Equipping Pemon Adventure Guides in Canaima National Park with High-Performing Footwear and Headwear that Promote Culture, Commerce, and Safety

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Preface

Being Venezuelan means many things, the most beautiful one being proud of the natural landscape and biodiversity that the country shares. Venezuela is one of the most diverse countries in climate and habitats, ranging from the Andes Mountains to the Amazon Forest and from the Llano's plains to the Caribbean coast **(**Encyclopedia Britannica, Venezuela 2023).

Nevertheless, Venezuela's pride is Canaima National Park. Named a World Heritage site by UNESCO in 1994, it is the home of the world's largest waterfall, Angel Falls, and a vital indigenous community, the Pemon people (UNESCO, 1994).

One can only dream of what experiencing these beautiful ancient sites of the Guyana Highlands, with its unique table-top mountains, would feel like. However, only a few can make this dream come true. Much like the British expedition group in 1835, who were the first to reach the top of the highest mountain peak, mount Roraima, I too had the urge to explore these lands. (Rodriguez, Roraima: 13 interesting facts you didn't know 2022). However for me, I had grown up so proud of these lands, and they were not just a far-off locale to the summit. So, when the opportunity to travel to Canaima with my mom came about during the summer, we jumped on the chance to fulfill a longtime dream of ours. Excited, I gave myself the task of contacting the different camps that now lead tourism in Canaima. As we began our journey, we had to take a small plane, the only way of accessing this place. We instantly felt welcomed by a fantastic community of hospitable people, the Pemon. Immediately, the journey began, guided by an experienced Pemon tour guide, who took us by boat to the closer waterfalls, El Sapo and Hacha.

Once we got there, we hiked up to some wet elevated terrains, and once we reached the waterfalls, we were recommended to walk barefoot. It was incredible as I and the other tourists got to shower and walk through the waterfalls. Afterward, we headed back through different trails, enjoyed the unique landscapes, and took the same motorized canoe. Once we returned to the base camp, we rested and recharged to prepare for the next day.

As the next day came, the journey to Angel Falls began, waking up to a dark sky before sunrise. The journey started this time by taking the curiara (a type of boat) on a 2-to-3-hour canoe trip that involved dealing with lots of water and guiding the boats across the river. (Socoadventures.net 2023) The weather throughout the journey was dynamic, shifting from sunny and cold climates to humid and rainy. Despite the challenging journey, the view was like no other. At times, the guides had to get the tourists out of the boat to walk and cross stretches of land for their safety while another guide handled the water rapids on the boat. Once we reached a base camp at the bottom of Auyantepui (the mountain where Angel Falls is located), the guides provided the tourists with food and water. Then, they got ready to ascend the path to Angel Falls, traversing rustic and rugged terrain in the middle of the jungle. As we got closer, the path to the falls got steeper, continuing for approximately an hour and a half. Despite the long journey, the tourists and guides enjoyed the astonishing view of the iconic waterfall and swam to the landing point. Once we completed our time there, we headed back along the same path to the base camp.

As far as my experience goes, it was the most fulfilling experience of my life. Seeing the beautiful tepuis (table-top mountains) and the biodiversity, and just experiencing these lands as a proud Venezuelan woman, nothing compares to it. However, during my time there, I also learned much about the Pemon community and their involvement in creating these experiences. I learned

how they see these lands as sacred places where you are in contact with the spirits resting in the mountains. I learned how involved they are in sharing their traditions, culture, music, and crafts.

However, I also learned that adjusting to the consequences of many tourists visiting this place has been hard for them. Many want to dedicate their lives to the hospitality sector and tourism, as they do not want to work in occupations that hurt their lands and go against their beliefs. Sadly, despite these wishes, many must work in the mining sector. ((Rodriguez, *Linking Well-being with Cultural Revitalization for Greater* 2017) This means that being tour guides and having control and responsibility over sharing this land with visiting people is highly important to them. Therefore, there is an opportunity here to impact the well-being of the Pemon people through the betterment of their tourism practice. I believe that the design of new footwear and headwear can uplift and legitimize the culture and identity of the Pemon people by giving the Pemon guides the best tools to do their jobs, ensuring a lasting experience for tourists while better protecting their land for future generations.

Introduction

Globally, specialized gear is required for tour guides in any national park to successfully guide visitors to adventurous new places. This is even more important for the native guides in Canaima National Park, which is one of the most challenging in terms of changing climates and environments. As important carriers of culture and knowledge of this land, the Pemon guides play the most important role of guiding and creating harmony between the visitor and nature.

The role of being the native tour guide goes beyond just a monetary endeavor. It expands to finding a way for their culture and identity to exist in the present day. It also ensures their place in this ecosystem as guardians of this sacred park. However, most Pemon guides wear inadequate gear when navigating these terrains. This affects how they can execute their job and complete each task when walking, hiking, wading, and canoeing on their journey to Angel Falls. The jungle crossings can be the most challenging; as avid climber Gary Flint supports in his description of his journey to Angel Falls; the jungle path can be a full-body workout. They passed over terrains filled with overgrown tree roots, narrow log bridges that go over gullies, and some water-filled pits.

Moreover, as the inclination of the assent increases, the whole body must be used, making this the most challenging path to transverse (Flint, Notes from the Lost World: Venezuela - secret compass 2023). Furthermore, it is problematic that the Pemon guides mainly prioritize comfort in their gear, given their current product choices on the market. By choosing convenience over function, they fail to have shoes that can enhance their overall performance in their journey through

the jungle. They currently choose to wear running shoes for their cushioning and support. However, these do not provide adequate traction, stability, or adaptability for Canaima's ever-changing terrains and climates. A balanced and specialized offering must be designed to combine the best of their met and unmet needs. Moreover, they carry a dry bag with them sponsored by the lodges they work for; in this bag, they usually carry first aid kits, change of clothes, towels, and additional food. But it becomes hard to juggle everything together when they have to be drenched in water all day. Nevertheless, the products currently used can be enhanced to provide protection and enable them to be always comfortable and clear of any distractions that can drastically change the course of the expedition. This especially applies when navigating the water rapids and having to walk in the river to help the canoe, as well as crossing roots and waterfalls, as this can compromise the safety of each of the tourists and the overall success of their journey. Overall, the Pemon tour guides need fast-drying and weatherproof equipment that will not sacrifice comfort over function, adapting to the many challenges they can quickly face in Canaima National Park's varied and dynamic environments. Additionally, their gear is needed to help them succeed in providing the safest and most memorable experience to the visitor, the success of which goes hand in hand with their identity and the preservation of their culture.

History: Pemon and Tourism

In southeastern Venezuela, the quest for exploration has never stopped. It is one of the world's most biodiverse places, home to the Pemon community and the tallest waterfall. A place denoted as the “lost world” still exists. Where movies like Up and Jurassic Park were inspired, this is what we know today as Canaima National Park. Despite the strong cultural and spiritual bond that the Pemon have with these sacred lands, in today’s world, they feel like strangers in their own home. There has been a lack of sensitivity and support for them, starting with not providing ownership, even though the 1999 National constitution recognized territorial property rights for indigenous people. Moreover, in recent years, mismanagement of land-imposed mining and systematic exclusion of their value has left the Pemon community feeling lost in their land.

It all started with the world’s tallest waterfalls, earning the name of American aviator and explorer James "Jimmie" Crawford Angel, who flew over it for the first time on November 18, 1933, during a solo flight through the Churún Canyon, nestled within the vast tabletop mesa known as Auyántepui. Jimmie Angel had a quest for the elusive “Lost River of Gold” (Angel, Up and Away to Angel Falls and Paradise Falls 2012), which led him to scout a landing location on Auyántepui from the air, an attempt he undertook on October 9, 1937. Initially, the landing seemed flawless, but the wheels of his plane, El Rio Caroní, penetrated the soil, sinking into mud, abruptly halting the aircraft, leading to a damaged fuel line and its nose embedded in the mire (Angel, Up

and Away to Angel Falls and Paradise falls 2012). Even though many people credit Jimmie as the discoverer of the largest waterfall in the world, the Pemon tribe had already been living on this same land for hundreds of years. In a way, they are thankful that gold wasn't found in sight because the effects of mining would have affected the rivers' water, fauna, and local population (Boon and Melendez). In December of 1939, the Venezuelan government officially christened the waterfall "Angel Falls" in tribute to Jimmie Angel's explorations across the Gran Sabana from 1933 to 1939 (Angel, 2012). His remains were laid to rest over the waterfall on July 2, 1960 (Angel, 2012).

Ten years following the official naming of Angel Falls, Ruth Robertson, a photojournalist originally from the United States who resided in Caracas at this time, spearheaded the first successful overland expedition to confirm its status as the world's tallest waterfall, measuring 3,212 feet (Gonzalez). Ruth took a major risk in carrying out this expedition, as it was entirely self-financed, and initial efforts to get National Geographic on board with publishing the photography and narratives of her expedition were turned down. The previous four expeditions had all failed to reach the falls, with some members never returning. Furthermore, on top of these dubious circumstances, with her being a woman in these times, she faced a seemingly insurmountable wall of doubt. The successful perseverance of her expedition required lots of planning and, most importantly, finding the right people to guide her in this unknown land. And these people ended up being the "guardians of the tepuis," the native Pemon (Gonzalez).

Ruth and her team enlisted the services of Kamaracoto Natives to serve as both porters and guides. Navigating through the terrain by curiara, a type of canoe used by the native community, and on foot, Ruth's expedition had a dual purpose: firstly, to ascertain and measure the falls definitively as the tallest in the world, and secondly, to capture the inaugural ground-level

photographs of the highest waterfall for global distribution (Gonzalez). The outcome of her remarkable journey was documented in the November 1949 edition of National Geographic, and subsequent reports were featured in Time, Newsweek, and major newspapers worldwide (Ruth Robertson Org). The significance of the native Pemon guides played a crucial role in the success of her mission.

Figure 1. *The Angel Falls photo that made history. This was Ruth Robertson's most valuable photograph in her archive and was published in every major newspaper and magazine worldwide,* ***(Ruth Robertson Org).***

The awe-inspiring Angel Falls, still nearly as remote as it was in the era of Jimmie Angel and Ruth, remains an enticing destination many travelers believe is well worth the challenging journey. The typical approach to reaching the falls commences with a flight to the village of Canaima, with some offering passengers an aerial preview of Angel Falls, providing a glimpse of what awaits them. Canaima lies approximately 50 kilometers from the falls, and due to the absence of roads, the primary mode of transportation is a motorized canoe known as a curiara (Tour to

Angel Falls in Venezuela). The adventure sets off from Canaima Lagoon, an area adorned with splendid waterfalls, especially following heavy rain, which most travelers find an unexpected and delightful bonus. The river journey typically lasts approximately four hours, tracing the paths of the Carrao and Churun rivers.

In today's world, it is important to acknowledge the significant accomplishments of Jimmy Angel and Ruth Roberston. However, it is easy to forget about the Pemon community, which was always there, guiding them throughout their expeditions. Most notable and there through it all was Chief Alejo Calcano, a legendary Pemon Chief (Capitan) of the Kamarata Valley community and a visionary of his own who was part of both Jimmy and Ruth's mission (Gonzalez).

Chief Calcano is a part of history that is briefly discussed and often overlooked. Despite this, he played such a crucial role in the success of the explorers of this era; many of the first expeditions to Canaima would not have been possible without him. He saw the opportunity that the outside explorers could bring to the Pemon community in Canaima and worked hard to help build bridges between the explorers and his people. Alejo's underappreciated yet valuable story began in 1914 when he was taken from his community as a newborn child to Ciudad Bolivar, Venezuela, to be educated by a white couple. After moving into young adulthood, Alejo returned to Canaima and his people with the mission to protect and maintain the Pemon culture, Kamaracoto traditions, and their land. After reconnecting with his roots and staying true to his goals, he became the chief of his community. Assuming the role of chief within his community helped him engage with explorers, negotiating and facilitating the transportation of their expeditions. Recognizing the threats posed by encroaching outside civilization, including the perils of mining, logging, and land invasion, Alejo delineated boundaries to define and protect the territory of the Pemon people, securing the continuation of their traditions and way of life. To this day, his knowledge has been

transmitted orally from one generation to the next. It is currently taking the shape of what they call "the Pemon life plan," a document that ensures cultural revitalization, the pursuit of territorial rights, and the development of Pemon life plans to define their well-being today (Rodriguez).

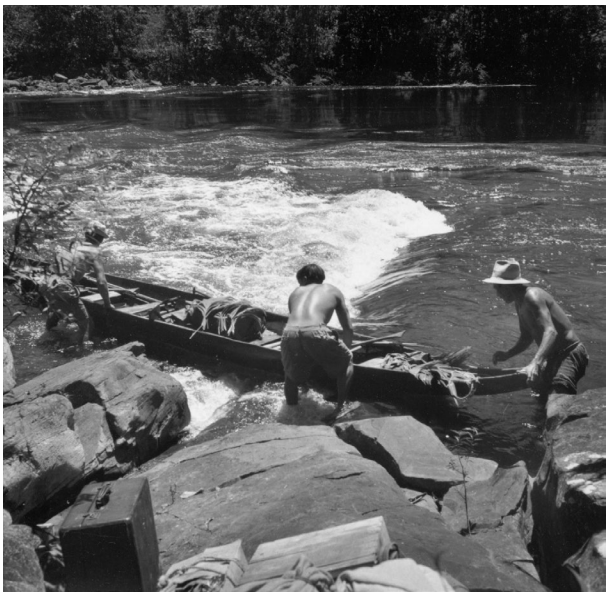


Figure 2, 3, and 4. *Ruth Robertson's collection of photos from the trip to Angel Falls with her team and the local Pemon was published in 1949 on National Geographic (*Ruth Robertson Org).

Problem Statement

How might we enhance the Pemon Adventure guides' capability to provide a safe, culturally enriching, and economically sustainable experience in Canaima National Park by equipping them with specialized adventure gear tailored for the diverse terrains, climates, and challenges of the park's unique ecosystems? This would enhance their performance and comfort, enabling them to excel in their job as native tour guides.

The User

Canaima National Park is home to the indigenous Pemon natives, part of the Carib linguistic group (Canaima National Park). The Pemon have an intimate relationship with the tepuis; these tabletop mountains are sacred to them. They are the houses of gods and believe they are also the home of the Marwari spirits, "spirits in the form of men who may steal the souls of the living" (Thomas). These make their home, and according to traditional Pemon norms, the tepuis were not meant to be explored because they were believed to be evil. However, as their community changed, these beliefs took on new forms. The Pemon want to be guides of newcomers to care for and explore these mystical lands while respecting the spirits that they believe to live within the tepuis.

Today, the Pemon economy in Canaima is based on agriculture, tourism, hunting, and fishing. Many young Pemons work as tour guides for new visitors to the park, following the legacy of Chief Alejo Calcano. They take tourists on a journey through the jungle, water, and mountains, sharing the beauty of Canaima and its sacred place within the Pemon culture. Overall, Pemon tour

guides play a multifaceted role in guiding visitors to Auyantepui and Angel Falls, ensuring their safety, providing valuable knowledge, and creating a memorable and culturally enriching experience in the heart of Canaima National Park.

This project aims to target the Pemon tour guides from ages 20 to 45 since it will take some years to specialize in this endeavor after graduating high school. Moreover, the product solution will target the male demographic, as most current tourist guides in Canaima National Park are male. Additionally, special attention is paid to Pemon guides with more than two years of experience constantly navigating submerged, wet, and dry environments while guiding tourists to Angel, Sapo, and Hacha waterfalls, as well as Kavac Caves. These are the designed target users for this project, as their experience and constant guide work push their product performance requirements and ensure an impactful project.

Broadly looking at the current products used by the best Pemon guides, it becomes clear that various sports gear and apparel are needed to guide tourists through such variable experiences in Canaima. These products include functional footwear for rugged terrains and wet environments, protective eyewear from UV rays, water, and debris, fast-drying headwear that protects from insects, rain, and sun, as well as fast-drying apparel and swimwear and waterproof dry bags used to transport and protect all of their persona belongings as well as first aid kits. While the guides do their best to pick products from the current market that work for their performance goals, many problems have not been addressed. There is a need to create outdoor gear tailored to the specific challenges of these environments, including moisture control, protection against dense vegetation, and adaptability to varying microclimates, all while providing superior comfort and durability in the different stages of hiking, wading, swimming, and walking. While current products individually address these concerns, no footwear or bag solutions address all the problems they

encounter. There is a need to design innovative, high-performing gear to ensure functionality, safety, environmental responsibility, and comfort for the Pemon guides.

Additionally, while this project focuses on the Pemon guide, many analogous users could benefit from these product innovations. Many other tour guides in similar regions face challenges in diverse, humid rainforest environments. This can potentially help expand the market for these products. It is also essential to consider that the same tourists visiting these sites can have the same benefits of wearing the high-performance gear specifically designed for these environments, and this can open more opportunities for additional user testing scenarios to validate the product solutions further and expand data gathering.

User Market Size

When considering the target consumer for this project, it is essential to recognize that while the target user population may be small, the users that could benefit from the innovations of this project are far greater. The Pemon population currently constitutes 15,000 Indigenous people (Instituto Nacional de Estadistica), and in one of the latest censuses, the Kamarata community in 2019 had a population of 3,151 (Angel Conservation Corp). However, the potential for product solutions this paper proposes could extend to new markets beyond the Pemon tour guides—encompassing tour guides in similar rainforest ecosystems and tourists. These populations are far greater, providing a viable untapped commercial opportunity. Ecotourism in South America continues to increase. Two of the most highly praised locations are the Galapagos Islands in Ecuador and the Amazon rainforest in Brazil. However, there are still various other tropical rainforests across the continent, including Venezuela. Moreover, natives and locals are designated guides for exploratory experiences in these places, and much like the Pemon guides, similar, if not the same, challenges need to be solved in the gear they wear.

It is essential to acknowledge the growing global ecotourism market, valued at US $185.87 billion in 2021 (Millioninsights.com) to US $215.7 billion in 2022 (Marketdataforecast.com). This market expansion is driven by increased awareness of global warming and the imperative to conserve natural areas, with ecotourism emphasizing learning about the environment, minimizing negative impacts, and promoting traditional cultures in natural settings. This aligns with current work being done by ecotourism organizations, such as the proposed ecotourism plan for the Kamarata Valley in Canaima National Park, designed to establish the region as a sustainable destination, contributing significantly to preserving the Pemon culture (Angel Conservation Org,

2018.). This plan strategically integrates with the existing telemedicine and communications project infrastructure, leveraging its medical, cultural, and tourism sustainability capabilities. Additionally, the initiative seeks to address unemployment issues among the local Pemón community while diverting attention from illicit gold extraction activities within the national park. A portion of the plan aims to create a sustainable tourism program to prepare the Kamarakotos for collaboration with the broader world, introducing them to the best ways to practice being part of the responsible tourism industry. The outreach component of the plan aims to raise awareness about indigenous cultures and peoples, emphasizing global efforts to protect and sustain indigenous cultural heritage. Best practices also apply to best overall performance on the journeys, which instantly ties to the product goals of this project. With these emerging efforts, guides can guide more safely and effectively while feeling comfortable, and overall, can help better the ecotourism industry in Canaima. Moreover, funding these programs can directly provide a source of investment for the product solutions this paper proposes if the high-performance equipment developed for these ecotourism users proves successful. There would be people and organizations ready to purchase the proposed product line.

Moreover, the adventure tourism market will reach US $4.6 trillion, and the outdoor equipment market will amount to US $24.65 billion in 2023 (Precedence Research). There is a clear opportunity to develop innovative high-performing gear tailored to the native guides in tropical rainforest regions that can help expand these growing markets and focus on promoting environmental preservation. The following are potential consumers outside of the Pemon guide community that could benefit from the products developed during this project:

Adventure Tour Operators: Companies specializing in adventure tourism in rainforests or other similar wet regions may be primary consumers. They could purchase specialized gear for their guides and offer it as part of their tour packages.

Individual Adventurers: Independent adventurers, backpackers, hikers, and explorers who visit rainforest ecosystems like Canaima could be a market segment looking for high-quality, specialized gear that suits the environment.

Eco-Tourism Providers: Eco-tourism companies focusing on sustainability and responsible travel may be interested in gear designed with eco-friendly materials and practices.

Government Agencies: Government agencies responsible for managing national parks and protected areas may seek specialized gear for park rangers, medics, and guides.

Conservation Organizations: Rainforest conservation and education organizations may need gear to minimize the environmental impact.

Universities and Educational Organizations: Institutions performing ecological or other related research in rainforest environments may seek to purchase products that are culturally sensitive, sustainable, cost-effective, and consistent with the needs of their students, professors, and researchers.

Military/Paramilitary Organizations: While not aligned with this project's cultural and sustainability messaging, innovations developed for this project could apply to military organizations looking for versatile equipment in tropical environments.

Performance Jobs to Be Done: The Adventure

Tourists visiting the Auyantepui in Canaima National Park arrive by air and usually stay at a base camp for three to four days. They usually complete three experiences throughout their stay: a visit to the nearest waterfall (El Sapo and Hacha), a trip to Angel Falls the next day, and Kavak caves. All are located in the western sector of Canaima National Park. The native guides always guide these different experiences. They typically start on a motorized canoe trip from the Canaima Lagoon, often the base point for every journey. In this portion of the trip, the guides must take control of the canoe, optimize where people sit, and shift their weight to accommodate and help stabilize the canoe. After this, the guide and another native guide helper operate the boat together through dynamic waters; one will drive the engine, and the other will be looking ahead, guiding with a paddle, all through the Carrao River. This portion of the journey focuses on looking out for visitors' safety through the long span of time driving the boat through the water. Here, guides need lots of control, be able to distribute weight, and anticipate the safest route to take depending on the levels of water in the river; they need gear that can cover and protect their belongings from constant water splashing, rain, and sun, it is crucial to have a safe, dry bag maintaining things dry. They also need shoes that can provide grip and stabilization when moving on the canoe. Moreover, water rapids can often get complicated; therefore, the guides must sometimes opt to get out of the boat and submerge in the river waters to guide the boat when control is lost and the canoe is close to hitting a big rock. (See Figure 5)

Figure 5. Here is Pemon Guide Steven Aranguren walking through the river in one of his journeys.

Guides might also take tourists to walk on stretches of land for their safety. In this portion, the guides and the tourists walk through the land, encountering water formations, mud, and more slippery land. Wading and walking faster to meet the native helper on the other side of the land to get back on the canoe and continue the trip, they must be efficient with time but maintain reasonable control through this part of the journey. This part may happen as often as needed.

After reaching the base of Auyantepui, or at any other experience, hiking and trekking begins. This can be a relatively strenuous hike. The guides must ensure the visitor's safety while feeling comfortable on their feet, having the energy and control to tackle uneven terrains, and being able to stabilize each step they take. Their vision and paths must be straightforward and clear to see and anticipate anything that can come in the middle of the jungle—and have fast-

drying footwear and gear to prepare for sudden climate changes and anticipate crossing small rivers, tree roots, and mud paths. Moreover, as they ascend the Auyantepui, they must ensure every tourist is safe, hydrated, and feeling good. The guides need to adjust to elevation as they take secured steps on the diverse terrain of the tepui.

The journey's goal for the native guides is to ensure that the tourist can witness the breathtaking views of each of the falls, especially Angel Falls, the world's tallest waterfall. The guides can take the visitors to various vantage points to view this site, and at times, depending on the climate, they opt to provide a closer experience by taking them swimming at the base of the falls. Furthermore, in this case, they must be ready to cross slippery surfaces of wet rocks. Here, excellent traction and control are crucial. Guides advise the tourist to cross this path using socks since they still provide enough grip while still having some protection for the feet and more ground feel/ control by having more contact with the surface. When going through the waterfall, the temperature can shift fast, from hot to cold, creating discomfort. They bring swimwear as their undergarments to enjoy swimming in these waterfalls with the tourists while showing them the beautiful landscapes. However, putting the same shoes back on with the wet socks, carrying different shoes, and changing socks can be annoying. Moreover, when you must be focused on the moment, it is crucial to have footwear and socks that can dry faster. This can help the native tour guides stay focused while providing the best traction without sacrificing comfort.

After enjoying the sights, the Pemon guides and tourists return to the Canaima base camp, retracing their steps through the same hiking trail, but this time downhill. It is essential to remain blister-free and dry for their descent. Once they reach the base of the tepui, they take some time to refuel and rest. However, the path back can be cumbersome since they often must carry the same wet clothes, towels, and swimwear. Then, they return by boat along the same path. At this point,

energy levels and fatigue start to hit, and weather conditions change. This is where the rain starts to pour, and strength and endurance are needed to continue the journey efficiently. Once they hit the base camp, they want to be warm and clean, and they want to ensure visitors feel good, eat food, and are satisfied with the adventure. Afterward, it is time to clock out for the day, and they must head back still feeling comfortable and without any pain to rest and recover successfully for the next day's adventure.

The Environment

Canaima National Park in Venezuela is the world's sixth-largest national park and the second largest in the country, just behind Parima-Tapirapecó. It spans an area equivalent to Belgium or Maryland and safeguards some of the Guayanan Highlands' moist forests ecoregion (Canaima National Park).

Recognizing its ecological significance, UNESCO designated Canaima National Park a World Heritage Site in December 1994. It meets criteria related to geological and biological processes, rare natural phenomena, and the survival of endangered species (UNESCO). Moreover, it is now administered by the National Parks Institute, INPARQUES. The Canaima environment is characterized by lush vegetation, extreme humidity, diverse flora and fauna, and vast natural resources, making it one of the world's greatest natural wonders.

Why is this place so unique? The park consists of what the Pemon calls tepuis, which are massive table-top mountains that are millions of years old. These mountains create one of Earth's most unique ecological environments that had remained intact for 1500 to 2000 million years when South America and Africa were one. Canaima remains free from the world, it features striking towering cliffs, stunning waterfalls, exotic plants, and Angel Falls, the world's highest waterfall, towering at 979 meters (3,212 feet) (Sharpe and Rodríguez).

The climate in the park has a mean annual temperature of 24.5°C, but on the tepuis, temperatures average between 9°-12°C and can fall to 2°C at night. Therefore, it is hard to predict the changing weather. The mean annual rainfall is between 1,800 and 3,000 milimeters. However, locals follow what they know as the wet season and the dry season. During the wet season, which is between April and December (June and September have been at their peak), rain is constant, and

the dry season is from January to March. During the wet season it is more accessible for locals to navigate the river and enjoy the waterfalls, which can be challenging, even dangerous, during the dry season. That being said, the summits are frequently rainy and constantly humid (Yichuans).

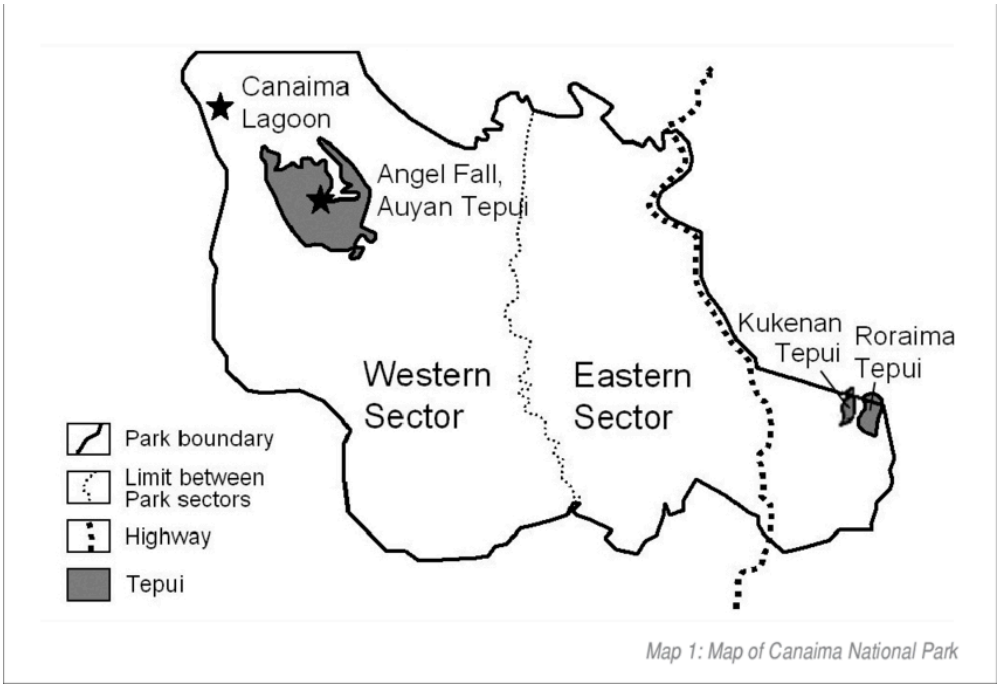


Figure 6. *Map of Canaima National Park. (Rodríguez)*

Product Classification Focus

The initial concept for the product line aims to target all the challenges the Pemon guide encounters in their diverse journey in Canaima National Park. This product line will include hybrid/modular shoes, and the drybag with a drying cage. The modular shoe will be adaptable and lightweight with superior traction and cushioning that can provide stability and comfort in every terrain. This shoe is meant to adapt to different scenarios and various surfaces, like wet rocks, mud, and dry terrains. It is also meant to dry faster this way, prioritizing ventilation, accounting for the long journeys on the canoe and by foot. Due to the discomfort that wet shoes can cause and the changes from hot to wet to colder climates, this shoe needs to be optimized for water drainage. The idea to make it modular comes from the moments where traction needs to be increased and more points of contact with the surface are needed. The idea is to have an outer sleeve component that can be used over the shoe, like an over sock, to optimize walking through wet and slippery rocks when wading and crossing waterfalls, like a felt outsole. Additionally, in the case of the dry bag, this must not only be lightweight and waterproof, but the idea is to enhance the current drybags function of maintaining belonging dry by having a cage/attachment that can help distribute weight while providing capabilities a hook on dry fast function.

Product Rules and Regulations

There are no specific rules in developing products for native tour guides in Canaima National Park. However, these products have a set of required qualities to be able to succeed in this location, such as being adaptable, breathable, and having durable materials, which are essential to combat the challenges presented by the unique environmental and cultural characteristics of the Canaima National Park and rainforest ecosystem. Using insect protection, UV protection, and quick-drying materials ensures the comfort and safety of guides and tourists amidst the region's high humidity and sun exposure. Moreover, integrating emergency features and adaptability within the products caters to unforeseen circumstances and diverse terrains, optimizing safety and functionality. Emphasizing eco-friendly materials and fostering cultural sensitivity aligns with sustainable tourism and supports the preservation of the region's natural habitat and cultural heritage. It is also important to note that in the jungle and any biodiverse habitat, products must be carefully crafted and well thought out so as not to attract undesired insects and animals. Therefore, color, material selection, and applications play an important role as a lack of discretion could disturb the ecosystem.

Moreover, collaboration with local experts can ensure authenticity and relevance, enhancing the tourist experience while respecting the local environment. Furthermore, prioritizing comfort is crucial when designing for the long hours of work and long journeys that these native guides must go through. Therefore, products that address practical needs can contribute to the guides' and tourists' health and well-being during extended excursions. At the same time, it is vital to make these products easy to use, lightweight, and packable. Overall, these product-suggested rules aim to create outdoor gear that is functional, safe, environmentally conscious, and culturally

respectful, promoting a holistic approach and the best performance of the tour guides' experience in the Canaima National Park and Rainforest Ecosystems.

Key Competitors/Baseline Products

When looking at the current competitors' products offering in the outdoor sports market in the categories of hiking/wading and jungle exploration footwear and drybags many relevant products compete for the target consumer preference, others for relevant design and functional use, and some for best overall in its category. This means that even though they might not be considered direct competitors in the market, for their application in this specific scenario, environment, and targeting consumers' needs in Canaima National Park, they can provide tremendous benefits and solve many of the challenges the native guides face in their journey.

The three products chosen for the footwear category are the Orvis Pro Approach shoe, the On Footwear Cloud X3, and Lizard Ultra Trek Sandal. These products were selected based on specific features that provide critical benefits such as quick drying, breathability, stability, and traction. The On Footwear Cloud X3 is already popular among the guides due to its exceptional breathability, lightweight design, and comfort. The cushioning and fast-drying properties make it ideal for the humid and wet conditions of Canaima National Park. The Orvis Pro Approach shoe is renowned as one of the best wading shoes on the market, boasting a fantastic drainage system and an outstanding Michelin traction outsole that performs well across different terrains. These features make it particularly suitable for traversing wet and slippery surfaces encountered during jungle exploration and river crossings. The Lizard Sandal is equipped with an impressive Vibram

outsole lug pattern, offering superb traction and high breathability and comfort. Its design is well-suited for the hot and humid environment, providing the necessary support and durability for long hours of trekking.

Orvis PRO Approach Shoes -$169

Cloud X 3 by On Footwear-$150

Lizard Ultra Trek Sandal- $ 105.85

Starting with the Orvis PRO Approach shoes, this shoe closely aligns with solving most of the tasks that the native guides complete in their journey. Designed for boating, wading, and hiking, the shoe is versatile and adaptable for different scenarios. It is lightweight and promotes ventilation, all thanks to a high-performance polyurethane cage technology made specifically for water drainage, allowing for quick drying and thermoregulation of the foot. This unique shoe also features a neoprene sock that protects the foot from debris while helping secure the ankle, providing more stability. When it comes to the grip of the shoe, the Orvis Pro Approach shoe features a Michelin extreme rubber outsole, designed to provide better wet traction. Moreover, the shoe also features a removable 3D molded Ortho-Lite insole, which lies on a single-density foam midsole, promoting comfort. When it comes to the price, it is on the higher side of the spectrum, but it is well worth it for the versatility and materials. However, when looking at reviews online, many users, although happy for their purchase, have also shared how the transition from wearing the shoe in the water to then hiking has resulted in lots of chafing on the ankle and even rubbing through the skin. This makes these shoes highly painful to wear without any socks, even though

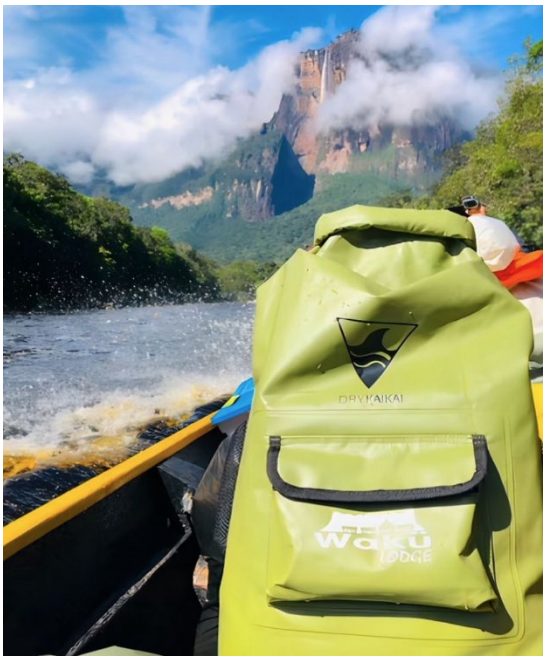
the product is described as able to be worn with or without socks. Because of this, the wading community advises wearing these with neoprene socks or wool socks.

The second shoe on the price scale is the Cloud X3 by On Footwear. These shoes are incredibly lightweight at approximately 243 grams, designed as multi-purpose workout and running shoes. This is one of the current products that the Pemon tour guides are currently using, shared by native tour guide Steven Aranguren. He highlighted how comfortable they feel throughout the long hours of work and also mentioned how he feels secure with the fit and how supportive the wider platform sole is. The shoe offers a 3-layer recycled mesh upper that makes it super breathable and fast drying, with a molded heel cap for additional support, along with the On's signature technologies the CloudTec cushioning system and Speedboard energy return and support system. Although this shoe might be on the more comfortable end of the scale, durability and performance are compromised for the variety of terrains and climates that it will go through.

This, however, is not the case for the last shoe, the Lizard Ultra Trek sandal. One great option for hiking and trekking in rainforest adventures. This unique shoe/ sandal design is perfect for mixed terrains, able to withstand the unique environments of rainforest ecosystems, with a somewhat affordable price of $105.85. It is both protective and responsive, with a TPU and spacer mesh upper design that can maintain airflow while protecting from debris. The star feature of the shoe is the TREK midsole, which provides a dynamic walking experience with an 8mm heel drop and recycled EVA footbed that helps absorb shock, minimizing fatigue through the journey. The Lizard Ultra sandal presents an outstanding outsole design with an exceptional lug pattern. It is made with Vibram ECO step rubber that efficiently targets traction and stability in the uneven, wet, and diverse terrains of the jungle.

Lastly, the shoe offers a simple yet efficient lacing system with a static lace cord, and it can be adjusted with the cord lock webbing closure, always providing a secure fit. Moreover, the unique venting design of the shoe protects the foot from having contact with the water. The sandal design allows quick drying capabilities and ensures that the feet stay dry and cool, which is crucial in these humid rainforest environments.

The downside is that the product is how open and stiff it is, and the lack of protection at times might become increasingly uncomfortable throughout extended work periods. When used for wading and hiking, debris can enter through the open vents. Moreover, when analyzing these competitors' footwear products, each has stellar features that can benefit the Pemon guide in his journey. The opportunity lies in a product that can provide all these features combing, the drainage system and adaptability of the Orvis Pro Approach, the comfort and weight of the On Cloud X3 and the grip and breathability of the Lizard Ultra.



DRYKAIKAI Drybag 20L-
$40 (current use in Canaima)

IDRYBAG Dry Bag Backpack 20L - $40

When looking at the competitors' products in the drybag market, this one is tricky because some national companies are currently sponsoring the Pemon guides in Canaima for these dry backpacks, such as the company DRYKAIKAI. These bags are essential for long hours of riding on the curiara and expeditions to different waterfalls. The water on the river gets hectic, so there is constant water splashing on the native tour guide, as well as swimming and trekking in the rain. This makes it hard at times when safety is compromised. Therefore, they need to keep their essential belongings dry and protected, like their first aid kit, camera, walkie-talkie/phone, additional food, sunscreen, towels, and change of clothes.

Therefore, to understand this product more, a similar product has been analyzed this one with the same features and is accessible in the US market. This one is called the IDRYBAG, like the DRYKAKAI. This one uses a 500D vinyl-coated woven polyester; it’s heavy-duty, welded, and sealed. It uses the same closure system as the 3-4 tape and roll system and buckle security. And features a front pocket splash proof with a waterproof zipper and an interior pocket and waterproof zipper for additional protection. Moreover, it comes with removable and adjustable straps and a mesh pocket to carry water bottles. Moreover, this product can already provide protection, durability, and packability in different ways, but lacks ways to separate dry and wet clothes in the journey and accessibility as well as comfort for the current guides.

Moreover, when exploring the current use of drybags and backpacks in Canaima National Park, a vital pemon creation came to light: the “Wayare.” The wayare is a woven basket that is a distinctive mark of the Pemon culture. It symbolizes generations of ancestral tradition. They use it to transport loads, and it is the equivalent of what we know as a bag or backpack. This carrying product enables them to carry around 15 kilos of weight in their bags; it features an open back where they can access and load any belonging and secure it with woven palm leaves simulating a paracord, but they must currently protect their belonging with some waterproof fabric/ plastic bag to protect from rain. By featuring an open woven structure, it is breathable on their backs. They usually take the Wayare on more extended expeditions and longer day trips. Nevertheless, this product can provide new enhanced features to existing products in the market for being super lightweight, high-ventilation durable, and ready to be worn under extreme conditions.

Product Anatomy

Footwear Anatomy

Figure 7. *Orvis PRO Approach Shoe*

The selected product to be analyzed for its anatomy and part was the Orvis Pro Approach shoe. Like the footwear products mentioned above, this shoe comprises three main parts: the upper, the midsole, and the outsole. The upper is made from a polyester mesh with a PU cage overlay and a PU toe cap. The built-in sock features a Nylon face with an Airprene lining, and the lacing system is standard with eyestay for the laces to loop, but additionally, it provides a built-in hood to tuck away the laces. The Orvis shoe has woven webbing pull tabs at the heel and tongue area. It also features an outer PU heel cup for more stability with the Orvis logo in white PU material.

Moving forward, the midsole is a single-density EVA foam and 3D molded Ortholite insole, for additional comfort. Lastly, the outsole features a Michelin extreme rubber material with a multidirectional lug design for different terrains.

Backpack Anatomy

Figure 8. *IDRYBAG and its parts.*

Furthermore, another important product in the Journey to Angels Falls is a weatherproof bag. The adventure guides need something to carry not only their belongings but also a safety kit, communication devices, additional clothes, water, and sometimes even food for the visitors.

Their current drybag (see Figure 8) was designed to carry around 20 liters of storage. It is made of Vinyl-coated woven polyester. It is a simple-to-use bag with 3-4 roll access a two-buckle protection system, and an interior pocket with a waterproof zipper for the most important things. It is 100 % waterproof and has a splash-proof front pocket. Additionally, it includes removable padded straps with zip clips and a side mesh pocket with zipper closure for extra protection.

Products Job to Be Done

`The Orvis PRO Approach Shoe addresses several key challenges faced by the native guides in Canaima National Park while enhancing their overall experience as guides. When wading or hiking through water, the shoe’s upper provides maximum drainage, ensuring that the guides' feet stay dry and comfortable. The lightweight and durable PU cage technology contributes to the shoe's fast-drying capabilities, making it ideal for the humid and wet conditions they frequently encounter. The integrated Airprene sock not only protects the foot from debris and dirt but also promotes airflow, keeping the foot ventilated and safe during extended hiking and wading. The shoe’s 3D molded Ortholite Insole and EVA midsole offer a cushioning system that provides all-day comfort, crucial for long and strenuous journeys. Additionally, the Michelin extreme rubber outsole, with its multi-directional lug design, ensures excellent traction on wet surfaces and diverse terrains, making the shoe versatile and reliable for the varying conditions the guides face. By addressing these needs, the Orvis PRO Approach Shoe helps guide tourists and provide them with a safe and pleasant experience.

The IDRYBAG dry bag backpack is an essential tool for the Pemon tour guides, as it solves the problem of keeping their belongings and safety equipment dry and secure in the unpredictable and often harsh outdoor environment. This dry bag is designed to withstand various outdoor water situations, providing effective protection against water and climatic changes. It can hold personal belongings, protect electronics from water, and able to carry up to 30L of belongins, making it indispensable for the guides, sinc they often carry safesty kit, food, cameras, change of clothes, towels sungreen, sun protective gear, bug spray and additional survival tool for any emergency

that they can encounter. The bag's ability to efficiently distribute weight and maintain stability is crucial, as it allows them to carry necessary items without hindering their mobility. The dry bag's design even permits them to swim while wearing it, ensuring that their equipment remains safe and dry, regardless of the journey's demands. By offering such comprehensive protection and functionality, the IDRYBAG enhances the guides' ability to provide a safe and enjoyable experience for tourists.

State of The Art Product Manufacturing

The Orvis PRO Approach Shoe upper is made through traditional manufacturing methods. Once the main piece of the polyester material is bonded with the PU cage, along with logos and interior padding and support, it is all sewn together with the mesh lining and the Airprene sock with the pull tabs. The upper piece is then sewn to a Strobel board and inserted into a last. Then, the midsole-making process starts with an injection machine placed inside the mold; then, the injection machine injects EVA foam into the mold that instantly expands and takes the shape of the midsole. After the foam cools, the midsole is removed and attached to the upper through a pressure machine and bonding glues.

After these parts are glued together, the outsole is prepared. The outsole is typically heat-pressed from a rubber compound. The rubber is placed in a two-part mold imprinted with a unique tread pattern and lugs. The mold is then heated, and then the rubber takes the shape of the mold. After the outsole is made, it's then glued to the midsole. Finally, the insole that Orvis uses are Ortholite insoles, which are 3D molded; this means that these are die-cut pieces of foam that are then molded together to create more specialized 3D forms. Once the insole is ready, it is then placed inside of the shoe, and the shoe is then laced and ready.

After production, each component undergoes stringent quality checks to ensure it meets the intended design, specifications, and performance standards. Once these are passed, the shoes are prepared for the final cleaning, polishing, and packaging before distribution to retailers.

Moreover, another manufacturing process that's important to highlight is the process of making a water-proof backpack. The overall process of manufacturing a bag is very similar to that of a garment, which also closely relates to how headwear is manufactured. (Ray, D 2022) The

process starts with meticulous design and planning. The designers focus on including durable, weather-resistant materials and specialized features. These designs consider waterproof zippers, sealed seams, and water-repellent fabrics to ensure optimal performance in adverse weather conditions. Material selection involves using high-quality, weather-resistant materials such as durable nylon, polyester, or fabrics treated with waterproofing compounds. (Refer to Figure 7) to understand how this process flows.

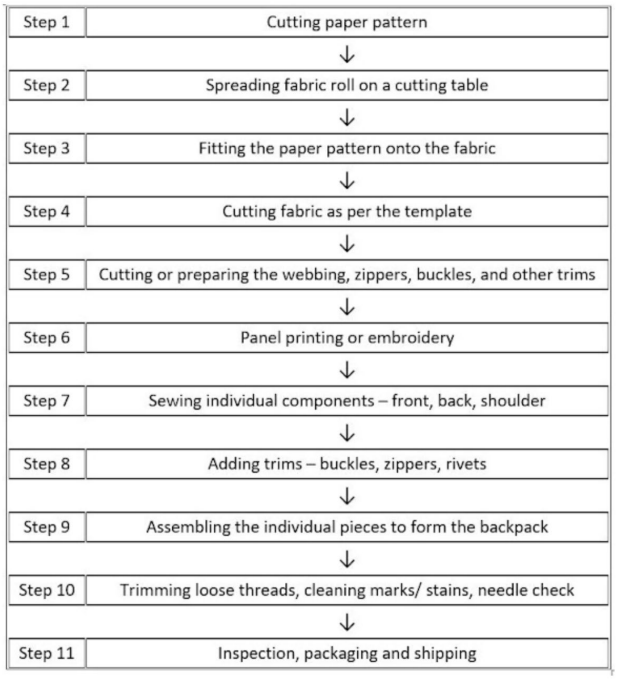


Figure 7. *Basic steps of cut-make-trim of the manufacturing process of a backpack*

Precise patterns are developed and used to cut fabric panels comprising the backpack's main body, compartments, and straps, assembled and treated for waterproofing. This process includes stitching and applying heat-sealing techniques to safeguard seams and attachment points against moisture intrusion. Additional features, like waterproof zippers, hydrophobic coatings, and reinforced stitching, are meticulously integrated to bolster the pack's resilience to water.

Quality control procedures are embedded throughout the manufacturing process to evaluate the backpack's water penetration resistance and durability under simulated weather conditions. Final touches encompass the addition of comfort elements, including padded back support, adjustable straps, and various compartments. Logos, labels, and branding elements are affixed before the backpacks are meticulously packaged to ensure dryness during storage and shipping.

Strengths, Weaknesses, Opportunities, and Threats Analysis

Figure 10. SWOT Orvis PRO Approach Shoes

For the chosen comparison product, the Orvis PRO Approach Shoes boasts a robust upper characterized by exceptional durability, breathability, and lightweight, seamless PU construction. The strengths lie in its adaptability to various terrains and its protective capabilities keep one safe against challenging weather. Whether wading, crossing wet surfaces, or hiking, The Orvis Pro approach shoe will dry fast and protect from debris. However, limitations arise in its suitability for swimming, and the cleaning challenge poses a potential weakness. Opportunities for improvement include exploring modularity, integrating new technologies like a removable 3D knitted outer sock to provide additional features when encountering challenging terrains like wet rock under waterfalls, incorporating reinforcements for enhanced durability, and emphasizing sustainability.

The threat perception revolves around the need for the shoe to be better received in terms of its distinct feel and silhouette.

Examining the lockdown system, the Orvis PRO Approach shoe exhibits strengths in it's ease of use and adjustability. However, there is room for improvement in terms of comfort. Opportunities exist to enhance user-friendly features, provide more cushioning, and expand the variety of lockdown mechanisms. However, potential threats may arise if Pemon guides find the system less comfortable.

Analyzing the lining and integrated Airprene sock, the strengths lie in its ability to offer breathability and protection. Challenges, however, include difficulties in cleaning and a need for a more comfortable inner layer that will not cause rubbing on the skin. Opportunities for enhancement encompass increased padding, support, and the integration of quick-drying comfortable materials. Potential threats include preferences among some Pemon guides of not having a built-in sock.

Moving to the midsole, the Orvis PRO Approach shoe employs single density phylon midsole cushioning, providing more support and responsiveness when used with the OrthoLite insole. Weaknesses may emerge in extreme conditions, impacting durability and functionality. And long hours of work. Opportunities include incorporating more sustainable materials and redesigning the drainage system to target under-ventilated areas. The potential threat is the pricing, which might be perceived as too high.

In terms of the outsole, the Orvis PRO Approach shoe demonstrates strengths in providing exceptional traction and durability. Weaknesses may arise in its potential unsuitability for specific microclimates in Canaima and extremely slippery terrains. Opportunities include exploring more

sustainable materials and offering multifunctionality through modularity. The threat lies in effectively managing the shoe's weight to meet user expectations.

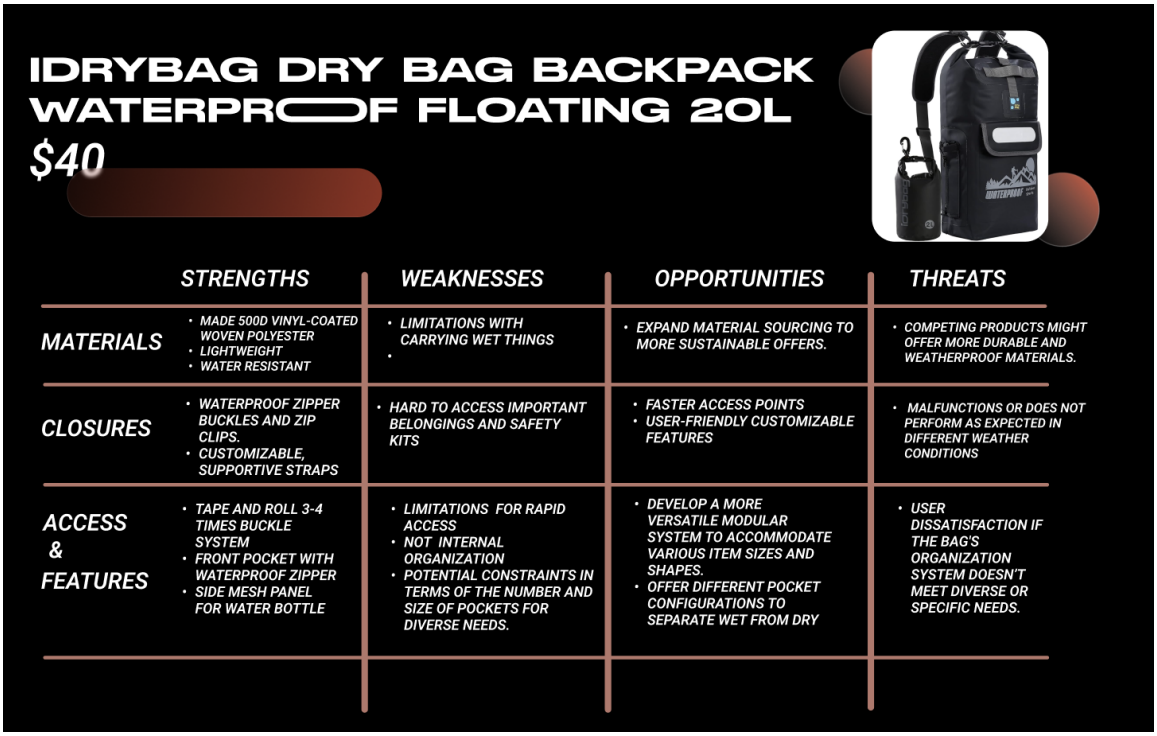


Figure 11. *SWOT for IDRYBAG dry bag*

The IDRYBAG is priced at $40 for the selected comparison product. The design features the main body material made of 500D Vinyl-coated woven polyester. It offers a tape and roll closure for waterproofing and protection that aligns with the outdoor nature of the journey to Angels Fall. However, its potential weakness is limitations when carrying wet things, especially when having these wet clothes inside the bag, resulting in bad odor and a disorganized way to access more important safety products. Innovation can lie in exploring modularity and new accessories that could enhance its adaptability to varying conditions along the journey, offering better use of fast drying capabilities, weight distribution, and weather protection to the Pemon tour

guide, along with the use of more sustainable/bio-degradable materials and having a design aesthetic that can tie back to their traditions and culture.

Addressing these aspects ensures the bags remain a reliable and comfortable accessory for the Pemon guides during their journey to Angels Fal to enhance this crucial component continually.

Intellectual Property Landscape

Patents are pivotal in safeguarding unique inventions or innovations within outdoor product design. They offer exclusivity for specified periods, protecting novel materials, mechanisms, or product features that enhance the functionality or safety of gear designed for outdoor use. As part of my research topic, I was able to access relevant patents for outdoor footwear, primarily hiking boots, and their sole design was what was patented. This was the case of patent US D476,799 S (see Figure 8). This was an exciting finding. As the project moves, the patented outsoles are a significant consideration.

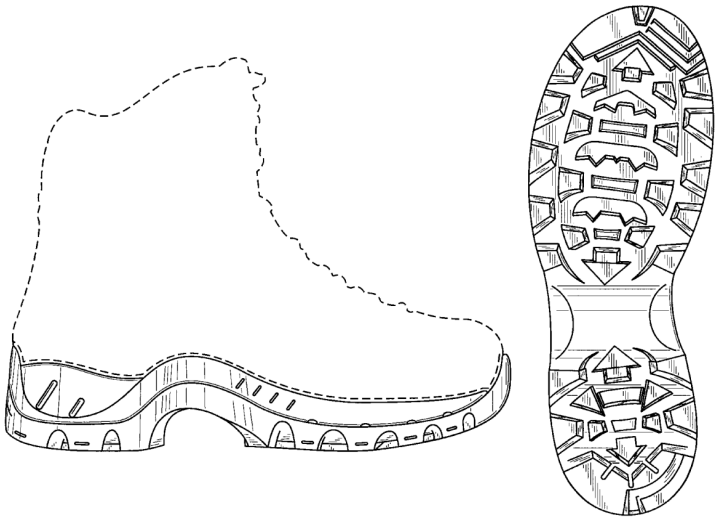


Figure 13. Patented outsole US D476,799 S

Another footwear patent relevant to this project was US 9,668,536 B2 by Adidas Terrex (Surace & Zwinger). The patent details an innovative shoe design focused on enhancing ankle support while maintaining comfort for wearers. This footwear comprises a rigid heel section integrated with a collar placed above it. The collar features two distinct portions: a more flexible first collar section and an even more pliable second collar portion. When the shoe is worn, these segments are strategically engineered to partially engage with the ankle—covering the lateral, medial, and rear sides. The first collar portion, designed to interface with the ankle, offers flexibility, balancing comfort, and mobility. In contrast, the subsequent collar section is even more flexible, potentially allowing increased adaptability and movement. This innovation has implications across various activities, such as sports, outdoor pursuits, and everyday use, addressing the crucial balance between support and ease of movement in footwear.

On the other hand, another significant finding in the footwear category was a patent for modular shoes. US 7,578,076 B2 (see Figure 9). Innovations in the footwear industry, particularly within modular shoe designs, are transforming the traditional concept of single-purpose shoes. This patent presents a groundbreaking idea where a shoe is reimagined as a series of separable components that interlock to form a functional shoe. The key innovation lies in the interchangeable nature of these components, offering exceptional versatility without the need for an extensive collection of single-use shoes. Furthermore, the collapsible nature of each shoe component introduces a new level of convenience for travelers or individuals with limited storage space. The ability of these components to collapse enables compact packing, allowing for easy storage in travel bags or confined spaces.

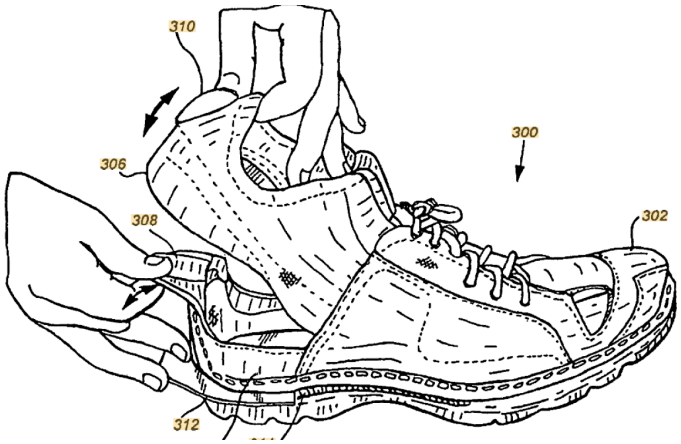


Figure 14. Modular shoe Patent US 7,578,076 B2

Moving into waterproof bags, innovative features in backpack design, particularly in integrating waterproof backpacks and organization systems, have been presented in various embodiments. For instance, these patents found US 8,302,749 B2 (Melmon et al, 2012) features a system that combines a waterproof dry bag segment designed for storing cameras and camera accessories with a bag segment that closely matches the size and shape of the dry bag, creating a unified unit. When detached, the two segments can function independently as separate units. The invention also offers a convenient way to carry and protect the equipment while ensuring easy access for the user.

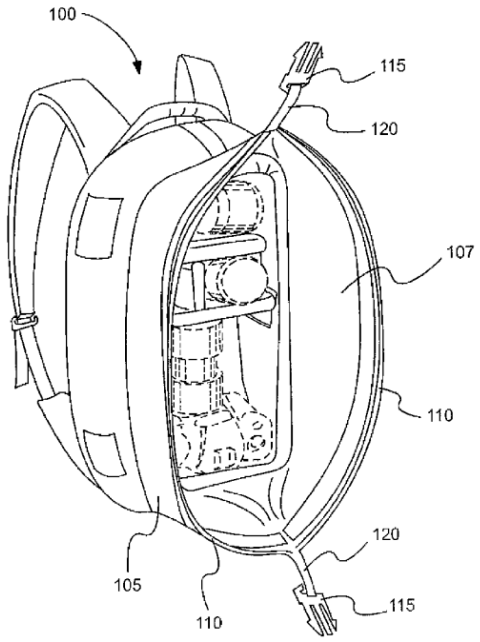


Figure 15. *Protective Transport Bag US Patent US 8,302,749 B2*

Lastly, a patented wet and dry bag product was a relevant and crucial part of this research. A novel patent design was found, WO2010018404A2 (Deaves, 2010); the wet and dry bag is an innovative design that finds a solution for carrying wet gear while protecting it from getting even more wet. It finds a way to dry the gear in any circumstance, indoors or outdoors, and even when raining. The invention uses a semi-permeable membrane to pass water in a single direction between the compartments and between the compartments and the outside world via a bottom valve.

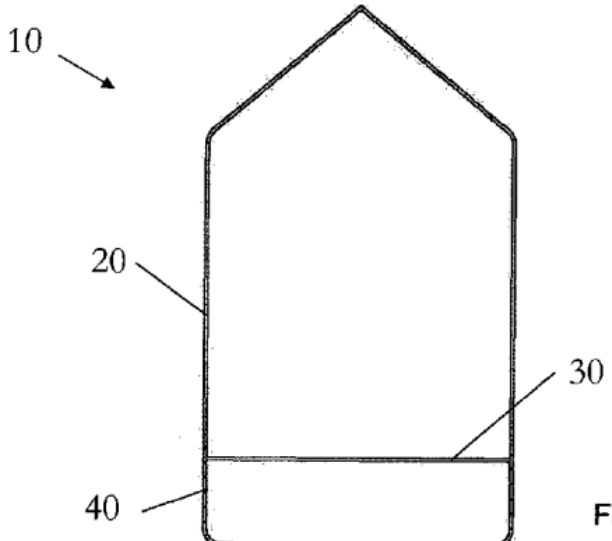


Fig. 1

Figure 16. *Wet and Dry bag WO201001840 4A2*

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Overall, the effective management and protection of Intellectual Property in the outdoor product industry is pivotal for fostering innovation, securing market share, and establishing a competitive advantage. IP protection allows companies to safeguard advancements, encourage further innovation, and maintain brand integrity in a rapidly evolving outdoor gear and equipment landscape. These patents signify the industry's ongoing commitment to addressing user comfort and enhancing the functionality of outdoor equipment. Through the protection of inventive designs and technologies, the industry not only elevates user experience but also stays at the forefront of innovation, ensuring its competitiveness and continued advancements in the field of outdoor products.

State-of-the-Art and Future Color Trend

Current color trends in outdoor gear highlight a significant shift towards sustainable and eco-friendly materials while still evoking functionality. However, most of the current outdoor products, ranging from outdoor footwear to headwear and eyewear, tend all to fall into the same color palette and, at times, become repetitive to the consumer. Even though this might be the ideal

colors to wear in these outdoor environments. There is more than what meets the eye. Brands want products to be timeless and to outlast current color trends. Furthermore, since most products are designed years prior to their release, brands must play somewhat safe with the current color choices and, at the same time, think about how the product can be blended in nature, ensuring safety and durability (Hicks).

Figure 17. The current color palette in outdoor gear 2023 (Hicks, 2023).

When looking at what current Pemon guides are wearing, they do not shy away from brighter colors. They wear dry, fast clothing that is more colorful than their gear. The apparel usually represents the camp they work for. In the case of Steven Araguren, a native Pemon guide, he often wears brighter long yellow sleeves or lighter blue, and in some of his shoe selections, he sometimes wears black HOKAS with brighter accent colors in the sole, like bright orange and yellow.

Steven Aranguren Pemon tour guide, wearing his preferred everyday work outfit.

As found on WGSN. A relevant color trend that ties along with this project's purpose and can refresh current color offerings is what they call "Restorative Realms." Restorative Realms is an evolution from the Future Terrains trend. This one examines how design responds to the

transition from resource abundance to regeneration-focused products and processes (Isaac & Paget, 2023). Part of WGSN's S/S 25 forecast trends addresses macro concepts encompassing Society, Technology, the Environment, Politics, Industry, and Creativity. This trend, primarily focusing on the Environment and Industry, emphasizes designs, products, and services that mitigate environmental strain and aim to restore a sense of equilibrium and tranquility.

Central to Restorative Realms is a deep connection with nature, reflected in biophilic designs, plant-based materials, and earthy aesthetics. Similar to the deep connection that The Pemon people have with the Tepuis. Themes inspired by the darker facets of nature, including overgrown foliage and underground mycelium networks, merge with a resourceful approach featuring foraged elements and repurposed waste. Embracing science, the trend explores bio-synthetic ingredients and climate-adaptable designs suited for extreme environments. The trend also reflects a fascination with extraterrestrial aesthetics and cosmic themes in response to planetary turmoil.

Despite its focus on preservation and conservation, Restorative Realms is anything but conservative. It embodies forward-thinking concepts that aim to rejuvenate individuals and the planet, setting a new trajectory for nurturing and sustainability. Color palettes encompass soothing tones like Future Dusk and Midnight Blue alongside vibrant shades such as Electric Indigo and Cosmetic Pink, culminating in a fusion of futuristic and outdoor-inspired hues. (see Figure 10).

Figure 19. Future Color Trends WGSN's S/S 25: Restorative Realms.

State-of-the-Art Future Graphic Trends

Current graphic design trends in outdoor gear highlight functionality. For most, outdoor footwear graphics are only applied to branding and textures; shapes and forms are often created with plastic overlays. Moreover, in headwear products, we see more experimentation in graphics like apparel graphics; fabrics are often printed with different designs. This is where products are more playful with camo patterns or even more modern dynamic designs.

Moreover, when looking at current graphic design trends that represent a culture, for example, the Native American tribes in the U.S., many brands have failed to do their research, simply putting out their wrong symbolism and wrong tribal visual language. In the case of Urban Outfitters, trying to represent the Native American golden tribe but failed to do so by erroneously having the California Republic bear wearing a headdress and then using the Navajo rug patterns from the New Mexico tribe. As Sadie Red Wing mentions in her article “Decolonizing Native

American Design," The first step to using any symbolism from a native tribe is asking for consent from the tribal authority. Moving forward, much research must be done, studying the traditional artifacts and the visual vocabulary that represents the culture. The overall goal when implementing native design graphics should be to give identity and pride to the tribe and educate nontribal audiences on that identity (Red Wing).

For the Pemon tour guides in Venezuela, the graphic trends they are currently wearing are minimal logos of the camps they work for; these graphics are usually seen on their apparel rather than on their gear.

However, when looking at future graphic trends in the outdoor space. As described by WGSN, restorative nature is one trend to be on the lookout for in outdoor products. It embodies wellness through rest and rejuvenation, especially in outdoor-themed visuals. This trend employs textbook-style infographics, designed with an educational intent, to convey information. It integrates organic textures and anatomical depictions of nature, utilizing the tree as a central motif.

The focus on wellness is central, aiming to promote a sense of rest and recharge through visual elements. Furthermore, this trend emphasizes partnering with eco-conscious organizations to support local nature and communities. Consumers are increasingly inclined to make purchases that have a positive impact, making such partnerships vital to this trend.

The design elements within Restorative Nature strive to engage audiences through visually educational materials, like Nike's ISPA infographics used for Advertisements (see Figure 11), which employ the calming influence of nature's anatomy and textures. Integrating these visuals with wellness-oriented content contributes to a broader movement, positively impacting consumers and local ecosystems.

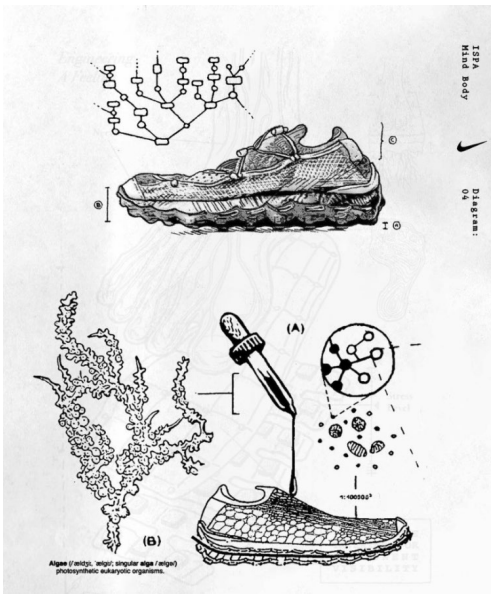


Figure 20. Nike ISPA Mind Body Ad.

Logo & Branding Applications

The current logo and branding application in outdoor footwear is often minimalistic and sleek, with TPU heat-plastic overlays or screen-printed fabrics and materials. This simple way of branding a product does not distract the consumer from the design. On Bag, logos are usually done through screen-printing on plastic or similar to footwear with TPU overlays, as well as engraved un-zipper, pulls, or even on buckles. When analyzing some of the competitor products' current logos and branding applications, we can dive deeper into how intentional the branding applications are. The Orvis Pro Approach shoe, where the Orvis logo is rather sleek, uses a TPU overlay on the heel counter, flowing along with the upper cage design. However, the “PRO” logo stands out of the toe cap up and front, with its technical functionality screaming “expert mode.” Then we see the Michelin logos making their way on the front of the shoe where the rubber outsole starts

following the small silhouette of the lugs in that portion of the shoe, and then it stands out in white along with the word “Michelin” on the center of the outsole demonstrating the high quality of the outsole.

Figures 21: *Orvis Pro Approach Branding*

Moreover, the On Cloud X3 shoe by On Running has a different approach to logo and branding usage. They are bolder in terms of using logos; they are more playful by having different sizing on the forefoot, sides, and throughout the outsole and tongue. They even split the logo in half and separated it in the back of each shoe, as well as added little details within the upper like the stitch “X” s on the sides of the lace loops and the words “Swiss engineered” like almost a high-quality stamp.

Figures 22: *On Cloud X3 Branding*

On the other hand, IDRYBAG uses logos and branding minimally. It only features a big front logo with the word “waterproof” and a mini patch with the logo name. This makes the “waterproof” claim a more important detail to show than the branding.

Figures 23: *IDRYBAG Branding*

Furthermore, the branding concept for this project aims to encapsulate a fusion of Restorative Nature’s focus on well-being and outdoor-themed graphics with homage to the revered

Pemon culture, celebrating and putting their heritage on the map. It draws inspiration from vintage expedition catalogs and maps and sleek branding from popular outdoor brands like Salomon and Arc-Teryx.

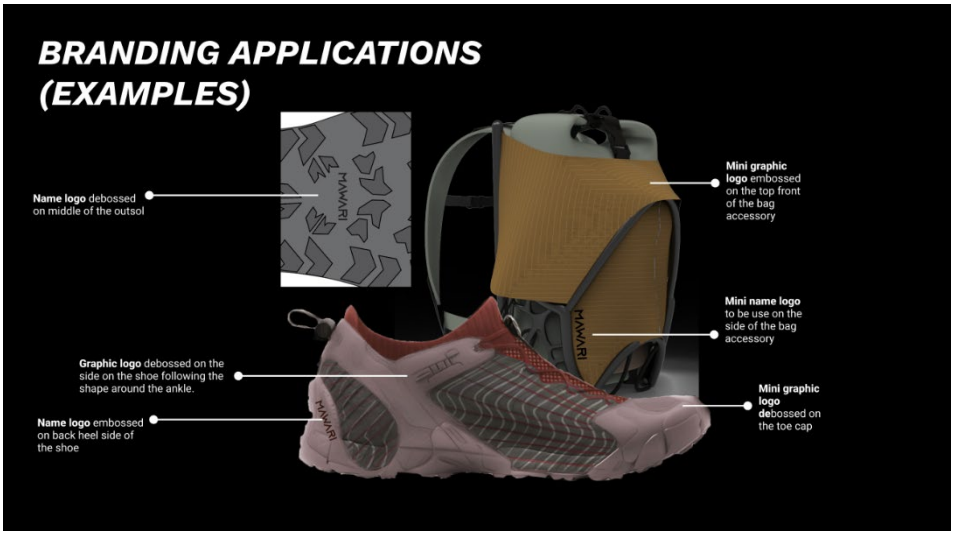
Figures 24: *MAWARI Branding Guidelines*

However, the central theme involves incorporating Pemon cultural symbols within the logo and branding; this is done by exploring their weaving patterns, forms, and shapes. The brand visuals will honor the Pemon culture while invoking a sense of exploration reminiscent of vintage expedition catalogs. Pemon visual identity is often literal in how they communicate the things around them with paint or by weaving them. We often see animals represented as visual components in their creations. From ants to lizards to birds and even depictions of monkeys. The Pemon storytelling on their garments, face paint, and woven baskets is like no other; it really brings the experience of adventure to life, as well as the spiritual component and majestic journey that is living on this land to whoever can see it.

The product line name chosen is “MAWARI,” the name of the evil spirits that lived in the tepuis. This is done to reclaim what was once the scary unknown or the obstacle to explore, which is not there anymore; now, they have found a way to coexist with these spirits, realizing that evil

lies elsewhere, igniting more exploration and adventure. Hinting that maybe we are evil spirits in this land if we don't learn to take care of it or respect it. Moreover, the graphic logo is a simplified depiction of the native Red Howler monkey found in Canaima in a geometric line form, like the weaved pattern of monkeys. Lastly, red is an important accent color in the color palette of the brand. Red is considered a color of protection in the pemon culture. They would often paint their faces red before entering the rainforest as a way to protect themselves from spirits, and that's what was also intended for this collection of products, a color to empower and protect, which is one of the overall goals of the adventure guides.

Therefore, the products aim to display hidden branding techniques, incorporating thermally bonded plastics and heat-pressed formed details aligned with forward-thinking design strategies, reflecting the trend's focus on exploration and innovation. While engaging with the consumer on a deeper level. Calling for exploration and adventure while maintaining a deep connection with the Pemon culture and representing who the Pemon adventure guides are in today's world.



Figures 25: *MAWARI Branding Appliactions*

In summary, the branding and logo concept for this outdoor product line embodies a harmonious blend of Restorative Nature's wellness focus while taking from technical and functional outdoor design, the celebration of Pemon culture, and the aesthetic essence drawn from Pemon art and folklore, as well as giving a sense of adventure through a strong letter font and technical material and color choices. Overall, strategically integrating minimalist line art, hidden branding, innovative materials, and traditional handcrafted details, creating a visual narrative that celebrates heritage while resonating with modern-day values and design sensibilities.

Figure 26. Pemon children Canaima, Venezuela

Physiological Research

Tour guides in Canaima National Park face diverse physiological challenges influenced by the environment. They must comprehend and adapt to the unique conditions, such as high humidity, varying microclimates, and altitude effects. The elevated moisture levels in the air necessitate understanding the body's responses, impacting thermoregulation and risking dehydration due to increased perspiration. This is highly important for the native tour guide foot microclimate; when exercise increases, body temperature rises, and at the same time, the environment temperature changes, which can promote discomfort and chafing on the skin. Significantly the feet' microclimate constantly changes from being in contact with water to going under-ventilated when hiking in a hotter terrain. “Comfort is related to sensorial parameters such as temperature and dampness. Warm or wet feet during sports activities are associated with

uncomfortable socks. Fibers that can transport the perspiration out of the sock are needed to avoid high foot temperature and humidity" (Bertaux et al). Therefore, supporting heat and vapor dissipation through ventilation will ensure superior comfort and performance for the native tour guide on the journey to Angels Falls. This not only applies to footwear but also headwear. Tropical rainforest climate can induce heat stress challenges due to high temperatures and humidity, which can increase heart rate and dehydration risks, potentially leading to heat-related illnesses like heat exhaustion; this can be prevented with the gear that targets the most important regions of the body. Thanks to a study by the Adidas FUTURE team and the Environmental Ergonomics Research Centre, Loughborough Design School, and Loughborough University, they identified the most critical regions of the foot that stay under-ventilated are the bottom, heel, and sides of the foot: "...heel and sole foot regions were identified as areas of high temperature and high moisture accumulation." (West et al., 2019). Therefore, paying more attention to these areas is essential. By potentially creating a drainage system on the footwear that works systematically with a breathable upper, the product can ensure an increase in drying speed and airflow for improved comfort and performance of the native guide.

Furthermore, the head from the air temperature, humidity, and heat from the sun can be conducted and thus cause thermal discomfort in overheating regions like the head. And if the temperature is not regulated, it can affect the user's well-being. In a study done for the USDA Forest Service to determine forest workers' thermal discomfort related to their use of protective helmets in hot and humid environments, they evaluated the physiological effects and environmental conditions – dry-bulb temperature (DBT) and wet-bulb temperature (WBT). It was concluded that "ventilation contributes to greater helmet comfort and that weight and fit are important factors in helmet design" (Davis et al., 2001). Once again, this proves how airflow can

enhance safety, comfort, and overall performance when working in these changing temperatures and environments.

Moreover, guides need to grasp altitude physiology since portions of the park are at higher elevations. Reduced oxygen availability affects aerobic capacity and may lead to altitude sickness. Furthermore, the weight of the footwear also plays an important role in terms of oxygen and energy use. A study for the European Journal of Applied Physiology focusing on the physiological strain due to load carrying in heavy footwear concluded that "the mass of footwear increased the energy expenditure" (Holewijn et al, 1992). This plays a vital role for the native tour guides, who must be at the same energy level throughout the journey. To be focused and alert, to best succeed on the journey and while guiding the tourists to be attentive to any signs of distress shown by the tourist and to be able to offer appropriate guidance for visitor safety.

Moreover, having a clear sight throughout the journey is connected to a better performance in the job. Additionally, interesting studies propose how color perception can influence exercise performance. In one study, participants were asked to use red-colored lenses during high-intensity intermittent soccer exercises, and it was proven to increase testosterone concentration but did not influence performance (Londe et al). However, a different study suggested that exposure to blue improves the performance of a muscular endurance-based task (Fisher et al).

Endurance and stamina are pivotal in the guides' physiology within this demanding environment. Sustaining physical endurance helps manage prolonged exposure to humidity and minimizes fatigue. Stamina is essential to endure lower oxygen levels at higher altitudes and withstand the heat prevalent in the rainforest. Guides with enhanced endurance and stamina can support visitors experiencing discomfort**,** ensuring continued guidance throughout the tours.

Figure 27. MAWARI mood board

Biomechanical Research

Guides navigating Canaima National Park integrate biomechanical principles into various activities, ensuring efficient movement, load management, and safety for themselves and tourists. Walking and hiking in uneven, muddy, and rocky terrains can modify the stride, step frequency, and foot placement; therefore, optimizing movement efficiency on diverse terrains is essential to reduce energy costs and fatigue during tours and prevent any injury. This was seen in a study done with military personnel during downhill walking in heavy, tall shaft military boots were compared to lightweight running shoes, and the research attributed the increased vertical ground reaction forces to how the participants adopted different gait patterns to accommodate for the different types of footwear and reduce impact variables, thus resulting in pain and discomfort, (Paisis et al)

Therefore, there has been a debate between hiking boots or trail running shoes' performance and efficacy on these surfaces. Hiking boots have been an all-time classic w; the tall shaft boot provides ankle support and traction on any terrain, but at times, these can increase pressure on the knees and hips. On the other hand, trail running shoes can be more lightweight and provide more ankle movement, but this can make the user more vulnerable to ankle sprains. that trail running shoes are recommended since they are specifically designed to provide more stability and support than regular walking shoes (Park et al) And this can be improved by increasing contact area and decreasing peak pressure to further provide comfort and better fit.

Biomechanical insights in load distribution with proper footwear can help minimize knee and joint stresses, decreasing musculoskeletal injury risks associated with heavy loads. And with Load distribution techniques and proper traction, footwear can help minimize strain and ensure comfort during canoeing, wading, hiking, or walking.

During boat rides, guides maintain proper posture and balance, reducing the risk of injury and fatigue through weight distribution and stable postures. In swimming, efficient stroke techniques conserve energy during long stretches in park waters.

Guides must consider efficient movement techniques and body response to movements to maintain posture, reduce injury risks, and conserve energy. The application of biomechanics optimizes movement efficiency, reduces injury risks, and enhances safety across diverse activities, ensuring a positive experience for guides and tourists in challenging environments.

Psychological Research

Although tourism is often portrayed as a hedonistic endeavor (Goossens, 2000), research indicates that travel is stressful and can be associated with adverse health and well-being outcomes (Furnham). Tourist guides operating in Canaima National Park and Angel Falls face multiple stressors. Foremost is the responsibility for visitor safety, where the burden of ensuring the well-being of tourists in challenging or remote environments triggers anxiety and a heightened sense of obligation. Additionally, they grapple with environmental challenges, adapting to diverse terrains, high humidity, and unpredictable weather, both mentally and physically exhausting.

Moreover, guides face pressure to deliver a positive and fulfilling visitor experience, striving to meet diverse expectations in the unique and demanding Canaima environment. Decision-making under uncertainty compounds stress, as guides must swiftly adapt to unforeseen

challenges, ensuring safety and visitor satisfaction. In the publication “Stress and Emotions at Work: An Adventure Tourism Guide's Experiences,” " the authors found that emotional labor may occur in employee guide relations, in addition to guide-client interactions, and this may contribute to dissatisfaction, burnout, and turnover. In addition to these sources of stress, the adventure tourism guide in this study experienced stressors similar to those documented with hospitality staff (Law et al).

The demand for effective communication and interpersonal skills also weighs heavily on guides. Managing group dynamics, addressing concerns, and maintaining enthusiasm stresses these professionals. Balancing physical needs and self-care is equally crucial, as guides must maintain endurance and mental resilience while caring for visitors, adding to their stress levels.

Recognizing and addressing these stressful factors is vital for the well-being of tourist guides. Implementing support systems, providing adequate training, and promoting self-care strategies are vital in mitigating stress and empowering guides to deliver a secure, enjoyable, and fulfilling experience for tourists in Canaima National Park.

This project is fundamentally about creating a line of products designed to empower Pemon tour guides to provide tourists with the most seamless, exciting experience in Canaima National Park. This approach also aims to preserve and protect their heritage and land by promoting eco-tourism practices. In other words, success means making the guides feel seen, empowered, and confident when using these products.

The Pemon guides consider themselves part of groups such as Explorers, Adventurers, Tour Guides, Photographers, and Expeditions. They are passionate about nature, exploration, culture, heritage, preservation, sustainability, photography, animals, music, and tourism. For our athletes, status markers include knowledge of the land, Pemon hierarchy status, the lodge they work for or

private work as a guide, knowledge of the gear, family status, and education. They can identify each other by their gear, knowledge, physical attributes, traditions, and language.

Pemon guides deeply connect to their environment, demonstrating a strong passion for Mother Earth, nature, and exploration. Their deep-seated interest in their culture and heritage highlights their commitment to preserving and celebrating their history and traditions. They also value sustainability, indicating a concern for the environment and a desire to maintain ecological balance. Photography and outdoor gear are integral to their lives, reflecting their need to document their surroundings and use appropriate equipment for their activities. Additionally, community and tourism are essential to them, showcasing their dedication to both local and broader social networks.

Moreover, safety is a paramount concern for Pemon guides, not only for the tourists they lead but also for themselves. They prioritize providing a satisfying and memorable experience for their visitors, emphasizing the importance of tourist satisfaction. The preservation of the ecosystem is crucial, indicating their commitment to environmental stewardship. They are equally dedicated to maintaining their culture and community, recognizing the importance of cultural preservation in their work. Their concerns extend to the well-being and survival of their families, underscoring the importance of their role as providers and protectors.

For Pemon guides, prestige is closely tied to their ability to lead tours effectively and safely. Wearing proper and high-quality gear is a marker of their professionalism and adaptability, allowing them to navigate unforeseen environmental challenges with confidence. This also reflects their respect for nature, as they strive to interact with their surroundings responsibly and thoughtfully.

In terms of values, these guides value respect for nature and are deeply affected by actions that undermine this principle. They find it off-putting when nature is not treated as sacred, indicating a spiritual and ethical connection to the environment. They also take offense at the mocking of their culture or the exploitation of their heritage for monetary gain, reflecting a strong sense of cultural pride and integrity.

Understanding these psychographic insights is crucial for designing products that resonate with Pemon guides. Products must enhance their guiding experience, providing practical benefits such as safety, durability, and adaptability. They should also align with their values, promoting sustainability and cultural respect. By addressing their passions, concerns, and values, these products can empower Pemon guides to offer a safe, pleasant, and enriching adventure to tourists in Canaima National Park, ultimately supporting the guides' professional and personal well-being.

User Insights Research

This study aims to design innovative, high-performing, culturally significant outdoor gear for adventure guides in Canaima National Park, focusing on their unique challenges and needs. The methodology adopted is a multi-pronged approach, incorporating in-depth interviews, observational studies, and a comprehensive survey to gather insights from the guides.

1. In-Depth Interviews

The research started with in-depth interviews with adventure guides working in Canaima National Park. These interviews, structured around pre-defined questions, focused on the guides' experiences, challenges, and specific requirements during their excursions. This method allowed

for detailed qualitative insights into the intricacies of their work, highlighting the gear-related issues they encountered. This happened through phone interviews.

2. Observational Study

An observational study was conducted, encompassing on-site observations of current gear being used as well as studied pre-recorded clips and videos depicting the guides in action. This approach aims to understand the guides' practical work environment, including their interactions with tourists, navigation through diverse terrains, and the challenges faced in various conditions such as high humidity, dense vegetation, and varied microclimates. This happened through obversing closely different guides in action on their own social medias and the lodges and camps they work for. Along with additional media shared.

3. Survey Distribution

A comprehensive survey was developed based on the insights from research and observations. The survey was designed to collect quantitative and qualitative data regarding adventure guides' preferences, needs, and challenges concerning their gear, focusing on footwear, accessories, and gear.

Section 1: General Information: This section aims to gather general information on the Pemon guide that will also be crucial to the project as it develops. Depending on the area of expertise of each guide and their experiences.

- Name:
- Years of experience as a Pemon adventure guide:

- Frequency of trips to Angel Falls and Kavac:
- What are the biggest challenges faced during the trips?

Section 2: Current Gear Assessment

This section aims to gather more detailed information on what they are looking for in their footwear, headwear, eyewear, and backpack, the characteristics they consider necessary when on duty, and what features they value the most and find more successful when guiding tourists.

Footwear:

- What types of footwear do you prefer when leading tours in Canaima National Park?

  Options:

  a. Hiking boots

  b. Water shoes

  c. Sandals

  d. Running shoes

  e. , Other

- How vital is durability in footwear, considering the varied terrains and submerged environments you encounter?

  Not as important----------Super important

- Are there specific features you find essential in footwear for your work?
- Yes/No

- If so, which characteristics are essential for you?
  a. Waterproofing

b. Grip
c. quick-drying material
d. Protection
e. Durability
f. Lightweight
g. Cushioning
h. Flexibility

Backpack:

- What are the most common challenges you face regarding backpacking when guiding tourists in Canaima National Park?

    a. Comfort,
    b. storage,
    c. durability
    d. weatherproofing

- What features are most valuable in a backpack for navigating submerged and wet/dry environments?

Section 3: Preferences and Suggestions. This section aims to gather information on what safety means to them, how they can see their culture represented in the gear, and how much they would value that.

- Would you feel safer with the right gear? Yes/No
- How can the gear you wear represent your culture as a pemon?
- How vital is cultural representation or incorporating indigenous design elements in your gear?
- If you could change one thing about your gear for these journeys, what would it be?
- What factors are most important when choosing gear for your adventures? (e.g., durability, weight, weather resistance, comfort, etc.)
- Are there any additional insights, suggestions, or specific needs regarding gear that have not been covered in this survey?

Insights and Results

I was able to interview two different experienced tour guides over the phone, the first being Antonio Hitcher, an experienced Pemon (Kamaracoto) guide. The second was Juan Parra Diaz, an experienced guide and wildlife photographer, who got to share their experiences of how the type of guided tour they do differs from those more popular from the lodges in Canaima and their experience with their gear. I also got to send the survey to several Canaima Tour guides. However, only four were able to respond. But I also got to ask follow-up questions as this research developed. Additionally, I sent emails to various lodges in Canaima. I contacted people who wanted to help, including a professor from a prestigious university in Venezuela (ULA). He works with the Pemon community in Canaima. His name is Vladimir Aguilar; he shared great enthusiasm for helping

along with great information and the book of the Pemon life, the current socioeconomic project they are embarking on, where ecotourism is a pillar of their economy. Moreover, he is excited to connect me with the current chiefs of the Pemon community in Canaima.

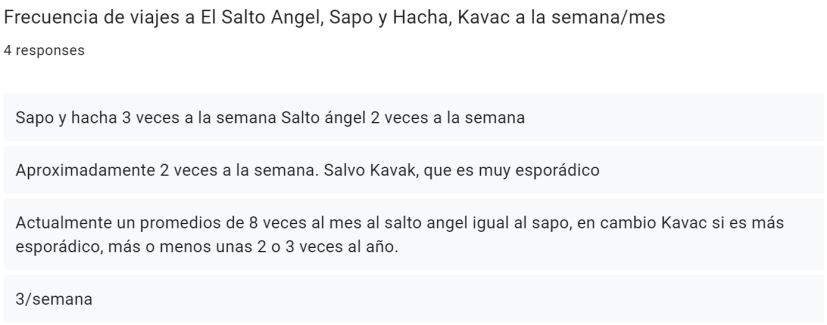
Current survey results: The survey was sent in Spanish since that's the official language of the users/country.

Names: Steven Aranguren, Nicolás Serratto, Beltran Ramirez and Erick Aranguren

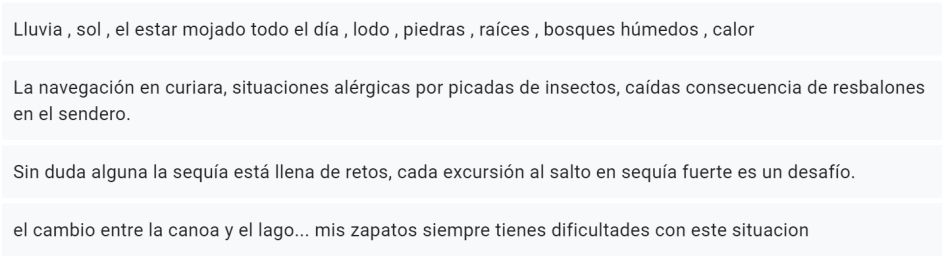
Ages: 27, 39, 37 and 28.

Years of experience as a Pemon adventure guide: 3 years, 12 years, 10 years, and 4 years.

Frequency of trips to Angel Falls and Kavac:



What are the biggest challenges faced during the trips?

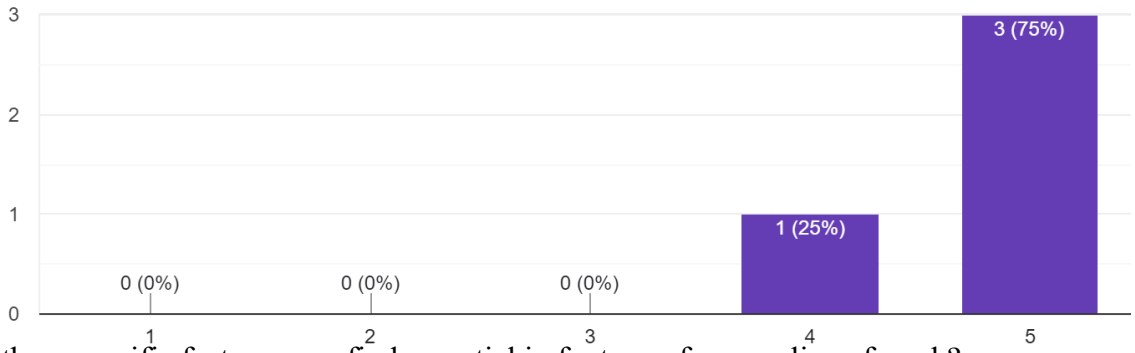


Section 2: Current Gear Assessment

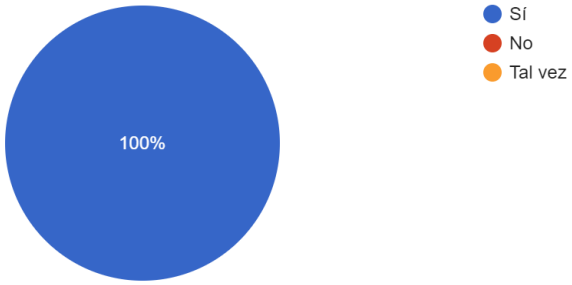
Footwear:

What types of footwear do you prefer when leading tours in Canaima National Park?

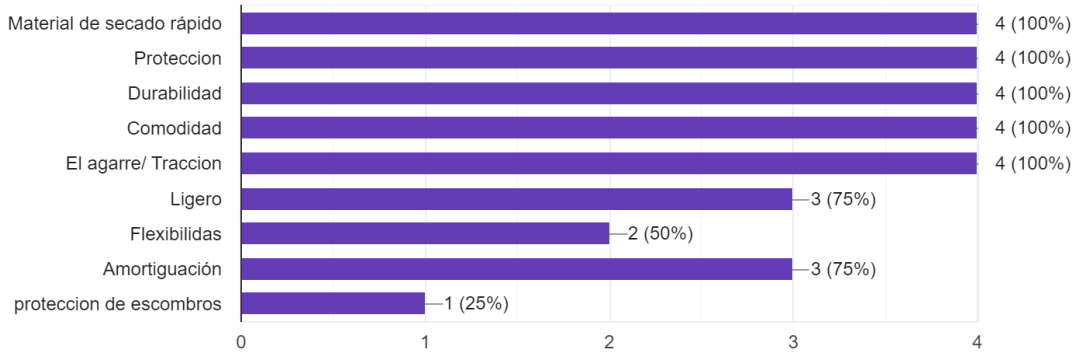
How vital is durability in footwear, considering the varied terrains and submerged environments you encounter?



Are there specific features you find essential in footwear for your line of work?

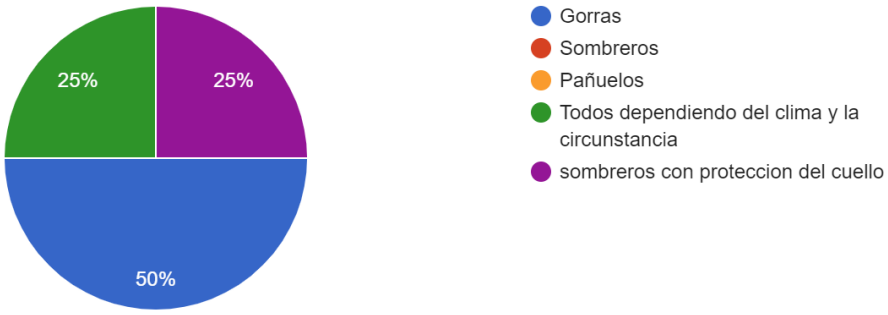


If so, which characteristics are essential for you?

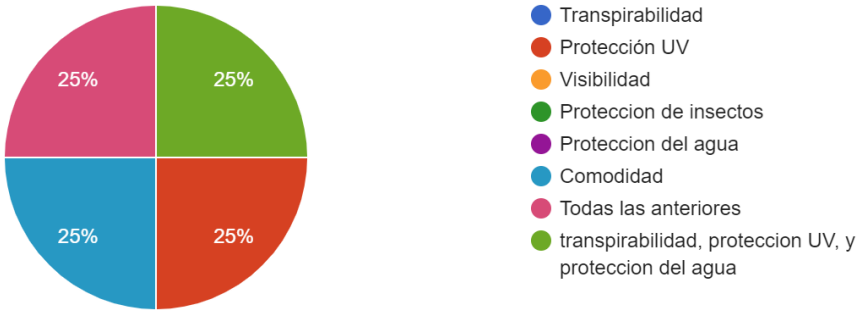


Headwear:

What type of headwear do you find most useful and comfortable in the park's humid and dense vegetation environments?



What features do you consider necessary in headwear for guiding tourists in the region? (select the ones that apply)



Backpack

- What are the most common features/characteristics that you look for in backpacks when guiding tourists in Canaima National Park?

"The bag has to be able to submerge in water, be waterproof, and adaptable to the changing weather."

"We mostly use drybag; this has to be able to carry at least 30L."

"We like to carry them with us at all times, whether hiking and trekking, wading and canoeing, and, most importantly, crossing waterfalls. We also like to help tourists carry their most important belongings, like their cameras and phones, in our bags."

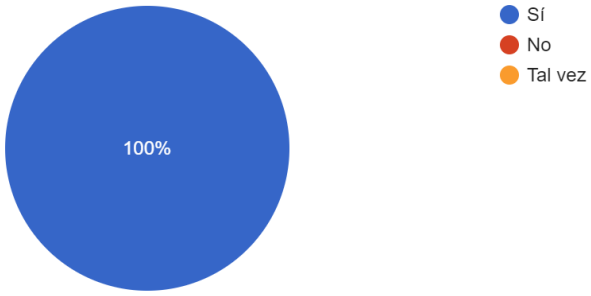
"The Wayare we use it for the most part on longer expeditions that can last up to 2-3 days to carry heavy loads that can get wet, the way we help distribute weight."

- What are the things you carry in your bag?

"First aid kit (for cuts, burns, and stomach pain), insect repellent, sunscreen, towels, food/snack, a change of clothes, and carry tourists' cameras and a light."

Section 3: Preferences and Suggestions. This section aims to gather information on what safety means to them, how they would like to see their culture represented in the gear, and how much they would value that.

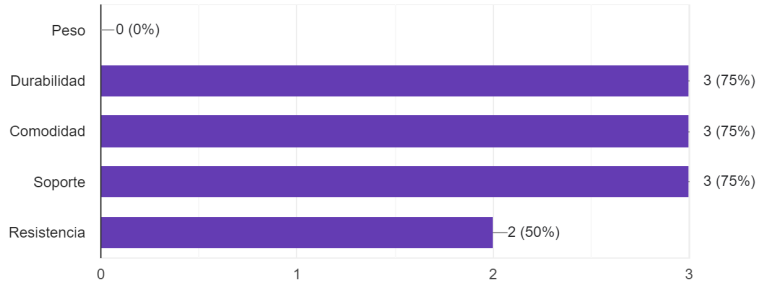
Would you feel safer with the right gear?



Is there a way to celebrate and represent the Pemon culture in your gear? If so, would you want to buy it?

Siempre es importante resaltar la cultura de la zona
No
Si son las verdaderas raíces dandole mérito a los que realmente les interesa la trascendencia de su cultura pero desde la conservación, la protección, la valoración y la no prohibición de la evolución de ecoturismo sostenible pues que así sea.
texturas y patrones naturales, y posiblemente un parche... si, yo quiero este idea ahora

What factors are most important when choosing gear for your adventures?



Are there any additional insights, suggestions, or specific needs regarding gear that have not been covered in this survey?

Es importe que que los equipos que utilicemos el día a día sean cómodo , que duren , que genere comodidad y que se vean bien que se adapten a todas la condiciones climáticas

Sería interesante fusionar elementos tradicionales como el Wayare con lo nuevo como los bolsos drypack.

Lo esencial sin duda es la protección, la resistencia al agua y la durabilidad

yo quiero zapatos con drenaje rapida porque mis pies estan muy discomodidad con mucho aqua por mucho tiempo

Survey Results Analysis

The survey responses from Steven, Nicolas, Beltran, and Erick, all experienced adventure guides in Canaima National Park, provided valuable insights into the region's challenges and preferences of outdoor gear. Initially, it helped confirm the age range for the product line. It also showed different ranges of experience as local guides in Canaima, ranging from 3 years to 15 years of experience. It was surprising how many weekly trips they make to Angel Falls, Sapo, and Hacha Falls. It was shocking because of the amount of physical endurance it requires and super durable gear. When they talked about their biggest challenges, Nicolas mentioned the canoe ride, the slippery walks that often result in hurtful falls, and allergies because of mosquito bites. Steven mentioned the difficulty of the diverse terrain and being wet all day, as well as the humidity and the hot weather. Moreover, when moving into the current gear assessment. When asked for their preferred shoe types when on the journey. Some mentioned lightweight hiking boots or trekking shoes, others mentioned breathable shoes with excellent cushioning, and one mentioned that he prefers a shoe that is in between running shoes and a trekking shoe, having a light and supportive

shoe with the structural integrity and traction of a trekking show. The four of them agreed on fast drying, protection, durability, comfort, and excellent traction for the characteristics they look for in a shoe.

Moving forward for backpack preferences, this section was primarily done in the form of an interview with Steven Aranguren, Antonio Hitcher, and Juan Diaz Parra; Steven shared insights into what they prioritize in terms of features for their bag. The most important finding was that they currently use drybag and they always have them with them; the bag must be a hundred percent waterproof and adaptable; they need to be able to swim and cross waterfalls with them and carry important safety and first aid kits as well valuable tourist belongings, he shared how must of the bags are given to them by national brands that sponsor the lodges, Antonio shared that he don't like using the drybag because of how uncomfortable they can be in terms of weight distribution, how they can cause chaffing on their skin when being wet and not optimal weight distribution, he also mentioned that the last drybag he tried to pack with 30L as recommended it ripped. And Juan agreed with these claims. Juan also shared about the different footwear he has for the different terrains and climates, but it's hard in Canaima's humid environment to find the right shoes that can adapt to every part of the journey. He also mentioned how it is important for him to have the correct support for the heel since he has suffered from plantar fasciitis, a common issue faced by hikers. Lastly, they all shared that they will indeed feel safer with the right gear, and they prioritize comfort, durability, and support when choosing it. When asked about having some cultural representation from the natives in their gear, most agreed that if it is well done working with the Pemon, it can be beneficial to celebrate their culture.

Lastly, they all left additional and valuable comments highlighting the critical needs throughout their gear: comfort, durability, and fast drying. They also mentioned that it must look

good. One also mentioned looking into traditional Pemon crafts like the wayare, a backpack made from palm leaves by Pemon artisans, and finding a way to blend it with more modern gear. The responses underscore the need for purpose-built gear tailored to the unique demands of Canaima's ecosystem and the cultural identity of the Pemon community. These valuable insights are a foundation for developing outdoor gear that addresses local guides' specific challenges and preferences.

Below are additional photos shared by the guides using some of the gear that they mentioned:

On the left side (Figure 28) is native guide Steven Aranguren wearing his drybag and Hoka shoes. On the right side (Figure 29) is another photo shared by Steven Aranguren wearing his Cloud X3.

Figures 28 & 29

Professional Interests

This section outlines my top strengths according to the strength's finder test and how. These strengths can be utilized for this project.

Personal Strengths

1. Individualization
2. Intellection
3. Input
4. Context
5. Ideation

Golden Circle Statement

Why? To elevate and improve the exploration experience for Pemon adventure guides and tourists in Canaima National Park. This will also contribute to preserving the park's ecosystem and promoting sustainable tourism practices, foster a memorable and responsible adventure for all involved, and ensure safety, adaptability, comfort, and cultural sensitivity.

How? By collaborating with outdoor gear experts and the Pemon indigenous community, we aim to address specific challenges with design, testing, and material innovations.

What? Cutting-edge outdoor gear, including footwear and equipment, explicitly designed for the challenges of Canaima National Park.

Project Alignment

This research project seeks to elevate the adventure experience in Canaima National Park by developing innovative and sustainable outdoor gear, aligning with my strengths in

individualization, intellection, input, context, and ideation. My strength in individualization proves invaluable in collaborating with outdoor gear experts and the Pemon Indigenous community, ensuring a personalized approach to address the diverse challenges present in the park. Intellection guides my thoughtful and analytical problem-solving process, leading to innovative solutions that surpass safety, adaptability, and sustainability expectations. My natural curiosity, as represented by my strength in input, enriches the project by incorporating insights from various stakeholders and existing knowledge.

My strength in context plays a vital role in understanding Canaima National Park's historical and cultural background, allowing me to design outdoor gear that respects and aligns with the local context. Ideation, as a strength, propels the creative and innovative aspects of the project, fostering the development of gear that stands out in functionality and cultural sensitivity.

Moreover, my Venezuelan background enhances the cultural relevance of the project. Being Venezuelan gives me a unique perspective and cultural insight that enriches the collaborative process with the Pemon indigenous community. This connection enables a more profound understanding of the local context, contributing to the development of outdoor gear that not only meets functional requirements but also resonates with the cultural nuances of the region. This intersection of strengths and cultural background positions me to navigate the complexities of the project, ultimately contributing to creating innovative outdoor gear that fosters safety, adaptability, comfort, and sustainability while celebrating the Pemon culture and the sacred lands of Canaima National Park.

This thesis project aligns closely with my aspiration to become a footwear designer specializing in sports product innovation. Focusing on developing outdoor gear for Canaima National Park is a strategic link between my academic journey and my future career goals. It

transcends exploration, representing a pivotal step into the dynamic field of sports product design. By creating distinctive outdoor gear tailored to the challenges of Canaima National Park, this project showcases my ability to think innovatively and address practical design challenges.

As the project unfolds, the aim is to establish a niche as a footwear designer within a team dedicated to crafting high-quality sports equipment. This endeavor is a thesis and a steppingstone toward my vision of revolutionizing the sports industry through innovative and thoughtful footwear design. It reflects my dedication to contributing meaningful ideas that cater to the diverse needs of athletes worldwide, harmonizing nature, science, and design.

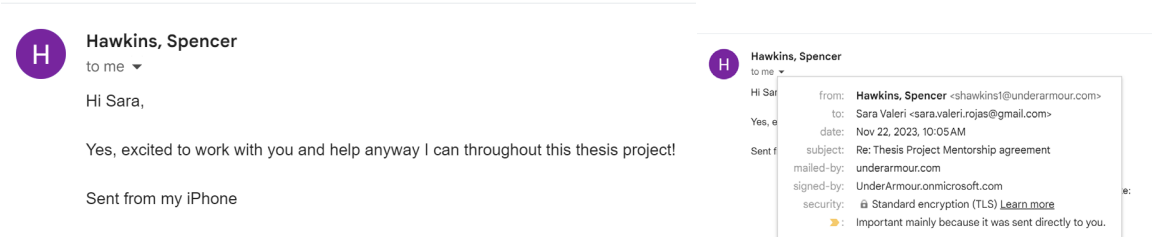
Mentorship

Spencer Hawkins

Senior Footwear Designer

Under Armour

He said he can meet every third Friday of the month and is open to meeting more according to his schedule. He is also available to meet until the end of the project (the last week of May).



Spencer is an experienced footwear designer and product designer specializing in connecting with athletes on a personal level to connect performance to a visual aesthetic that promotes personality, culture, and intuitive solutions on the shelf and in external marketing. He has brought amazing products to the market with Under Armour and has worked with Notable athletes like Bryce Harper and Stephen Curry. He also has experience working with soft goods for

Giro sports. His experience overall is super valuable, his eye for excellent and innovative design, targeting athlete's problems while telling their personal story with the products.

Definition of Success

What defines these products as successful is linked to the jobs they work for. For the footwear, what would make it succeed in Canaima National Park is that it will help the native tour guides excel in their jobs by being comfortable and adaptable.

The footwear needs to be comfortable, and this will be measured through faster drying capabilities and a lighter weight compared to the comp product.
(testing for ventilation and water drainage). The footwear adaptability will be measured through traction for the different terrains (wet rocks, mud, vegetation, and dry terrains). This one must perform better than the comp product.

In the case of the backpack, success lies in comfortability, accessibility, weight distribution, and drying capabilities. For the bag product to succeed, it must maintain the regular drybag capabilities while improving accessibility to items inside the bag and optimize dry bag drying capabilities, separating wet to dry.

The bag frame product also needs to be a more comfortable way of carrying things/weight compared to the comp product, improving ergonomics and weight distribution. This is all while implementing native inspiration

Lastly, for both products to succeed, they should demonstrate improved energy efficiency. Success would entail accurately measuring and comparing energy expenditure by relating it to oxygen saturation. The products should demonstrate comparable or improved energy efficiency, enhance biomechanical performance, and reduce fatigue during prolonged use.

Platform Technologies

Figure 30. MAWARI product line

After gathering important insights from the Pemon guides and going into ideation. Three platform technology ideas were developed, and prototypes were later created to assess their

usability, functionality, and success. For the first technology improved traction was a pillar to be solved for the user. Since the current traction technologies in comp products are based on rubber outsoles and lug pattern design. However, these are not optimized for the variety of terrain found in Canaima National Park. Furthermore, they do not perform well in the slipperiest terrain, like wet rocks and riverbeds, and they are even worse when crossing waterfalls.

The DENDOGRIP technology is an innovative traction solution to traditional trail/hike footwear; the technology focuses on optimizing through the outsole lug geometry design, and additionally, it features a unique flat knit inner bootie sock with grippy sipping pads made out of an enhanced nano front ultrafine polyester grip fabric, while having a minimal but protective rubber outsole for the most sensitive areas, made for to enhances traction on wet rocks.

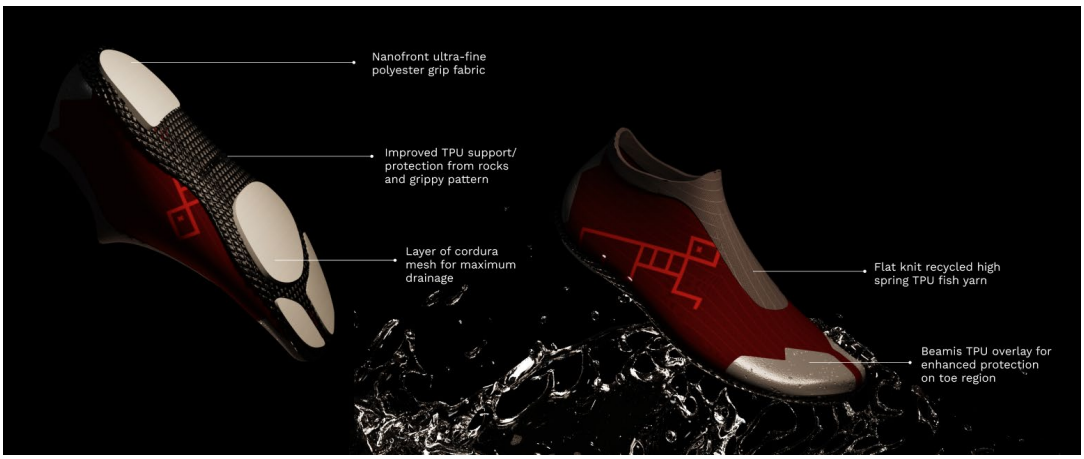


Figure 30. *Dendrogrip sock-bootie knit technology*

Moreover, current drainage systems from comp products aren't as effective and compromise breathability, durability, and protection from debris. But with the CHURUN-FLOW, this can all be improved.

The Churun-Flow is a Drainage system that works together to maximize water drainage, combining upper ventilation to work along a 3D-printed Voronoi lattice structure made with

optimal materials for the outdoor setting. In this case, EPU41, created by the company Carbon, is the midsole. This one is protected from debris by monofilament nylon mesh fabric covered by a TPU cage that reinforces the toe and heel area and a rubber outsole with open cavities. And this works together with the inner sock bootie.

Figure 31. *Churun-Flow drainage system technology*

The last technology was developed by thinking about how current dry bags used in the journey (comp products) are simple in their design and materials that successfully do their function (maintain belongings dry). However, they do not provide fast access points or a way to dry wet clothes when on the adventure. That is when the DRYARE comes into play. The DRYARE is an aluminum rod structure that takes inspiration from the “Wayare” (Pemon woven carrier) to create a drying rack that can work as a modular system with the drybag to optimize weight, reduce fatigue, and provide an organized way to have different compartments to protect belongings, and separate wet from dry item from the dry bag.

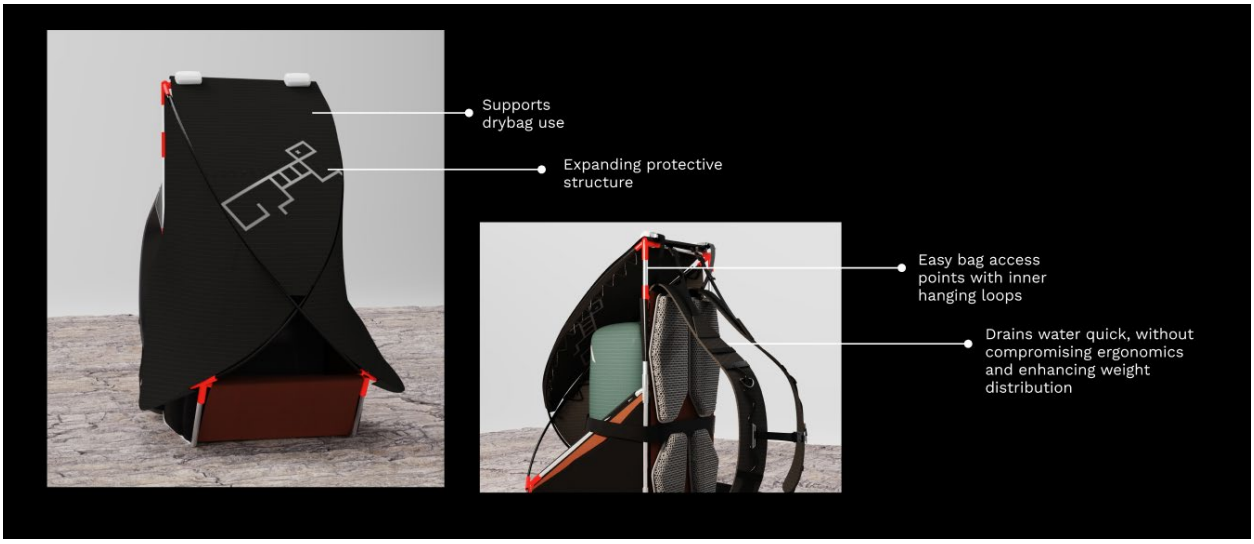


Figure 32. *DRYARE technology*

These unique products feature a tent-like exoskeleton that promotes rain protection of the wet object, made out of nylon tubbing and 420 D. X 420 D. Large Diamond Ripstop Nylon/Polyester with Duraflex hardware that secures the different access points to the inside of the structure, with space designated for the drybag to be placed, secured and accessed at any time., it also features side pockets to carry personal belongings like water bottles, eyewear, and safety kits, among others, and improved upper and lower back support padding as well as functional shoulder straps and a hip belt.

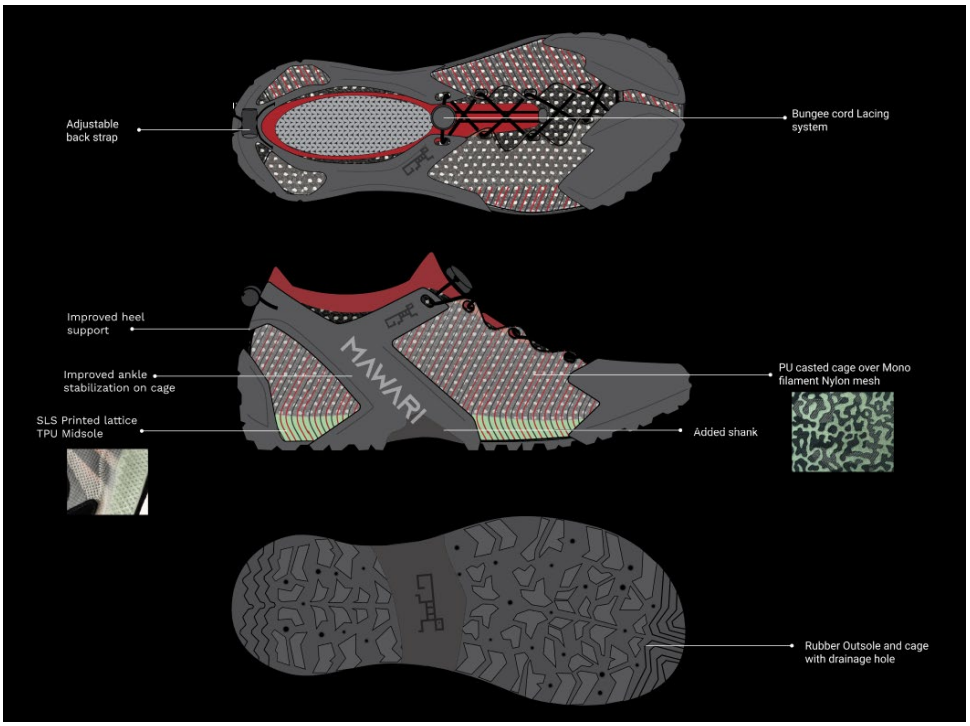


Figure 33. *Tech-Flat of material for the Footwear and cage*

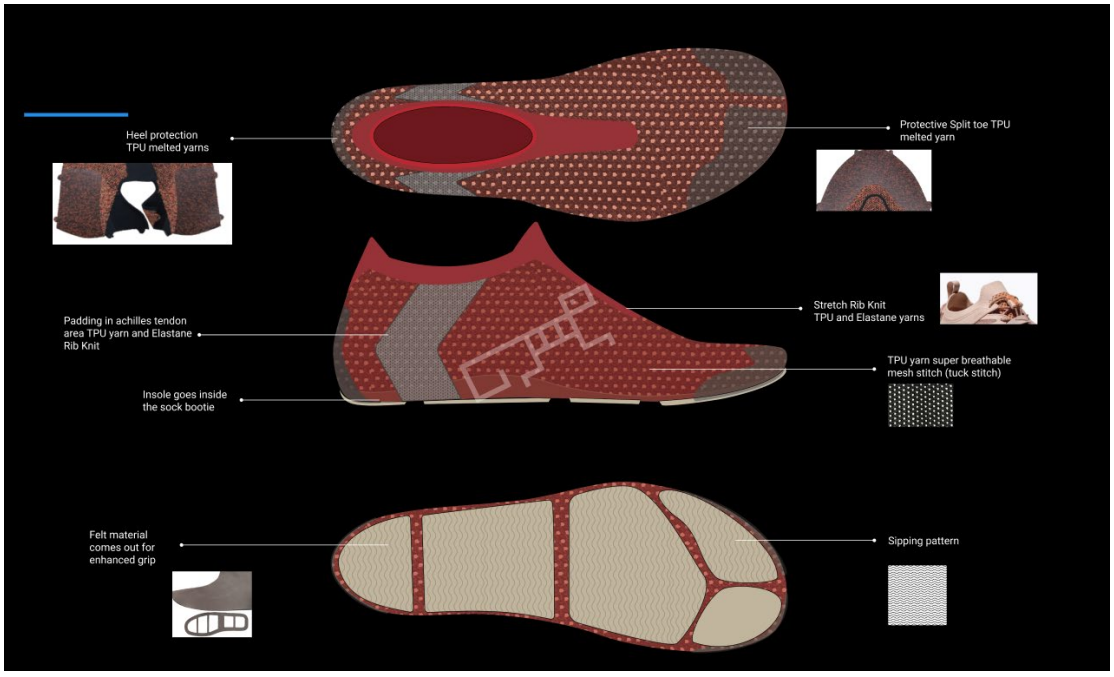


Figure 34. *Tech-Flat of material for the* inner bootie sock

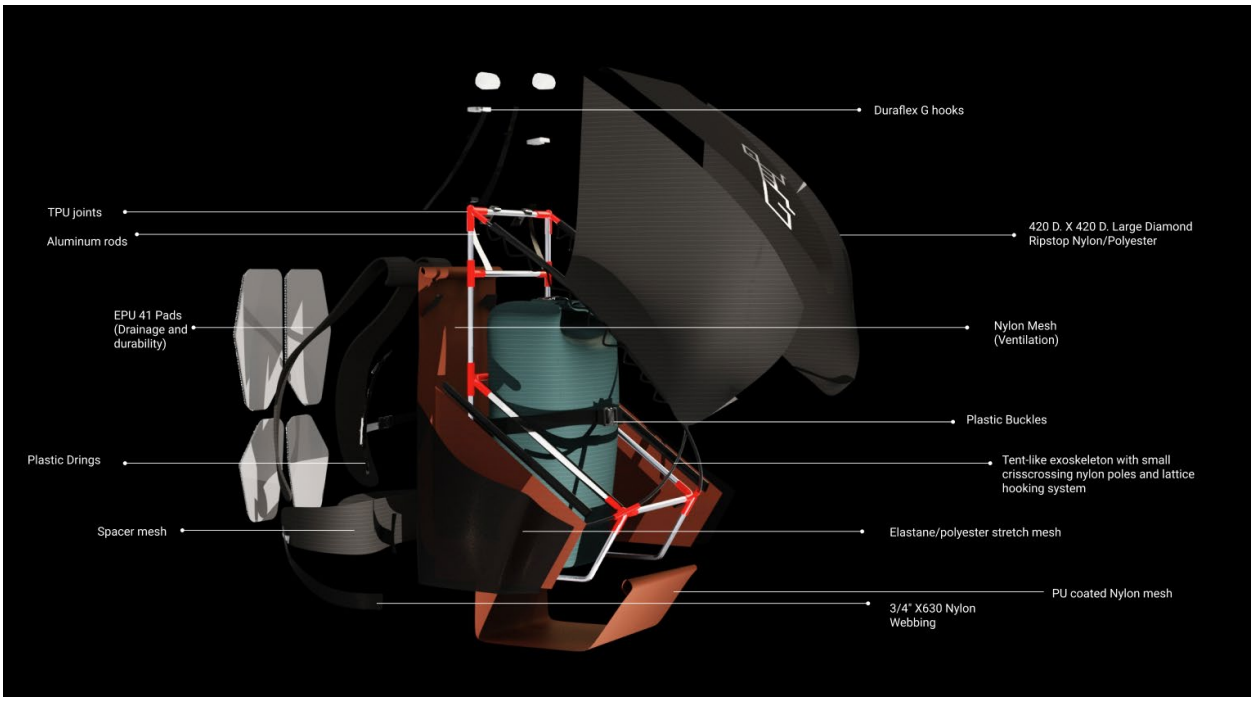


Figure 35. *DRYARE materials*

Performance Testing and Results

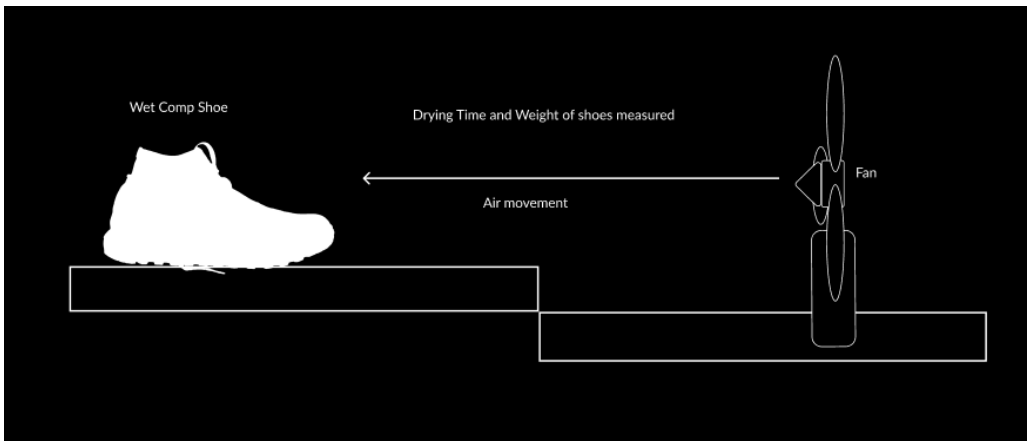
The following testing aims to gather the following data to validate the current success of the platform technologies for the products by identifying the current competitors' products, analyzing the products' jobs to be done, and then evaluating the jobs to be done by the native guide.

Jobs to be done for the footwear:

Canoeing, hiking, wading, swimming, stability/balance, comfort, and water management.

Testing: Ventilation and Drainage

Gut Check: Does the shoe feel comfortable (fast-drying and light)?



Figures 36: *Ventilation testing for footwear infographic*

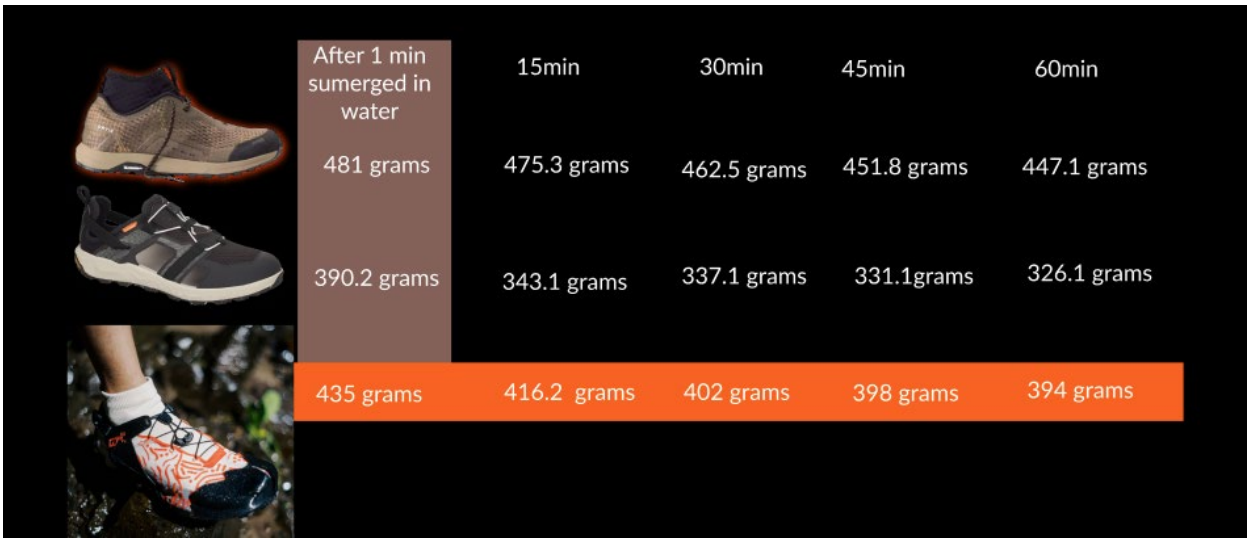
Benchtop test:

Testing Procedure for drying speed and wet weight**:**

Context: The test method consists of utilizing appropriately sized 9.5 men footwear, using two competitor products (the Orvis pro approach shoe and the lizard sandal shoe), and my personal shoe prototype "MAWARI". These were all submerged in water for a minute. The products were

then placed in front of a fan, and the weight was recorded in intervals of 15 minutes to measure drying speed; they all had different weights; however, we can still analyze the drying speed when placed in the same distance and direction in front of a Dyson fan, using the same airspeed.

The Results:



Figures 37: *Ventilation testing results for footwear*

Drying Speed Comparison:

Time (minutes)	MAWARI Prototype	Orvis Pro Approach	Lizard Sandal Shoe
15	44.2%	16.1%	47.4%
30	76.7%	54.0%	64.1%
60	95.3%	100%	100%

Data analysis:

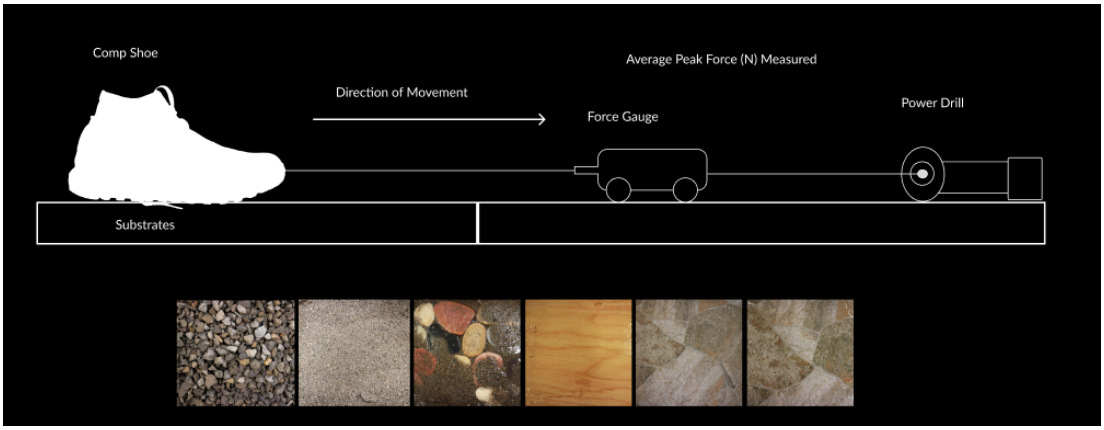
- The new MAWARI prototype exhibits a strong initial drying performance, likely due to improvements in materials or design.

- A consistent fan air source aids in achieving faster evaporation rates initially but reaches a plateau as residual moisture becomes harder to remove.
- These results can guide further refinements in the prototype design, possibly focusing on enhancing the drying efficiency for the remaining moisture.

Overall, the new MAWARI prototype demonstrates promising drying performance, it evaporates 76.7% of the absorbed water within the first 30 minutes, significantly outperforming the Orvis Pro Approach (54.0%) and closely matching the Lizard Sandal Shoe (64.1%)

Testing: Traction

Gut Check: Is my foot stable on uneven surfaces with the shoe on? Does it stick well to the ground?



Figures 37: *Traction testing for footwear infographic*

Benchtop Test:

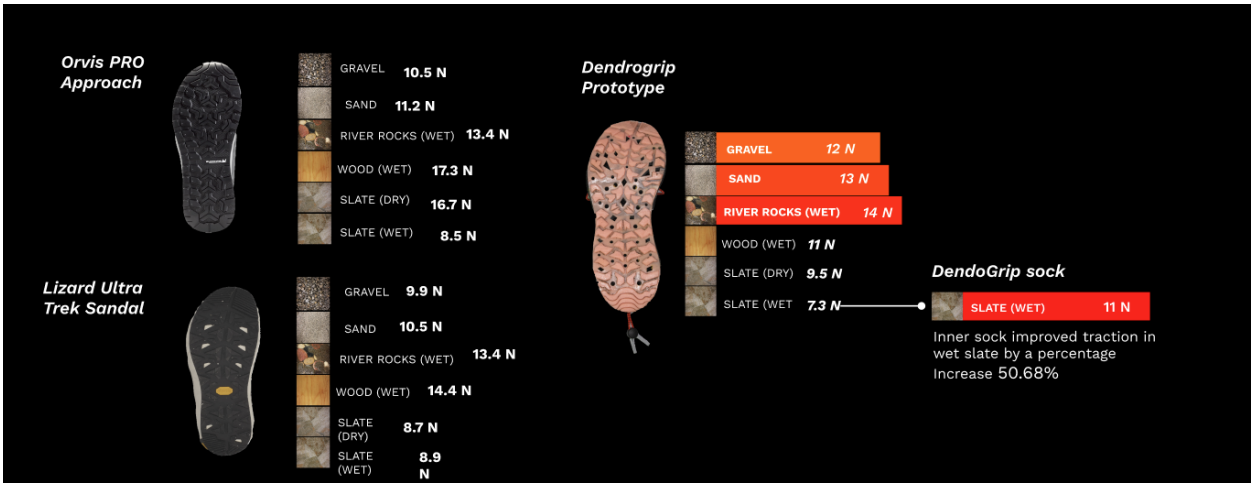
Lab Testing for traction: The footwear adaptability and traction were measured through the performance of traction for the different terrains (wet rocks, mud, sand, wet and dry terrains). Moreover, asses which outsole material and lug pattern perform better on the various surfaces.

Context: This was done in the nucleus lab.

Lab Testing Procedure: The footwear (prototype and comp product) was tested by measuring the average peak force (N) when pulled by the constant force of a power drill and a force on the same plane and direction of movement while placed on different surfaces, thus creating friction. The surfaces were:

Repeat Testing: Five rounds of testing were done on each substrate to ensure reliability and consistency, and the results for each were averaged. The higher the Newtons, the more excellent the initial traction.

The Results:



Figures 38: *Traction testing results for footwear*

Data Analysis:

Across most terrains, the "Dendogrip" outsole lug geometry shows competitive or superior traction compared to competitor products. It exhibits higher peak force values on gravel, sand, and wet river rocks compared to the Orvis Pro Approach and Lizard Sandal Shoe, with an average traction performance of 1.46% better than the Lizard Sandal Shoe.

The Orvis Pro Approach performs exceptionally well on wood, especially when wet, suggesting its outsole material and lug pattern are optimized for this surface. In contrast, "Dendogrip" shows better dry slate traction than the Orvis Pro Approach and Lizard Sandal Shoe.

When the knit-inner-sock Dendogrip technology is used, it demonstrates improved traction on the wet slate, it enhances traction on wet slate by an impressive 50.68%, making MAWARI the ideal choice for challenging and slippery surfaces

Jobs to be done for the DRYAYE and drybag:

Protect belongings from water, separate wet from dry, and distribute weight.

Testing: Accessibility

Gut Check: Can I quickly access the things in my bag?

Figures 39: *Drybag object the guides carry with them*

Benchtop Test:

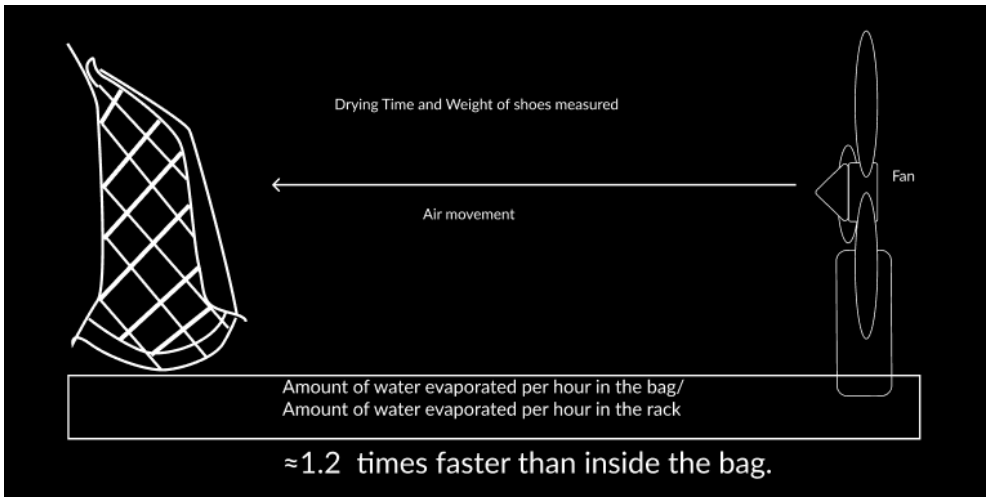
Gathering all the crucial objects that the native guides will carry in their bag (first Aid kit, phones, water, camera, sunscreen, insect repellent, sunglasses, towels, and a change of clothes), all of these were put inside the bag and secured. Then, the time was recorded to see how much time it would take to access the bag and retrieve the first aid kit.

The results:

It took approximately 2 minutes to open and unroll the bag to find the first aid kit, which is subjectively not too long; however, it can be detrimental in emergencies. Additionally, all of the things inside the bag were pretty disorganized, which implies the difficulties encountered when having wet clothes inside.

Testing: Fast-Drying

Gut Check: Can my wet clothes dry inside the dry bag?



Figures 40: *Ventilation testing for Bag cage infographic*

Benchtop test:

Testing Procedure for Drying Speed

Context: Through different interviews, identify the current dry bag setup for the Pemon guide. When they store wet clothes in the drybag, it becomes a mess, and wet clothes can start smelling bad when they return to base camp. Sometimes, they might have different smaller dry bags to separate wet from dry (inside the bag), but it is not optimal (at the end of the day, the clothes can

start smelling bad). The testing procedure was done to see how quickly things would dry with the over cage (hanging wet things) compared to using only the dry bag.

The procedure consisted of submerging wet socks in water for 1 minute, placing one inside the drybag and the other on the drying rack in front of a Dyson fan for an hour and weighing the wet socks at the initial weight and after the hour.

The Results:

Drying Rate of the wet sock inside the Bag:

Water evaporated in 1 hour: 42.5 grams.

Drying rate: 42.5 grams/hour

Drying Rate of wet sock hanging on drying Rack (Over Cage):

Water evaporated in 1 hour: 55.5 grams.

Drying rate: 55.5 grams/hour

Data Analysis:

The drying rate with the drying rack (over cage) is higher (55.5 grams/hour) compared to using a dry bag (42.5 grams/hour).

This indicates that hanging wet clothes on the drying rack allows for faster water evaporation than storing them in a dry bag, even when both methods are subjected to the same conditions (such as being placed in front of a Dyson fan for an hour).

Implications:

Using a drying rack or over-cage can be more effective than relying solely on a dry bag to dry wet clothes.

Faster drying rates can help prevent clothes from developing bad odors, which is particularly important for outdoor activities where access to laundry facilities may be limited.

Cage design should be improved in terms of hooks and protection, weight, and ergonomics.

The Pemon guides may benefit from incorporating drying racks or a similar setup into their equipment to improve the drying process and maintain the freshness of their clothes during outdoor expeditions.

High-Fidelity Testing

In-situ testing was done with an experienced hiker in a similar environment to Canaima in the PNW. He tested the prototypes while hiking and walking on a muddy trail to a waterfall for 40 minutes. In the end, an overall survey and RPE scale test were shared with him.

Figures 41: *In situ testing with prototypes in the Pacific Northwest*

Survey conducted and results:

1. How did you feel overall while using the prototypes?

The prototypes were very comfortable and secure

2. How comfortable were the products during the hike and waterfall crossing?

I feel like I could hike for days

3. Did the products fit well? Were there any areas that felt too tight or too loose?

The fit was great. I wish the TPU cage would open larger to make it easier to put on

4. How effective was the grip on slippery surfaces, especially while crossing the waterfall?

The grip and traction were very effective on the wet rocks

5. Did the socks/shoes allow for natural movement of your feet?

Yes, it allowed for natural movement, but the midsole was not as flexible as I had expected

6. Did the socks provide adequate protection against rocks and other debris?

The socks provided more traction than protection. I felt secure crossing the rocks

7. How well did the outsole of the trail shoe perform on rugged and muddy terrains?

The outsole was great on the different surfaces. It felt grippier than other shoes I own

8. How effective was the lattice midsole structure in draining water and maintaining comfort?

The lattice midsole was fantastic and very comfortable

9. Did you find the shoes lightweight and easy to move in?

They were not as lightweight as I would have hoped

10. Did the upper protect your feet from debris effectively?

yes

11. How well did the frame distribute the weight of the dry bag?

It did an excellent job with the hip and sternum straps

12. Was it easy to access your gear while on the move?

The hardware was quick release on the top, but the bottom cover was cumbersome

13. How comfortable was the frame to carry for extended periods?

I did not notice any fatigue carrying the pack

RPE (Rating of Perceived Exertion)

On a scale of 1-10, how physically demanding did you find the hike with the new gear compared to your usual gear?

3 (low energy)

How much effort did it take to cross the waterfall with the grippy socks/shoes on a scale of 1-10?

3 (low energy)

Experience Enhancement

Did you feel that these products enhanced your hiking experience? If so, how?

The shoes and socks were comfortable and improved grip on the waterfall

Were there any specific features that stood out to you as particularly beneficial or problematic?

The midsole and traction

Did you feel less fatigued or more comfortable using these products compared to your usual gear?

About the same

Suggestions for Improvement

What improvements would you suggest for each of the products tested?

larger opening for the shoe sock to make it easier to put on and off

I think a thinner midsole would help the tour guide feel more responsive and connected to the ground on loose gravel

Are there any additional features or functionalities you think would benefit the products?

A pull tab on the back of the shoe so it can hang to the cage when not being worn

Based on your experience, how suitable do you think these products would be for tour guides in the rainforest environment?

I like the modular design. It is very adaptable and thoughtful of the rainforest environment and tour guide needs

Analysis of the survey responses:

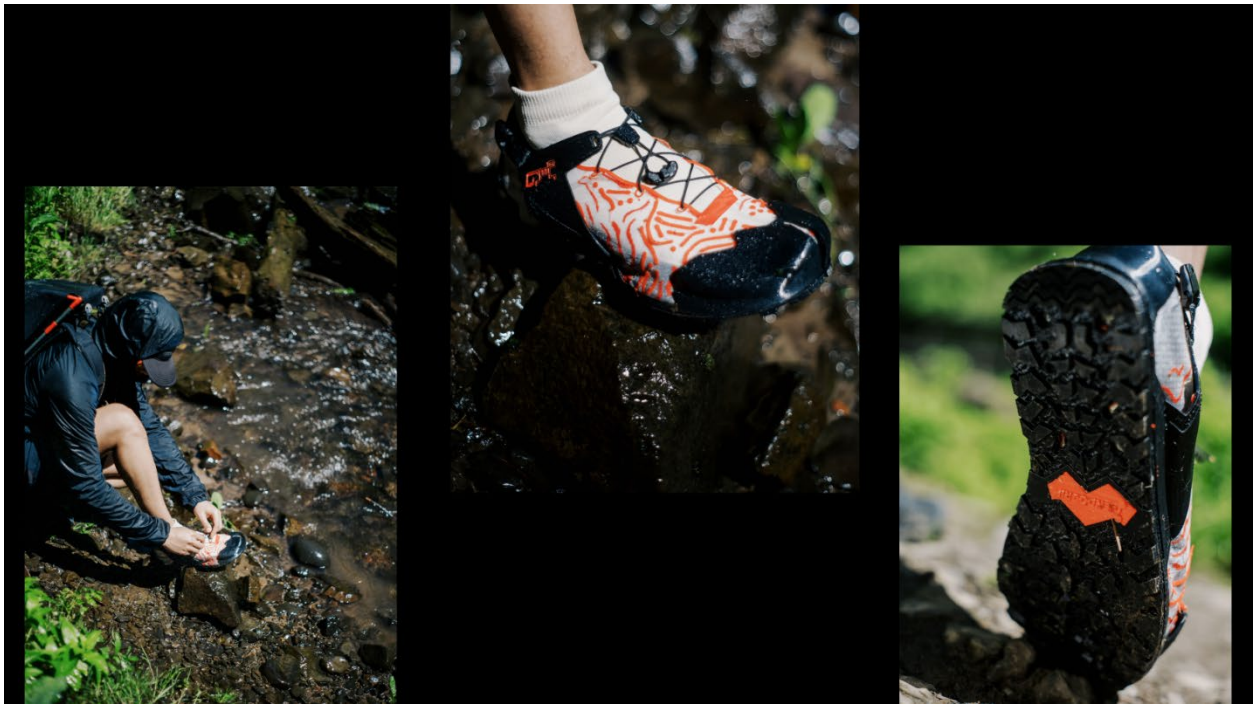
The feedback highlights the excellent comfort, security, and traction on wet surfaces, which is crucial for the demanding environment of Pemon adventure guides. Constructive suggestions were received for improvement, including enhancing the ease of wearing the TPU sock, reducing the weight, and increasing the midsole's flexibility. Moving forward, it is important to integrate these improvements further to enhance the performance and user experience of the footwear and the cage.

Final Product Photography

Figures 42: *Glamour shot subject wearing the bag carrier and close-up shot of the monkey logo.*

Figures 43: *Detail shots of the bag carrier and its features*

Figures 44: *Glamour shot of the Dendrogrip inner-knit sock technology*



Figures 45: *Glamour shots of the full shoe*

Figures 46: *Glamour shots of the lattice midsole and the model using the MAWARI bag carrier*

Conclusion

Exploring Canaima National Park presents profound challenges for the native tour guides, influenced by the region's diverse physiological demands, biomechanical intricacies, and complex environmental conditions. This thesis delved into the development and testing of innovative outdoor gear specifically tailored to address the unique needs of Pemon guides, aiming to enhance their comfort, safety, and performance in one of the world's most challenging natural environments.

The initial phase of this study focused on meticulously understanding the physiological responses of guides to Canaima's environment. High humidity, varying microclimates, and altitude effects were identified as critical factors influencing guide performance. Insights into thermal regulation, moisture management, and altitude adaptation guided the design of equipment that aimed to optimize comfort and reduce the risk of physical strain.

Biomechanical research illuminated the necessity for footwear that balances traction, durability, and comfort across diverse terrains—from muddy, uneven paths to slippery river rocks. The development of the "Dendogrip" outsole with its optimized lug geometry and the "Churun-Flow" drainage system exemplifies technological innovations to improve grip, stability, and moisture management in challenging conditions. Benchtop tests underscored these innovations' effectiveness, showcasing superior traction on various surfaces and accelerated drying rates compared to conventional gear.

User feedback from seasoned Pemon guides provided invaluable insights into the prototypes' real-world performance. Positive responses highlighted the prototypes' comfort, security, and adaptability to the rainforest environment. Critical feedback prompted adjustments

to improve ease of wear, reduce weight, enhance midsole flexibility, and fortify protective features without compromising traction or comfort.

Looking forward, the validation of these prototypes through field testing with the Pemon guides in Venezuela represents a crucial next step. Collaborating with the Pemon tribe and their Indigenous council not only ensures cultural sensitivity but also enriches the design process with traditional knowledge and community input. This collaborative approach not only validates the efficacy of the prototypes but also fosters sustainable relationships and community engagement in ecotourism initiatives.

Future improvements will focus on refining the PU cast upper based on user feedback and optimizing the cage and upper details for enhanced durability and protection. Adjustments to the bag's top cover and exoskeleton structure aim to increase durability and reduce exposure while maintaining accessibility and functionality in rugged environments.

In conclusion, the MAWARI footwear and DRYARE backpack carrier prototypes exemplify a holistic approach to outdoor gear design, integrating scientific research, biomechanical insights, user-centric feedback, and technological innovation. This project demonstrates the transformative potential of iterative design processes in crafting gear that not only meets but exceeds the demands of extreme environments. This research contributes to the broader discourse on ecologically responsible outdoor gear and community-centric tourism initiatives by prioritizing comfort, safety, and sustainability. The journey continues with a commitment to ongoing refinement, validation, and collaboration with Indigenous communities, ensuring that future iterations of outdoor gear reflect both technological excellence and cultural respect.

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