_VF%20.pdf)



## FOREST FIRE EVOLUTION

### 1st GENERATION

The cultivation mosaics diminish. More continuity of the forest: larger fires are generated.

### 2nd GENERATION

Fuel accumulates over the years, and the flames gain propagation speed.

### 3rd GENERATION

Thicker forests, more intense fires. They exceed the extinguishing capacity.

### 4th GENERATION

The continuity of vegetation takes fire to villages. More lives at risk.

### 5th GENERATION

Different simultaneous focal points are registered in the same geographical area.

to establish a Special Device for Combatting Forest Fires (DECIF)<sup>27</sup>.

Those responsible for fighting fires are the Volunteer Firefighters League, composed of only 10% of professional staff<sup>28</sup>. From their experience, one of the lessons that this fire left in Portugal was that there must be a strategy that considers full-time personnel to fight the fires, and not only seasonal groups, maintaining defense lines throughout the year. On the other hand, it is necessary to avoid improvised urban development in critical areas where large fires have been unleashed.

One of the reasons mentioned as facilitating these phenomena has been the widespread neglect of rural areas – increasingly irrelevant from an economic perspective –, and the government’s reluctance to strengthen fire prevention.

Additionally, it is estimated that with global warming, Mediterranean climates will have a greater chance of mega-fires, since the conditions of higher temperature, drought, combustible vegetation, and strong winds will produce fires of great magnitude and danger<sup>29</sup>.

<sup>27</sup> *Ibíd.*

<sup>28</sup> [https://elpais.com/internacional/2017/06/21/actualidad/1498061862\\_249554.html](https://elpais.com/internacional/2017/06/21/actualidad/1498061862_249554.html)

<sup>29</sup> Turco, M., Rosa-Cánovas, J.J., Bedia, J. et al. Exacerbated fires in Mediterranean Europe due to anthropogenic warming projected with non-stationary climate-fire models. *Nat Communications* N° 9. Article N° 3821. 2018.

FIRES	DEAD PEOPLE	DESTROYED HOUSES*	LOSS COSTS US\$	DURATION (DAYS)
California 2018	88	13.972	24 bill.	17
Australia 2019	28	2.000	4.4 bill.	Developing
Portugal 2017	65	262	554 mill.	7
Chile 2017	11	1.551	29 mil.	18

\* Data in hectares.

The following comparative chart has been prepared in order to better understand the magnitude of the phenomena, as well as their impact on human lives, infrastructure and associated costs.

### CHILE 2017

Between January 18 and February 5, 2017, forest fires –whose most likely origin was direct or indirect human intervention<sup>30</sup> – spread over three regions of the country: O'Higgins, Maule and Biobío.

The area covered by the fires spanned 1,155,307 acres, and there were 417 focal points of forest fires in the three affected regions, out of a total 681 considering other areas of the country. In terms of simultaneous fires (that occurred on the same day), the record was on January 26, with 120 outbreaks in total<sup>31</sup>.

Regarding deployment of personnel, more than 4,000 people were employed by Conaf alone, without considering additional resources from the Military and Police Forces<sup>32</sup>.

### COST FOR THE STATE “FIRE STORM”

Emergency, reconstruction, restoration and recovery | Between January 18 and February 5, 2017

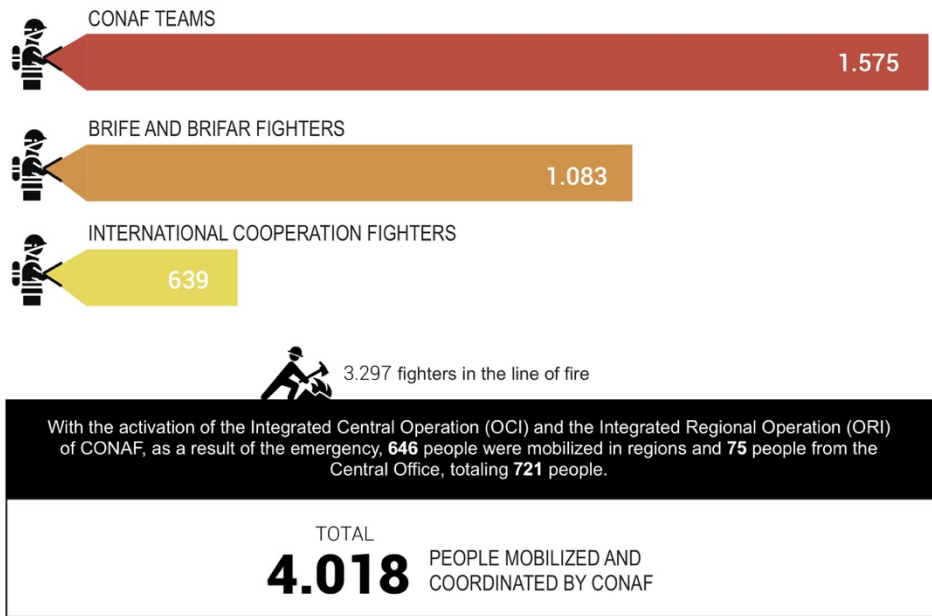
	COMPONENT	COSTS (MILLIONS OF \$)	%
FEBRUARY ESTIMATE	Emergency (fire fighting)	93.867	39
	Support to productive sectors	39.144	16
	Housing reconstruction	95.372	39
	Reconstruction of schools and health centers	5.000	2
FOREST RECOVERY MEASURES	MINAGRI subsidy	8.000	3
	CORFO reallocation	1.450	1
	<b>TOTAL</b>	<b>242.833</b>	<b>100</b>

<sup>30</sup> <http://www.conaf.cl/incendios-forestales/incendios-forestales-en-chile/estadisticas-historicas/>

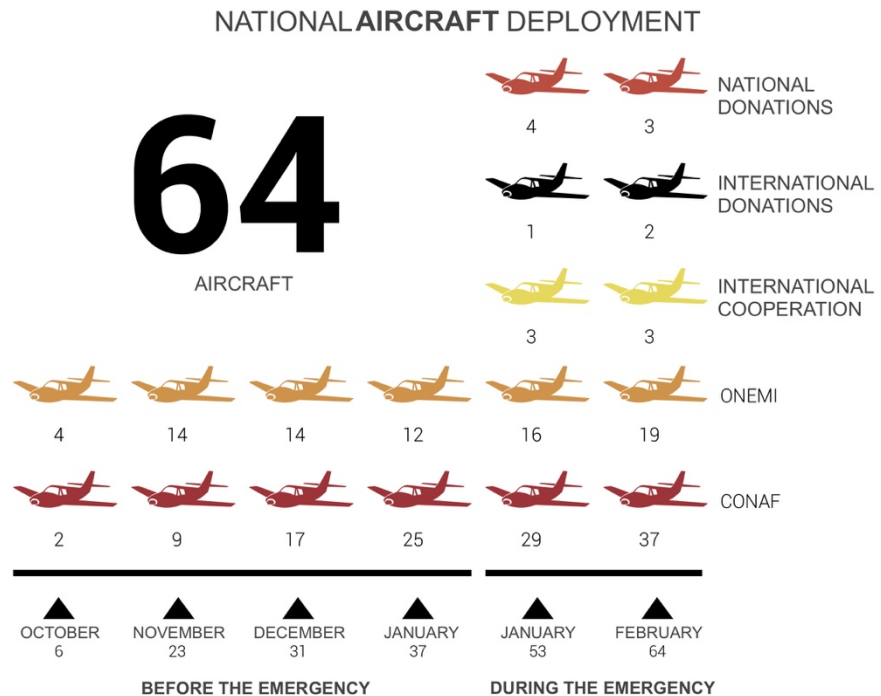
<sup>31</sup> Ibidem.

<sup>32</sup> Ibidem.

## MOBILIZATION AND COORDINATION OF PEOPLE



Regarding the use of aircraft, the following table shows the resources used:<sup>33</sup>



<sup>34</sup> Conaf. Plan Nacional de Prevención y Combate de Incendios Forestales, 2019-2020. Conaf. Santiago de Chile.

<sup>33</sup> Ibidem.

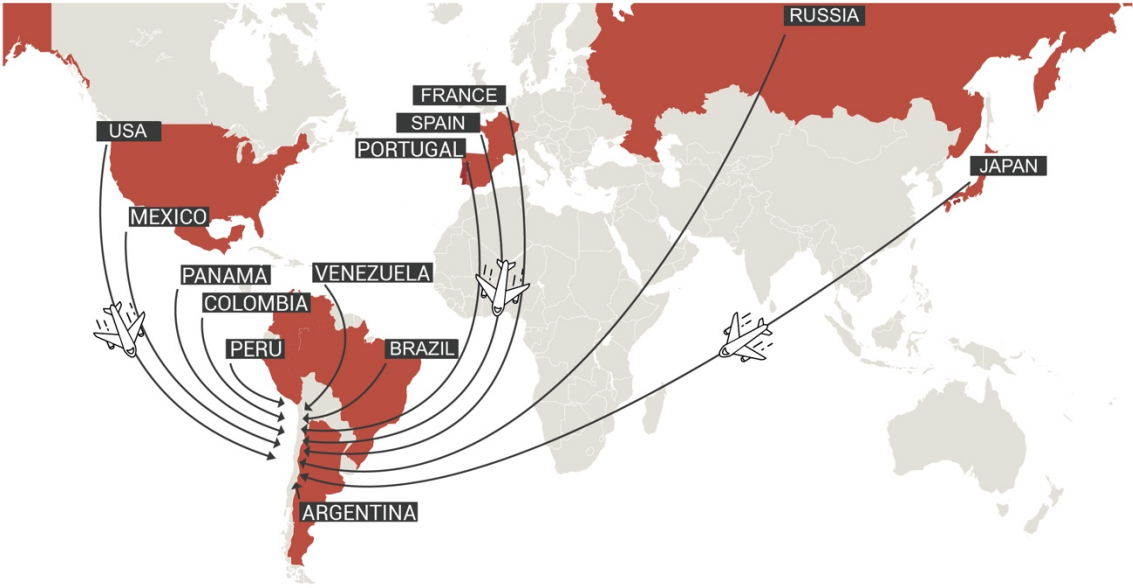


Regarding international cooperation, Chile received the following assistance from 13 countries:

The values mentioned in the attached tables do not represent the totality of the costs, since it would be necessary to add the costs and put a value on the support from the Military and Police Forces, Firefighters, and all state and private organizations. However, these figures provide us with concrete evidence of the relevance of the costs involved in these events.

**COLABORATION AND INTERNATIONAL DONATION**

 **13** COUNTRIES  **5** AIRCRAFTS  **639** SUPPORT PEOPLE





Incendio en la Araucanía, febrero 2018  
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## 0.5

### Lessons learned in Chile

In Chile, the entity in charge of fighting forest fires is the National Forestry Corporation (Conaf, for its Spanish acronym), which during recent years has been developing a more efficient strategy for disaster prevention and control, after the experience gained in the emergency of 2017, which was referred to as a “fire storm”.

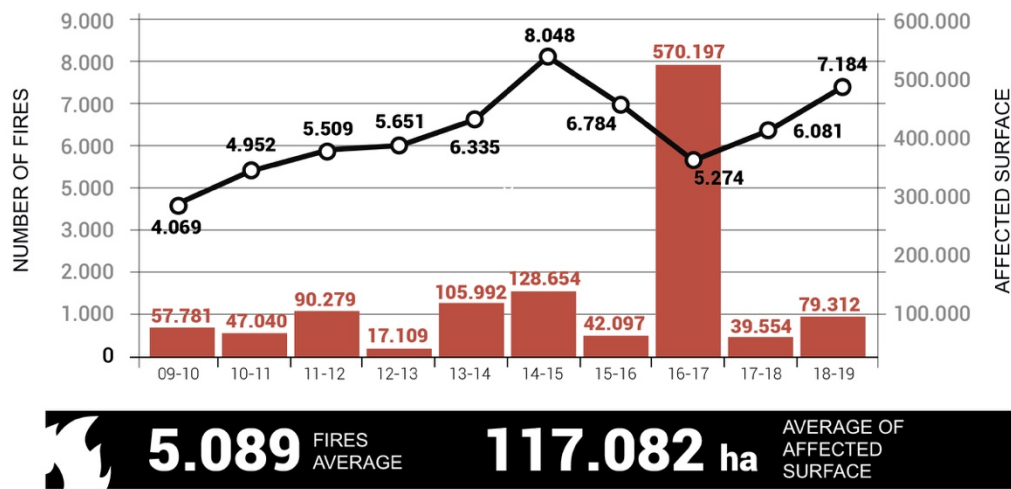
According to information provided by Conaf for this document, the agency designed a forest fire prevention and control action plan to address the 2019-2020 season, which internalizes many of the lessons learned over a decade of fires<sup>34</sup>.

For this period, Conaf has a budget of 63 billion Chilean pesos (around 84 million USD),

which makes it possible to provide 56 aircraft (mostly leased) and 2,515 brigade members distributed between the regions of Atacama and Magallanes, through 238 brigades. This budget is 46.5% higher than the previous season, which was 43 billion Chilean pesos (around 57 million USD). Of the 56 aircraft, four are heavy helicopters (Chinook model), 18 tankers, 30 helicopters, and 4 coordination planes. Technically, said resources allow different combinations, depending on the requirements of each emergency. In terms of capacity, the most important resources are the Chinook and Air Crane helicopters, which allow a water discharge of 10 cubic meters.

Additionally, fire prediction softwares have been developed in order to use the available

#### HISTORICAL OCCURRENCE AND DAMAGE OF FOREST FIRES IN CHILE



SOURCE: Corporación Nacional Forestal - CONAF

<sup>34</sup> Conaf. Plan Nacional de Prevención y Combate de Incendios Forestales, 2019-2020. Conaf. Santiago de Chile.

resources more efficiently, such as *Wildfire Analyst*<sup>®</sup>.

The training of communities at the national level is important too, as well as the establishment of a joint bureau with the various institutions that participate in or collaborate with Conaf on a preventive basis and during emergencies. This has forced the development and increase of capacities in terms of interagency coordination. The following institutions correspond to this instance: National Forestry Corporation (Conaf), National Emergency Office of the Ministry of Interior and Public Security (Onemi), the Armed Forces, Firefighters, Wood Corporation (Corma), Carabineros, Investigations Police of Chile (PDI), Ministry of Public Works (MOP), Directorate General of Civil Aviation (DGAC) and air clubs.

Acting in a timely manner and with greater means configures what Conaf calls "initial attack", since it is precisely at this point that 98.8% of fires with an area of less than four hectares are fought. On the other hand, the Conaf strategy defines "extended attacks", which represent 1.2% of the registered fires and explain 85% of the damage produced. Hence the need to act timely and massively.

Consequently, when analyzing Conaf's strategy, a new, more aggressive, coordinated and sophisticated approach can be seen both in the budget and in the amount of resources, as well as in its deployment and employment. This is something that was seen in the attack on the fires that affected the hills of Valparaíso, Christmas 2019, which shows the positive result of building better institutional capacities, both in prevention and execution, as well as greater resilience in the population.

Regarding the Armed Forces, although facing large fires is not part of their essential tasks, a defense mission area adequately named "National Emergency and Civil Protection"<sup>35</sup> can indeed be noted.

As a result of the above, the Ministry of Defense has developed the "Emergency and Civil Protection Plan", which makes the Armed Forces available to support the government authorities responsible for the administration of the emergency, to satisfy the needs of the citizens, through the different military units deployed in the affected regions and others that could be called on from other garrisons to provide aid, in case of an emergency and / or catastrophe caused by natural and / or man-made phenomena .

In this plan, and in the context of fires, force capabilities that may be useful in extinguishing the fire are made available. As an example, the Chilean Army collaborates with the Forest Fire Backup Brigades (BRIFE): a unit of approximately 23 men with training in this area, plus aircraft equipped with the so-called "bambi bucket", a basket that can carry thousands of liters of water. The Chilean Navy has also collaborated with brigade members and air-and-sea exploration aircraft to visualize higher temperature areas, where the use of extinguishing means must be used with greater effectiveness. And the Air Force, for its part, has used strategic transport of resources, as well as its aerial technological capabilities (the Hermes 900 drone, for example) and satellites, to have a clearer and more accurate picture of the evolution of the phenomenon. Thus the versatility of resources acquires a concrete and real dimension in these emergencies.

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<sup>35</sup> Libro de la Defensa Nacional de Chile 2017, p115.



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### A weapon to fear

Fire as a weapon is a very old resource. For example, "Greek fire" was the name given to two types of incendiary weapons. One was called the Greek fire of Archimedes, based on the reflection of sunlight, and was used in the defense of Syracuse (2nd century BC). The second, based on a flammable substance, (a stream of burning fluid) was used during the Byzantine Empire, created in the 6th century, but used mainly in the 13th century as a naval weapon<sup>36</sup>. In both cases, the intention was to produce fire in the combustible elements of the enemy.

On the other hand, arson as a weapon has been present throughout the history of war. In recent years the idea of pyro-terrorists has emerged<sup>37</sup>, who start intentional fires in order to produce terror in the population, usually for political reasons and with fatal results for innocent civilians.

Additionally, the use of fire as a weapon is consistently expressed in the propaganda of terrorist and anarchist groups globally<sup>38</sup>. Fire does not require much planning or use of resources and has a high impact, even more so when human lives are affected, or when critical infrastructure or relevant public goods

are damaged, with little chance of being detected.

Consequently, the use of fire and its close relationship with political ends can also affect security and is an area to be studied in more depth<sup>39</sup>.

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<sup>36</sup> <https://www.britannica.com/technology/Greek-fire>

<sup>37</sup> See David Thomas Sumner and Lisa M. Weidman, "Eco-Terrorism or Eco-Tage: An Argument for the Proper Frame," *ISLE: Interdisciplinary Studies in Literature and Environment* 20, no. 4 (December 1, 2013): 855–876. Robert Arthur Baird, "Pyro-Terrorism—The Threat of Arson-Induced Forest Fires as a Future Terrorist Weapon of Mass Destruction," *Studies in Conflict and Terrorism* 29, no. 5 (August 1, 2006): 415–428.

<sup>38</sup> See <https://www.dhs.gov/sites/default/files/publications/Action-Guide-Fire-as-a-Weapon-11212018-508.pdf>

<sup>39</sup> Sheppard, Adrian. *Fire as a Weapon: High-Rise Structures*. Naval Postgraduate School. Monterey, California. December, 2017. Thesis for Master in Security Studies.





Diromadair fire-fighting plane, 20 de junho de 2018, Ouzenda (Pedrogao Grande)  
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## Final considerations and recommendations

After having studied fires and the threat they pose to national security, as well as the cases that occurred in Chile 2017, Portugal 2017, California 2018 and Australia 2019, we can deduce the following final considerations:

- There is evidence that global warming is causing an increase in temperatures, which along with drought areas and strong winds, form a combination of circumstances that facilitate the possibility of greater forest fires. In this regard, the similarity between California and the central zone of Chile is striking, in terms of geography, vegetation, atmospheric conditions and morphological conformation of the terrain. This allows us to affirm that due to the aforementioned conditions, forest fires will probably increase in number and aggressiveness in the short term.
- Additionally, it is important to mention that statistics show that almost all fires (more than 90%) are caused by human actions, either voluntarily or accidentally. This leads us to propose the need for permanent campaigns aimed at the community to monitor and preserve their environment and thus avoid the generation of fires that affect not only the personal safety of local inhabitants, but also produce enormous environmental damage and harmful effects to the local ecosystem.
- We believe that forest mega-fires that seriously affect both the population and public goods of relevance or critical infrastructure, should begin to be seen as a factor that can threaten national security, especially considering that these phenomena are expected to continue to increase in the immediate future.

In the classification of mega-fires, the category of 6th generation fires has appeared<sup>40</sup>, in reference to those that release a large amount of energy that modify the meteorology of their surroundings, also called “fire storms”. This is true of fires in Chile in 2017 or California in 2018. As a result, it seems to us that these types of phenomena must be considered a threat that is no longer seasonal, but permanent, weighing the effects of climate change, greater drought, the lower availability of water and the stress or fatigue of forests that, having less water, due to its dryness, present better conditions for combustion.

- Additionally, the cases analyzed prove that fires – as a permanent threat to national security – must have **permanent strategic planning**, which considers Conaf its main coordinating body, together with private means and related non-governmental organizations – including the capabilities and means of the Armed Forces, when the situation so requires –

and certainly the local community, which should be the most interested in having optimal security conditions to avoid this type of phenomena. In other words, the neutralization of this threat requires effective and permanent coordination among all agencies and other actors. We believe that this inter-agency capacity, in order to mobilize national capacity, should be included as a key and relevant factor in the creation of the new “National Civil Protection Agency” that will replace ONEMI.

- It is proposed that the strategic planning to be developed increases the use of mathematical models of prediction and propagation of fire for better preparation and use of resources in situations of catastrophes. This will allow us to move from a state in which we worry about fighting the flames according to how they arise and unfold, towards a model in which fire behavior is better understood, allowing efficient use of resources and personnel in its neutralization.
- Likewise, and as a complement to the previous point, it is interesting to develop an “interagency process” regarding all the institutions involved in the control of forest fires, developing an effective coordination between State – whether civil or military –, private and individual resources.
- The preparation of the areas of greatest risk, through the preparation of firewalls, cleaning of weeds around forests, as well

as the elimination of illegal garbage dumps – which act as true powder kegs – near densely arboreal areas, together with educating people in populated areas, constitutes a first barrier, which considerably helps lower the chance of forest fires. This must be part of an adaptive and constantly renewing strategy.

- The origins of forest fires – especially when they are intentionally provoked – must be carefully studied in order to be able to specify whether there are truly political motivations involved. If so, it is advisable to develop or adjust legal norms to properly penalize these behaviors.
- Finally, it is relevant to consider that climate change constitutes a phenomenon to be monitored and faced in our country, because water scarcity, increasingly significant droughts, and rising temperatures form a combination of variables that make the emergence of forest fires highly likely, with the consequent risk to citizen safety, as well as property and biodiversity. The Spanish government just adopted on Tuesday, January 21, the Declaration of Climate and Environmental Emergency, committing to adopt 30 priority lines of action to fight climate change. Such initiatives mark the course of current times.

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<sup>40</sup> See It refers to the classification by Marc Castellnou, which establishes six fire types or 'generations'. A 'sixth generation' fire is characterized by such a high level of energy that the heat modifies existing atmospheric conditions, creating a firestorm. The storm, in turn, drives and accelerates the flames, resulting in new ignitions and erratic winds that make its direction or course unpredictable and its impact on the ground, brutal. See: <https://www.elperiodico.com/es/sociedad/20171202/fuegos-sexta-generacion-apogeo-incendio-forestal-6432855>

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