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Pines for Progress: Empowering Rural Nicaraguan Villages

By

Paige Smith

A Thesis submitted
in Partial Fulfillment of the Requirements
for the Degree of
Master of Fine Arts in Industrial Design

School of Design
College of Art and Design
Rochester Institute of Technology
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Thesis Committee:

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Figure 1. Pine-woven backpack. Photograph by Elizabeth Lamark.

Abstract:

In January 2023, I traveled with Linking Hands for Learning to live with host families and build a school in El Carrizo, Nicaragua, and spent time with the children in the village, even taking the same hikes through the mountain paths they traverse each day to attend school.



Figure 2. A photo with the children in El Carrizo, Nicaragua. Taken by Rob Lupisella, January 2023.

Inspired by the resourcefulness and resilience of Nicaraguan culture, I returned to Rochester, NY focusing my MFA industrial design thesis project on addressing the pressing needs of these underprivileged communities. I aimed to develop a solution that could be manufactured locally (without electricity, running water, power tools, or modern-day shipping), utilizing materials sourced from the region and incorporating sustainable elements, all while honoring and empowering Nicaragua's beautiful and diverse culture.

I connected with a weaver nestled in the mountains of Ocotol, Nicaragua. We worked together for several months developing and refining a backpack design for children in similar villages, along the way gathering feedback from other expert weavers, designers, craftsmen/women, material experts, furniture makers, professors, teachers, translators, and other friends in both the U.S. and Nicaragua.

The backpack is constructed with pine needles collected from the forest, and hand-sewn by thread. The straps are made from braided recycled t-shirts. The backpack is used by children to carry schoolwork on their walks to school, and also dually to be used as a flat desk-like surface for doing work at home.

Additionally, this product is meant to accelerate local business. After speaking with the weavers and community members about this design, they will be crafting similar bag designs as exportable objects to other areas, even worldwide. For most of these women, selling hand-woven baskets is their only source of income and their only job outside of taking care of their children and homes.

In February 2024, armed with a completed prototype and enriched by further research and collaboration during my return visit from Nicaragua, I returned home with renewed conviction in the transformative power of design to create meaningful and lasting impact in addressing complex challenges of marginalized communities. This paper delves into the journey of cultural study, conceptualization, design, and implementation of the backpack project, offering insights into the challenges, successes, and lessons learned along the way.

Keywords: Sustainability, Craftsmanship, Cultural preservation, Community Empowerment, Nicaragua, Rural Communities

Introduction

Families in less privileged parts of the world, such as the mountain communities in Nicaragua, the second poorest country in the Western Hemisphere¹, face considerable challenges in accessing basic amenities and supporting themselves financially. Typical rural villages in Nicaragua have 300-1000 community members, no electricity, a single mechanically-pumped water well, and a single dirt road. When families are not maintaining their house and children, most resort to farming, producing coffee, or managing livestock. It is a hard lifestyle to have. One bad season or crop disease can impact the entire village's ability to support themselves.

While education is nominally free for all children in Nicaragua, the scarcity of resources has historically limited access, particularly in impoverished areas where constructing schools within a reasonable distance remains an ongoing struggle². In regions like these in Nicaragua, children embark on their educational journey at the age of five, navigating great distances to attend schools. The daily trek can be arduous, with some students walking for hours across rugged terrain to reach their classrooms. Unfortunately, for many of these young learners, in addition to the practical challenges of daily travel, when they get to the school building there is neither sufficient space nor comfortability to learn effectively. While the Nicaraguan government sometimes pays for the school buildings, it is up to the community to come up with everything else - chairs, desks, and supplies. The furniture is usually rotting, rusting, and broken down. Paper and pencils are not always easy to come by. In some schools, the kids share a single pot of rice for lunch. Many of them return home where they have no furniture other than a hammock and a few plastic chairs. Their homework, if they have any, and if they are able to do it at all, is done on the floor or in their laps.

¹ United States Agency International Development, <https://www.usaid.gov/nicaragua>.

² "Transforming Education in Nicaragua", Global Partnership.



Figure 3. Classroom in El Carrizo, Nicaragua. Photograph by Paige Smith, January 2023.



Figure 4. House in El Carrizo, Nicaragua. Photograph by Paige Smith, January 2023.

In spite of these communities' limited resources, nothing is ever wasted. It is embedded in Nicaraguan culture to use and reuse everything. The unusable desks become lunch break surfaces for construction workers. The chairs become the base structure for a laundry washing basin. Plastic bottle caps become toys for young children to play with. A hose and gravity are good enough to bring an entire village water. Old tarps become a wall for a damaged house, or a sink cover for laundry. The United States has a lot to learn from the Nicaraguans in terms of resourcefulness.



Figure 5 (top left). El Borbollón, Nicaragua. Three men using a ladder to paint a roof. Photograph by Jeanine Lupisella, February 2024. Figure 6 (bottom left). El Borbollón, Nicaragua. Using boulders pulled from the ground as chairs. Photograph by Paige Smith, February 2024. Figure 7 (right). El Carrizo, Nicaragua. A girl playing with plastic bottle caps. Photograph by Paige Smith, February 2024.

“Fuente De Pinos” Artisan Cooperative

In 2011, several women in the small mountain village of Ocotal, Nicaragua started a cooperative called Fuente de Pinos, mostly as a tourist initiative. They constructed structures for dining, tree swings, tours, and other events to bring people to the mountains as a vacation destination. The women also, through a workshop in 2007 led by the Enlace Project and Richard Millard (from Rochester, NY), learned how to craft baskets out of pine needles collected from the forest, thread, and sewing needles. They went on to sell these baskets to tourist groups.



Figure 8. The Fuente de Pinos selling their handmade baskets to our tour group in Ocotal, Nicaragua. Photograph by Paige Smith, February 2024.

I was so inspired by these women, not just for their incredible skills and dedication, but also in their ability to create this business that allows them to be self-sufficient and support one another in the process. The Fuente de Pinos artisan women could not be more proud to sell their products and teach others how to weave pine.

Problem Statement

How can current crafts in remote Nicaraguan communities be accelerated to enhance local business, sustainability, and independence while also fitting into the Latin American culture and local manufacturing capabilities?

Project

This project started as a classroom furniture project. In efforts to create comfortable, effective, and sustainable furniture for children in Nicaraguan villages, my research was centered around local manufacturing and materials studies for school environments.

What I quickly learned was that redesigning classroom furniture for multiple Nicaraguan villages, each with different resources and different needs, was neither feasible nor reasonable. Another big realization through my research was the commonality that *did* exist throughout each of these villages: the student experience *out* of school. There was a greater necessity to accommodate these kids' commutes to school and ability to continue learning at home.

With this new direction, I started researching student experiences and resources in remote villages, not just in Nicaragua but across the world. I was still focused on creating a solution that relied entirely on local materials and manufacturing (meaning no electricity, no machines, no modern amenities). It was also important to me for it to be sustainable, because while resourcefulness and reuse is a staple in Nicaraguan culture, there is still a big issue of trash management and plastic waste in the country.

During my research I came across a portable cardboard desk designed by Industrial Designer HaYoung Lee. Inspired by observations during a journey through India, Lee observed numerous children sitting on the street ground or narrow staircases while doing their schoolwork. The cardboard desk designed was sturdy, affordable, and transportable³. Thus, the idea for me to create my own version of a portable desk for Nicaraguan children was born.

³ Katie Dupere, "This Foldable Cardboard Desk Gives Kids in Developing Nations a Place for Homework."



Figure 9 (left). Child using the “Letter Desk” designed by HaYoung Lee. Photograph by Katie Dupere, July 2017.
 Figure 10 (right). Indian students study outside their houses in slums. Credit: Ritesh Shukla/NurPhoto/Getty

The constraints for this project in Nicaragua were:

- Withstand heat
- Withstand rain (Nicaragua’s rainy season extends half the year)
- Large enough to fit a standard size piece of paper
- Value in terms of the culture (not viewed as “recycled trash”)
- Lightweight (for small children to carry, as young as 5 years old)
- Accommodate for ergonomics of Nicaraguan children in these villages, who are typically smaller than American children

I then did a materials study to determine what natural resources are available in Nicaragua.

RESOURCES / MATERIALS IN NICARAGUA

- CROPS - COFFEE, BANANAS, ORANGES, RICE, MAIZE, BEANS, SORGHUM, PLANTAINS, CASSAVA
- CLAY
- Adobe bricks
- Concrete
- Wood
- Metal
- Brick & Block - commonly used in walls, partitions, facades.
 Readily available & relatively inexpensive
- Roofing - corrugated metal, clay tiles, thatch
- Stone - natural stone (volcanic rock, limestone)
- Plastics - inc. PVC pipes, plastic panels, bottles,
 soft plastics (tarp, wrappers, bags)
- Glass
- Asphalt
- Ceramic
- Tile
- Insulation materials - fiberglass, foam board, reflective insulation
- cardboard
- Pine (wood & needles)

I explored crafts that were already being made throughout Latin America - hammocks woven out of plastic bags, purses made of old burlap sacks, banana leaf chairs, and wood made of coffee husks. I connected with an organization called The Rainbow Network who had been making these types of sustainable crafts.

When I thought back to the communities in Nicaragua I had already visited, and how these new concepts might fit in, there was a problem with all of these ideas - they would be completely new. New materials to gather or buy, and it would take hours of training and practice. It was possible, but it would take an incredible amount of time and resources to introduce these into the community. Time and resources that many of these people do not have.

This brought this back to my original goal: to develop a solution with existing capabilities. Consequently, it brought on the question of: **what do these people already know how to do?**

I was at the RIT Industrial Design Studio when I took a sip of my tea, and under it was a pine-needle coaster that I bought from the village of Ocotal, Nicaragua a year prior in January 2023. People in these villages knew how to weave pine. They were good at it, and they were proud of it. So, I started developing designs using a similar spiral-woven pine that Ocotal artisans make their baskets out of.



Figure 11. The Fuente de Pinos artisans selling their pine baskets. Photograph by Paige Smith, January 2023.

In December 2023, a friend connected me to a member of the Fuente de Pinos cooperative who might be interested in working with me on this project, a 26-year old woman named Anielka Martínez. We communicated for several months with the help of a translator, along the way getting feedback on the designs from friends and experts both in the U.S. and Nicaragua.

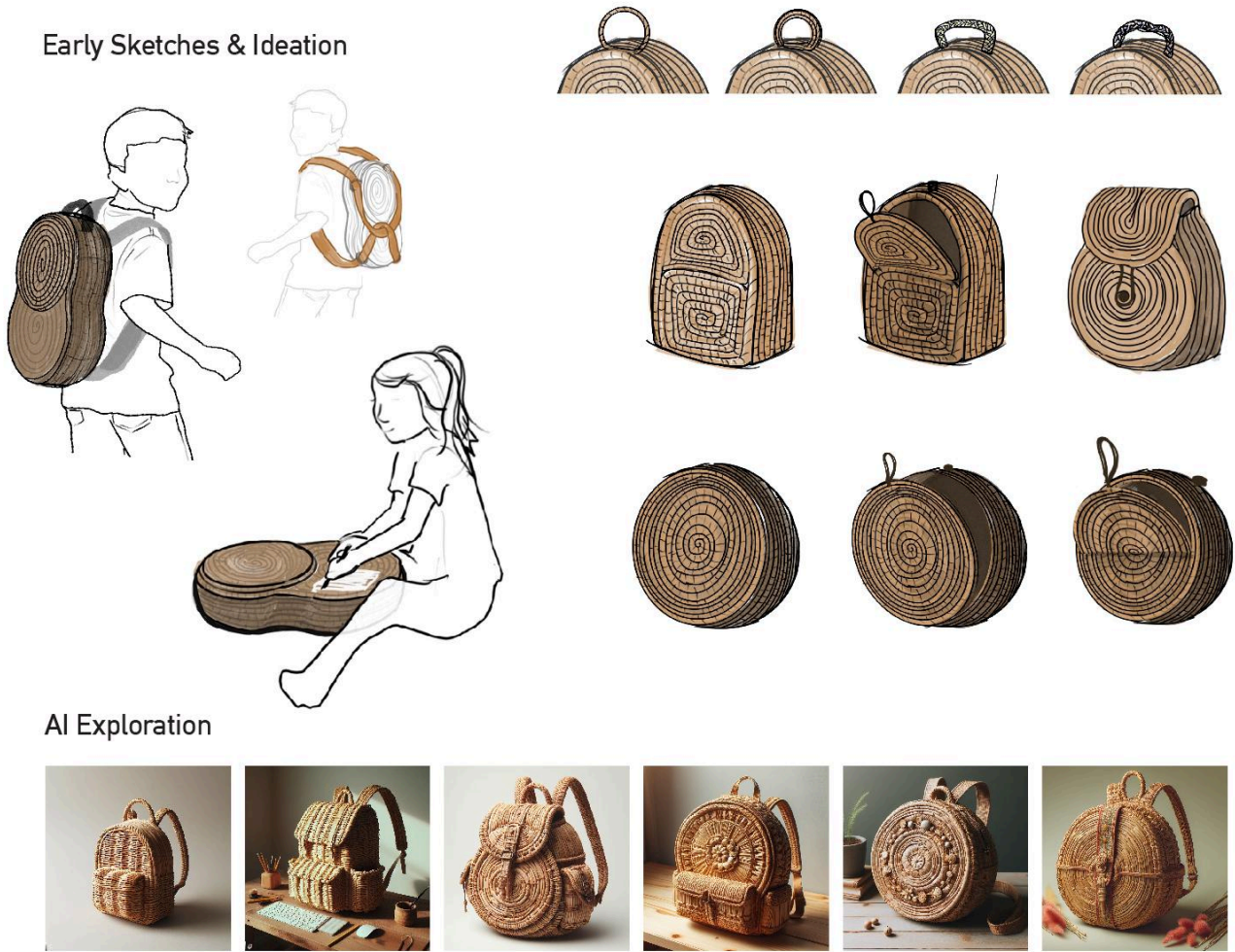


Figure 12. Some of the initial sketches and ideas presented to Anielka in winter 2023-24.

Anielka and I ultimately decided to move forward with the “figure 8” shape. It featured the Fuente de Pino’s famous spiral, but it was also unique and had an effective surface area as a desktop. In the U.S., I prototyped using cardboard to narrow down shape, dimensions, and pattern type. Anielka decided she would use bunches of pine that were half the size than usual, so it would be more lightweight.

Prototyping

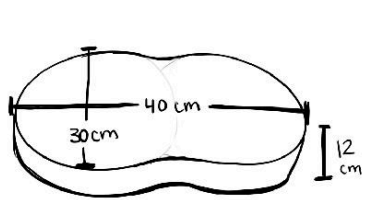


Figure 13. Prototyping, Rochester, NY, January 2024.

While Anielka started weaving this backpack in Nicaragua, I worked on the straps at home. I ultimately chose to use t-shirts, a material readily available in Nicaragua and surprisingly strong when braided.

Manufacturing & Development

Anielka Martínez spent 59 hours crafting this backpack.



Strap Development

(Rochester, NY)
Made of recycled t-shirts

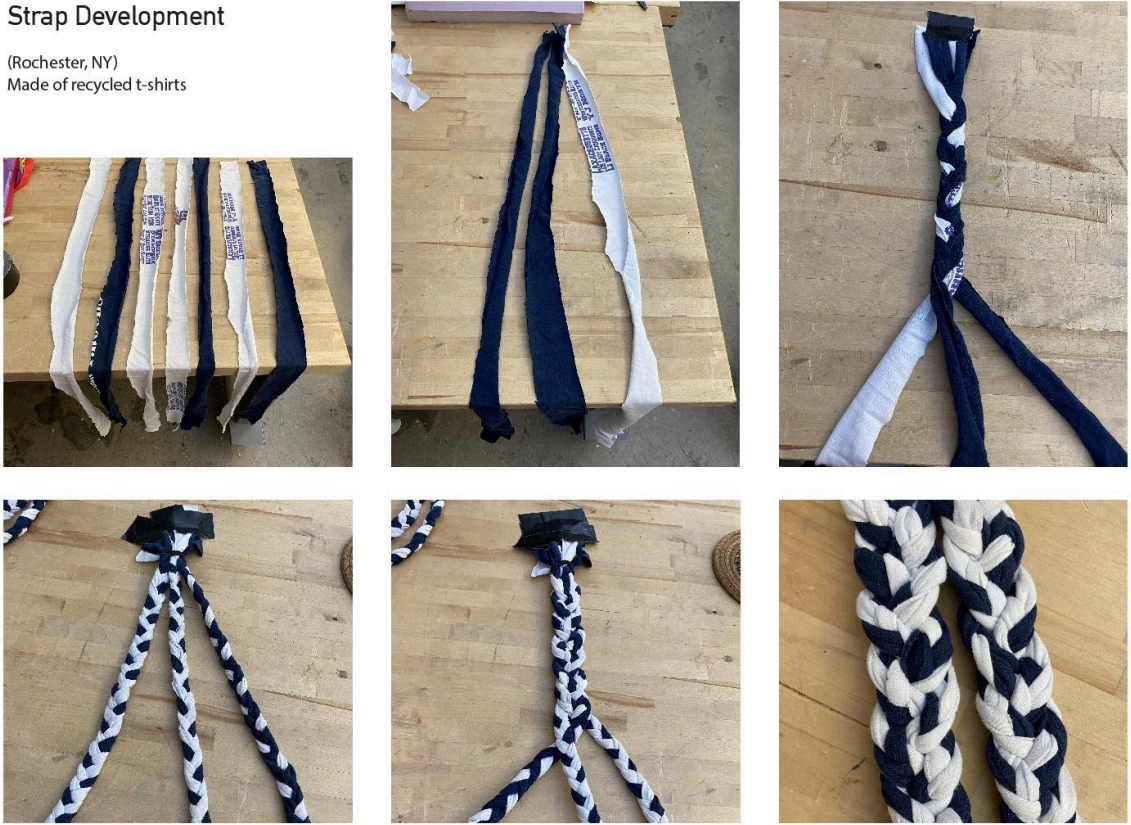


Figure 14. Manufacturing & Development, Anielka Martínez, Nicaragua, January 2024.
Figure 15. Strap Development, Paige Smith, Rochester, NY, January 2024.

During this point in the process, I was preparing for my upcoming trip to Nicaragua. Anielka and I's goal was to complete this project for me to bring it on my plane ride home.

When I arrived in Nicaragua, the backpack's main body was almost completely constructed. In between the other school construction I was taking part in, documentation, and interviews, Anielka and I met several times in person to go over the design.



Figure 16 (left). Anielka and I finally meeting in person for the first time in Ocotol, Nicaragua. We are discussing the placement of the zipper, overall dimensions, and straps. Photograph by Sharon Lonthair, February 2024.

Figure 17 (right). Anielka weaving the backpack, February 2024.

We made some changes based on Anielka's suggestions - a thicker body and the addition of a zipper, which added extreme value to the design but was an element I was previously unaware she had easy access to. She hand-sewed the straps I brought with me. Anielka, after 59 hours of rigorous work, completed the backpack the morning of my flight home. She had also lined the inside with fiber, to make it more waterproof.

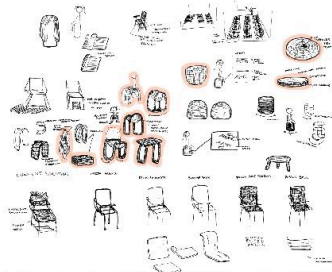
In true Nicaraguan fashion, the backpack was put to use immediately. I left a pair of shoes and a towel in Nicaragua, stuffed the backpack with dirty laundry, and fit it all home in my carry-on.

Project Evolution



Initial Inspiration

After spending significant time with children in Nicaraguan villages, the primary focus of this project was to address educational challenges. Recognizing the importance of local manufacturing, community empowerment, and sustainability, my thesis project's foundation was set.



Classroom Furniture

The project commenced as a furniture design endeavor, aiming to enhance classroom furniture for better learning environments. The furniture designs incorporated local manufacturing capabilities and local materials.



Evolution of Concept

Through iterative design exploration, it became evident that the fundamental issue for these children lay beyond the classroom – in their arduous journey to school and lack of furniture at home. Along with this came the realization that standardizing classroom furniture designs across many different villages would be unreasonable.



Emergence of Backpack & Desk Concept

Inspired by a foldable cardboard desk design, the innovative idea of integrating a dual backpack and desk surface was conceived, aiming to address the multifaceted challenges faced by the students.



Refinement & Adaptation

Interviews and further development of the concept revealed a shift in focus towards the socio-economic context of Nicaragua. It became apparent that the value of handmade crafts differed between cultures, yet again leading to a pivot in the project's direction.



Backpack as an Economic Advancement Opportunity

Realizing the potential for economic empowerment within the local community, the project transformed to prioritize the creation of accelerated exportable and sellable products, particularly targeting the tourism market.

Interviews

In the early stages of this project, I interviewed Wayne Sharpe of Caned by Wayne, Curtis Buchanan of Greenwood Chairs, and Bridget Sheehan of ARBR studios. From these conversations, I built a general understanding of the materials and techniques needed to build furniture and crafts. Curtis Buchanan had also woven chairs in Honduras as part of a Canadian sustainable forestry initiative, using the inner bark of majau trees, catulin negro trees, and corn husks.

When I was in Nicaragua, I conducted in-person interviews with several members of the Fuente de Pinos cooperative.

About the Weavers

Fuente de Pino, Ocotol, Nicaragua
Interviewed February 2024



Maria Morillo

Maria is a single mother. Since she does not have a husband, she works in the farm with the men. There are different farming seasons - corn, bean, etc., so she does this year-round. After returning home from the farm, she takes care of her children and house, and makes baskets at night. She does not use any of the baskets she makes. Every basket is made to sell.

Maria has been a member of the Fuente de Pino cooperative since 2007 when they first started making baskets.



Fatima del Rosario Murillo Martínez

Fatima attended a workshop in 2016, led by Richard Millard and Kellan Morgan, both from Rocheser, NY. This workshop is where most of the women learned how to weave baskets. It was a technique taken from a nearby village.

Fatima is excited to see tourist groups come, because local Nicaraguans do not buy many of the products they make.

Angela Martínez Reyes

Angela did not attend the workshop in 2016, but she knew how to sew, which is how she learned to weave baskets.

Angela works in 2-hour shifts: working for two hours, taking a break to do things around the house, and working for two hours after that. A normal basket takes eight hours, or four shifts, to be done.

Angela now teaches other women in the community how to weave. She also does not use any of her baskets at home.

I also conducted a formal interview with Anielka Martínez, who weaved the backpack.

From the Production Artist

"The other artisan women really liked how the backpack turned out, I shared the designs with them and they are encouraged to work with new designs, in addition to the designs we already made... one of the new designs, I made it in a shorter time.

I feel very happy that everyone loves it, it makes me feel proud of the work I do.

These jobs have given me the opportunity to have new ideas. In this way we take advantage of the forest and help ourselves economically. What I like most is the jewelry we can make.

I have always wanted to help women develop skills and earn a living from crafts, since 2018 sales fell and they became discouraged, I got to work and sold, always something and I told them that they too, They could sell, in 2020 things were improving a little, they invited us to markets to sell, but the sales have always been few, here in Nicaragua. When tourists come, as well as your group, they are encouraged to work because we sell well.

I decided to study something that helps women project themselves and take care of the financial-economic aspect because I agree with an aspect that is important for the survival of the cooperative. I am studying Accounting, so that this business of crafts and the #entrepinosveredas viewpoint can be sustainable and means financial help for us.

This is a great opportunity for my ideas because I know that we all need it, especially the new members we have.

The crafts have that added value that they are completely handmade, here people do not take much importance. Thank you for valuing our work."

Anielka Martínez



It was important for me to learn the backstory of these weavers; how they learned to weave, what makes them encouraged, and their lifestyles. This is important not only to add context to my thesis project, but also to continue working on new designs and collaborations.

The most important thing I learned from these interviews (albeit, a little late in my process), was that the women do not use the pine woven baskets in their own homes. Local Nicaraguans, I was told, do not appreciate hand crafts, most cannot afford them, and for the women in Ocotol it is more valuable for them to sell these goods than use them. If one of their children needed a backpack, for example, they would rather use an old sack and sell hand-woven bags for money instead. Something I didn't fully realize until I arrived in Nicaragua was how tourist-oriented their trade is. As I was asking for feedback on my designs, assuming them as the self-sufficient consumer, they wanted my feedback instead as a buyer. Their entire cooperative is geared towards foreign tourist groups (usually volunteer groups from the US)

which unfortunately arrive in Nicaragua only two or three times per year. My project shifted once again. This project was still about self sufficiency, but in an entirely different way than I expected. It was now more about building strong and self-sufficient businesses in Nicaragua that can reach larger markets.

Recognizing the potential for economic empowerment, I explored avenues for local entrepreneurship, re-envisioning the backpack design as a catalyst for the growth of artisan cooperatives and sustainable livelihoods in rural Nicaragua.

Concept Refinement



Figures 18 & 19. Refined bag design. Photograph by Anielka Martínez, March 2024.

Taking into consideration the new goal of this project, Anielka and I decided to move forward with a design that was faster and cheaper than the previous design. The new bag, now geared more towards tourists, took less than one fifth of the time and cost to produce. The straps still feature the same braided t-shirt technique.

Conclusions and Future Considerations

In terms of the backpack itself, we concluded that the amount of work and complexity outweighed the appeal and impressiveness of the final design. The women in the Fuente de Pinos have already started weaving new iterations of handbags and backpacks with faster, cheaper designs.

Because this project transitioned to become an economic effort, the next steps in expanding Fuente de Pino's market is to become fair trade certified. This involves making updated packaging and organizing a consistent system of output. Anielka is putting together a catalog. We are also adding designs beyond pine needles (like cloth flowers and volcanoes, jewelry, etc).



Figure 20. Earrings crafted by the Fuente de Pinos, March 2024.



Figure 21. Design for Fuente de Pinos product tags & packaging, by Paige Smith.

I plan to return to Nicaragua every year that I can, and if we are not able to get a shipment to the U.S. before then, I will likely be packing a checked bag full of baskets to bring back and sell to local shops.

While I was writing this paper, Anielka sent me a poignant message: ***“Take advantage of the fact that you can help us. We are very grateful and I hope we can do many more things.”***

In closing, I want to emphasize that countries like Nicaragua, often labeled as “third world”, are frequently approached with pity or seen as needing to be “saved”. However, our culture, while blessed with resources and relative stability, lacks some of the essential qualities found in theirs. Nicaraguans embody happiness, hard work, resourcefulness, talent, and kindness. They do not require saving; rather, they deserve equal opportunities to thrive.

Acknowledgements

I would like to acknowledge Linking Hands for Learning and The Enlace Project, two organizations that have worked tirelessly hand in hand to build over thirteen schools in remote villages of Nicaragua (two of which I was lucky to be a part of: El Carrizo in January 2023, and El Borbollón in February 2024), particularly Jeanine Lupisella, Rob Lupisella, and Enrique Corrales. They give so much time and effort each year not only to make these school builds possible, but also to plan volunteer trips that have changed all of our lives.

I would also like to acknowledge James Myers, Jenny Sullivan & RIT Global, Alex Lobos & The RIT College of Art & Design for providing financial support towards my travel and research in Nicaragua.

Special thanks to all the friends and family who donated towards the school build in El Borbollón, Nicaragua.

Thank you to my friends and translators in Nicaragua - Karina Martínez who connected me with the Fuerte de Pinos weaving cooperative in Ocotal, Anna Yancy Vasquez and the entire Vasquez family for hosting and feeding me for two weeks, and Anielka Martínez who I worked with over several weeks refining this design and who meticulously and enthusiastically worked over 59 hours weaving this product by hand.

Other acknowledgements: Stan Rickel, Lorraine Justice, Kellan Morgan, Bridget Sheehan, Curtis Buchanan, Wayne Sharpe, Kris Dreesen.

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