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Exploring the Cultural Impacts of Faunal Loss Resulting from Climate-Induced Deforestation: A Study of the Spatial Relationships of Fauna and their Physical Habitats in Los Angeles County and the Northwestern Region of the Amazon Rainforest

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Nelson, Damari

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Exploring the Cultural Impacts of Faunal Loss Resulting from Climate-Induced Deforestation

A Study of the Spatial Relationships of Fauna and their Physical Habitats in Los Angeles County and the Northwestern Region of the Amazon Rainforest



A Capstone Project Report



By: Damari Nelson

Email: d8nelson@ucsd.edu

Master of Advanced Studies in Climate Science and Policy | MAS

University of California San Diego | Scripps Institution of Oceanography

Declaration of Authorship

I, Damari Nelson, declare that the following pages of the Graduate Capstone Project Report succeeding this page are the sole work of the aforementioned person, and has been reviewed by a list of accredited scholars of the University of California San Diego/Scripps Institution of Oceanography who I have collaborated with.

Any listed individual of the Cultural Aspect of this work has been credited and have been duly notified of images or video recordings proceeding our physical meetings featured in this report in regard to “*Model Image Authorization and Release*” forms written in English and Portuguese, provided by the University of California San Diego, that have been read and signed by each individual.

All scholarly journals in this report have been properly cited and included on the references page.

Damari Nelson | Signature:

A black rectangular box redacting the signature of Damari Nelson. The signature is written in blue ink on a blue horizontal line.

Email: d8nelson@ucsd.edu

Master of Advanced Studies in Climate Science and Policy | MAS

University of California San Diego | Scripps Institution of Oceanography

Capstone Advisory Committee Members/Project Approval

Listed is the carefully orchestrated list of committee members who have supervised the process of this Capstone Project over a span of several months in addition to their signatures:

Kellie Uyeda, PhD | Capstone Committee Chair

Email: kuyeda@ucsd.edu

Executive Director | Natural Reserve System

University of California San Diego

Signature: 

Heidi Batchelor | Capstone Committee Co-Chair | Scientific/Geographical Aspect Advisor

Email: hbatchelor@ucsd.edu

Program Analyst | SIOB. 296: Special Topics in Ocean Biosciences

University of California San Diego | Scripps Institution of Oceanography

Signature: 

Maryam Entezam, PhD | Capstone Committee Cultural Aspect Advisor

Email: mentezam@ucsd.edu

Urban Studies and Planning Lecturer | USP. 170: Planning for Sustainable Communities

University of California San Diego

Signature: 

José Netto Da Silva | External Capstone Committee Member

Email: amazonglobalgreentours@gmail.com

Amazon Rainforest Survival Expedition Guide

Amazon Global Green Tours

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Furthermore, I would like to express my gratitude to Julia Brown for funding my research, the UC San Diego Media Teaching Lab staff for providing video equipment, and my Capstone committee as follows: Heidi Batchelor, for teaching me the fundamentals of Geographic Information Systems (GIS), Dr. Kellie Uyeda, for directing me onto the right path of guidelines to follow, and Dr. Maryam Entezam, for teaching me the aspects of urban planning and social interaction with new groups of individuals in unfamiliar places. I would also like to thank Dr. Corey Gabriel and Jadah Ryan, the true pillars of the Climate Science and Policy program of the Scripps Institution of Oceanography, who have always been there for our cohort.

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Introduction

I. Motivation/Background

This Capstone project illustrates the spatial relationships between fauna and the physical properties of their habitats in areas impacted by climate-induced deforestation, especially wildfires and flooding. The primary locations of focus lie within the neighborhood of Altadena in the Eaton Canyon/San Gabriel Mountain area in the northeast of Los Angeles County, as well as the northwestern region of Brazil, specifically in Amazonas state from the west of the major city of Manaus. Manaus is the easiest and closest access point into the mouth of the rainforest into the Iranduba region after crossing the point of convergence where the Amazon River and Rio Negro meet, known as the “[Meeting of Waters](#)” (“Solimões and Negro Rivers - NASA”, 2008).

There are a variety of deforestation causes which spawn from naturally occurring factors ranging from random lightning strikes in open fields, to man-made or artificially prescribed burnings to decimate dead vegetation. This Capstone will address two forms of deforestation, being wildfires and floods, two frequently occurring phenomena in afflicted areas of the world. Deforestation, especially in areas such as the Amazon Rainforest which occupies a space of up to 60% of Brazil alone (Flores et al., 2024), is difficult to fully monitor. Techniques such as aerial-based and spaceborne platforms use remote sensing to scan the planet, giving us a good approximation of deforestation variations. In 2021, the Brazilian Space Agency (AEB) launched a mini-satellite named the “Amazonia-1”, with the sole mission to monitor global deforestation (Amazonia-1 - EoPortal, 2021).

Biodiversity is the variety of life forms that exist on earth, including fauna, flora, and their interactions with their respective ecosystems. For this study, animals were chosen as the primary variable of mapping because fauna is arguably the most reliable indicator of climate change. We can observe drastic shifts in close ecosystems based on animal behavioral responses, such as migration patterns. Nature-related disasters caused by the climate disrupt the way of life for the fauna unique to Los Angeles County and the Amazon Rainforest. Changes in animal behavior is correlated with resource availability and with deforestation covering large areas of land in fires and floods. Habitat selection is based on ecological adaptation, or what an animal is accustomed to as its usual home (Gomez et al., 2025).

Vegetation and foliage are prominent catalysts to fire spread. Dead plants contribute heavily to how far a fire can spread, especially shrublands in Los Angeles. Another component linking deforestation to habitats is greenhouse gases (GHGs), which are the vast result of any kind of flame. The two main components being observed in this study are produced from wildfires after they end, which are nitrogen dioxide (NO_2) and carbon dioxide (CO_2). While not occupying much of the atmosphere, they are the most detrimental absorbents of sunlight. Other fire-borne gases include poisonous carbon monoxide (CO), and water vapor (H_2O), the most abundant GHG (US EPA, 2017). Smog is the buildup of particulate matter ($\text{PM}_{2.5}$) contacting traces of solid and liquid contaminants including combustion particles from flames, soot, mold, bacteria, pollen, and even dead organic particles from people and animals resulting from GHGs baking in the sun.

The Amazon Rainforest is home to thousands of the most unique species on the planet, which is why it will be a central area of focus for this Capstone project. Furthermore, the Amazon Rainforest is both the largest hydrological drainage system and the largest carbon store in the world (Espinoza et al., 2022), meaning it is one of the largest absorbents of GHGs and producers of floodplain environments. It is an essential place for GHG emissions involved in the carbon and nitrogen cycle of South America, since the decomposition of organic material is a vital component of what is absorbed under the canopy of deciduous trees in the rainforest. The main purpose of using fauna unique to both locations as my main variable of focus is because, based on location, animals are arguably the greatest indicators of climate variability.

If we monitor the mobile biodiversity of the rainforest, this will allow us to see where possible invasive or carrier species of zoonotic diseases will migrate to with concern for human-inhabited communities. Interestingly, declining biodiversity loss seems to increase the risk of human exposure to new zoonotic pathogens and hosts for certain transmissible diseases (Keesing and Ostfeld, 2021).¹ *Aedes aegypti* for example, have a high probability to proliferate in human-dominated communities, likely due to the mass abundance of a food source in human blood. Therefore, we know that we can predict that certain species of animals will migrate toward large communities based on the amount of ecosystem loss.

¹ The *Aedes* group is a genus of mosquito commonly found in Central Africa and South America. It is known as a primary vehicle and biological vector for yellow fever, dengue fever, malaria, and Zika virus.

(Source: <https://www.cdc.gov/mosquitoes/about/life-cycle-of-aedes-mosquitoes.html>)

II. Description of Habitat, Climate, and Environmental Challenges

A. Los Angeles

I visited the neighborhood of Altadena in Los Angeles in the month of March during the beginning of spring. I was not expecting to be able to fully explore the Pacific Palisades area of Los Angeles due to strict fire zone blockades as I originally planned, which is why I chose the neighborhood of Altadena as a backup for any possible contingency due to Altadena being severely affected by the Eaton Canyon wildfire spread as well. For a stark description of the environment in Altadena, most homes were completely destroyed and there were no signs of life other than myself and a few debris cleaning construction workers.

Several of the burned down homes had pink placard notices authorized by the San Gabriel District Office of inspection sent by the County of Los Angeles to identify present hazardous material lingering around the affected area. In addition to this, many vehicles remaining in driveways were spray painted with the words “NOT EV” (not electric vehicle) to warn passersby of possible lithium-ion fume inhalation. Overall, the area was barren, and the fires were an incredible blight on the land that did survive.

B. Brazil

Starting on April 22nd until April 30th, I embarked on a 9-day survival expedition visiting several locations in the Amazon Rainforest, beginning from the southern end of Manaus to cross the Rio Negro and reach the side of the Amazon River near the Iranduba region. The entire purpose was to explore the harshest areas of the rainforest during the flooding season and experience the lives of the residents who live along the Amazon Basin

when the climate is destroying the habitats of terrestrial organisms such as three-toed sloths (Flores et al., 2024). Despite this, most land-based organisms have adapted over time to become semi-aquatic, however their habitats are drastically affected by the rising levels of floodplains. As we trekked deeper into the areas of Careiro along Lago Mamori, the first observation I took notice of was the gigantic canopy. This contributed heavily to the striking amount of effort I had to put into breathing, as the air was growing thinner despite being on flat land, similar to an elevated large swamp. The climate was incredibly humid with dry heat until the rain began spontaneously at random times of the day.

Afterwards, I visited my third destination in the neighborhood of Maracanã of Rio de Janeiro. Across the street from the famous Maracanã stadium was the Universidade Pluriétnica Indígena Aldeia Maracanã, a village contained in the middle of the city beset by constant urban activity. The purpose of being here was to understand the subject matter of urban deforestation from the plethora of diverse ethnic groups who live within the village, the prejudice they experience, and the vulnerability they face due to the clearing of forested areas around their village.

I do not seek to make a comparison of Los Angeles County with the Amazon Rainforest of Brazil simply because the mapping data available for each region is too different, as are the fauna, habitats, and forms of deforestation. Additionally, the spatial scale of the two areas (a single county versus a rainforest that spans across ten countries) is vastly disparate. I have chosen to explore the effects occurring between two different regions experiencing deforestation in the form of wildfires and floods, which in Brazil persists from December to May on average.

III. Goals/Research Questions

A. Los Angeles

My goal was to explore the topics of wildfire hazards and urbanization as it relates to both the built and natural landscapes of Los Angeles. I sought to use both mapping approaches and a site visit to more fully understand the relationship between wildfires, people, and natural communities.

B. Brazil

My second goal was to understand the subject matter of flooding-centric deforestation from the residents of the Amazon Basin caused by climate change.

In Rio de Janeiro, I sought to understand the subject matter of urban deforestation with the diverse ethnic groups who live within the Maracanã village, the prejudice they experience, and the vulnerability they face.

Los Angeles and the Amazon Rainforest both include vast communities in the urban-wildland interface. Densely populated areas exist in both locations, have different causes of vulnerability, and different adaptive capacities. However, both areas face a common threat due to proximity to foliage, accumulation of GHGs, etc. I seek to explore different approaches to adapting to wildfires and flooding in a changing climate, identify letting themes, engage stakeholders, and document impacts via mapping, as well as through interviews and photographs. My broad goal is to effectively engage the public through case studies of both the human and ecosystem impacts of increased vulnerability to deforestation in these distinct, but similarly vulnerable, ecologically critical locales.

Methods

I. Los Angeles

A. Mapping

This component is composed of several maps of variables and migration patterns of specific species unique to Los Angeles. I have obtained online datasets originating from public databases of the California Department of Fish and Wildlife, US EPA Air Quality Index, and the California Department of Forestry and Fire Protection to construct maps (See: Results and Findings) displaying current and active USA wildfire perimeters, habitat ranges of coyote and mule deer, NO₂, CO₂, and CO (carbon monoxide) pollution which are gases emitted from fire, to link wildfires caused by these variables to deforestation in northern Los Angeles County.

I drove to the neighborhood of Altadena in Los Angeles and wandered throughout the neighborhood for 6 hours to pinpoint my coordinates. The data I collected in Altadena consisted of photos captured on my phone that are embedded with the coordinates of the approximate location they were taken at. These points would be publicly available for viewers to know areas vulnerable to the despoliation of wildfires with the addition of information linked to deforestation impacting areas near Los Angeles County residents.

B. Field Visit

As mentioned beforehand, the most valuable item for my research for both areas of study was my phone. With location settings on, it is possible to take photos anywhere on the planet to pinpoint approximate locations. The example to the right here as seen in the first image are the coordinates for the Griffith Observatory in Griffith Park to the east of the Hollywood sign. In Altadena, my qualitative methods for research were simple as I used this method to take photos of every burned down home that I encountered to convey the aftermath of the January 7th fires. The bottom image are the coordinates for the Zane Grey Estate, a famous landmark of Altadena that is now inhabitable.

This was essential in my research because with these approximate numbers, they are automatically plugged into Esri's insert photo function in its story map software to create points on a globe of precise areas that were visited in the world.

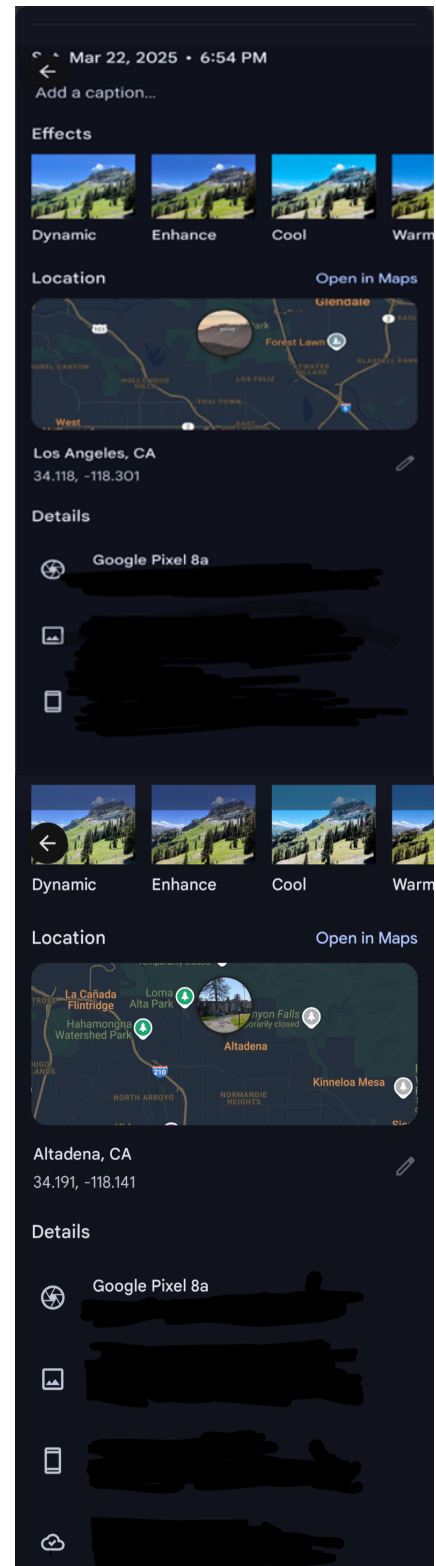


Fig 1. Capturing approximate coordinates in Los Angeles

II. Brazil

A. *Field Visit to the Amazon Rainforest*

The first two days of our expedition involved staying in Maçarico lodge of Lago Maçarico to adapt to the humidity and deadly fauna we may have encountered underneath the rainforest canopy. Because of the wet season, the majority of our method of travel was by speedboat and trekking on land when we were camping or seeking food. The entire expedition was brutally humid with varying weather between intense heat and heavy rainfall accompanied by the constant feeling of vigilance.

The amount of biodiversity encountered within the 9-day expedition included fauna and flora found nowhere

else on the planet, which is part of the narrative of why

their photos were vital for research purposes. Examples of biodiversity sighted include festive amazon parrots, pink river dolphins, wandering spiders, bullet ants, rubber trees, red-eye

piranhas, howler monkeys, caiman, arapaima (pirarucu), and giant anacondas. Similar to Los

Angeles, I took photos of the biodiversity encountered for coordinates as seen in the figure to the right, to embed coordinates into my photos which would be displayed in my story map, and a full list of observations compiled in an iNaturalist project page for identification purposes. The figure displayed above has the details of the coordinates gathered in a body of water filled with red-eye piranha we caught for dinner in the Rio Juma, a small river known for its piranha populations.

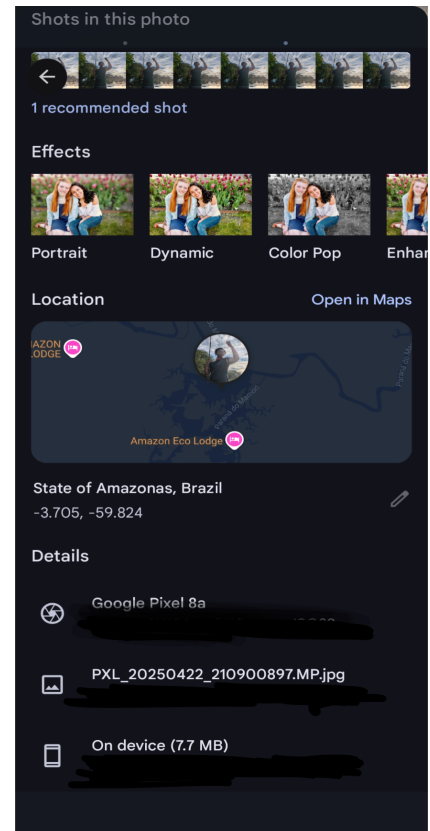


Fig 2. Capturing approximate coordinates in the Rio Juma

The importance correlated with the photos I captured of biodiversity in the Amazon Rainforest is also to accentuate the populations of fauna important to the Amazon Basin residents, as the fauna sacred to their culture are affected by flood-based deforestation that is deterring their numbers.

B. Interviewees

For this Capstone, three separate interviews with residents who live along the Amazon Basin have been conducted. All with different backgrounds to avoid biased answers for each question for each interviewee. Two are ² caboclo, and one is an indigenous person of the riparian ³ Kumbewa tribe. The idea was to gain a cultural understanding with interpersonal questions of the detrimental effects of climate change that occurs in the rainforest, from natives witnessing their home being exploited or even destroyed as well as to understand the significance of specific fauna and tribal fetishism for these specific species. The interviewees are as follows:

1. **André Vieira de Souza (A):** a health professional worker for ⁴ Saúde Indígena. He considers himself a caboclo due to his lifestyle and area of residence in Lago Mamori.
2. **Gefferson Lima Da Silva (G):** a caboclo bushman who invited me to his home in the flooded rivers of Lago Mamori.
3. **Jeremias Carnes da Silva (J):** the Kumbewa village shaman/leader. Born near the borders of Columbia where he had to forcefully leave due to deforestation caused by rubber tree (*seringueira*) harvesting and gold mining.

² Individual of mixed Brazilian indigenous ancestry or who has been culturally assimilated into the indigenous method of living.

³ Indigenous tribe of peoples originating from western South America, primarily from Colombia and Peru, who now reside in the lower west-end of Lago do Ubin and Lago Acajatuba, an outlet of the main Rio Negro. Their aldeia (village) consist of five families, each in their own oca (hollow home).

⁴ A federal ministry of South America which administers national healthcare policies for indigenous peoples of Amazonas state.

C. Interview Questions

My guide, Netto, acted as my interviewer. Each interviewee spoke and understood fluent Brazilian Portuguese. Each interview involved seven socially-climatic centric questions as follows:

1. Qual é seu nome completo?

(What is your full name?)

2. O que você acha que é uma tribo indígena?

(What do you think an indigenous tribe is?)

3. O que você chama de lar?

(What do you call home?)

4. Você já foi forçado a se mudar devido às mudanças climáticas ou destruição de habitats?

(Have you ever been forced to move due to climate change or habitat destruction?)

5. Já viu suas terras serem destruídas?

(Have you ever seen your lands destroyed?)

6. Existem animais na Amazônia que você considera especiais ou que você venera?

(Are there animals in the Amazon that you consider special or that you worship?)

7. Você já sentiu a perda deles? O que acontece quando esses animais morrem?

(Have you ever felt their loss? What happens when these animals die?)

D. Field Visit to Maracanã, Rio De Janeiro

Rio de Janeiro was the next destination after the expedition to visit the Universidade Pluriétnica Indígena Aldeia Maracanã. Here I spent the day with seven different ethnic groups who all lived in an urban village in the middle of Rio de Janeiro. I understood the hardships of the Maracanã affected by “urban deforestation”, which I logged in a journal. The seven groups who resided here consisted of the following:

- 1. Guajajara**
- 2. Maxakali**
- 3. Pataxó**
- 4. Potyguara**
- 5. Kariri**
- 6. Xukuru-Kariri**
- 7. Xavante**

The village, or aldeia, was similar to the village of the Kumbewa tribe in a way that both had several ocas for separate families, ritual tents, and stations for ⁵ manioc root harvesting. The most noticeable difference with the Maracanã village is that the ruins of the old Indian Museum of Rio de Janeiro, constructed in 1862, lies on the edge of the settlement as an extension of the village. This is where classes and schooling take place. As it stands, the village is considered a symbol of opposition against the Brazilian government.

⁵ *Manihot esculenta*: a poisonous, woody shrub native to South America that is a staple crop to most Brazilian diets and cuisine. Also known as cassava, tapioca, or more commonly in the United States, yuca.

(Source: <https://aihd.ku.edu/foods/manioc.html>).

The village and stadium names “Maracanã” originate from the name of the blue-winged macaw, a beautifully vivid species of parrot that thrived all over Brazil from the state of Amazonas to the nearly 2,000 mi. distance to Rio de Janeiro state. Today, as explained by the residents of the village, the once common species of blue-winged macaw is now marked as nearly threatened. Recently, they were considered as extirpated (locally extinct) in the neighborhoods of Maracanã and Copacabana (Blue-winged Macaw, iNaturalist, 2020) due to increasing urban sprawl occurring around Rio de Janeiro in the last few decades. The elimination of tree coverage all over Rio has exacerbated the parrot’s optimal habitat, however, breeding efforts have been increasing their populations back to nearly threatened. This [map](#) provided by iNaturalist shows blue-winged macaw observations all over Brazil as sightings are gradually increasing, especially in the southern end of Rio de Janeiro.



Fig 3. A Blue-winged Macaw (Primolius maracaná). The species’ name originates from the Tupi–Guarani language of the Tupi people of South America. It roughly translates to “green bird.”

(Source: <https://www.inaturalist.org/observations/143190925>. Picture taken by user: nicoolejnik).

III. Capstone Project Timeline

Phase 1: Completion of SIOB. 296 GIS class: Jan. 6th - Mar. 14th.

- Gained better knowledge in creating and curating maps using a variety of spatial analysis tools with ArcGIS Pro software.
- Found specific datasets from California Department of Fish and Wildlife, Living Atlas, and more.
- Constructed half of the story map for deliverable that will represent my entire finalized project which I will add my findings from Brazil into during the month of May.

Phase 2: Research for burn site photography and coordinates in LA County: Mar. 20th Mar. 23rd.

- Drove to Hollywood where I would travel to specific areas in the Pacific Palisades and Eaton neighborhoods. Unfortunately, the Pacific Palisades and most of Malibu were nearly impossible to access, but I received plenty of photos and coordinates in Altadena.

Phase 3: Travel to Brazil for second half of Capstone research: Apr. 20th - May. 5th.

- Arrived in Manaus on Apr. 21st and started the survival expedition on Apr. 22nd for 9-days. Gathered coordinates for mapping, observed and logged biodiversity, and conducted interviews with two residents of Lago Mamori, and one interview with the Kumbewa village shaman/leader of Lago do Ubin.
- Flew to Rio de Janeiro to visit the Universidade Pluriétnica Indígena Aldeia Maracanã to observe and interact with the village residents for the remaining 5 days in Brazil..

Phase 4: Compile all findings into a singular story map along with a short 3 min. interview footage: May 7th- Jun. 13th.

- Review all findings, edit, and transcribe all raw video footage with Adobe Premiere Pro software.
- Create a final draft report for committee review by May 19th and finalize the report by June 13th.
- Include all findings into the final presentation and report.
- Present PowerPoint and Deliverable at symposium on June 12th.

Results/Findings

I. Los Angeles

A. *Wildfires and Deforestation*

The figure below presents a still image of semi-current 2025 global visualization of wildfires that burn in frequent hotspots of the United States.



Fig 4. An Animated Time Lapse (see: Story Map Deliverable) of National Active and Prescribed Wildfires in the 1,000 to 300,000 acres range as of 05/01/2025. The golden fire emblems are prescribed fires, red-in-yellow is recent in the past 24-hours, and the red are randomly occurring natural fires based on size.

B. Dead Foliage

An important component to fire spread is shown in the figure below to illustrate trees and shrublands in Los Angeles.

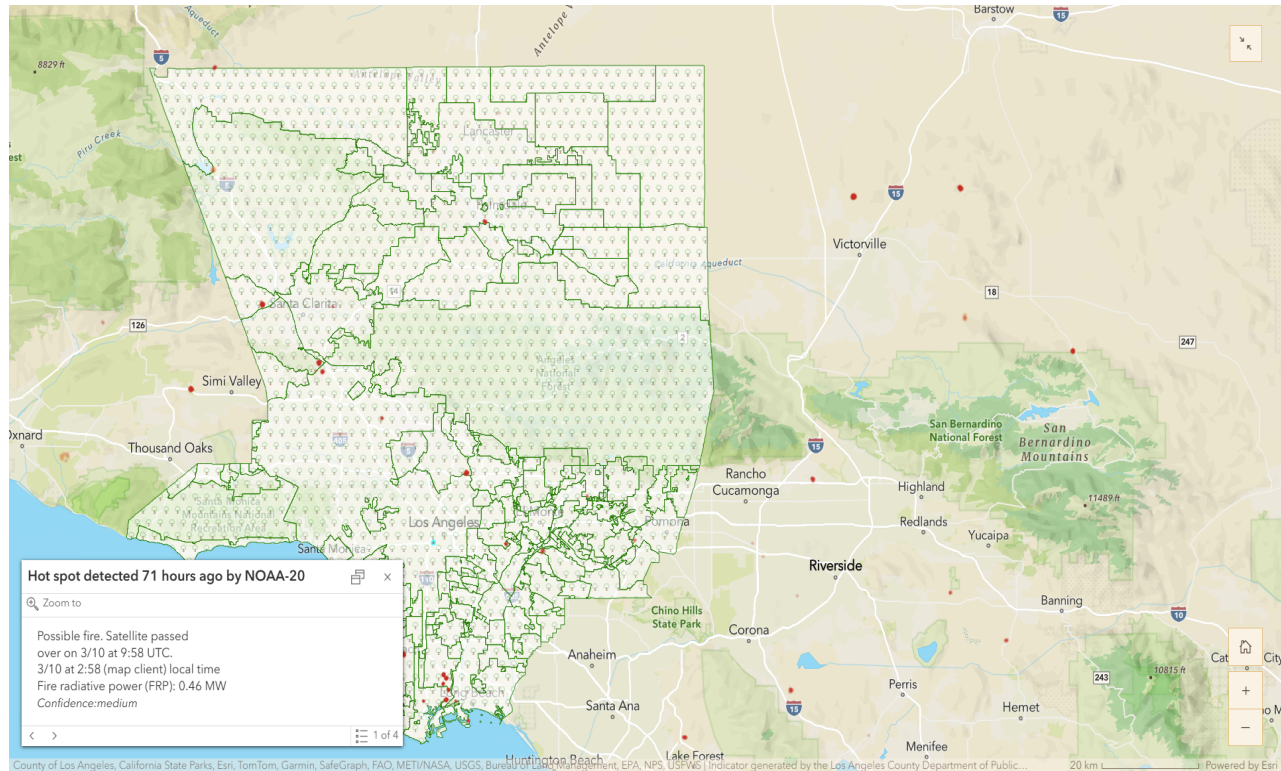


Fig 5. An overlay or approximation of flora coverage over all of Los Angeles. The red dots indicate hotspots marked by satellite sensing to show where fires are likely to start based off of environmental conditions. (Click the dots in the story map to see when recent fire radiation was last detected in real time. Every city in Los Angeles County can also be clicked to see coordinates).

C. Biodiversity and Habitat Properties

As illustrated in the figures and map below, there is a special affinity between biodiversity and their unique habitats. Observing the behavioral changes of biodiversity in their habitats can give us an idea of new predictable habitat range patterns in addition to mitigating the spread of possible zoonotic disease infection from biological vectors, suppressing pests, and monitoring endangered or threatened species' populations.

There is a link and mobile friendly QR code (see: Deliverable) for the final product story map highlighting an extensive list of biodiversity available in Los Angeles along with the fauna encountered in Brazil. The approximative coordinates are embedded in the pictures taken of each species listed in the Amazon Rainforest map tour section of the narrative being told.



*Fig 6. A Coyote (*Canis latrans*) staring into the distance.*

(Source: <https://www.flickr.com/photos/yellowstonenps/15725741555>)



*Fig 7. A Mule Deer (*Odocoileus hemionus*) stag shedding its velvet in preparation for the spring.*

(Source: <https://worlddeer.org/deer-velvet-shedding/>)

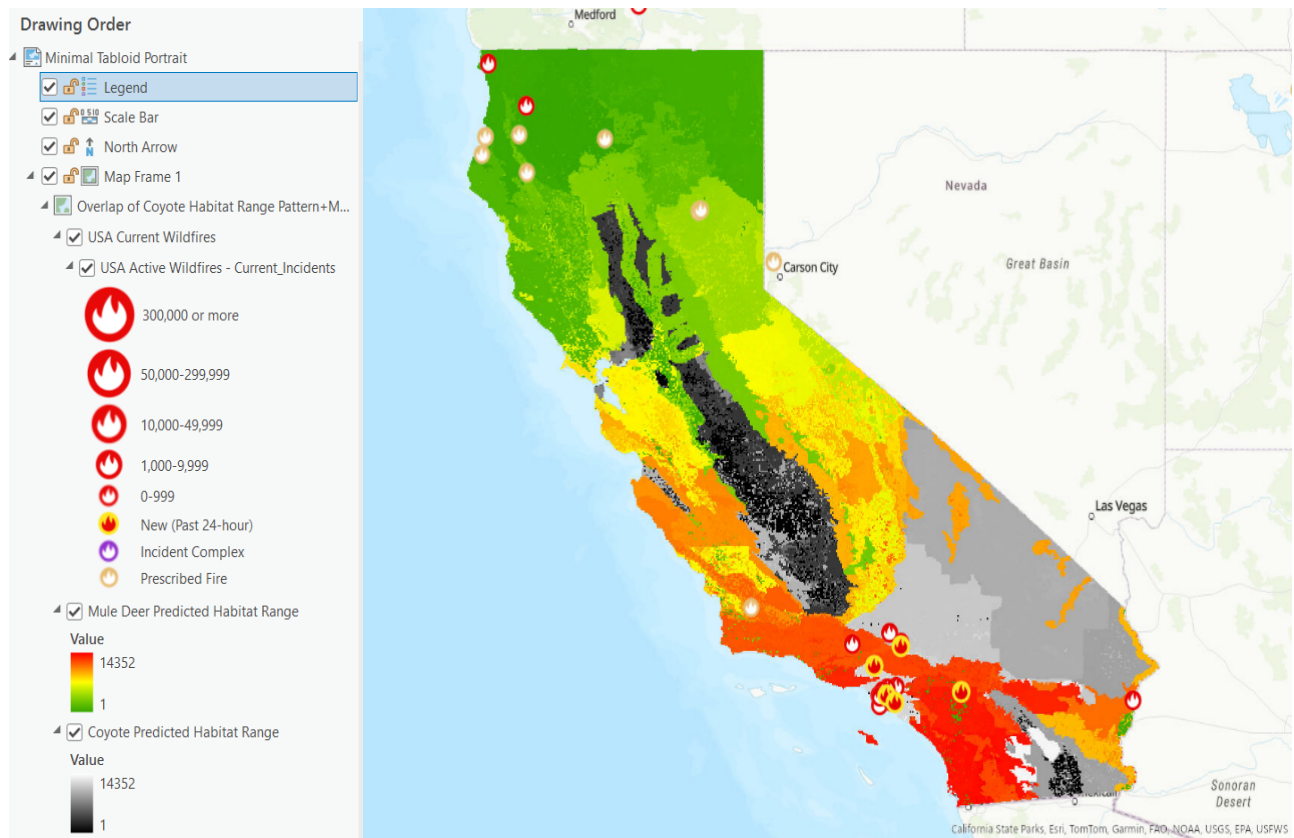


Fig 8. An intersection of the habitat ranges of the common mule deer with their natural predator, the coyote. The fire emblems in particular here represent wildfires in the 0-999 acre range. The intersect tool shows the paths of intersections where mule deer cross with USA Current Active Wildfire Perimeters as seen in the content bar. The wildfire perimeter dataset was obtained from the Living Atlas of ArGIS Pro.

D. Greenhouse Gas (GHG) Perimeters

The figure presented below is the daily air pollution sets taken from EPA's air quality control site, showing the aftermath of GHGs occurring around Los Angeles as of May 1st, 2025.

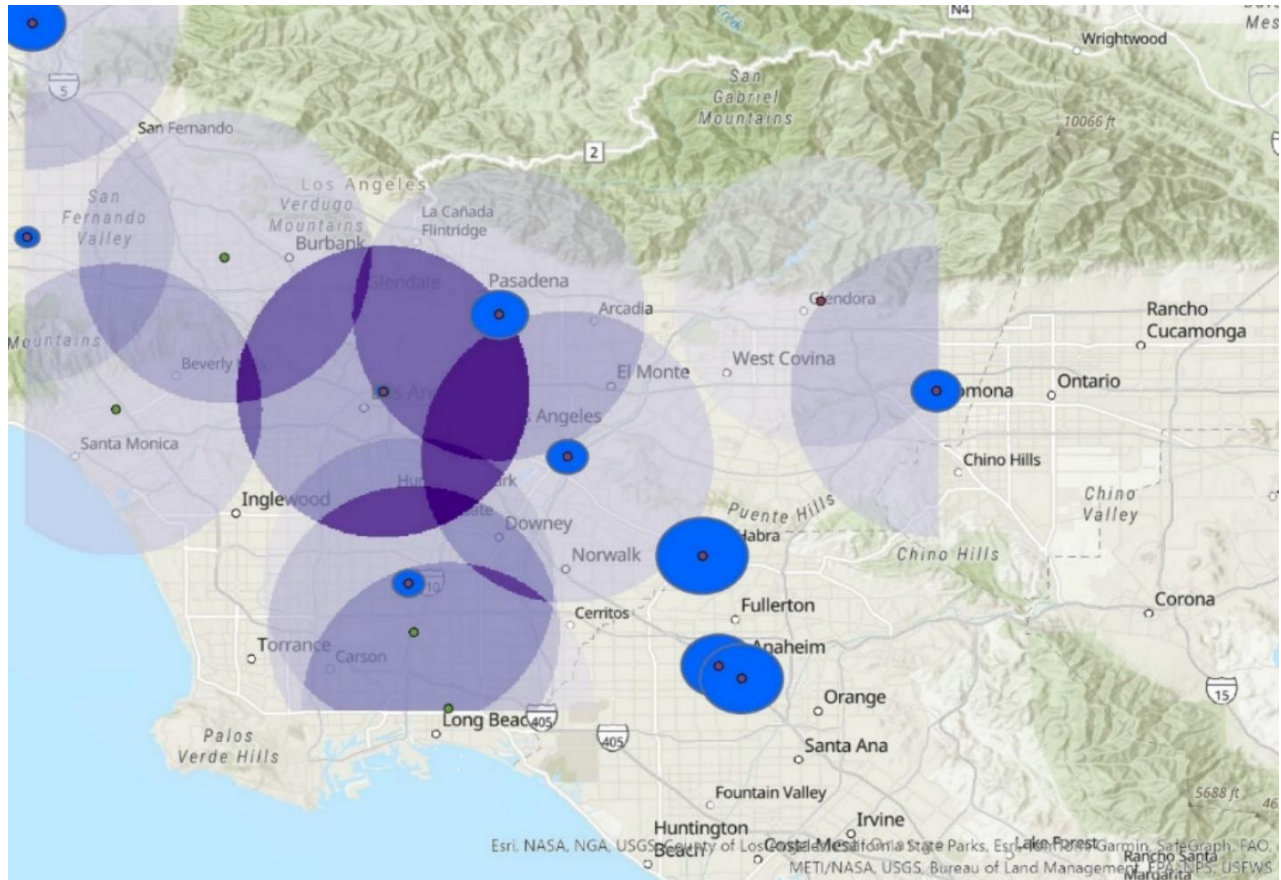


Fig 9. Radial buffers that illustrate the perimeters of GHGs in Los Angeles. The brown dots are carbon monoxide while the green dots are nitrogen dioxide, both with perimeters growing more transparent based on density.

E. Heat Density

Los Angeles, particularly the Pacific Palisades and Eaton area more than any heated location now, still remains as some of the worst air quality of any metropolitan city in the nation since the 1950s, contributing to the urban heat island effect (US EPA, 2017.) The figure below illustrates this claim.

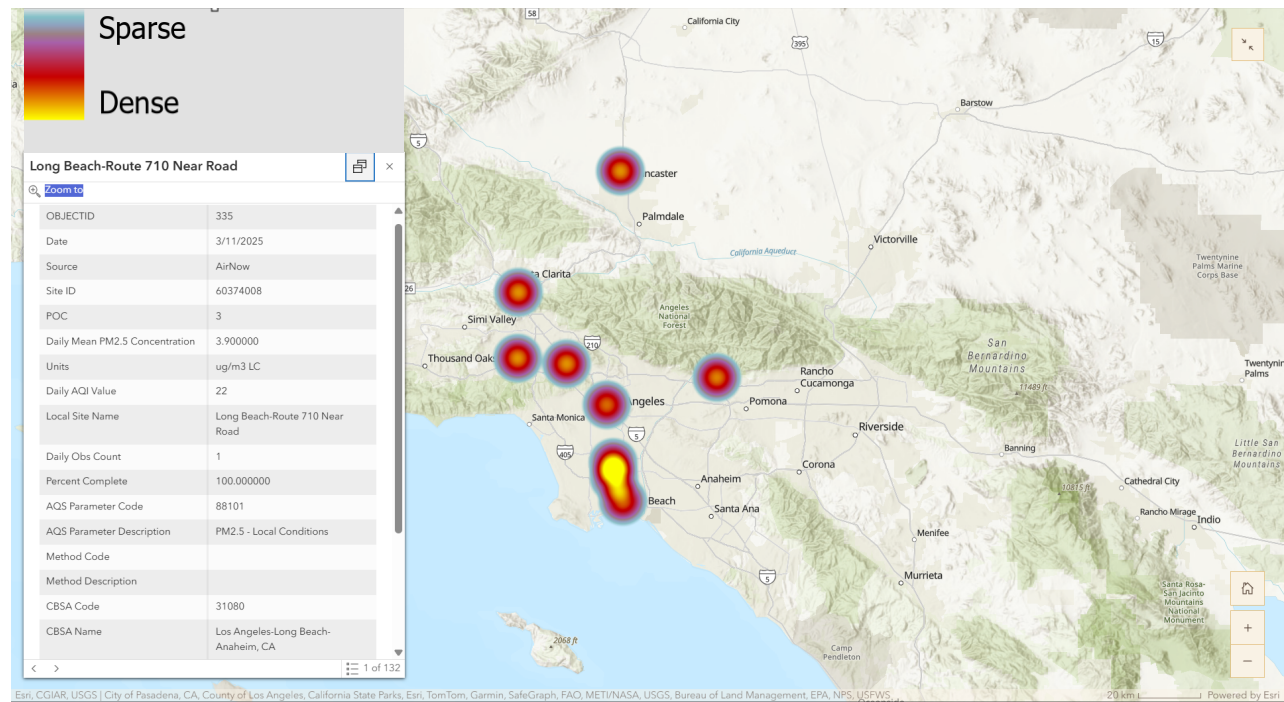


Fig 10. The heat dense zones indicate that smog mainly accumulates toward the city, however; the bluish areas indicate declining heat while the more red-yellowish (dense) zones are closer to the outskirts of downtown. Daily Mean PM2.5 below 5 $\mu\text{g}/\text{m}^3$ is healthy. These locations are captured by monitoring stations measuring AQI (Air Quality Index).

(Click on the heat density zones in the story map to see daily PM2.5 concentrations in real time.)

II. Brazil

A. Interview Results

Here are the corresponding answers to each question (See: Interview Questions) addressed in order:

1. - **A:** André Vieira de Souza. Eu sou agente de endemias eu sou responsável de fazer a cobertura pela a nossa área todinha. Aqui território indígena aqui. To aqui a 18 anos como microscopista.

(André Vieira de Souza. I am an endemic disease agent. I'm responsible for covering our entire area (Lago Mamori). This is an indigenous territory. I have worked here as a microscopist for 18 years.)

- **G:** Gefferson Lima da Silva
- **J:** Bom dia, senhores, caro visitante. Direi meu nome em português. Meu nome é Jeremia Cannes da Silva. Esta é a aldeia Kumbewa. Eu sou o xamã aqui da aldeia. Nasci na fronteira com a Colômbia.

(Good morning, gentlemen, dear visitor. I will say my name in Portuguese. My name is Jeremia Cannes da Silva. This is the Kumbewa village. I am the shaman here in the village. I was born at the border of Colombia.)

2. - **A:** Ahh, na minha opinião a comunidade indígena é onde todos nós moramos todos juntos. Unidas. Compartilhamos todos os indígenas nas esculturas rituais lendas. Compartilhamos da mesma casa da mesma pesca.

(Ahh, in my opinion, the indigenous community is where we all live together. United. We share the same indigenous beliefs, sculptures, rituals, legends. We share our houses and go fish together.)

- **G:** Na minha opinião, é um coletivo de pessoas que trabalham em torno de uma única comunidade, sabe? Como pescar, caçar. Esse tipo de coisa.

(An indigenous tribe, in my opinion, is a group of people who work around a single community, you know? Like fishing, hunting. That kind of thing.)

- **J:** Observe o clima indígena. Todos que temos aqui, todas as famílias, são de uma tribo indígena. Eles bebem os remédios antigos do primeiro mundo que temos aqui, nós cantamos e exploramos a floresta em busca de remédios tradicionais aqui na aldeia, como a ayahuasca. Meu mestre me apresentou aos costumes antigos, então agora eu também vivo da mesma maneira.

(Look at the indigenous climate. Everyone one we have here, all families, are an indigenous tribe. They drink the old first world medicine we have here, we sing and explore the forest for traditional medicine here in the village, like ayahuasca. My master introduced me to the old ways, so now I live the same way too.)

3. - **A:** Lar? Isso. Aquí. Nao lá. E aonde eu resido aonde eu trabalho onde eu convivo com as pessoas. eu não sei qual é meu verdadeiro lar.

(Home? This. Here. It's where I live, where I work, where I live with the people around me.)

- **G:** Este é um lugar aconchegante para mim. O importante é descansar sem problemas. Consigo dormir e acordar, por exemplo. Minha casa é aqui, nós vamos para lá porque somos todos parentes. Consigo dormir, entendeu? É isso para mim.

(This for me is a cozy place. The solution is to rest without any problem. I can sleep and wake up like for example. My home is here, we go there (around Lago Mamori) because we are all related. I can sleep peacefully, understand? That's it for me.)

- **J:** É aqui, senhor, dentro da floresta, para nós a Mãe Natureza é o nosso lar. Pedimos permissão para entrar na floresta porque não somos os donos, então é assim que funciona hoje para nós aqui.

(It is here sir, inside the forest, for us Mother Nature is our home. We ask for permission to enter the forest because we are not the owners, so that's how it works today for us here.)

4. - **A answered both questions 4 and 5 here:** Já. Já. Porém hoje ela desmata desmatamento está muito grande. Foco hoje e onde você vê isso? Está uma devastação aí, você diz matou a mata, o clima e tendencia e esquentar ai com ele, vem as cheias do rio. Que ai e o que faz a gente se mudar porque h 10 há 30 anos atrás, a gente não via isso hoje em dia você se você fizer uma casa no nível mais baixo, pensa que não. No ano seguinte a água vem e faz estragos na sua casa, então você tem que lutar ou se mover contra tudo isso, o clima já interfere nisso.

(Already. Yes. Deforestation is very high today. Focus, and where do you see it today? There is devastation here, there is devastation there. The climate is tending to get warmer and with it, the river floods. That is what makes us move because 10 to 30 years ago, we didn't see this today. Think about it, if you build a house at the lowest level, next year the water will come and take your house already, the weather interferes with this.)

- **G:** Lá na beira do campo, houve uma grande enchente e fomos obrigados a sair de casa, sabe? Mas o habitat continua o mesmo.

(Eh, there. On the edge of the field, there was a big flood and we were forced to leave our house, you know? But the habitat remains the same.)

5. - **G:** Não aqui na nossa região, mas no Amazonas, tem muitas instituições aqui nessa região para as pessoas.

(Not here in our region, but in Amazonas, there are a lot of institutions here in this region for people {whose homes are destroyed by floods.})

- **J:** Sim, foi por isso que vim para cá. As pessoas estavam destruindo a terra e estávamos perdendo recursos. A fronteira é onde eu nasci. Você tem que ir até o primeiro município que fica aqui no Rio Negro. Depois, Marcelo Santa Isabel, e Santo Gabriel da Cachoeira é o último, onde o barco chega para nos levar para a Colômbia. Costumo passar mais de três semanas de barco para chegar lá, onde meu pai vai visitar.

(Yes, that is why I came here. People were destroying the land and we were losing resources. The border is where I was born. You have to go up to the first municipality that is up here in the Rio Negro. Then Marcelo Santo Isabel, and Santo Gabriel da Cachoeira is the last one where the boat arrives to take us to Colombia. I usually spend more than three weeks by boat to get there where my father is to visit.)

6. - **A:** Sim. Hoje em dia, em geral, as agoutis não vêm mais ao seu território com tanta frequência como antes. Elas costumavam vir de manhã, mas hoje não.

(Yes. Nowadays, generally, the agoutis no longer come around to their territory as often as they used to. They used to come in the morning but not today.)

- **G:** Que eu gosto bastante e de macaco. É importante para mim.

(What I really like is the monkey. It is important to me.)

- **J:** Sim, o macaco aranha. Desde que cheguei aqui, nunca matei um macaco. Então, meu amigo, muita energia espiritual reside no coração do macaco-prego para nós. Quando vemos um macaco, ele desce das árvores e caminha para comer conosco, porque ele é espiritual. Eles são cuidados pela floresta, e é por isso que ela não pode ser destruída. Olhe para a vaca, ela também quer comer, mas a proteção está toda aqui na floresta, na natureza.

(Yes, the spider monkey. Since I've been here, I have never killed a monkey. So my friend, a lot of spiritual energy lies in the heart of the nail monkey for us. When we see a monkey, he comes down from the trees and walks by to eat with us because he is spiritual. They are taken care of by the forest which is why it can't be destroyed. Look at the cow, he wants to eat too, but the protection is all here in the forest, in nature.)

7. - **A:** Os incêndios geralmente vêm e os matam. Quando animais como cutias estão por perto, eles são mortos e desaparecem. Não os vemos por muito tempo depois.

(The fires usually come and kill them. When animals are there like agouti, they are killed and they disappear. We don't see them for a long time after.)

- **G:** Cara, às vezes a gente até sente a perda deles porque tem animais que são perseguidos na nossa região, como o tatu. Essas coisas são muito perseguidas, então isso só acontece com alguns animais, é triste. O ser mais difícil de encontrarmos vivendo na nossa região é a anta. Normalmente existe um ciclo, certo? E cada animal tem uma função na natureza. Então é isso.

(Dude, sometimes we even feel their loss because there are animals that are persecuted in our region, like the armadillo. These things are persecuted a lot, so this only happens with a few animals, it's sad. The one thing that is the hardest for us to find living in our region is the tapir. Normally there is a cycle right? And each animal has a function in nature. So that's it.)

The interviews all resulted in short questionnaires styled with GoPro footage (see: Story Map Deliverable for final interview product) included to show the surrounding outside environment of the river banks each participant lived around.

All three participants were truthful and responsive with their answers from a personal point of view. Jeremias' language of origin is Kumbewa and some of his answers were incomprehensible to translate, so I paraphrased his answers. All interviewees support my claim that there is a consensus in which deforestation is destroying the habitats of the specific fauna that they feel connected to when sightings of these animals are diminishing in numbers as the wet season arrives. For André it was the ⁶ agouti, a rodent which is a clear indicator of the drought season ending when their populations decline. For Gefferson, he spoke of ⁷ macacos, and species of tapir that are disappearing mainly due to human intervention. Finally, Jeremia also spoke about the significance of the macaco, particularly the spider monkey, as a spiritual and biological indicator of rainforest health when they are seen in groups.

Despite their seemingly different backgrounds, all three participants live similar lives and consider themselves indigenous, not entirely because of their blood origins, but instead agree that being indigenous is a way of life and assimilation into the culture and fauna that are important to their home. To them, home is several families together who fish and hunt together, whether they struggle to survive in the drought season or when they struggle to prevent their homes from being damaged by floods as said by André specifically. They consider fauna as part of their homes and way of life.

⁶ Agouti (*Genus: Dasyprocta*): also known as cutia, are an endangered genus of medium to large-sized rodents native to Central and South America. They are the only known species of rodent with molars strong enough to crack through the thick tree of Brazil nuts, making them essential in the cultivation of the nut. (Source: <https://animals.sandiegozoo.org/animals/agouti>).

⁷ The Portuguese word for monkey. Includes macaco prego (Nail monkey) macaco marrom (Brown capuchin), and macaco esquilao (Squirrel monkey).

III. Deliverable

All findings have been combined into one large story map into a final deliverable. This is intended to be presented entirely into one beautifully-crafted graphic story with 3D models, scenes, pictures, and coordinates with every map I have created to show as a large presentation available on desktop. Included is an additional mobile friendly QR code below for users who prefer a more interactive experience with the 3D models of the map tours created. Additionally, there is a link to iNaturalist for all sightings of organisms encountered on my expedition with approximate location coordinates. While my entire project is more informative and intended to raise awareness, the finalized project will show my research as results for helping create predictive migration patterns of fauna in habitat modeling studies to provide better aid in preserving the unique species of animals found in California and Brazil. Knowing what was discussed in this report, fauna are likely to migrate toward human inhabited communities, especially carriers of zoonotic diseases such as mosquitoes with Zika virus and three-toed sloths carrying parasitic protozoans which cause leishmaniasis. It is essential to know this information to prevent further spread to humans. Moreover, iNaturalist will provide viewers with (approximate) locations on where specific species can be encountered and possibly aid in preserving their habitats.

The deliverable and interview portion of this project will be a product of future community outreach.

Final Deliverable: [Story Map](#)

All Biodiversity Observations: [iNaturalist](#)



Fig 11. Mobile-Friendly Story Map QR Code

Conclusions/Discussion

I. Los Angeles

Fauna and people are selective of their habitats by food source and habitat coverage as deforestation caused by wildfires pushes them outward. Both are likely to proliferate in areas based on ecological selection because of habitat loss. My maps illustrate that wildfires factors such as dead foliage and native shrublands spread around Los Angeles are an excellent form of travel for wildfires. We now know that GHGs accumulate toward metropolitan areas due to wind and are contributed by the heat island effect with no form of evaporative cooling taking place to help mitigate the issue because of the scarcity of trees in an urban setting.

Therefore, habitat fragmentation is aided by these detrimental conditions which aid the spread of wildfire hazards in Los Angeles County. We can conclude from an observational perspective in the neighborhood of Altadena that due to the presence of toxic GHGs and materials contaminated by the hazardous aftermath, that the environment is currently not suitable for most natural and urban communities.

II. Brazil

Based on my immersive experience in the Amazon Rainforest for 9 days, residents of the Amazon Basin interviewed have particular species of fauna that are culturally significant to them, tied to their ethnic group or association with their identity as an individual with indigenous background.

In addition to the visit to Rio de Janeiro as told by the residents of Maracanã, they worship and named their village after a threatened animal species: the blue-winged macaw. The blue-winged macaw and the village residents are continuously threatened because of increasing urban sprawl throughout the city which has, according to the residents, even eliminated large areas of trees around their home. According to the Maracanã village, this is likely what led to the blue-winged macaw's local extinction in the past as they have personally experienced city level opposition from the state of Rio de Janeiro to expand their revenue with the use of the Maracanã stadium.

In conclusion, deforestation comes in many forms, including the heat-centric wildfires of Los Angeles, California, flooding in the wet season of Brazil from the months of December to May, and the urban level that causes detrimental climate effects in the pursuit of monetary gain.

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