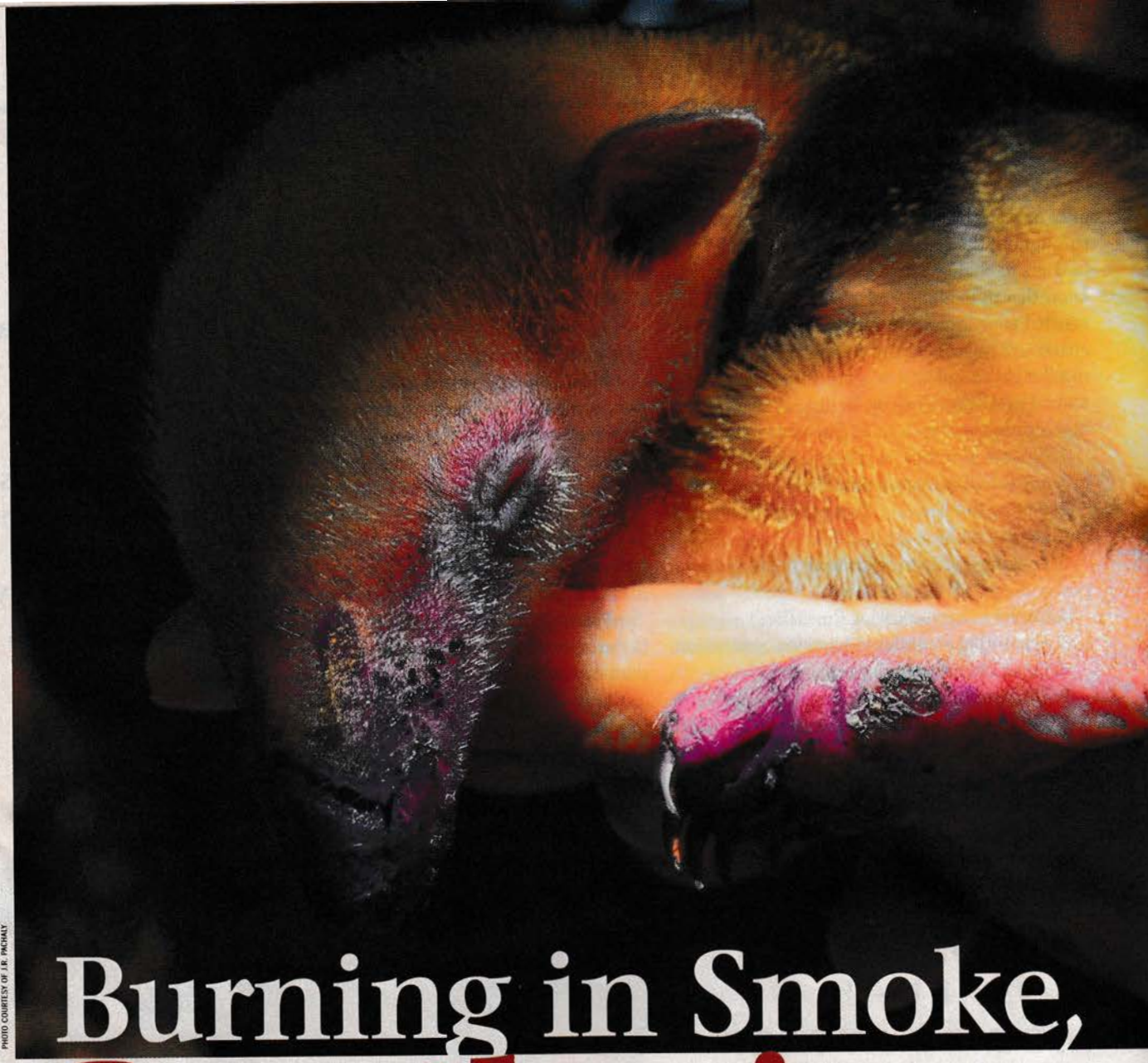

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Burning in Smoke, Smothering in Flame

Brazil's continued struggles with widespread wildfires highlight the country's need for focused fire management policies geared to its incredibly diverse ecosystem.

By Letícia Koproski, Antonio Carlos Batista and Johann George Goldammer

protected areas are becoming protected islands, without significant connections to other natural areas, making it impossible for wildlife to safely move to alternative areas during post-fire periods.

In 2010, a number of protected areas were affected by wildfires that represented serious threats to environmental health — the balance of ecosystem, vegetal, animal and human spheres of health. National Parks such as Ilha Grande (PR/MS), Serra da Canastra (GO), Araguaia (TO) and Brasília (DF) burned for several days, and more than 90% of the territory of Emas National Park (GO) was affected by fire.

In addition to affecting wildlife habitats, extensive burnings such as these harm numerous species. For example, armadillos (*Pilosa* order, formerly *Xenarthra*) are very sensitive to high-intensity and high-severity wildfires. Several investigations have determined that armadillos were the species most affected by wildfires in Ilha Grande National Park, due to direct and indirect fire effects, and represented the taxonomic group of medium-size mammals most susceptible to fire. Considering the burned area and the population density for armadillo species, fires caused 15% of this population's mortality in the park.

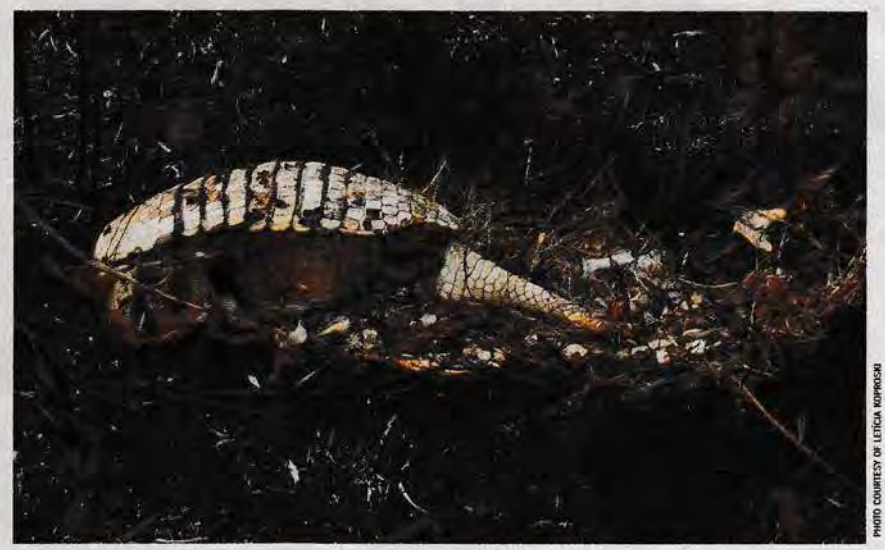

PHOTO COURTESY OF LETÍCIA KOPROSKI

Six-banded armadillo *(Euphractus sexcintus)* carbonized in a wildfire in Ilha Grande National Park.

Although the dynamics of infectious diseases in armadillos is unknown, a 15% rate of mortality can be considered high and indicative that fire can also be seen as a "disease" in conservation areas. The high frequency of events and their distribution over time also indicate that fire might be considered a chronic disease in some areas because it threatens species' survival and ecological health. Extensive burnings also change the natural dynamics of the food chain and force all sizes of wildlife vertebrates to leave the protected areas, exposing them to other threats such as road kill, domestic animal diseases and illegal hunting.

In light of the increased number and severity of uncontrollable wildfire in recent years, there is a need to review current landscape management policies. New scientific insights on fire ecology should be considered, and fire management plans should be defined according to ecological and environmental requirements and objectives.

FIRE AND THE ECOSYSTEM

Although the main cause of the fires was related to humans' illegal actions, fire is a natural part of many Brazilian ecosystems. Total suppression is the protected areas' fire policy, but in extremely dry years such as 2010 the fire-exclusion policy may become infeasible, especially within ecosystems that have high fuel accumulation. For example, the preceding wet season favored the growth of grass, which provides the most dangerous fuel for a wildfire.

Considering that fire is part of some ecosystems, this natural element should be seen as a management tool and used where appropriate to maintain the functioning of the environment. Brazilian biomes vary greatly from north to south, as do fire regimes. Fire regime conditions range from intact to degraded — even inside the same biome or eco-region. As fire's effects vary according to environmental degradation status, at the present time and considering Brazil's fragmented biomes, even intact fire regimes could

pose a biodiversity threat to degraded ecosystems. Thus, fire regimes should be settled and applied to promote environmental health.

In light of the increased number and severity of uncontrollable wildfire in recent years, there is a need to review current landscape management policies. New scientific insights on fire ecology should be considered, and fire management plans should be defined according to ecological and environmental requirements and objectives. Fire management in Brazilian protected areas should combine prescribed fires with the suppression and use of human-caused and natural fires. Brazil has a great potential, widespread area that could be managed to restore fire regimes using prescribed fire — as is done in North America, Europe and Africa. More than 2 million hectares could be managed in the Cerrado domain, just within the national parks.

SETTLEMENTS AND THE PERI-URBAN SPACE

Although the 2010 fires reached major proportions, they did not exceed the occurrences of critical years such as 2004 or 2007. However, the number of occurrences in the wildland-urban interface is growing every year across the country — threatening human health and security, making fire control more difficult and leading to high economic, social and environmental losses. In 2010, extended wildfires affected settlements, towns and urban fringes in the states of Tocantins, Mato Grosso, Mato Grosso do Sul, Acre, Rondônia, Minas Gerais, Rio de Janeiro and Paraná. Some events even affected metropolitan areas, including the informal settlements (slums) in the city of Rio de Janeiro.

The most documented 2010 Brazilian interface fire occurred in the city of Marcelândia in the state of Mato Grosso. The fire started in a garbage dump where wood waste was deposited and it spread through rural areas, eventually reaching the city and lasting two days in the urban area. The fire destroyed homes of employees in the wood-processing industry, the basis of the city's economy, and the wood companies lost equipment, vehicles and timber stocks. According to a report by the city administration, at least 80% of the industrial area of Marcelândia, composed mainly of sawmills and woodworking plants, was hit by fire. Despite the extensive area affected, there were no reports of people killed or seriously wounded; however, about 330 people suffered respiratory injuries.

The increasing number of fires in Brazil's wildland-urban interface is related to the accelerated growth of cities toward the rural and forested areas. In 1950, 70% of the population lived in rural areas and only 30% lived in cities.

Today, the opposite is true — about 80% of the population lives in cities, while only 20% inhabit rural areas.

This rural exodus is causing the growth of transition areas between urban, rural and wildland regions. Within these peri-urban interfaces, factors associated with fire's ignition and spread increase both in number and intensity. The agents involved in this process are complex. One example is the large number and variety of ignition sources in urban areas, such as vehicles, power transmission lines, garbage and arsonists. In addition to the natural biomass that determines the wildfire hazard, peri-urban fuels are composed of many industrial waste materials, including paper, plastic and waste wood. Urban populations also tend to have less knowledge about the risks and potential economic, environmental and social effects of fire use and wildfires.

In Brazil, the growing number of these events indicates the critical need for government's efforts to control these fires. Since the 1990s, the government has developed analytical tools to prevent and control fires in the wildland-urban interface, but there are few studies and no public policies directed to the peri-urban fires. Actions are reactive rather than proactive, with measures being taken only when events occur. There is also urgency for agreements of mutual assistance between fire management agencies. Interagency planning is critical to understanding the potential environmental impacts, reducing fuels, making communities more resilient and acting to reduce potential damages.

FIRE MANAGEMENT

Currently, the Brazilian government does not provide adequate financial resources to develop and implement national disaster response management plans. Despite the high number of occurrences, fire is not seen as either the threat or conservation tool it can be. In fact, only one of this year's three main presidential candidates included a fire policy in the proposed governmental program.

In 1989, the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) established the National System of Prevention and Control of Forest Fires (PREVFOGO). This system has been dealing with the fire issue and acting throughout the country. In 2008, the IBAMA was restructured, and since then, PREVFOGO is no longer responsible for controlling fires in protected areas. Instead, another institute was created to manage protected areas, the Chico Mendes Institute for Biodiversity Conservation (ICMBio). This move was an unfortunate loss for fire

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management in the country, as skilled wildfire prevention and suppression professionals were no longer responsible for protected areas.

Of course, many professionally trained and equipped ground crews and aerial fire suppression resources are still available. Because of the country's size, however, huge territorial gaps need to be filled. Both PREVFOGO and ICMBio need partners to succeed. With this in mind, a national interagency program is being established by the government, and there is still plenty of room for community action.

Limited fire management resources in Brazil and neighboring countries have prompted South American nations to create a South American Wildland Fire Network. This network was formally established in 2005, within the framework of the Regional Co-operation Strategy for the Prevention, Control and Combat of Forest Fires in Latin America and the Caribbean. This working group was initially financed by the United Nations' Food and Agriculture Organization (FAO), but continuous support is lacking. With technical support provided by the Global Fire Monitoring Center, the group aims to support governments and communities to develop fire management capacities throughout the Latin American region.

In the end, what matters most is how well you walk through the fire. Brazil is walking, not always in the best way, but walking. W

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