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Porto-Portugal
May 16-19th
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8th International Wildland Fire Conference

Global Wildland Fire Network – Statement of the South America Region

16 May 2023

Introductory remarks

South America has a land area of 17.8 million km², which are equivalent to 12% of the Earth's surface. It is home to an extraordinary diversity of ecosystems, climates and topography, including the largest area of tropical rainforest (885 million ha in the Amazon basin and 85 million ha in the basins of Orinoco and Paraná rivers), representing 95% of the forest area of the continent. Around a quarter of the tropical forests of the planet is located in the region and protected under different conservation schemes. Natural and planted temperate forests along with the Andes mountain range and your ecosystems are also important landscapes of South America.

In the period 2009-2019, over 90% of the burned area and 87% of the fire incidents in Latin America occurred in South America, and about 19% of the South American territory was affected (UNDRR, 2021). Three major kinds of vegetation are equally affected by wildfires in South America: forests, featured mostly by the Amazon region; croplands, basically representing agricultural areas; and open grasslands, mostly associated with arid environments. Bolivia and Paraguay are the countries that suffer the most from fires on wetlands, with almost a fifth of the events being felt on these systems, while Colombia and Venezuela present the highest proportion of impacts on grasslands (UNDRR, 2021).

In the case of Ecuador, the Andean Paramos are the ecosystems most affected by forest fires, many of which are 99% caused by anthropic activities. The paramo consists of a collection of neotropical alpine grassland ecosystems covering the upper region of the northern Andes. They play a key role in the hydrology of the continent. Many of the largest tributaries of the Amazon basin have their headwaters in the páramo. It is also the major water source for the Andean highlands and a vast area of arid and semi-arid lowlands, where páramo water is used for domestic, agricultural and industrial consumption, and the generation of hydropower. Recently, the páramo is increasingly used for intensive cattle grazing, cultivation, and pine planting, among others (Buytaert, 2006). Fire is present in the paramo ecosystems and plays a fundamental role for sociocultural links and for being part of the Andean worldview of the indigenous communities settled in their territory. On the other hand, fire is widely used for the implementation of agricultural activities because it is a cheap work tool and available to everyone. Unfortunately, its use is indiscriminate and negligent, being one of the first causes for the occurrence of forest fires. These activities, as well as global phenomena such as climate change, severely alter the hydrological regime (Buytaert, 2006).

According to the Intergovernmental Panel on Climate Change (IPCC), climate change increases the likelihood of extreme weather-related events, including wildfires induced by extreme temperatures and anomalously dry conditions. Therefore, we are moving towards an increasing frequency of wildfires in a variety of vegetation types. When driven by deforestation and degradation processes, fires also have a double impact in the concentration of greenhouse gas (GHG) emissions in the atmosphere as they both increase it and decrease the ability of natural systems to capture carbon.

Specific landscape fire problems of the region

Climate change and land-use change are projected to make wildfires more frequent and intense, with a global increase of extreme fires of up to 14% by 2030, 30% by the end of 2050 and 50% by the end of the



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century. Wildfires and climate change are mutually exacerbating. Wildfires are made worse by climate change through increased drought, high air temperatures, low relative humidity, lightning, and strong winds resulting in hotter, drier, and longer fire seasons. Also, fire suppression efforts are made more difficult by climate change (Smith et al., 2020). At the same time, climate change is made worse by wildfires, mostly by ravaging sensitive and carbon-rich ecosystems like peatlands and rainforests. Therefore, areas of tropical forest in the southern Amazon are also likely to see increased burning if greenhouse gas emissions continue at their current rate (UNEP, 2022).

Simulations of future climate and land-use change conducted by Oliveira et al. (2022) pointed to a dramatic increase in High Impact Fires by 2050: in the Cerrado it would expand from the current 3% of the biome to 15%, from 7 to 8% in the Pantanal and from 0.7 to 1.2% in the Amazon. In addition, the impact of fire would intensify in 95% of the Cerrado, 97% of the Amazon and 74% of the Pantanal.

Other activities, such as deforestation, soil conversion, and mining, also increase greenhouse gas emissions, affecting and contributing to more extreme fires. In Brazil, there is a close correlation between deforestation and fire events, as registered in a 2022 Technical Note by Ciman, the National Center of Integrated Multi-agency Operational Coordination.

Based on the Oceanic Niño Index (ONI), NOAA classifies El Niño (warm) and La Niña (cool) events in the eastern tropical Pacific as Weak (with a variation of 0.5 to 0.9 in a 3-month mean anomaly), Moderate (1.0 to 1.4), Strong (1.5 to 1.9) and Very Strong (≥ 2.0) events (GGWeather, 2023). The last four years were marked with oscillations from weak to moderate in the ONI Index. The El Niño/Southern Oscillation (ENSO) was considered as “Weak La Niña” on the periods of 2020-2021 and 2021-2022.

The sea surface temperature anomaly predictions for February-March-April 2023 (FMA/23) indicate that waters over the Equatorial Pacific are likely to remain cooler than the historical average. However, near the coast of Peru and Chile, the surface-ocean waters are already warmer than the historical average. That is, although there is still a certain probability of persistence of La Niña (27%), forecasts indicate a greater condition of neutrality (73%) (INPE, 2023).

Data from INPE, the Brazilian National Institute for Space Research (<http://www.inpe.br/queimadas>), show hotspots detected in South America by the reference satellite AQUA_M-T – MODIS Sensor. From 2019 to 2022, the number of hotspots was close to the average value for the historical series from 1998 to 2022. The worst year was 2020, with 458,948 hotspots detected. 2021 was the year with the fewest hotspots detected in this period, a total of 325,334 hotspots.

Brazil had the most hotspots detected, with approximately 200,000 hotspots detected annually, and 2020 being the year with the most hotspots detected (222,797). It represents almost half of the hotspots detected for all of South America that year. Bolivia comes in second, with slightly more than 40,000 hotspots detected per year in 2019, 2020, and 2022. The worst year was 2019, with 44,273 hotspots. All other countries had less than 40,000 hotspots detected by year, with the year 2020 having more hotspots detected for Argentina, Colombia, Ecuador, French Guiana, Paraguay, Peru, Uruguay, and Venezuela.

In South America, the number of fire events in 2019 registered higher figures than those observed in the previous 5 to 6 years. In 2019, fire events were most densely distributed in the outskirts of the Amazon basin and El Chaco region. Brazil alone registered over half of these affected lands, totalling almost 200 Mha of burned area during this period, followed by Argentina and Bolivia, with roughly 35 Mha of burned area each. However, in terms of burned area with respect to total national territories, Paraguay and Bolivia appear as the most affected countries, with 0.5% and 0.3% of affected areas respectively. In contrast, Peru recorded the lowest ratios, with less than 0.01% of their lands being impacted by fires over the period (UNDRR, 2021).



Despite restrictions and economic setbacks from the COVID-19 pandemic, concentrations of the major greenhouse gases (CO₂, CH₄, and N₂O) continued to increase in 2020. In spite of La Niña conditions in the latter part of the year, the global mean temperature in 2020 was one of the three warmest on record. Annual precipitation totals in 2020 were also below the long-term average in many parts of South America - including the central Andes, southern Chile, Northern South America, the Amazon and Pantanal regions and Southeastern South America. However, above average rainfall was observed in southern Paraguay, parts of Peru and the semiarid region of Northeast Brazil. The intense drought and unusual fire season in the Pantanal region of Brazil, Paraguay and Bolivia was the worst drought in the last 50 years. From 29th September to 15th October a major heat wave was felt from the southern Peruvian Amazon, all the way to Bolivia, Paraguay, northern Argentina and central and southern Brazil (WMO, 2021).

The Pantanal, the largest contiguous wetland in the world with a high diversity of ecosystems and habitat for several endangered species, was impacted by record-breaking wildfires in 2020 (Kumar, 2022). The burning was severe in 2019, charring roughly 16,000 square kilometers, but in 2020, the scale was catastrophic, burning one-third of the whole biome (Voiland, 2022). Peaking by August-September, a remarkable 39,000 square kilometers burned in 2020, an area about the size of Switzerland (Voiland, 2022). Fires were fueled by an exceptional multi-year drought, but human-caused fires exacerbated drought effects on natural ecosystem within the Pantanal, with large, burned fractions primarily over natural (52%), and low cattle density areas (44%) in 2020 (Kumar, 2022).

According to studies carried out by the Center for Climate and Resilience Science (CR)², which brings together researchers from various universities and other academic institutions in Chile, the summers of 2017 and 2023 have revealed a new and devastating regime of forest fires in the south-central zone of Chile, in which a few events experience rapid and intense propagation, burning thousands of hectares in the first days after their ignition. The total burned area in each of the seasons exceeded 450,000 ha -nearly 10 times the historical average- causing the unfortunate death of dozens of people, the destruction of residences and infrastructure, the deterioration of biodiversity and great losses in various areas. productive sectors.

The study indicates that the mega-fires have coincided with extremely hot days (air temperatures above 40 °C) and very intense winds which, together with abundant and continuous forest fuel and multiple sources of ignition, are a perfect recipe for generating serious socio-environmental catastrophes. These meteorological conditions are also without precedent in the historical record and their recurrence in recent years suggests a contribution of climate change to the establishment of this new regime of forest fires.

The mega-drought in central Chile -which began in 2010 and continues to the present- has altered the historical fire regime, increasing the burned area, the number of events outside of summer, and the simultaneity of events. Within this period of change, the 2016-2017 season is unprecedented: although the number of fires was relatively lower than average, the total burned area reached 560,000 ha, which is equivalent to ten times the historical average. (CONAF 2018) .

After 2016-2017, the following seasons were within the historical ranges of occurrence and damage. Until the current season (2022-2023) arrived. Several large fires in December and January, including a dramatic event on the outskirts of Viña del Mar the day before Christmas, raised the total burned area to some 100,000 ha. Then, at the beginning of February, several fires were generated in the Ñuble, Biobío and Araucanía regions, which reached the category of mega-fires due to their extensive duration, intensity and burned area. Among these events, the one in Santa Ana, commune of Santa Juana, which consumed more than 120,000 ha; a significant portion of the total was burned in the first three days of development and could only be controlled several weeks later.

The most dramatic impact of this season, especially the fires of February 2023, are the 25 fatalities. Added to this are the more than 450,000 ha consumed (eight times the historical average), which has produced a



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socio-environmental and economic cost, particularly in the forestry, agricultural and tourism sectors, still to be quantified, but which will undoubtedly be enormous. It will also be necessary to evaluate carbon dioxide emissions into the atmosphere and its impact on human health as a result of poor air quality. Indeed, the levels of particulate matter remained in the emergency range for several days, in locations near and far from the fires.

The official figures reported by SIDCO-CONAF for this season <https://www.conaf.cl/incendios-forestales/incendios-forestales-en-chile/estadistica-de-ocurrencia-diaria/> indicate that, although as of March 21 the occurrence is only 5% higher than the past five-year period (5,765 fires), the affected area is 439,918 affected hectares, which represents 511% higher than the last five-year period, which registered 72,029 affected hectares.

These figures reflect how complex the current 2022-2023 forest fire season has been for Chile and that forced the government to request international help, receiving invaluable support from Argentina, Brazil, Canada, Colombia, Ecuador, Spain, France, the United States United States, Mexico, Portugal, Japan, and the European Union, who contributed their knowledge, planning and strategy resources for land and air combat, and financial funds for restoration.

Under the conditions of extreme emergency, civil and military authorities, governmental and non-governmental, public and private sectors, and volunteers, joined forces to face this social, environmental, and economic catastrophe in much of the country. Added to this was the redoubling of efforts to fight the cause of these fires, all of which are anthropogenic, where intentionality, and with worrying records of criminal intent in some rural areas, made fire control operations in the urban-forest interface more complex. The latter is also a new complexity, given the explosive occupation of the territory by new homes that, under the threat of fire, disperse and modify the priorities it is combat forestry response forces.

Thus, although the sample is limited, in CR2 they may suggest that the mega-fires that are occurring in this new fire regime in central Chile are associated with extreme weather conditions. However, in the case of Chile, practically all fires begin with an ignition product of human action, whether accidental or intentional. Under average conditions or even during an "ordinary" heat wave (say an event of maximum temperatures around 35°C in central Chile), fires are expected to spread and some even become major events. However, the events of January 2017 and February 2023 suggest that those ignitions that occur on days with temperatures above 40 °C can become megafires that consume hundreds of thousands of hectares in a few days, very difficult to control and that trigger a socio-environmental catastrophe. In simple terms, extreme heat waves and high winds allow fire spread to be explosive, turning from "normal" wildfires to true "firestorms".

The annual series offer a temporal perspective of the occurrence of megafires in Chile. In the last seven years the two record seasons in terms of burned area and three summers with extreme temperature events have been concentrated in central-southern Chile. It is striking that in the summer of 2019, when an extreme event (greater than 40 °C) also occurred in the center-south zone, no mega-fire was recorded. The foregoing emphasizes that in Chile extreme weather provides favorable conditions for the violent propagation of a fire, but not its ignition. Without human ignition and a conducive landscape, fires would not occur.

In short, the CR2 report concludes, a new regime of forest fires is taking place in south-central Chile and projections of a drier and warmer climate in the coming decades will continue to establish it. The study of the factors that affect these events contributes to making well-informed decisions that promote their mitigation in the future. The understanding of aspects associated with extreme weather may improve the prediction of the conditions that favor the development of mega-fires, especially taking into account that the initial attack on fire continues to be essential.



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Although it is impossible to modify the climate, it is possible to generate mechanisms to mitigate its impact. For this reason, Chile is already taking actions to continue improving early warning systems for highly risky meteorological events, promoting the implementation of a forceful policy for the proper management of vegetation and vegetable fuel in the territory, not just around population centers, but throughout the rural-forest landscape, and a reduction in the sources of human ignition in the landscape, whether for accidental or intentional reasons.

In 2020, wildfires affected thirteen of Argentina's twenty-three provinces, where more than 400,000 hectares burned. The first wildfire outbreaks were registered in the Paraná River Delta in February and reached a peak in August, when another large wildfire began spreading in the central province of Córdoba. Residents of several towns had to be evacuated. At least two people died as a consequence of the fires (Global Voices, 2020).

The year 2021 was characterized by the influence of the La Niña climatic phenomenon, translated into an increase in precipitation and a reduction in forest fires in most of the continent. Except for Paraguay, all other South American countries reported burned areas lower or much lower than the average of the historical series. In the cases of Bolivia, Colombia and Paraguay, the regions closest to the Amazon basin were the ones with the highest occurrence of fires, suggesting expansion on the dynamics of the agricultural frontier. In Brazil, the most affected biome was the Cerrado, where fire is regularly used to renew pastures. On the other hand, in Ecuador and Peru, the areas linked to traditional forestry and livestock activity in the Andes Cordillera are those with the highest burned surface. In Chile, the burned area is also linked to agricultural activity in the central zone of the country, but it presented the exceptionality of a significant increase in the occurrence of fires in areas of indigenous conflict in the central-southern zone (European Commission, 2022).

In 2021, three major fires, all involving pine tree plantations, burned near where the Andes cross the Río Negro, Chubut provincial border in Argentina. The first began in January on a plantation in Cuesta del Ternero and then burned through native forest for 40 days. According to firefighters and government officials, the valley's plantations made the wildfire much worse. In March, another fire ignited just 16 kilometers to the southwest and exploded through an abandoned pine plantation in Las Golondrinas, destroying 500 homes in a single afternoon and leaving thousands of people homeless. Together with a third fire nearby, nearly 30,000 hectares burned in total (DeGraf, 2022).

The Copernicus Atmosphere Monitoring Service (CAMS) estimated in 2022 a continuing decline in global total emissions related to the decrease in savanna fires in the tropics. However, CAMS scientists also monitored substantially high emissions in some parts of South America during their peak seasons for wildfires, "where hotter and drier conditions are leading to increased flammability of the vegetation", in the words of CAMS Senior Scientist Mark Parrington. Between January and March, some regions in Paraguay and Argentina experienced record high fire emissions for the time of the year (CAMS2, 2022).

In the very beginning of 2022, a heatwave and the consequent dry conditions across northern Argentina and Paraguay have resulted in record wildfires in the region, with much higher than average fire emissions and smoke transport. In January-February, Paraguay put total estimated carbon emissions from wildfires at just under 5 megatonnes. Meanwhile, total estimated carbon emissions in Argentina in the same period amounted to almost 12 megatonnes, with over 8.5 megatonnes generated by fires in the north of the country, including over 5.5 megatonnes in Corrientes Province and the Iberá Wetlands (located at the border with Uruguay). Argentina's Vice Minister for the Environment stated that the burning wetlands are indicative of the drought level in the region. It was estimated that the wildfires have burnt more than 900,000 hectares, or 10% of the region's surface. The situation in Paraguay began to improve as of February 23, thanks to the arrival of rain (CAMS1, 2022).



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Colombia and Venezuela, where the fire season typically begins in February and lasts until April, also experienced increasing wildfire emissions at the end of January and in early February 2022 related to drier conditions and increased wildfire danger in the Amazon and the Orinoco Valley. This has resulted in significant smoke transport across the region and southwards towards Ecuador and Peru (CAMs1, 2022).

In the second half of August 2022, data from the CAMs Global Fire Assimilation System (GFAS) showed above average daily fire emissions from the Legal Amazon in Brazil resulting in one of the highest total estimated emissions for the period since 2010 (GFAS estimates emissions of atmospheric pollutants from wildfires and biomass burning using satellite-based sensors through fire radiative power – FRP, a measure of the intensity of the fires). The intensity of fires increased to significantly above the 2003-2021 average in Brazil as a whole and in the Legal Amazon in the first few days of September, before dropping to below average later in the month to end the month at about average levels. In contrast to the average daily emissions experienced in the Legal Amazon, August emissions in Amazonas state were significantly higher than the average for the past 15 years. This dynamic continued into September, with Amazonas state recording its highest emissions in 20 years in mid-September (CAMs1, 2022).

In Bolivia, the situation was slightly different - throughout the month of August, GFAS daily total FRP in the country was well below average. However, this situation changed rapidly at the start of September, when the intensity of fires began to increase. After spiking to levels significantly above average around September 8, total FRP dipped to below average in mid-September before returning to higher than average levels for the remainder of the month (CAMs1, 2022).

Fires that started in late November in the province of Tierra del Fuego confirmed that over 10,000 hectares of land have already been consumed by forest fires, making the episode the largest such catastrophe in the history of the province. Although there are various theories as to the origin of the fire, a badly extinguished bonfire seems to be the most plausible of them all. In this scenario, a group of firefighters from the El Bolsón National South Brigade have gone on strike over unpaid wages, Clarín reported (Mercopress, 2022).

Main advances achieved since the last International Wildland Fire Conference - Action taken between the 7th and 8th Conferences:

In the past few years, many cooperation actions have been developed to improve the capacity of South American countries to deal with forest fires:

- Between 2017 and 2022 Ecuador implemented the Forest Fire Reduction Program through integrated fire management actions in the mountains and coast of Ecuador "Amazon without Fire", providing the opportunity to continue the technical actions successfully held in Brazil (1999 - 2009) and Bolivia (2011 - 2016). "Amazonia Sin Fuego Ecuador" a Program of the Ministry of the Environment, Water and Ecological Transition of Ecuador that seeks to reduce the incidence of forest fires, through the implementation of alternative practices to the use of fire, such as agroforestry techniques, conservation agriculture and sustainable livestock at the farm level, contributing to protect the environment and improve the living conditions of the communities. The PASF is developed with the technical and financial support of Italy's and Brazil's Governments and the Development Bank of Latin America (CAF). It promotes actions to prevent forest fires related to the strengthening of technical capacities in fire management, construction of public policy, education and environmental awareness, and the promotion of good agricultural practices as alternatives to the use of fire in rural areas, especially in the provinces with the highest occurrence of forest fires in the country which are the Sierra and Coast regions of the country. In November 2022, the Ministry of the Environment, Water and Ecological Transition of Ecuador began the second phase of the Program with actions planned until 2025. The central focus based on integrated fire management is maintained, incorporating a strategic approach related to governance frameworks and public policies for or the overall management of wildfires. Currently, the program



has the financial aid of the Governments of Ecuador and Italy through the Italo-Ecuadorian Fund for Sustainable Development.

- Alongside and in addition to the FSAP, from June 2019 to March 2022, the project called "Strengthening Technical and Institutional Capacities for the Integral Management of Fire in the Natural Heritage of Ecuador" was executed, which the objective was to promote and strengthen Ecuador actions related to environmental, social, and economic problems, such as forest fires in the country's most sensitive natural ecosystems to fire. This international technical assistance project was executed by the Ministry of the Environment, Water and Ecological Transition through the PASF, along with the support of the Brazilian Cooperation Agency (ABC), the Center for Prevention and Combat of Forest Fires of the Brazilian Institute of Environment and Natural Resources (Prevfogo/Ibama), the National System of Conservation Areas of Costa Rica (Sinac) and the German Technical Cooperation - GIZ, within the framework of the Regional Fund for Triangular Cooperation in Latin America and the Caribbean (BMZ).
- Cooperation with the Spanish Agency for International Development Cooperation – AECID, the Technical Cooperation Project was implemented, in 2018, through which internships between Spain and Peru were financed.
- Cooperation with the Autonomous Organization of National Parks - OAPN of Spain, under the Memorandum of Understanding, signed with the National Service of Natural Areas Protected by the State – SERNANP/Perú, the SERNANP staff did an internship in Spain to learn about the response device for forest fires.
- Cooperation with the International Tropical Timber Organization - ITTO, it co-financed the National Forestry and Wildlife Service - SERFOR, the Project prevention and response to forest fires in tropical forests and forest plantations in Peru, to contribute to the conservation of forest ecosystems and other types of threatened wild vegetation, strengthening the capacities of national and local authorities through the adoption of urgent prevention and quick response actions.
- Cooperation with the Food and Agriculture Organization of the United Nations – FAO, under the project "Developing the scientific and social bases for the restoration of high Andean wetlands and peat bogs", in which trips to Spain were paid for personnel from 05 Reserves of Biosphere for the training of instructor's course in forest fires.
- Colombia has signed different agreements about forest fires:
 - Brasilia Agreement, with the aim of strengthening attention to fires in large spaces, air rescue and support and advisory for the creation of the USAR Brasilia team.
 - Agreement with Chile (CONAF), aimed at strengthening attention to sixth category forest fires.
 - Agreement with Guatemala aimed at exchanging knowledge on the Indigenous Firefighters Program.
- Chile signed a Framework Collaboration Agreement between the National Forestry Corporation and the Pau Costa Ecology and Fire Management Foundation (Spain)-FPC-, the latter having held various training courses for Chilean technicians (prescribed burning course and training of instructors in fire management).
- Through the EGIF program, the Air Operations Coordination (COA) program is being developed, staffed by CONAF/Chile personnel, and trained by coordinators from different organizations with extensive experience.
- In 2020 support was given to the preparation of a proposal by ACTO and the World Forest Fire Network to submit to the IKI fund - Germany: Regional Program "Strategic Actions for the Reduction of Forest Fires in the Amazon Region and their Impacts on Amazon Biodiversity and Climate Change". The proposal was submitted and is being evaluated by the IKI fund.



- Publication of a chapter in a book on forest fires within the framework of RIOCCADAP - Red Iberoamericana de Oficinas de Cambio Climático (RIOCC) – project evaluation of climate change adaptation initiatives – AECID. Available in: Chapter 12 - Forest Fires:

https://www.academia.edu/43579778/Incendios_forestales

https://www.researchgate.net/publication/342847084_Incendios_forestales_En_Adaptacion_frente_a_los_riesgos_del_cambio_climatico_en_los_paises_iberoamericano_-_Informe RIOCCADAPT/stats

http://www.ingebook.com/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=9382)

- In 2021, several actions were carried out, as we can mention:
 - Conclusion of two documents within the scope of the Amazon Cooperation Treaty Organization – ACTO, namely: “Protocol facing the care of forest fires in the Amazon” – within the scope of the Lectícia Pact and "Memorandum of Understanding on Cooperation and Mutual Assistance for the Integrated Fire Management” both bring prospects of bilateral and multinational cooperation between the countries of the Amazon Basin.
 - Creation of the Fire Management Resource Center – South America Region (FMRC-SAR) with CEMAF <https://cemaf.org/>.
 - Articulation with the Inpe/UEA-UK Project on controlled burning data, sending data and inter-institutional articulation in Brazil and with the South American and Central American Networks.
 - Argentina promoted training in fighting forest fires for 70 Bolivian agents.
 - Project "Prevention and Control of Fire Storms in Chile and Colombia" with the support of the Chilean Agency for International Development Cooperation (AGCID) and the Colombian Presidential Cooperation Agency. With the main objective of "Contributing to improving management capacities in the prevention and response to forest fires in Chile and Colombia", strengthening prevention and intervention strategies for the management of highly complex forest fires based on the exchange of experiences between Colombia and Chile”.
 - Online Workshop for Colombian institutions involved in Disaster Risk Management. The following topics were presented by Chile: community prevention, preventive forestry, research to determine the origin and cause of forest fires, and environmental education for the prevention of forest fires.
 - Chile-Argentina binational work called "Joint National Parks", within the framework of the Chile-Argentina Agreement on the Environment and the CONAF Agreement and the Administration of National Parks of Argentina-APN.
- Still in 2021, the Project for Cooperation and Technical Assistance in Protection against Forest Fires from Chile to Paraguay was established, with the assistance and collaboration of the Government of Canada, represented by CONAF in the case of Chile and the National Forestry Institute (INFONA) by Paraguayan. The project was developed in 3 stages.
 - Stage 1: Forest Fire Protection Management Course conducted online from Santiago by CONAF professionals to various professionals from INFONA, the National Secretariat of Emergencies, Volunteer Fire Departments of Paraguay and the National Police of Paraguay, key organizations in the device emergency against Paraguayan forest fires.
 - Stage 2: Specific Technical Assistance in Protection against Forest Fires, for example, on issues of investigation of the origin and cause of forest fires, regulation of the use of fire, prepared communities, and environmental education.
 - Stage 3: Brief Technical Internships in Forest Fire Management in CONAF Chile, for a selected group of Paraguayan technical experts, dependent on CONAF Central and Regional, were conducted.
- In 2021, the group “Grupo de Expertos en Fuegos Forestales de Latinoamérica y el Caribe (GEFF LAC)” was created, which aims to facilitate the exchange of knowledge and good practices in the management of forest fires, which, together with the harmonized information provided by the Global



System of Forest Fires (GWIS) can lead to strategic actions to minimize the impact of forest fires in the region and improve fire policies at national and regional levels. The GEF LAC is an initiative of the European Union and is composed of fire managers in relevant ministries and agencies of countries in Latin America and the Caribbean, who are responsible for managing fires in the different stages of the fire cycle, from prevention, setting up, fighting wildfires, and even restoring areas damaged by wildfires.

- Between 2021 and 2022, the Regional Fire Program for South America began. The program aims to strengthen the region's technical and human resources and empower the alliance between partners and the cooperation between countries that participates in the program to prevent, manage, and respond to forest fires, especially in the vast Amazon territory. This program involves Brazil, Peru, Colombia, and Ecuador. The main expected results are:
 - Fire prevention strategies focusing on socioeconomic factors and land use.
 - Regional exchange of information, synchronized coordination, management of incidents and standardized security procedures.
 - Regional agreements on mutual assistance and trilateral cooperation.
 - Standard classification and resumé systems for the brigade members
 - Exchange of information on innovative financial mechanisms.
- In June 2022, the team from the Analysis and Diagnosis area of the Department of Prevention and Mitigation conducted a remote training workshop for SPLIF staff in Bariloche on issues of Investigation the origin and cause of forest fires During the two days of the workshop, topics on the cause classification system, fire behavior, determination of the starting area, physical evidence investigation method, protection of the occurrence site, and presentation of practical cases were discussed in depth.
- In September 2022, in order to learn about CONAF/Chile's organization for preventing and fighting forest fires and observe how it works in the field, a Honduran delegation, headed by the National Forest Conservation Institute, toured the Valparaíso, O'Higgins, and Metropolitan regions.
- In October 2022, specialists from the US Forest Service held a course on techniques for investigating the origin and causes of forest fires for the professionals who work in the Analysis and Diagnostic Units (UAD) of CONAF/Chile. The course was held on the Las Cenizas farm in Valparaíso.
- Fire-Adapt project: with the objective of assessing the role of integrated fire management in climate change adaptation for ecosystem services in tropical and subtropical regions, the project, approved in 2022, has started in 2023 and it will be continued until 2026. It is internationally funded by the European Union and with the participation of Argentina, Bolivia, Brazil, Colombia, Spain, France, Italy, Mexico, Portugal, and the United Kingdom
- International meetings: the South America Region was represented in:
 - International Liaison Committee (ILC) and the Portuguese Conference Organizing Committee for the 8th International Wildland Fire Conference.
 - ACTO Webinar on 08/12/2021 under the theme "Integrated Fire Management among ACTO Member Countries - Memorandum of Understanding for Cooperation and Assistance" with the participation of Prevfogo.
 - Attendance at four Interpol Seminars on criminal investigation of forest fires between 06/08/2020 to 06/29/2020.
 - Participation in virtual meetings held between the World Network and the South American Regional Forest Fire Network.
 - Participation as a speaker at the 16th International Wildland Fire Safety Summit & 6th Human Dimensions of Wildland Fire Conference, May 24-27th, 2021.



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Towards an International
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May 16-19th
2023

- International support in fighting forest fires:
 - In 2019, 197 brigade members and equipment were sent from Argentina to Bolivia to help fight the fires in the Amazon.
 - In 2022, Bolivia sent 70 forest firefighters to help with the fires in Corrientes/Argentina
 - In 2023, 63 brigade members and 15 vehicles were sent from Argentina to Chile.

Conclusions and recommendations

- Promote land management through the implementation of integrated fire management actions.
- Recognize the role of fire as an element that must be managed.
- Promote local, national, and international inter-institutional articulation.
- Elaborate regulations according to the current reality and future projections.
- Generate capacities in the different players and roles to solve the problem.
- Generate information and research that allows better decisions to be made.
- Make integrated fire management strategies visible as climate change mitigation and adaptation actions.
- Rescue ancestral knowledge by incorporating society in general as part of the solution.
- The 8th Conference must contribute as mandatory for all countries with a high risk of forest fires, which must guarantee the financial resources and the structure or system responsible for its management, as well as the international cooperation in all its interventions or projects. They must consider the risk of forest fires, taking as a premise, that natural spaces cannot be preserved if their risks are not managed.

References

Buytaert W., Célleri R., De Bièvre B., Cisneros F., Wyseure G., Deckers J., Hofstede R. 2006. Human impact on the hydrology of the Andean páramos. *Earth-Science Reviews* 79 (2006) 53–72. Available on <https://condesan.org/recursos/human-impact-on-the-hydrology-of-the-andean-paramos/>

¹CAMS - Copernicus Atmosphere Monitoring Service. South America sees record wildfire activity in early 2022. Published on 2nd March 2022. Available on <https://atmosphere.copernicus.eu/south-america-sees-record-wildfire-activity-early-2022>

²CAMS - Copernicus Atmosphere Monitoring Service. Wildfires: Amazonas records highest emissions in 20 years. Published on 14th October 2022. Available on <https://atmosphere.copernicus.eu/wildfires-amazonas-records-highest-emissions-20-years>

³CAMS - Copernicus Atmosphere Monitoring Service. Extreme wildfires in Europe, South America and North America in 2022. Published on 12th December 2022. Available on <https://atmosphere.copernicus.eu/copernicus-extreme-wildfires-europe-south-america-and-north-america-2022>

CPC/NOAA - Climate Prediction Center - National Centers for Environmental Prediction - National Weather Service. https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.shtml Updated on 12th January 2023.

Center for Climate and Resilience Research. <https://www.cr2.cl/analisis-cr2-meteorologia-extrema-uno-de-los-factores-tras-los-incendios-de-febrero-2023-en-el-centro-sur-de-chile/>.

DeGraf, D. Tree plantations in Patagonia are the site of wildfires and land dispute. *Mongabay Series: Global Forests, Latin America*. Published on 6 July 2022. Available on <https://news.mongabay.com/2022/07/tree-plantations-in-patagonia-are-the-site-of-wildfires-and-land-dispute/>



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European Commission. Incendios Forestales en Latinoamérica em 2021. Published on 2022.

GGWeather - Golden Gate Weather Services. El Niño and La Niña Years and Intensities, based on Oceanic Niño Index (ONI). Available on <https://ggweather.com/enso/oni.htm>. Updated thru Nov-Dec-Jan 2022-2023.

Global Voices. Devastating fires rage in Argentina as economic interests become key suspect. Published on 16th October 2020. Available on <https://globalvoices.org/2020/10/16/devastating-fires-rage-in-argentina-as-economic-interests-become-key-suspect/>

GWIS – Global Wildfire Information System. Available on <https://gwis.jrc.ec.europa.eu/apps/country.profile/continent/SA> - Access on 2nd February 2023.

INPE – Brazilian National Institute for Spatial Research. Available on <http://enos.cptec.inpe.br/> Text updated on 25th January 2023.

IPCC - Intergovernmental Panel on Climate Change. Impacts of 1.5°C Global Warming on Natural and Human Systems, 2018. Available in <https://www.ipcc.ch/sr15/chapter/chapter-3/>

Kumar, S.V., A. Getirana, R. Libonati, C. Hain, S. Mahanama, N. Andela 2022: Changes in land use enhance the sensitivity of tropical ecosystems to fire-climate extremes, Sci. Rep 12, 964, doi:10.1038/s41598-022-05130-0.

Mercopress – South Atlantic News Press. Forest fires in Argentine Tierra del Fuego the worst ever. Published on 17th November 2022. Available on <https://en.mercopress.com/2022/12/17/forest-fires-in-argentine-tierra-del-fuego-the-worst-ever>

Oliveira U, Soares-Filho B, Bustamante M, Gomes L, Ometto JP and Rajão R (2022) Determinants of Fire Impact in the Brazilian Biomes. Front. For. Glob. Change 5:735017. doi: 10.3389/ffgc.2022.735017

Smith, A.J.P., Jones, M.W., Abatzoglou, J.T., Canadell, J.G. & Betts, R.A. ScienceBrief Review: Climate change increases the risk of wildfires, September 2020. In: Critical Issues in Climate Change Science, edited by: C. Le Quéré, P. Liss, P. Forster. <https://doi.org/10.5281/zenodo.4570195>

UNDRR - United Nations Office for Disaster Risk Reduction – Regional Office for the Americas and the Caribbean. Wildfires in Latin America: A preliminary analysis, messages and resources. Version 13 August 2021. Available on <https://www.undrr.org/publication/wildfires-latin-america-preliminary-analysis-messages-and-resources>

UNEP – United Nations Environmental Program. Spreading like Wildfire: The Rising Threat of Extraordinary Landscape Fires. Published on 23th February 2022. Available on <https://www.unep.org/resources/report/spreading-wildfire-rising-threat-extraordinary-landscape-fires>

Voiland, A. NASA Earth Observatory. A Human Fingerprint on the Pantanal Inferno, 2022. Available on <https://earthobservatory.nasa.gov/images/149398/a-human-fingerprint-on-the-pantanal-inferno>

WMO – World Meteorological Organization. State of the Climate in Latin America & the Caribbean 2020. Published on 17th August 2021. Available on <https://www.preventionweb.net/publication/state-climate-latin-america-and-caribbean-2020>