An aerial photograph showing a lush green forest with a winding river. In the foreground, there is a large area of deforested land, appearing as a brown, skeletal landscape with many dead trees and exposed soil. The contrast between the vibrant green forest and the brown deforested area is stark.

DEFORESTATION FRONTS

DRIVERS AND RESPONSES IN A CHANGING WORLD

SUMMARY



Joelma Diarroi from Associação Povo Indígena Jiahui (APIJ), photographed at Kanindé Ethno-Environmental Defense Association, located in the surroundings of Porto Velho, Rondônia, Brazil.

© Marizilda Cruppe / WWF-UK

WWF

WWF is one of the world's largest and most experienced independent conservation organizations, with over 5 million supporters and a global network active in more than 100 countries. WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption.

Citation: Pacheco, P., Mo, K., Dudley, N., Shapiro, A., Aguilar-Amuchastegui, N., Ling, P.Y., Anderson, C. and Marx, A. 2021. Deforestation fronts: Drivers and responses in a changing world. WWF, Gland, Switzerland.

WWF, 28 rue Mauverney, 1196 Gland, Switzerland. Tel. +41 22 364 9111 CH-550.0.128.920-7

WWF® and World Wide Fund for Nature® trademarks and ©1986 Panda Symbol are owned by WWF-World Wide Fund For Nature (formerly World Wildlife Fund). All rights reserved.

For contact details and further information, please visit our international website at wwf.panda.org/deforestationfronts

Design by Miller Design UK

Cover photography: © Marizilda Cruppe / WWF-UK

A HEALTHY PLANET BEGINS WITH HEALTHY FORESTS AND PEOPLE

Last year brought a profound realization that our health as individuals and as a society is deeply connected to the health of nature and the many services it provides. The spread and emergence of zoonotic diseases such as Covid-19 is yet another tragic consequence and indicator of the accelerating pressure we're putting on natural systems, and the precipitous loss of nature driven by our current unsustainable development models.

Forests are a lifeblood of our economies and our health – from the air we breathe to the wood we use. Covering nearly one-third of the Earth's land area, forests are home to more than half of the world's land-based species and are the source of 75% of the world's freshwater. More than a billion people live in and around forests, and they are the physical and spiritual home to many indigenous peoples and local communities. Forests are key carbon sinks – tropical forests alone store seven times more carbon than humanity emits every year and draw down up to 1.8 gigatonnes of carbon annually.

Yet forests today are in crisis, devastated by fires, converted and degraded for agriculture, for fuel and for timber. The mismanagement of the world's forests is ramping up carbon emissions, ravaging biodiversity, destroying vital ecosystems, and affecting the livelihoods and wellbeing of local communities as well as societies globally. And the situation is getting worse. The world's current unsustainable food systems mean that instead of repurposing degraded land for sustainable agricultural use, forests, savannahs and grasslands continue to be destroyed.

Deforestation and forest degradation are major drivers of zoonotic diseases. When healthy, forests are a buffer against diseases like Covid-19. But when forests are under attack, their safeguards are weakened, leading to a spillover of diseases.

It's time to value what nature provides to us, and a key focus for that action has to be our forests. As this report shows, we need collective action to implement tailored and integrated solutions that work for people and nature. And this shift needs to happen across the chain – from the countries that are home to forests to countries where consumption patterns and lifestyles are contributing to deforestation.

All this lends further weight to the need for a New Deal for Nature and People that puts nature on a path to recovery by 2030 and sets us on course to achieve real sustainable development, and a carbon-neutral, nature positive, equitable society. Among other goals, we're calling for an end to the loss of natural spaces like forests, and measures to halve the negative impacts of production and consumption.

We know what has to be done: protect critical biodiversity areas and sustainably manage forests, halt deforestation and restore forest landscapes, recognize and protect the tenure rights of indigenous peoples and local communities, support local people to build sustainable livelihoods, enhance landscape governance, and transform our economies, food and financial systems to better account for the value of nature. With a strong enough global coalition of the willing – governments, businesses, local communities, Indigenous Peoples, civil society organizations and consumers – we can do it.

Let's use this crisis as a wake-up call to halt nature loss, and safeguard forests, one of our world's most precious resources.



Marco Lambertini,
Director General
WWF International

SUMMARY

The causes, pace and magnitude of deforestation and forest degradation have changed over time. The way that different causes of deforestation link together and the effects they have on forests varies across regions.

Globally, a multitude of approaches have been implemented to halt deforestation and forest degradation. While progress has been made in halting forest loss and degradation, both continue at alarming rates.

This report provides a comprehensive analysis of deforestation connecting drivers and responses globally by taking a closer look at 24 “deforestation fronts” – places that have a significant concentration of deforestation hotspots and where large areas of remaining forests are under threat. Over 43 million hectares were lost in these fronts between 2004 and 2017, an area roughly the size of Morocco.

The analysis presented here focuses on the tropics and sub-tropics, which accounted for at least two-thirds of global forest cover loss from 2000 to 2018 and where forest fragmentation is significant. Nearly half of the standing forests in these 24 deforestation fronts have suffered some type of fragmentation.

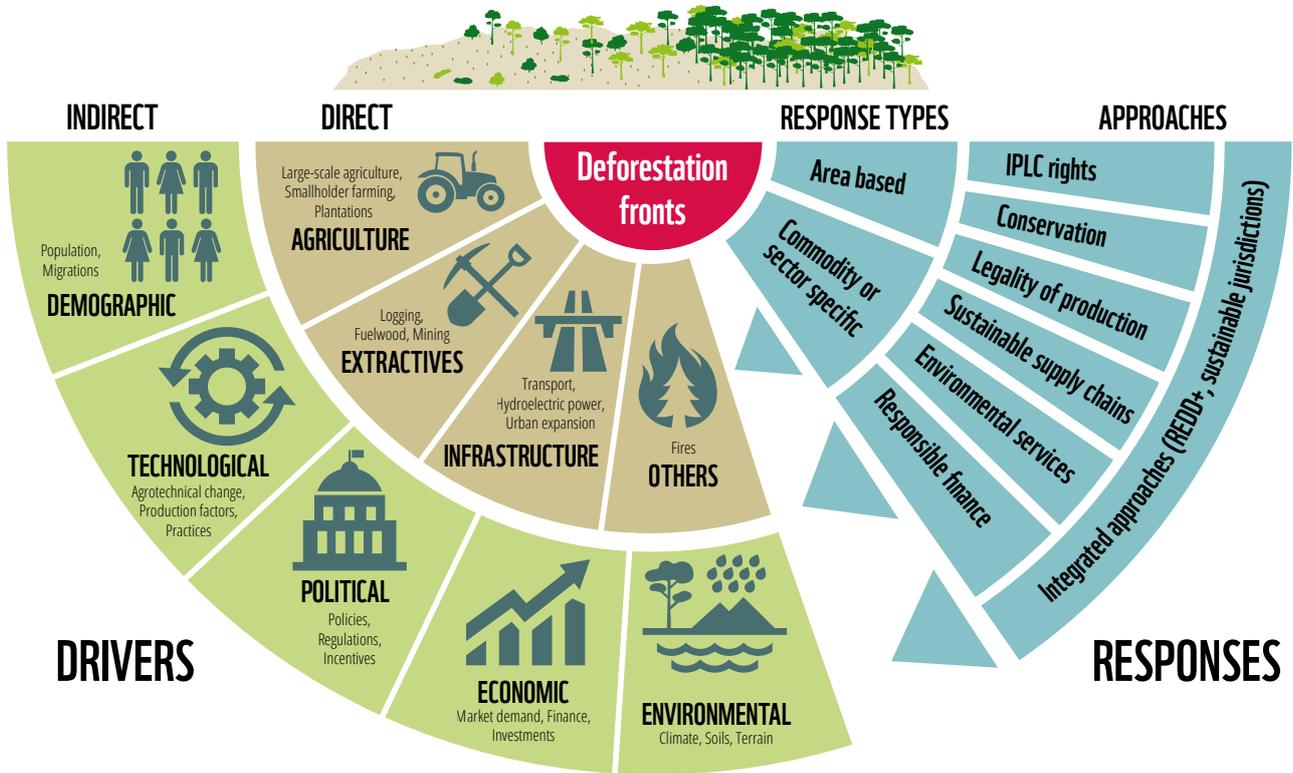
Deforestation tends to oscillate over time. Recent trends indicate that deforestation will persist in these fronts unless there is collective action and more integrated approaches tailored to each front. To be more effective, the different responses to halt deforestation and forest degradation have to reinforce each other.



Rainforest in Borneo, Malaysia, destroyed to make way for oil palm plantations.
© Shutterstock / Rich Carey / WWF-Sweden

Linking drivers and responses

The following framework shows the links between drivers of deforestation globally and the existing approaches to address them. How these approaches address drivers plays an important role in shaping the dynamics of deforestation fronts, which are at the centre of this analysis. Assessing the socio-environmental impacts of deforestation in these fronts is beyond the scope of this analysis.



Expansion of commercial agriculture (both large and small scale) and tree plantations are by far the greatest drivers of deforestation, with land speculation playing a strong role in several local contexts. Infrastructure and extractive activities, particularly the expansion of mining, are increasingly important drivers. These drivers take different shapes across locations and change over time.

Multiple approaches and responses have emerged from state and non-state actors to tackle deforestation. Some have worked better than others, yet all have limits. Acknowledging the potential and limits across approaches and responses is critical, as well as the synergies that are needed for responses to be more effective to tackle deforestation and forest degradation while avoiding negative social impacts, and achieving more inclusive and equitable outcomes.

Our findings are designed to help policy-makers, the corporate sector, civil society organizations and anyone working to halt and reverse deforestation better understand what approaches are needed to have lasting impact at scale.

Area-based responses – such as protected & conserved areas, recognition of indigenous peoples and local communities (IPLC) tenure rights and moratoria on conversion of

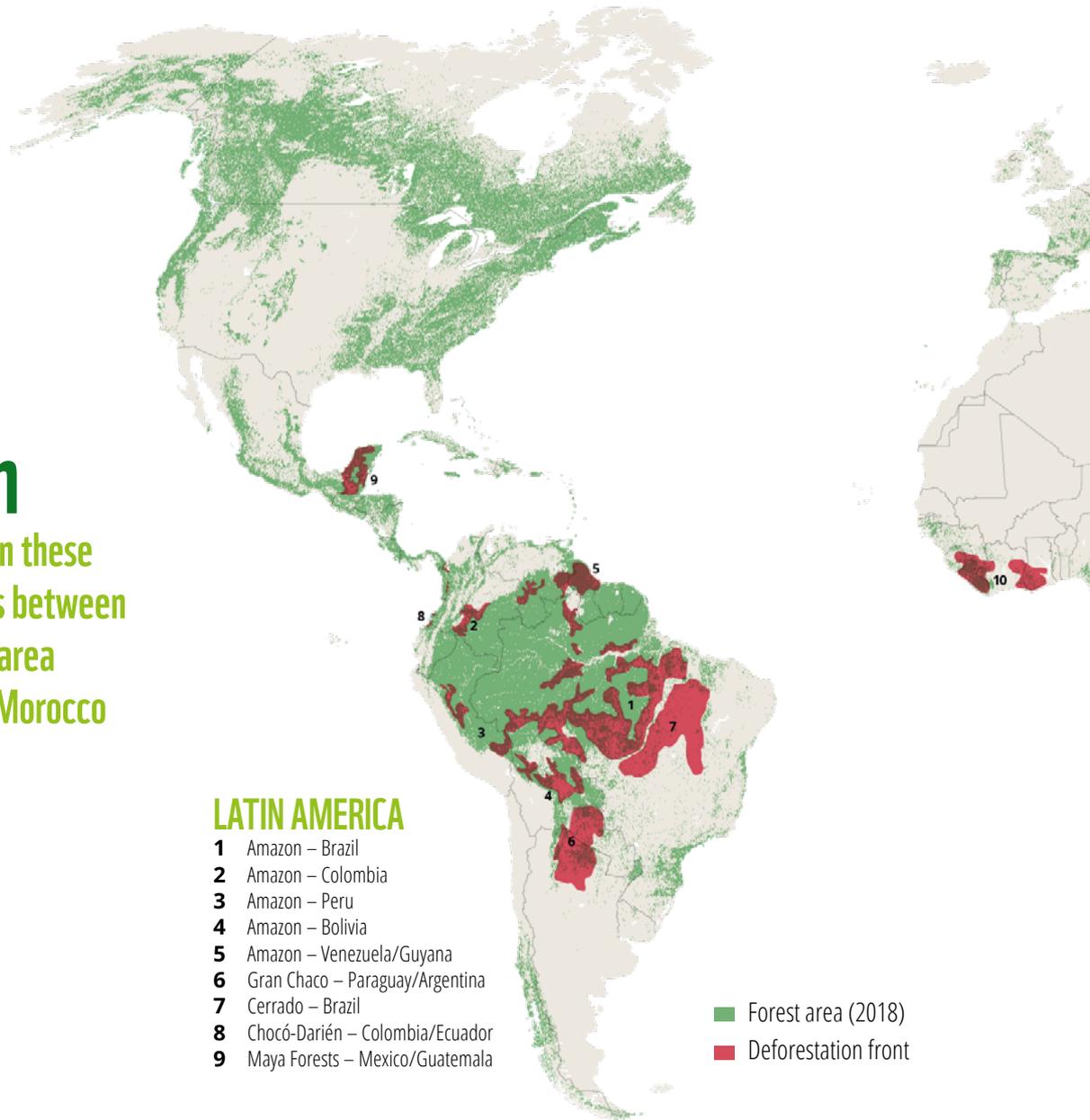
forestlands – can be effective in preventing the loss of threatened forests but don't help stop deforestation beyond their own boundaries and have different social implications. In turn, commodity or sector specific responses like voluntary certification, payments for environmental services (PES) and deforestation-free supply chains are important but thus far have had limited impact at scale. Additional integrated approaches are emerging motivated by result-based payments for reducing deforestation as well as jurisdictional and landscape approaches. The latter leverage the power of markets and finance but still require active state intervention at the national and sub-national levels and public-private-partnerships, ensuring the conditions for wider participation of local stakeholders, including IPLCs.

More ambitious action is needed to build on existing responses across scales and within landscapes, while improving conditions for wider uptake of solutions that are more effective to reduce deforestation and forest degradation, with considerations of social inclusion and equity. Ultimately though, real impact will come from transforming our economies, and food and financial system and development paradigm shifts to place nature and people at the centre.

DEFORESTATION FRONTS

Over
43 million

hectares were lost in these
deforestation fronts between
2004 and 2017, an area
roughly the size of Morocco



LATIN AMERICA

- 1 Amazon – Brazil
- 2 Amazon – Colombia
- 3 Amazon – Peru
- 4 Amazon – Bolivia
- 5 Amazon – Venezuela/Guyana
- 6 Gran Chaco – Paraguay/Argentina
- 7 Cerrado – Brazil
- 8 Chocó-Darién – Colombia/Ecuador
- 9 Maya Forests – Mexico/Guatemala

■ Forest area (2018)
■ Deforestation front

Most forest loss is clustered in 24 deforestation fronts across Latin America, sub-Saharan Africa, Southeast Asia and Oceania. Several appeared in WWF's previous analysis in the 2015 [Living Forests Report](#), including the Amazon, Central Africa, Mekong and Indonesia. In addition, new fronts have appeared in West Africa (e.g. Liberia, Ivory Coast, Ghana), East Africa (e.g. Madagascar) and Latin America, including the Amazon in Guyana and Venezuela and the Maya Forest in Mexico and Guatemala.

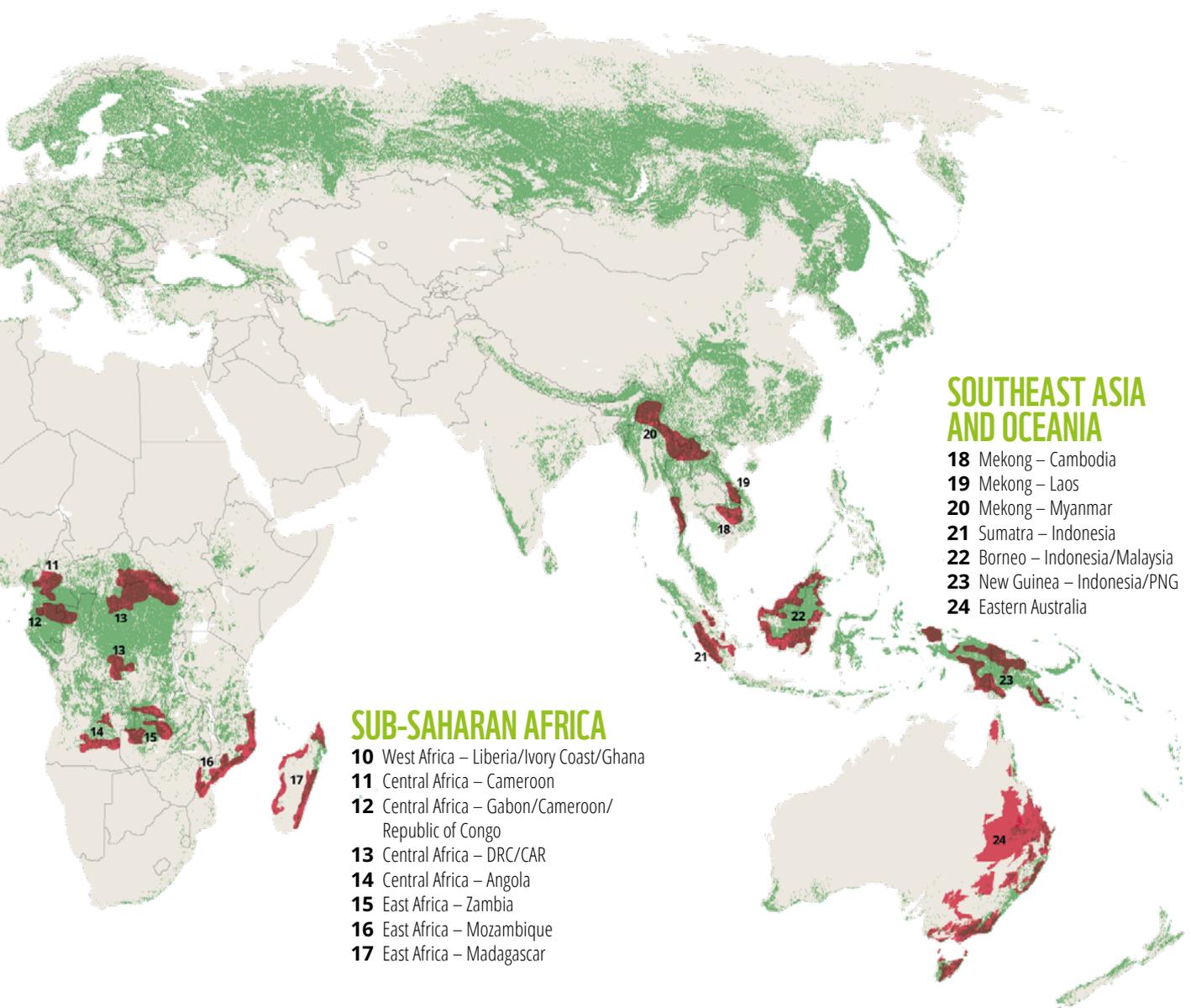
The 24 deforestation fronts cover an area of 710 million hectares. Half of this area is currently forested (377 million hectares or about a fifth of the world's total forest area in the tropics and sub-tropics), with primary or intact forests making up around two-thirds (256 million hectares). Over 10% of the forest area in the deforestation fronts, about 43 million hectares, was lost within the boundaries of these fronts between 2004 and 2017.

Nearly half of the standing forest in these fronts – around 45% – has experienced some type of fragmentation. Fragmented areas and forest edges are more prone to fire, and are more susceptible to human intervention due to higher accessibility.

Drivers of deforestation – old and new trends

We already know a good deal about the drivers of deforestation, from agriculture and plantations to infrastructure development and extractive activities. Yet the shifting influence of these drivers over time is less well understood. These drivers tend to change depending on global market and investment trends, national political shifts, and local political economies, among others.

One common thread is the steady development of roads associated with the expansion of mining and logging that is often followed by commercial agriculture. Conversion to agriculture is also linked to climatological and topographic conditions, market logistics and land speculation that tend to persist in frontier areas. A distinctive driver of deforestation



SUB-SAHARAN AFRICA

- 10 West Africa – Liberia/Ivory Coast/Ghana
- 11 Central Africa – Cameroon
- 12 Central Africa – Gabon/Cameroon/ Republic of Congo
- 13 Central Africa – DRC/CAR
- 14 Central Africa – Angola
- 15 East Africa – Zambia
- 16 East Africa – Mozambique
- 17 East Africa – Madagascar

SOUTHEAST ASIA AND OCEANIA

- 18 Mekong – Cambodia
- 19 Mekong – Laos
- 20 Mekong – Myanmar
- 21 Sumatra – Indonesia
- 22 Borneo – Indonesia/Malaysia
- 23 New Guinea – Indonesia/PNG
- 24 Eastern Australia

is cattle ranching and soy in Latin America – the former primarily in the Amazon and the latter in Cerrado and Chaco – and timber and oil palm plantations in Southeast Asia.

In Africa subsistence agriculture remains a key driver of forest loss, yet commercial agriculture tends to expand over time, accompanied by small-scale timber extraction for energy, though this is mainly associated with forest degradation rather than deforestation.

A new trend in several regions is the increasing number of smallholders growing commodity crops such as cacao, oil palm, maize and raising cattle – sometimes for export but often to fulfil a rapidly rising demand in domestic markets. Deforestation also expands in places where there is pressure from informal mining operations and expansion of human settlements.

Illegal large-scale logging, often to supply international timber markets, has also led to forest degradation, which is often followed by forest clearing. Large-scale logging, however,

is slowly being replaced by informal smaller-scale timber operations linked to domestic and regional markets, mainly for fuelwood and construction. Timber extraction is also used to finance further forest clearing in some frontier areas.

The influence of indirect pressures underpinning these trends is less clear. Economic and global population growth leading to increased food consumption has led to an expansion of commercial agriculture. Growing demand also fuels land speculation and encroachment on public forestlands and lands under control of IPLCs. These trends are often accompanied by the expansion of illegal and/or informal economies, activities that in some cases tend to involve local and business elites.

In addition, governments tend to stimulate investment in agriculture and extractive industries, linking it to their objectives of economic growth, but often not taking fully into account the needs and perspectives of rural people including IPLCs, smallholder farmers and landless rural poor.

DRIVERS OF DEFORESTATION BY FRONT

The following maps show the 24 deforestation fronts, which were identified based on emerging deforestation hotspots analysis in the tropics and sub-tropics, identifying places where deforestation significantly increased from 2004-2017. Remaining forest is shown in green. The icons indicate the direct drivers for each of the fronts: primary causes of forest loss and/or severe degradation are in red and secondary causes are denoted in orange.

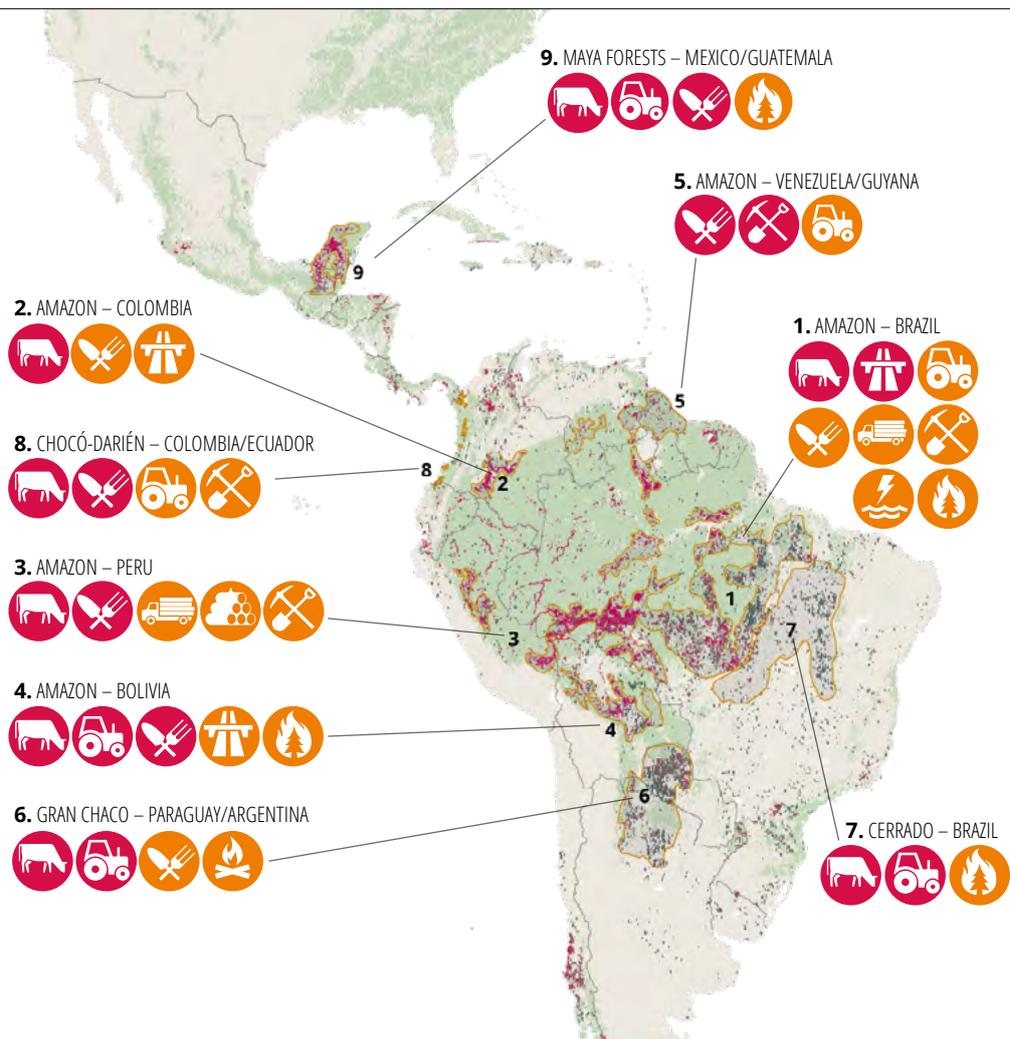
-  Cattle ranching
-  Large-scale agriculture
-  Smallholder farming
-  Tree plantations
-  Large-scale logging
-  Small-scale timber
-  Fuelwood and charcoal
-  Mining
-  Transport infrastructure
-  Hydroelectric power
-  Urban expansion
-  Fires

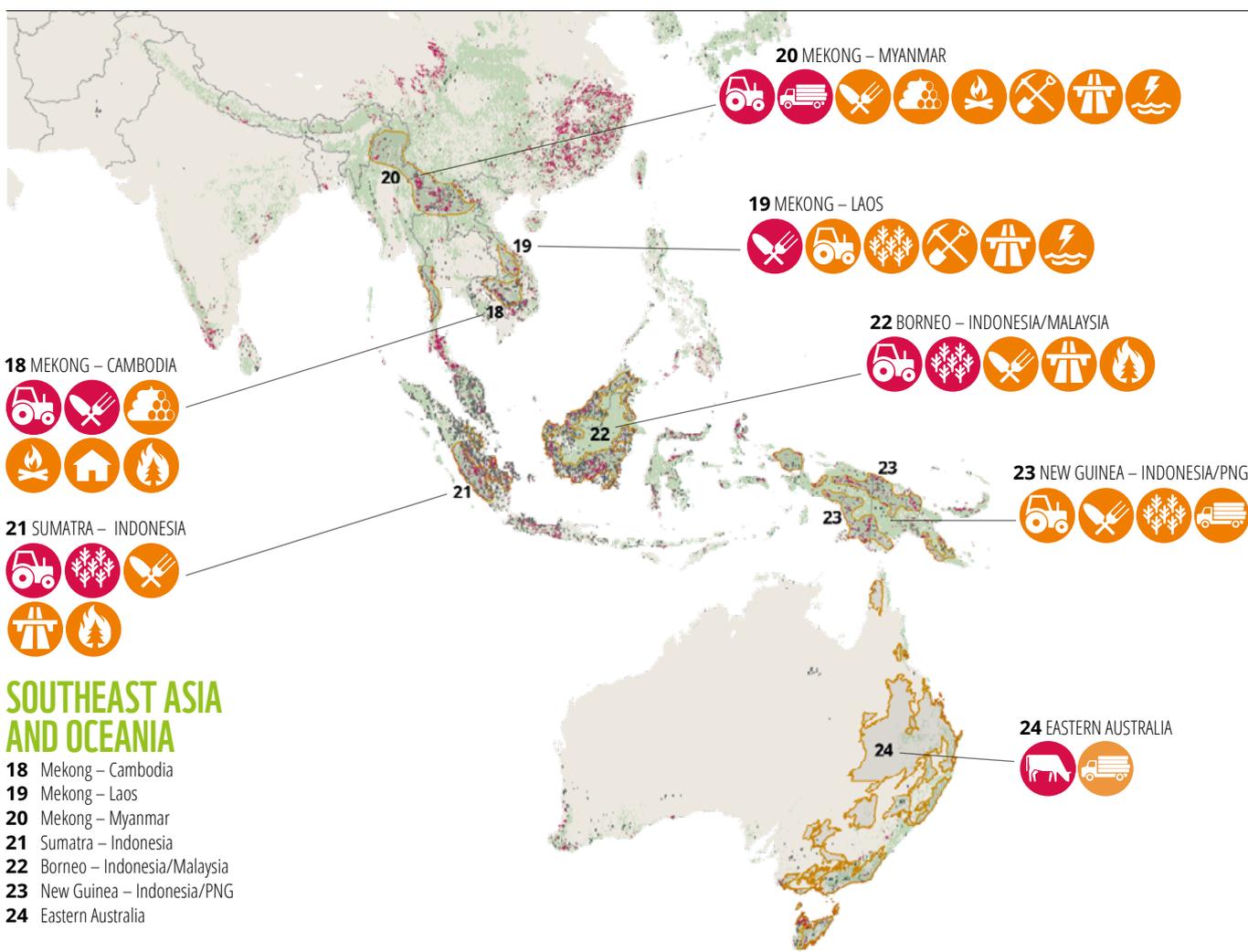
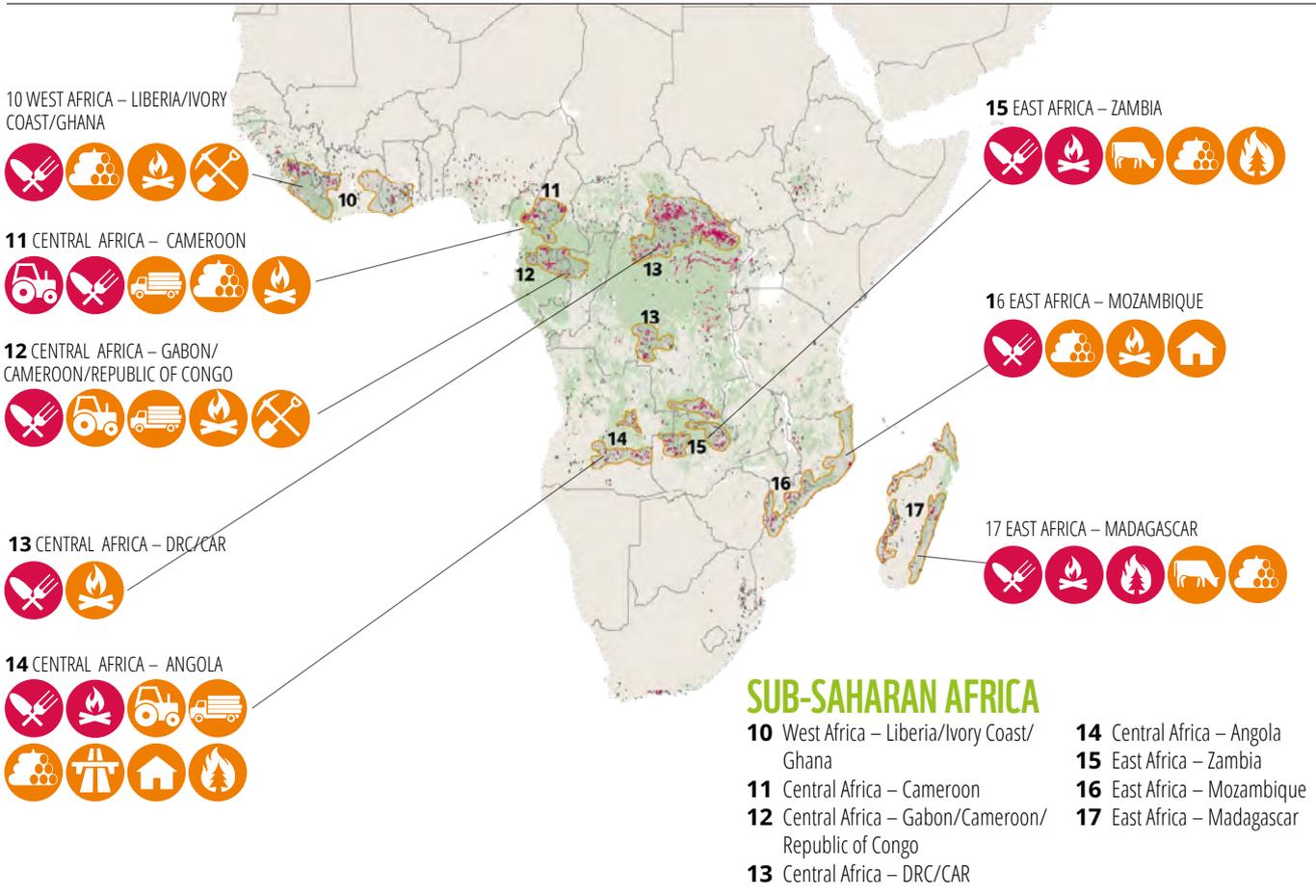
-  Forest area (2018)
-  Deforested since 2004
-  Deforestation hotspot
-  Deforestation front

For more detailed information, visit the interactive deforestation fronts dashboard [here](#).

LATIN AMERICA

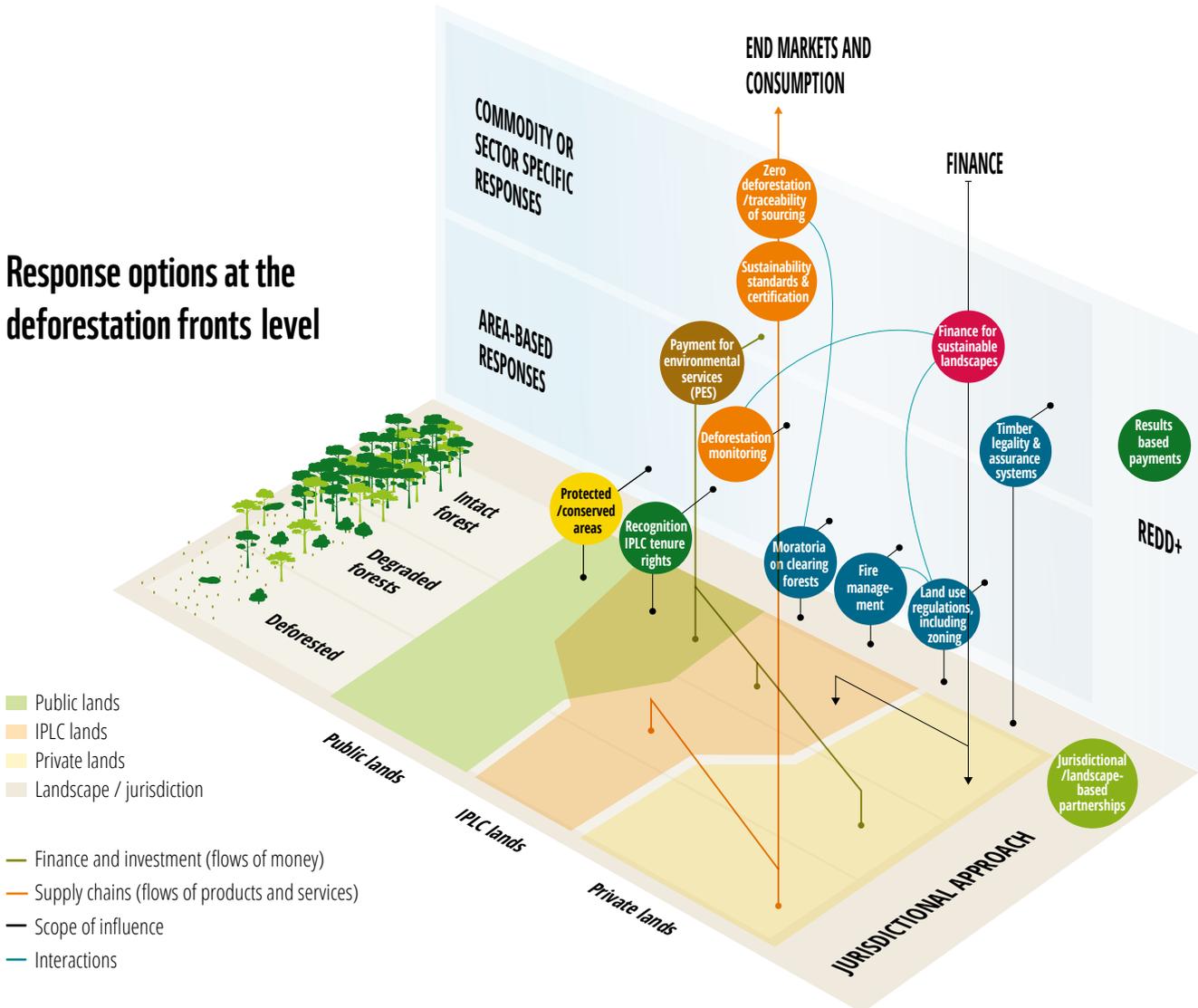
- 1 Amazon – Brazil
- 2 Amazon – Colombia
- 3 Amazon – Peru
- 4 Amazon – Bolivia
- 5 Amazon – Venezuela/Guyana
- 6 Gran Chaco – Paraguay/Argentina
- 7 Cerrado – Brazil
- 8 Chocó-Darién – Colombia/Ecuador
- 9 Maya Forests – Mexico/Guatemala





RESPONSES TO DEFORESTATION: EVOLVING APPROACHES

Response options at the deforestation fronts level



Approaches to halting deforestation have evolved over time. In particular, there has been a shift from relying solely on state policies and regulations to an increased emphasis on market-based initiatives, including PES and certification schemes. Corporate commitments to zero deforestation have also been increasing, including those of financial institutions.

Approaches tend to emphasize different dimensions and goals, all of which are related to addressing deforestation and forest degradation. They have aimed at protecting the human rights of IPLCs, supporting the conservation of biodiversity-rich areas and maintenance of environmental services, as well as promoting legal production and trade, sustainable supply chains and responsible finance. Two approaches have emerged seeking to link multiple interventions. The first is REDD+, the UN-backed scheme for reducing emissions from deforestation and forest degradation. The second are jurisdictional and landscape approaches that are aimed at tackling deforestation along with achieving wider sustainable development objectives, often at sub-national or landscape scales.

The above approaches embrace different type of responses that fall under two main groups:

1. Area-based responses include the recognition of IPLCs land tenure rights, governance of those lands and territories, and sustainable economies within them. In addition, include other type of area-based strategies such as protected areas, moratoria, fire management and land use regulations.
2. Sector/commodity-specific responses include legality and assurance systems, voluntary sustainability standards and certification, zero-deforestation policies and traceability in sourcing, PES, financing for sustainable landscapes, and deforestation monitoring.

There is some overlap between these two groups of responses, since some area-based responses apply to a specific sector, while some sectoral responses focus on a particular area. Additional, yet more integrated responses include results-based payments and jurisdictional-based partnerships, both of which tend to build upon or combine various types of responses circumscribed to specific territorial boundaries.

WHAT HAVE WE LEARNED?

A number of responses have shown positive effect, with some achieving impacts at scale faster than others, but there is no certainty that these responses won't be reversed. Therefore, they need to be accompanied by conditions that ensure their permanence in the long run (e.g. by continued political support), increase their uptake and expand their scale over time (e.g. by lowering costs, improving the sharing of benefits, or redefining market access). In addition, good monitoring systems are critical to address illegality, inadequate implementation or partial compliance and leakage (the displacement of conversion from one place to another).

Area-based approaches, including protected and conserved areas, are often effective in reducing forest loss; however, they often lack management capacity and financial resources to prove effective. Recognizing indigenous peoples and community land rights, and their local management practices and governance systems have contributed to protect forests under effective local control. Moratoria to avoid deforestation within entire biomes has worked when accompanied by legal enforcement. These approaches, however, cannot avoid leakage into other areas.

Forest certification has been effective in improving forest management around the world; however, it was not aimed at halting deforestation, and its uptake was limited across those forest users engaged primarily in local, domestic, or regional market where certification is not demanded. Certification systems of other agricultural commodities are increasingly adopting zero-deforestation criteria, but have yet to have impact at scale in deforestation fronts.

Though zero-deforestation commitments by companies are a key step, most commercial enterprises struggle to drive a conservation agenda without supportive national laws and policies. When government policies coincide with private initiatives, major decreases in forest loss can follow, as was the case in the Brazilian Amazon – when the government was supportive of reducing deforestation and implemented laws to do so – and in parts of Indonesia. But there has to be continued commitment for long-term achievement of outcomes.

Securing provision of environmental services – mainly through payment or compensation schemes for biodiversity, carbon and water – has worked in specific places through project-based private transactions, but only on a limited scale. State-sponsored programmes reaching large numbers of farmers have overcome this limitation, but this does not always lead to additional conservation outcomes.

Initiatives such as REDD+ and jurisdictional/landscape approaches have been embraced as a way to offer integrated long-term perspectives for halting deforestation and forest degradation. REDD+ initiatives have emphasized more robust monitoring, reporting and verification in public policy, but more needs to be done to affect the political and economic forces shaping business as usual.



Responses to address deforestation and its drivers need to be inclusive and tailored to the local and regional contexts. Solutions have been most effective when multiple response options are combined.

Jurisdictional or landscape approaches promote transitions to more sustainable and inclusive low-carbon economies in a defined area, often at the subnational level. Key factors include supporting public–private partnerships, de-risking finance schemes, advancing land-use planning, clarifying tenure and supporting land conflict resolution, facilitating wider uptake of sustainability practices and clarifying responsibilities of government bodies at the jurisdictional level. This approach is promising, and more knowledge is needed on its actual effectiveness and the challenges it faces.

Finally, the Covid-19 crisis, the implications of which are not analysed in this report, may open the door for the kind of transformational changes that have been identified as necessary for some time: a changed relationship with nature, addressing over-consumption and putting greater value on health and equity rather than the current overwhelming emphasis on economic growth and financial profits. What we have learnt above all is that responses to address deforestation and its drivers need to be inclusive and tailored to the local and regional contexts. Solutions have been most effective when multiple response options are combined in ways through which they can establish reinforcing effects among each other.

THE WAY AHEAD – ISSUES TO CONSIDER

While there is an urgent need to better understand what types of responses and approaches are most effective in different deforestation fronts and the enabling factors that have to be in place, we can draw some general lessons:

- 🌿 Responses to address deforestation and its drivers need to be tailored to the local and regional specific contexts, and must be inclusive and adaptable over time.
- 🌿 There is no one-size-fits-all approach – solutions have been most effective when multiple responses tend to reinforce each other, and often involving public and private partnerships.
- 🌿 A balance is needed between the stringency of regulations and standards, and the capacity of producers, particularly local forest users and smallholders, to follow them.
- 🌿 Illegal and shadow economies, and corruption, persist in undermining sustainability – there is an urgent need for greater accountability and transparency.
- 🌿 Responses in consuming countries have to engage more meaningfully with stakeholders in producing countries to develop workable long-term solutions while avoiding negative social impacts.
- 🌿 In looking for lasting solutions at scale, responses need to consider specific locations or fronts (considering leakage effects) as well as timing (urgency, duration).
- 🌿 Empowering indigenous peoples and local communities should become a priority, as well as supporting their efforts to secure the tenure of their ancestral lands and safeguard their cultures.
- 🌿 There is a need to overcome sectoral silos and misalignment between national and subnational levels when devising integrated extension programmes and more targeted incentives to keep forests standing.
- 🌿 Protecting forests should not lead to the conversion of other natural ecosystems (e.g. grasslands and savannahs) – avoiding leakage is a must and embracing wider landscape approaches.
- 🌿 More ambitious and inclusive public-private-people partnerships are needed to set up and embrace targets across ecosystems and entire ecoregions that actively involve the participation of indigenous peoples and local communities.



Working to sustain the natural world for the benefit of people and wildlife.

together possible™ panda.org