

REPORT TO THE NATIONS

Forest fires in Chile: causes, impacts and resilience

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A landscape photograph showing a hill with several bare, dark trees. The sun is a bright white circle in the upper center of the frame, surrounded by a soft red and orange glow. The sky is a uniform light beige color. The foreground and middle ground are filled with the dark, intricate silhouettes of the trees and the textured surface of the hill.

Summary and recommendations

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This report provides an account of recent changes in the fire regime in Chile and the main factors that explain the occurrence and magnitude of forest fires. It also addresses the impacts and consequences of the fires, as well as the community's resilience and ability to adapt to extreme events, along with institutional responses and challenges in terms of prevention and mitigation policies. Based on these background factors, we offer the following conclusions and recommendations:



During the last decade, fire seasons have been longer and the fires larger and more severe, especially between the regions of Valparaíso and La Araucanía. The widespread drought experienced in recent years has favoured the occurrence of megafires, such as those that occurred in the summer of 2017. These extreme events are multi-causal, and anthropogenic climate change is compounded by other atmospheric phenomena that contribute to extremely high temperatures and low humidity, in combination with land use and land cover characteristics that are favourable to the spread of fire (e.g. tree plantations and shrubs).



Of the fires whose origin has been determined, 99% are caused by humans, either accidentally or intentionally. In some years and regions of the country, intentionality accounts for about 50% of these events. The causes of fires and their impacts are related to multiple factors, mainly associated – directly or indirectly – with human activity (e.g. traffic and recreation), poverty conditions and the occupation of highly exposed urban-rural interface areas. It is difficult for the people living in these areas to control these factors, and when they are combined with psychological and community barriers, they create a scenario that is not conducive to fire prevention.



To better address the socio-economic and environmental consequences of the future increase in megafires – given the acknowledged inability to control and suppress them worldwide – we must move from reactive measures (mainly focused on fire suppression and firefighting) to actions that target the main causes of the problem. Thus, priority should be given to prevention activities and strategies, in conjunction with landscape management and planning policies aimed at avoiding and/or reducing the socio-economic and environmental damage and losses derived from extreme fire events.



In such a context, the effectiveness of a population's response to a fire depends not just on actions by the individual, the family or the community, but rather on the action of the public and private apparatus. It is therefore highly important to build the population's capacity for resilience. This requires prevention to be included in territorial planning, efforts to overcome poverty and public safety. These policies should recognize local communities' knowledge and experience of the territory they inhabit and integrate public and private efforts.

Summary and recommendations



The gradual increase in temperatures has contributed to around 20% of Chile's burnt area over the last three decades. The continuation of this warming trend, along with a reduction in rainfall, could over the coming decades lead us to have a climate that favours the occurrence of large forest fires in the south-central zone of Chile.



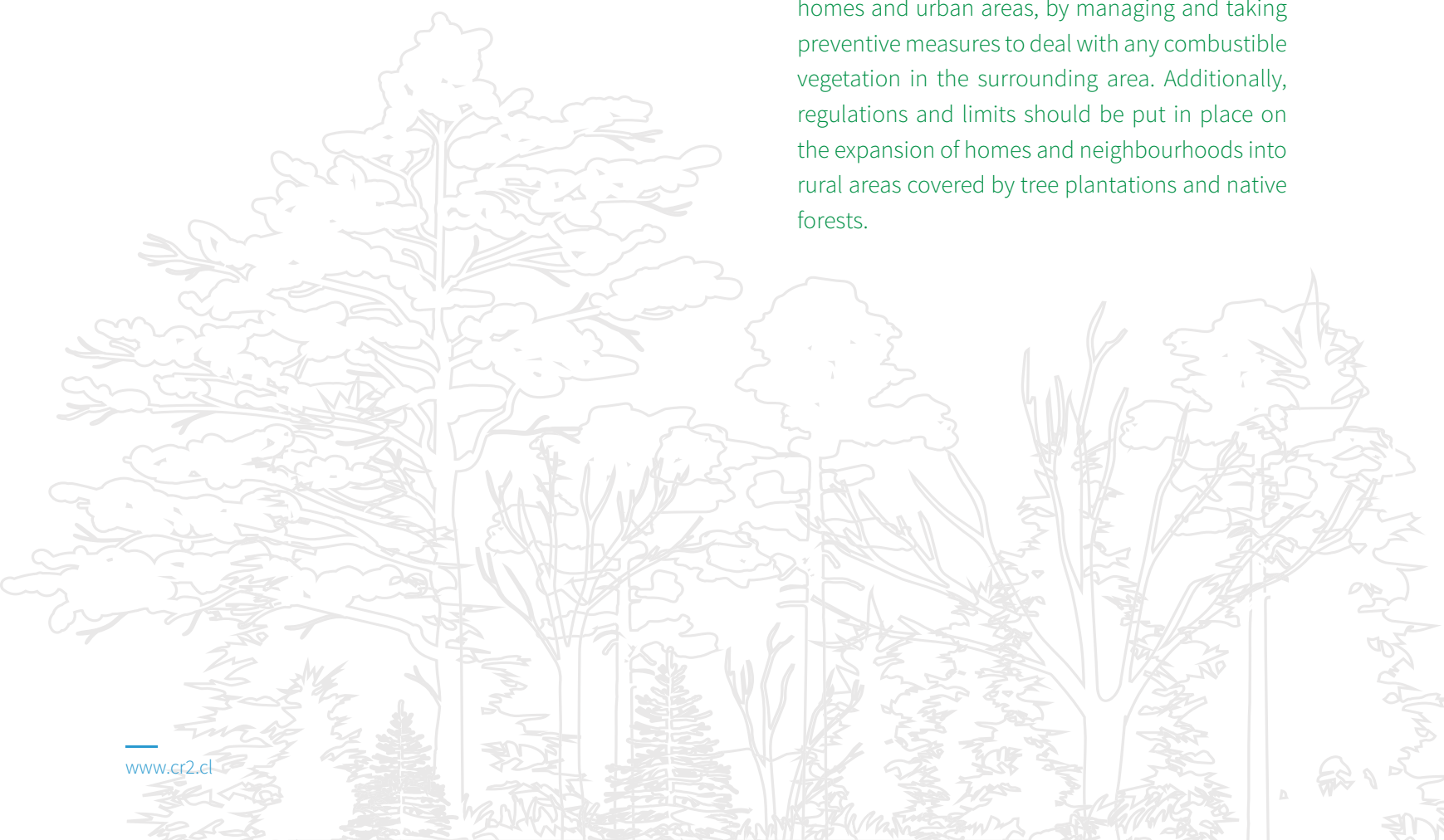
This is likely to happen despite the efforts to mitigate the effects of climate change, due to the warming and drying of much of south-central Chile. This emphasizes the need to promote actions aimed at preventing and mitigating forest fires.



The rural-urban interface (RUI) is the area where human communities (both rural and urban) interconnect with plantations, bushes, native forest and other ecosystems. Eighty percent of the population and around 60% of the fires that occur are concentrated in these areas. The main factors that increase the risk of fire in the RUI are the presence of tree plantations, proximity to roads (and cities) and population density.



It is in the rural-urban interface that most losses to human lives and housing areas occur, and it also accounts for the greatest share of spending on fire fighting and post-fire recovery. A safety perimeter therefore needs to be established around homes and urban areas, by managing and taking preventive measures to deal with any combustible vegetation in the surrounding area. Additionally, regulations and limits should be put in place on the expansion of homes and neighbourhoods into rural areas covered by tree plantations and native forests.





The occurrence of fires and their ability to spread is not only impacted by the sources of ignition and climatic conditions, but also by the type, amount and flammability of the combustible material and its distribution in the landscape. Changes in land use and its coverage can significantly alter the fire regime. Homogeneous and fuel-intensive landscapes – like those dominated by tree plantations – favour megafires breaking out during extreme climatic situations. In addition, fires and changes in land use have led our Mediterranean ecosystems to a condition of fragmentation and vulnerability that threatens their survival.



The presence of a large number of exotic species can modify the forest fire regime, increasing their frequency, intensity, extension, temporality and how fast they spread. Some 70% of the exotic plant species present in Chile come from regions of the world where forest fires occur frequently and naturally. This is why they have the ability to adapt, enabling them to persist and even increase in abundance after forest fires have taken place. Thus, there is a positive feedback between the invasion of exotic plants and fires, leading to the degradation of native ecosystems.



The ecosystems that are most affected are those that present some degree of threat, for example those comprising endangered tree species such as ruil (*Nothofagus alessandrii*), queule (*Gomortega keule*) and pitao (*Pitavia punctata*), as well as vulnerable species such as hualo (*Nothofagus glauca*). Therefore, territorial planning and landscape diversification programmes that consider local identity and culture are key to moving towards socio-ecosystems that are more sustainable and resilient to climate change.



In a climate change scenario that will favour more frequent, extensive and intense fires, the expansion of exotic vegetation can exacerbate the impacts on natural ecosystems and human wellbeing. Therefore, in order to reduce the probability of catastrophic events, it is paramount to develop and implement policies and actions aimed at controlling invasive exotic species and restoring native ecosystems.

Summary and recommendations



Forest fires could become one of Chile's largest sources of greenhouse gas emissions. For example, the megafires that occurred in the summer of 2017 emitted an amount of CO₂ equivalent to around 90% of Chile's total 2016 anthropogenic emissions.



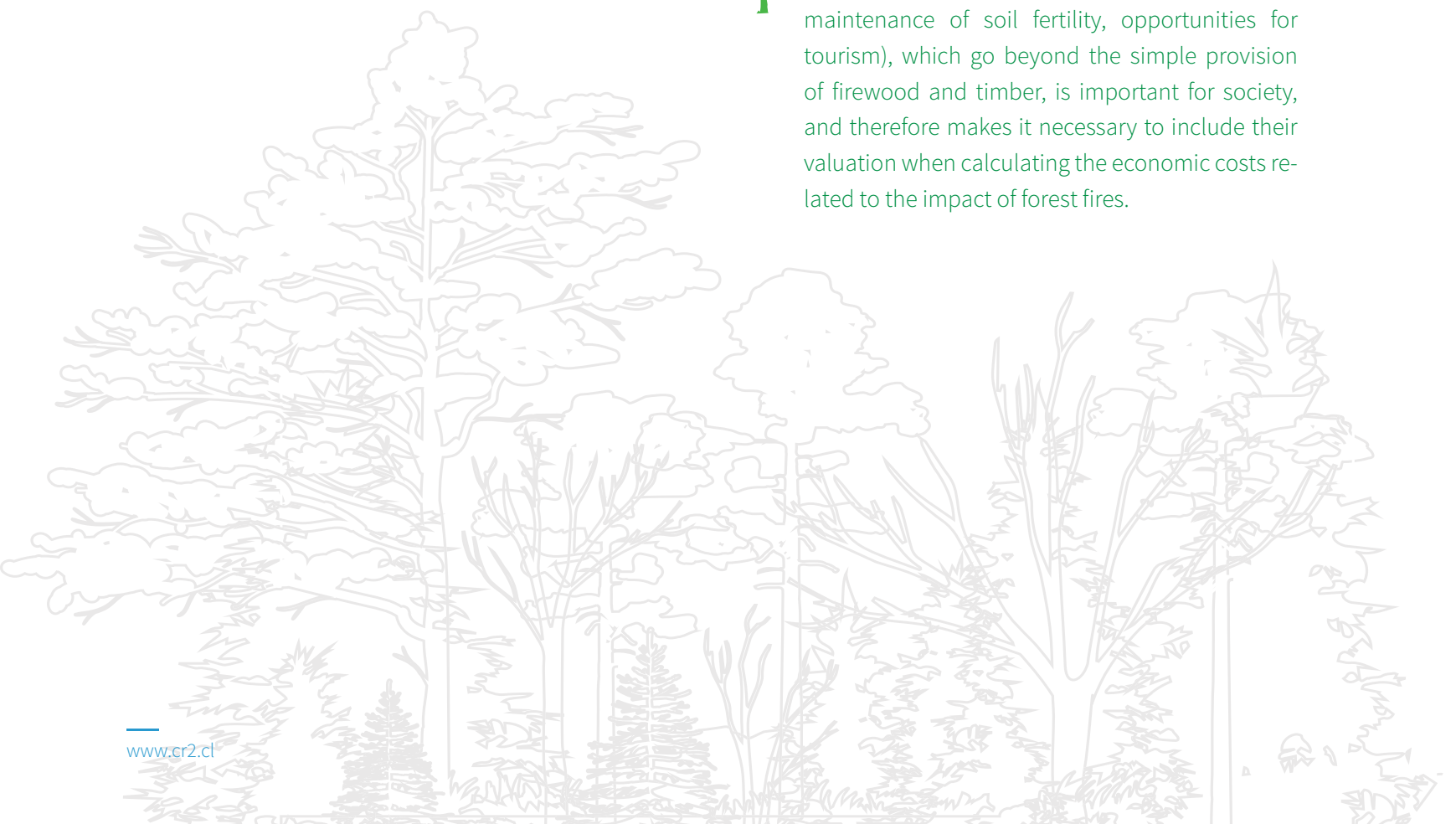
Therefore, programmes that integrate forest fire prevention, monitoring and management are needed in order to reduce greenhouse gas emissions in Chile. This is essential, as the occurrence of extreme fire events will significantly enlarge the gap between GHG emissions and capture.



The quantification of socio-economic costs related to forest fires provides guidance for directing prevention, mitigation and control activities towards those areas of greatest importance from a social, economic and environmental perspective. However, the available literature and documentation reveals a lack of research into the socio-economic costs of forest fires in Chile, as well as the losses from an economic point of view. The costs reported are mainly related to fire suppression, but do not consider losses to production and the provision of ecosystem services.



Forests provide a range of benefits that are essential for human wellbeing. Preventing the loss of these ecosystem services (e.g. water provision, maintenance of soil fertility, opportunities for tourism), which go beyond the simple provision of firewood and timber, is important for society, and therefore makes it necessary to include their valuation when calculating the economic costs related to the impact of forest fires.





Forest fires are socio-environmental disasters, and their psychological and community impacts far exceed the material and economic losses, affecting individuals, families and entire communities at multiple levels, increasing their perception of vulnerability and abandonment. Furthermore, these impacts are unevenly distributed, depending on existing socio-economic and environmental conditions and on a community's level of exposure to the threat. Living in an area of high fire risk without adequate fire management plans could have serious implications for the mental health of a population and diminish its ability to prevent and prepare for those events.



To address these impacts, systematic long-term psychosocial support programmes are needed for affected communities, with a family-level and community approach that is locally coordinated and contextualized. In order to make these interventions more effective, tools need to be developed to quantify the impacts of fires on the mental health of the population, along with indicators aimed at evaluating and improving such programmes.



Chilean institutions evidence a lack of coordination in the area of forest fires. The existing model does not emphasize prevention, as it focuses on fire suppression, and it is only when forest fires become an emergency or disaster that it makes it necessary for public organisms to work together.



The country must move toward an institutional framework that assumes and coordinates fire prevention by designing resilient landscapes through territorial planning and bylaws that allow risk to be addressed in an adaptative manner, favouring landscape heterogeneity. In addition, there must be a focus on the early detection of the fire risk level. Regulations should consider a programme aimed at modifying people's behaviour based on our knowledge of what motivates people to cause fires. Outreach and education programmes are needed, as well as an appropriate system for forecasting, including, for example, heat waves in prevention plans and in the early warning system.

