AMAZONIA ON FIRE:
PERSPECTIVES FROM THE SCIENCE PANEL FOR THE AMAZON (SPA) ON THE 2024 WILDFIRE EMERGENCY

The Amazon has been engulfed in record-breaking fires and smoke throughout August and September 2024. This document captures the perspectives of leading science experts on the current wildfire crisis, reflecting on its origins, impacts, and potential mitigation strategies.

The Science Panel for the Amazon (SPA) Secretariat engaged with renowned experts and SPA members, **Jhan-Carlo Espinoza** from *Institut de Recherche pour le Développement (IRD)* in Peru; **Dolors Armenteras** from *Universidad Nacional de Colombia*; and **Ane Alencar** from *Instituto de Pesquisa Ambiental da Amazônia (IPAM)* in Brazil. **Natalia Calderón**, Executive Director of *Fundación Amigos de la Naturaleza (FAN)* in Bolivia, also contributed her insights to uncover this emergency's local, regional, and global dimensions.

Origins of the 2024 Amazon Wildfires

The surge in wildfires across the Amazon in 2024 results from a **complex interplay of extreme climate conditions and human activities.** Natalia Calderón points out that "the frequency and severity of wildfires have become critical issues," with severe and prolonged drought conditions starting in May 2024 (commensurable with the severe droughts of 2023), leading to record levels of heat and burned areas in most of the Amazon, including Bolivia's Pantanal and Chiquitania regions. Jhan-Carlo Espinoza observes that "almost all fires in the Amazon are human-induced," exacerbated by an intense El Niño phenomenon and an unusually dry period extending from late 2022, through 2023, and into 2024. This prolonged drought, coupled with historically low river levels and unusually warm conditions in the Northern Tropical Atlantic, has heightened the Amazon's flammability.

Although illegal deforestation was reduced in Amazonian countries in 2023 and 2024 (compared to 2022), Dolors Armenteras emphasizes that **deforestation for agricultural expansion and illegal activities**, such as land grabbing, significantly fuel the fire crisis, with fire being used as a tool for land clearing. Weak law enforcement enables these illegal practices to persist unchecked. Ane Alencar concurs, noting that while extreme climate conditions "favor the propagation and spread of fires," the primary ignition sources are human activities, particularly agricultural practices and arson.

Historically, slash-and-burn agriculture, or "shifting cultivation," was a traditional farming technique used by Indigenous peoples and local communities (IPLCs) in the Amazon on a small scale. This practice involves cutting down small forest patches and burning the vegetation to release nutrients for crops. While this technique enriched the soil and supported sustainable agriculture in the past, current climate conditions and its use for large-scale agriculture and land clearing for other purposes have made it increasingly dangerous.

In summary, we are witnessing "the perfect storm scenario of a burning Amazon," with record-breaking temperatures and droughts due to climate change and variability, stronger winds and increased dry biomass due to forest degradation and deforestation, and an increased number of human-caused ignitions due to cost-efficiency and economic profitability accompanied by weak governance.

Immediate and Long-term Impacts

The 2023 and 2024 wildfires in the Amazon are inflicting **severe immediate damage with significant long-term regional and global implications**, including impacts on biodiversity, forest vulnerability, and climate patterns.

Dolors Armenteras highlights the immediate destruction of biodiversity and habitats, particularly affecting fire-sensitive species. She warns that "repeated fires degrade forest structure, alter species composition, and reduce ecosystem resilience," potentially **pushing the forest towards a tipping point** where it could transition towards an open-canopy and highly degraded ecosystem.

Ane Alencar explains that the natural fire return interval of the Amazon—defined as the average time period between natural wildfires occurring in a specific area—becomes increasingly vulnerable after the first fire. The region's natural fire return interval of 200 to 1,000 years has been affected by the much higher frequency of severe droughts in the last decades (2005, 2010, 2015, 2016, 2023 and 2024). Tree mortality opens the canopy and increases fuel material on the forest floor, creating "a perfect recipe for escaped fires." Additionally, the smoke disrupts rainfall, exacerbates drought conditions, and hinders forest recovery.

Jhan-Carlo Espinoza elaborates on the broader implications of the fires, highlighting that they release substantial amounts of CO_2 and other Greenhouse Gases (GHGs) like Methane (CH_4), Nitrous Oxide (N_2O), Carbon Monoxide (CO), Volatile Organic Compounds (VOCs) and Particulate Matter (PM) which **intensify global warming**. He describes a "vicious cycle" where increased forest fires contribute to global warming, leading to prolonged dry seasons and further degradation, which in turn increases the likelihood of more fires. This cycle disrupts climate patterns both regionally and globally.

Dolors Armenteras adds that the fires undermine the Amazon's role as a crucial carbon sink, further **aggravating global climate change**. She notes that increased deforestation and fire activity alter regional hydrological cycles and atmospheric circulation patterns. Espinoza points out that continued deforestation in the Amazon could reduce precipitation by up to 30% in the Peruvian and Bolivian Andes, as well as over the Central and the Southeastern parts of South America (especially the Cerrado Biome), as Amazon evapotranspiration significantly contributes to regional rainfall.

The emergency is affecting not only the Amazon forests, but also rural and urban centers in and outside of the Amazon, across Bolivia, Peru, Brazil, and as far as Argentina, Paraguay and Uruguay. These communities are facing significant health challenges due to the air pollution caused by the fires. Poor air quality can also disrupt transportation systems, with smoke closing airports and affecting major cities like São Paulo. This disruption to air quality and transportation underscores the broader, far-reaching social and economic impacts of the fires on both health and infrastructure.

Impacts on Amazonian Populations

The 2023 and 2024 wildfires severely impact Indigenous peoples and local communities, disrupting **health, livelihoods, and economic stability**. As stated previously, smoke from the fires poses a major health concern. Ane Alencar explains that pollutants like CO_2, N_2O, black carbon, and 2.5PM, can lead to respiratory and circulatory diseases. In places like Manaus, these health issues result in increased medical costs, with vulnerable groups such as babies and the elderly being particularly at risk.

Economically, the fires destroy crops, animals, and infrastructure such as fences and energy transmission lines, leading to widespread financial losses. Dolors Armenteras stresses that fires not only damage forest resources essential for **food, medicine, and cultural practices**, but also undermine traditional land management systems, while communities face growing pressure from illegal groups.

Natalia Calderón points out that local governments face significant challenges in responding to the crisis. In this regard, over 50 communities in Santa Cruz, Bolivia, have already been affected, losing material goods and livelihoods, with worsening weather conditions putting more areas at risk of severe damage in the coming months.

Recommendations and Mitigation Strategies

The 2023 and 2024 Amazon wildfires underscore the urgent need for comprehensive, multifaceted strategies to prevent and mitigate future fire events.

The experts consulted by the SPA Secretariat recommend a combination of policy reforms, governance improvements, and practical actions.

1. Expanding Protected Areas and Indigenous Territories, and Improving Monitoring

A key recommendation is to expand Protected Areas (PAs) and Indigenous Territories (ITs), and establish stronger mechanisms to safeguard them from illegal activities like land clearing and grabbing. Jhan-Carlo Espinoza highlights the importance of increasing these protections to control activities in these lands and to prohibit or prevent fires, which is especially critical during prolonged dry periods. These efforts should include enhanced and improved monitoring systems for early fire detection and rapid response and continuous surveillance of climatic conditions to identify high-risk periods, given that nowadays, there is a limitation of early warning systems (like the GOES16 satellite) which only identify fires when the burned area reaches 30 to 40m^2 (taking about 1.5 to 2 hours after the fire is ignited), thus constraining the real time response actions.

2. Implementing Integrated Fire Management and Community Involvement

Dolors Armenteras advocates to first tackle illegal deforestation, illegal selective logging and other illicit activities in fire-sensitive ecosystems such as the Amazon, but also for Integrated Fire Management (IFM), which combines traditional fire practices with modern techniques such as green firebreaks and controlled burns to manage fuel loads and reduce the risk of escaped fires. The success of IFM hinges on community involvement, as Indigenous peoples and local communities possess invaluable knowledge about land management. Engaging these communities in fire prevention efforts ensures that measures are culturally appropriate and enhances the effectiveness of fire management. Given the Amazon's ongoing deforestation, forest degradation and climate change challenges, there is an urgent need to adapt and rethink traditional practices like slash-and-burn. Integrating Indigenous and Local Knowledge (ILK) and other sustainable development practices is essential for protecting the forest and the livelihoods of those who depend on it. On the other hand, while these traditional practices are an important part of the livelihoods of amazonian populations, extreme climate events, such as droughts and heat waves make fires a big threat to the Amazon. Therefore, a legal framework that prohibits forest fires accompanied by capacity building for IPLCs, farmers and cattle ranchers could also be effective, given that modern agriculture no longer requires using fires to prepare soils.

3. Creating Enabling Conditions and Addressing Criminal Activity

Natalia Calderón stresses that creating the right enabling conditions—such as political commitment and oversight, institutional frameworks, adequate financial resources, and inclusive governance processes—is essential to implementing effective fire management. Addressing the socio-economic drivers behind illegal activities, like land tenure insecurity and inequality, is also critical. As Dolors Armenteras points out, "criminal minds are behind many of the fires," making it crucial to address these underlying factors to reduce the overall fire risk in the region.

The complex interactions between climate extremes, ecosystems, communities, and economic incentives, make fire risk management an evolving challenge. To secure the Amazon's **sustainable and resilient future**, comprehensive policies must address fire prevention while promoting biodiversity conservation, climate adaptation, reducing illegal activities and promoting sustainable livelihoods. The Science Panel for the Amazon (SPA) will continue to engage with regional and global stakeholders to advance policy-relevant, science-based recommendations for Amazon conservation and sustainable development, such as zero deforestation, forest degradation and wildfires, large-scale forest restoration, sustainable infrastructure, and supporting the socio-bioeconomy of healthy standing forests and flowing rivers, among others.

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