Recover and Regrow

Toward a Regenerative Fashion Design Future

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Towards a Regenerative Fashion Future.

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Abstract

The current research project follows two overlapping lines of inquiry. The first is a theoretical framework of regenerative design and how we can apply it in the fashion system. I open a dialogue with different practitioners to create a first approach to the fundamental principles of regenerative fashion design. Secondly, it explores the creative potential of developing a design process that can become a regenerative methodology towards a regenerative fashion future over time, practices, and improvements.

The design process I have developed consists of the bio-fabrication of a series of material samples that, in the prototyping process, combines contemporary and vernacular methods such as hand tufting, felting, fermentation, dying, blending, and the experimentation of a bio-composite between short organic wool fibers from the spinning process and bacterial cellulose used as a scaffold in the hand-tufting technique. The goal is to identify how to create fashion within the life system and take advantage of the resources we have at hand. The concept of regenerative design is not only understood as a way of designing but also as a cosmovision of life in which there is no concept of waste, in which it is possible to design with the resources of the environment and nature around in a 0km supply chain where the whole process of creating a garment is done in one place, respecting its natural cycles and enhancing both the community and the regional economy.

In this exploration, I propose to design from closed cycles, create with the resources found in the immediate context and respect the life cycles. By the challenge of using organic materials free of toxic and wasted natural resources, I ensure that at the time of final disposal of the products, the garments can return to the earth as fertilizer to support the further growth of biodiversity. Depending on the context, systemic solutions are proposed rather than just designing new biodegradable and circular objects. The systemic approach does not impose itself on the matter. Still, it presents a collaboration with the matter depending on the matter available in each context and systemic solutions rather than designing from the objects themselves.

This hybrid process, both theoretical and practical, can help us to understand the limits of regenerative design and represents a first approach to the fundamental principles of regenerative fashion design. Thinking about the future, looking to the past, this research proposes zero-kilometer production practices with the ambition of becoming a future methodology that can bring tools to evolve toward a regenerative fashion paradigm.

KEYWORDS: Regenerative design, biocomposites, close-loop system, wool, hand tufting, bacterial cellulose, blended materials, Bio-fabrication, Waste valorization, self-sufficient model, circular design

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"Waste is a design flaw of a deeply ingrained, powerful, financially successful, and exploitative system. In the textile and garment industry, more than a century of development biased toward uniformity, high speed, and lower costs has resulted in one of the most wasteful and exploitative industries on the planet. Every time we purchase a pair of jeans, 15% of the fabric is thrown away before it is constructed, yet the cost of this is included in the retail price. As a result, there are few financial incentives to reduce waste. We are easily seduced by the deeply held human-centric belief that technology will enable us to implement a simple 'drop-in' solution to avoid the more difficult discussions of systems change. The industry is often so buffeted by the convergence of user and business expectations that forging an alternative path is difficult. The future of garments does not lie in one technological solution: it will require fundamental changes to how the industry is organized to enable local, on-demand-waste systems and how we experience fashion in our lives. We will have fewer garments; what we have will be second-hand cycled, regenerative, and produced locally, and designed for multiple, extended cycles of use, and what we don't own, we will borrow or rent. The materials used will be aligned with intended circular reuse, and in some cases, digital fashion will dematerialize the fashion experience entirely. If we are serious about putting waste elimination, circularity, and regeneration at the forefront, our systems, outcomes, and expectations must change. We must weave a new future."

***Dr. McQuillan**, H.L. - TU Delft, Waste is a design Flaw.*

0. Introduc-

Most of us have family stories that mark our lives. The reason why I became a fashion designer is because of my family history. I come from a family where everything was related to the fashion industry. One part of the family had wool factories in Milan, and the other had fashion textile businesses in Paris until the Second World War broke out. They had to escape, emigrating to Latin America where they rebuilt their lives from cero, between Argentina and Uruguay, getting ahead thanks to their knowledge of wool and textiles. The fashion history in my family is a story of resilience. It has always been the means to survive. No matter how often we've had to start over, our knowledge of the industry has always kept us going. I bring this introduction because it is important to tell where I came from and where I am going. While the fashion industry in my family has allowed us to move forward with our lives, the fashion business also has severe consequences.

While I am the fourth generation to carry on this family legacy, I am the first to be academically educated. This brought me a greater global understanding of the behind-the-scenes of the industry in question. When I started my career in Buenos Aires, I did some internships in different fashion brands where I had the opportunity to see with my own eyes all the waste that is generated in the production process, how hundreds of fabric scraps are discarded and buried and how many samples are sent by plane from Asia to South America. Every day, many carbon emissions are released by exchanging goods between continents, and tons of plastic fibers and chemicals come into contact with the soil or the ocean.

My early work experiences, the academy, and my curiosities helped me understand the fashion industry's impact on climate change and the social and economic system. As a result, I discovered how I want to do things and the responsibility I have as a designer when it comes to proposing which methodologies I want to implement, what kind of materials I choose to create with, what kind of garments I produce, and which type of message I want to spread through my work. This is how, gradually, I created a fashion studio named Cumbre. In Studio Cumbre, I am committed to developing sustainable and flexible production methods underpinned by the values of artisanal technique, evolutionary digital design, and holistic sustainability. The brand aims to create functional, versatile, and vital pieces ready to adapt to different body shapes. I understand clothing and sustainability as a living concept, forever evolving. Cumbre is an invitation to question our definition of fashion while celebrating a contemporary and adaptable approach that promises to accompany our body as it transforms throughout our lives. The garments are meant to reach a broad public, embracing inclusion by celebrating different identities and body shapes. While developing this concept, I implement ancestral techniques, representative Latin American artisanal knits, and hand-tufting methods. Eastern and Western modalities are merged to embrace each other in time, focusing on using vernacular pattern-making techniques, such as zero-waste, natural dyes from food waste, and textiles with less environmental impact.

As a student of the master Design for Sustainable Fashion Technology, while I was exploring new perspectives on materials, bio-manufacturing, and a circular design process, I realized that in the last decade, the concept of sustainability has spread to all aspects of our lives. New generations have incorporated this when designing or developing everyday behaviors. Even though this is positive, throughout time, today, this concept may no longer be enough.

The human being has been highly extractive for so long; therefore, more than having a sustainable approach is needed, as it aims to reduce the human beings' footprint but not to restore it. The word sustainability raises the question of what we are trying to sustain: an outdated cultural narrative, an unhealthy conception of the relationship between humanity and nature, and business as usual in a profoundly unequal world. Trying to sustain today's damaged environment over time does not present the most promising future. When we think about improving the impact for a better future, we are required to find alternative ways of interacting with the environment by developing processes to satisfy our needs, not only without destroying the ecosystem but also with the capacity to restore the damage we caused. That said, I do not mean we should dismiss the need for more sustainable practices. On the contrary, we should see them as steps to envision a regenerative system view of life. We need to search for new ways to restore ecosystems, celebrate cultural diversity, initiate a worldview change, and facilitate the transition towards diverse cultures that regenerate vital resources and community resilience and contribute to the health and vitality of nature's life support systems.

Although the emerging term regenerative design has been conceptualized in recent years, several agricultural practices prioritizing soil health, biodiversity, and holistic ecosystem restoration, called permaculture, have been used for hundreds of years. Nevertheless, there are still few theoretical frameworks and case studies of regenerative fashion design. Much of the existing theory remains in agriculture, and it does not cover the practices in the entire production chain of a garment, its environmental and social impact, and its interaction within a system approach. This is why with my theoretical and practical research of a fashion design process, I seek to make a contribution of my case studies and a possible framework so that, through time and further development, it can be transformed into a methodology towards a regenerative fashion design paradigm.

Towards regenerative fashion design future is a contemporary fashion design process and framework that questions how we consume, produce, and discard. It considers the entire cycle of the garments in a context where the fashion system deeply aggravates the environmental crisis.

Given the scenario presented so far, this research starts from the awareness that to change the fashion system, we must understand its processes and impact and thus insert something that the system resists creating. I believe this is the way to disrupt the traditional systems of fashion and capitalism to create a new one that makes the current ones look obsolete.

Figure 1:Studio Cumbre (2022). By the Author.
Figure 2: Studio Cumbre (2022). By the Author.

As the fashion system goes far beyond dressing and is a vast industry that provides jobs, protection, and hundreds of necessary tools that contribute to our daily lives, it is impossible to think that it has to end. A possible improvement might not be to close down the industries affecting us but shift our individualistic vision and start unifying the entire system. In that sense, the turning point would be to see everything interconnected as a weaved reality.

I understand the world crisis as a design problem. For me, the starting point of the design is the proposition that things could be otherwise. In other words, if you believe in design, you believe that things can be changed and are changeable. Capitalism is a design principle that insists that markets are the primary organizers of design; it promotes a kind of design monoculture, which is misrepresented at once as free choice and irresistible necessity. As a designer, I am committed to spreading strategies that can make it possible to articulate decreasing production and consumption chains. This thesis is built from the concatenation of sustainable practices, understanding consumption and discarding as a construct inherent to our society but at the same time as a potential process that, if it is chained, collaborative, and cyclical, can have the ability to transform waste into a resource and also within a period of time could become a regenerative source. As today's fashion industry is principally settled over petroleum and other finite resources, I ask myself if it would be possible to envision it based on biomaterials and regenerative agriculture resources.

Through the proposed design process, I aim to address how to implement practices in the fashion field that emphasize the agricultural process and the system as a whole. Defining in this way, the principles that in the process of making garments could be the most critical to evolve in the future towards a regenerative methodology. To approach this, I try to learn to design like nature, with an alternate relationship between nature and technology through the respect of its natural course. The experience combines contemporary and vernacular methods. I generate proofs from organic wool, create felt with short fibers from the spinning process, and use bacterial cellulose as a scaffold, applying it in the hand tufting technique.

This is why I intended to think about how to redesign the fragmented production methods of the current system, how to create a systemic technique that avoids the consumption of chemicals in the production of garments, how to create a product within an ecosystem in which the materials and the entire production chain are local and self-sufficient, and how to assemble garments that can go to the soil in their final phase without harming it and even contributing to its restoration. The final goal, if these types of considerations were implemented on a large scale, would be to bring new jobs in the industry that encourage the efficient use of regional waste streams as new resources for production, collaborate, and help local producers to get a reasonable price for the raw materials and biomaterials they grow, increase resilience by increasing self-sufficiency, reduce dependence on costly imports, and contribute to the effort to rapidly reduce greenhouse gas emissions by reducing the transportation of raw materials and finished products.

It is clear that to think about a regenerative fashion future, we will first need changes at different levels and in different parts of the system, from big brands to emerging designers and innovators, from policymakers to citizens and educators. I understand that creating and realizing a vision of a regenerative future will take many years. However, I still believe that opening dialogue with different experts and creating both theoretical frameworks and design processes can help this emerging issue to move from extractive approaches that deplete, deforest, and degrade to regenerative ones to rethink, restore and replenish, to transition from the current fragmented system to a new systemic and regenerative paradigm.

This thesis presents the first phase of a design process, some textile samples, and a summary of the empirical research conclusion. Still, I will need more sample trials and practice improvements for it to become a future methodology. The regenerative design might take years to reach goals because regenerative design not only has an impact on a particular industry but also on the environment, culture, economy, and politics. Because regenerative design exists, the systemic and everything is interrelated.

The broad parameters of the research questions and the main objectives are clearly defined
at the start. I deep into the problem in question to focus on a specific problem within this macro industry, but at the same time, the purpose of its solution can have a systemic impact. The Research methodology is where I explain how the practice is implemented in the design process.

The historical and conceptual research is named "The toxic industry." Chapter 1, the context, is divided into two subheadings: "Dirty Design" and "An extra shot tool, circularity as a path to reach a regenerative practice." In this sub-chapter, I will explain what is happening in the fashion field today and its impact. After this, I bring a glimmer of hope while introducing the second chapter, "Towards a Regenerative Fashion design paradigm," where I reference regenerative practices. After this, in the following stage, I explain the term regenerative design and three projects interrelated under the subheading: "A gap in the emerging design." During this research, you will also find a summary diagram of conversations with professionals from different backgrounds.

The third chapter is "Studio Cumbre as the context towards a regenerative fashion design process." In this instance, you will be introduced to the practical part of this research. This phase is rooted in my personal project, Studio Cumbre, where I create garments consciously and sustainably. I explore the perceptual qualities of different materials from the practices I am linked to. I undertake this design process to investigate new blends and collaborations to move toward a profitable future. In this section, you will go into the sub-chapters, which are detailed step by step, and reach some initial conclusions.

Following this part comes chapter 4: "An approach to the main principles of regenerative fashion design," Where I expose, as a result of my investigation, both practical and theoretical, what I consider to be the main principles of regenerative fashion design.

Subsequently, we go through a possible business model for this proposal. To give a partial summary of the design process, you will find the last chapter, "In a time of transition," where this work's conclusions appear. In the end, you can also see the bibliography and the appendix with the dialogues of the conversations I experienced with the experts and further technical data.

0.1. Formulating a Research question

Fashion is a highly complex and global industry. It is also one of the best – or in this case, worst – examples of the damage that an extractive, linear economy causes to both people and the planet, creating vast volumes of waste, pollution, and exploitation. It is a system that needs radical rethinking to make it fit for a regenerative future in which we address the intertwined challenges of climate change, environmental degradation, and inequality.

Working towards a regenerative future might be a challenge in the upcoming years. It requires significant shifts within the system as a whole. We must keep thinking about the purpose of fashion and its relationships with citizens, producers, governments, and workers. We should rethink how the industry works, what, how, and where it could produce, and how garments will be used. We need to reshape the relationship between our clothing and nature.

Daniel Wahl, in his book "Designing Regenerative cultures," mentions that Bill Reed's graphic helped him understand sustainability differently by showing that as we move towards a sustainable system, our behavior is a little less harmful but still has a negative impact and does not pay back or restore the damage we have already done. (Wahl, D. Designing Regenerative cultures. 2016. P. 84) That is why the idea of moving beyond sustainable design to regenerative design is fundamental in the movement towards a sustainable culture.

Taking all these considerations into account, could I develop garments that are non-toxic when discarded? Could I create a collaborative practice in which I move from globalized to local and collaborative manufacturing? And could bio-fabricated processes within fashion transform my working methods leading towards a 'resilient and regenerative fashion design future? These questions became the starting point for this research project.

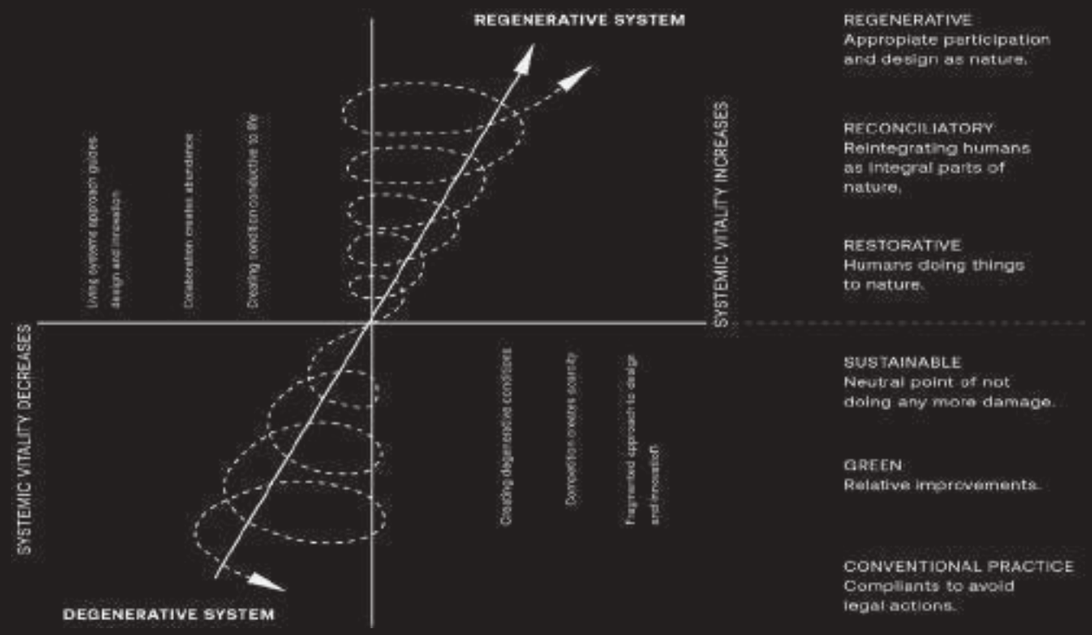


Figure 5: Wahl, D. The regenerative design Framework - Source: Designing Regenerative cultures (2016)

0.2 Research Methodology

This Practice-based research was carried out by making a wide range of textile samples. The raw materials used to make these samples are three: short staple fibers (that nowadays are wasted), wool from wool dreamers' production, and bacterial cellulose in the pulp state. The methods I experimented with from these feedstocks to produce the samples are felting of the discarded short fibers, hand tufting techniques with the embroidery gun, and a bio composite of bacterial cellulose applying the bio-fabrication technique. A detailed record and a technical file of each sample are attached in the appendix. Together, these samples represent the core of my research on material and form and serve as a mode to collect data, evaluate results, nourish further experimentations, and as a tool of reference for a future regenerative methodology.

All these resources are produced in Wool Dreamers Farm (@wooldreamers). Some of them are waste, while others result from farm production. However, they are not used to producing garments on the farm yet.

These short fibers are waste left over from the production chain in the wool carding process, but the farm does not know how to absorb it. It is a waste that is paid to go to landfill. I work on this material to make a felt. Felt is produced by pressing these fibers through heat, humidity, and pressure. I kneaded it until the fibers were compressed with each other. As it is a 100% natural composition, it can be subjected to be dyed with any natural dye.

The hand tufting technique is an alternative method to work natural wool yarns. This technique is familiar because I implement it in my studio and for Ramon, as his family used to produce rugs with wool from the farm. This is why I decided to work with it. To work with this technique, apart from using yarn, I need a frame, a base of textile (in this case, we use a piece of fabric that they use in the harvesting supply chain), a hand tufting gun, and a kind of glue to finish the pieces.

As in the hand-tufting technique a type of glue is needed, I decided to explore Bio-composites. Bio-composites or green composites are fully degradable composites made up of a bio-polymer and natural fibers as reinforcing faces. In this case, I decided to work with bacterial cellulose, mix it with a multiprocessor gadget, and spread it in a pulp state. To make the samples, I worked closely with Lara Campos, an expert in biomaterials. Not only did I rely on her technical knowledge of how to work with bacterial cellulose, but I also valued her knowledge and was receptive to her suggestions.

Figure 6: Felting Short wool fibers.

Figure 7: Bacterial celullose, from scoby to pulp.

Figure 9: Hand-tufting process.- By the author.

Figure 10: Bacterial cellulose pulp tests with mica mineral.- By the author

Figure 12: Framing samples. - By the author

Figure 11: Bacterial cellulose pulp as scaffold.- By the author

The Toxic Industry

1.

1. The Toxic Industry

The textile field is the fourth most stressed industry in terms of raw material and water use, after housing, agriculture, and transportation, and the fifth in terms of greenhouse gas emissions (Janssen, R. 2019). About 60% of its feedstock comes from finite resources such as petroleum and other fossil fuels (N. Bruce, 2016). As the UN warned in 2019, the textile business is the second most polluting sector in the world in several areas, after the oil industry. All these statistics allow us to understand the emergency of incorporating alternative practices in this industry to continue preserving the ecosystem.

Every day, an incense quantity of goods goes around the sea, air, and land. In an over-globalized world, we exchange goods regardless of distance, and nothing stops us from trading. We don´t even stop asking ourselves about its environmental cost or whether the local industry could help reduce the exchange. Societies are also victims of the excessively globalized world and the savage economic crisis it has produced. As Jason Hickel says, "The problem with economic growth is not just that we may run out of resources at some point. The problem is that it progressively degrades the integrity of ecosystems" (Hickel, J. 2020).

Fashion is a remarkable example of a «take-make-waste» industry, in which resources are used to manufacture rarely used products and eventually thrown away. It is a linear, fragmented one-way model considered the main contributor to a large amount of waste generation (Ghisellini et al., 2016). Linear economies are known for increasing resource scarcity, making resources price more volatile and degrading products and materials' value while polluting the environment. Of all the materials used to make clothing, 87% end up in landfills or are burned (Textile Exchange Report, 2022), and only a tiny percentage of those recycled made it into new clothing.
"The resources used to produce clothing and accessories, the materials, energy, and creative ideas that went into their marketing are simply lost forever" (Ellen McArthur Foundation, Circular Design fashion, 2021).

It is common knowledge that every industry produces waste. No matter how much we work under ethical terms, fair labor, and organic origins, there are particular discards in the production chains that are almost impossible to prevent. For many companies, this waste not only generates a negative environmental impact but also implies a cost. Today, companies pay for this waste to go to landfill.

Although the fashion industry is not the only one responsible for the damage, discarding, and overproduction, it is very influential since this industry involves all humans. As the fashion industry is a cultural construct (We are the only species that wear clothes) shaped by economic and cultural processes driven by the market of desire, supply, and demand, it is closely linked to systems of consumption and economic growth based on rapid product obsolescence and runaway production that leaves permanent traces. Through land degradation, the use of natural ecosystems for the production of raw materials, and the pollution of waterways, the industry contributes significantly to biodiversity loss (Granskog, A., 2020). "Since the environmental and social impact of fashion activity began to be examined in the early 1990s, understanding of the problem has consolidated around two things: the urgency of change and the global impact of the fashion industry" (Buckley, Ch. & Clark, H, 2017). Although we are aware of the presented problems, we sometimes neglect the idea that all the damage is caused by how we live our lives. All of these factors are generally analyzed individually, rather than understanding that they are a consequence of a more significant problem and that the way to look for positive impact alternatives might be related to recognizing that all of the factors are part of a unified system. ¨As the twenty-first century unfolds, it is becoming more evident that the significant problems of our time – energy, the environment, climate change, food security, and financial security – cannot be understood in isolation. They are systemic problems, meaning they are all interconnected and interdependent. There are solutions to the major problems, but they require a radical shift in our perceptions, thinking, and values¨ (Capra, F. and Luisi, P.L, 2019).

Figure 13: Global goods trade flow mapping (2015).

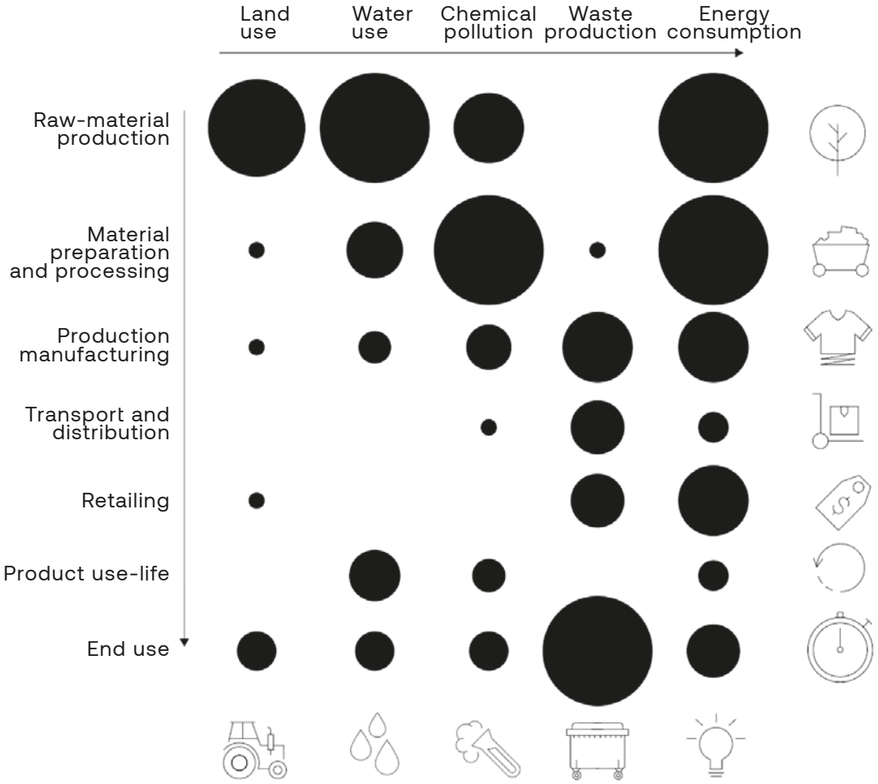


Figure 14: Relative impact on bio-diversity along the aparel value chain - Source: McKinsey analysis.

1.1. Dirty Design

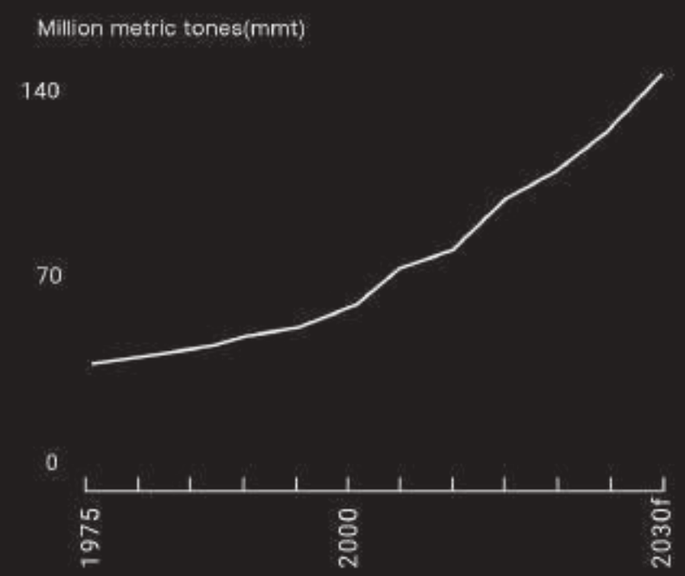
As I mentioned before, as a designer I have the conviction that things could be otherwise. The above evidence led me to reflect on my responsibility as a citizen and from a professional point of view. During the last decades, designers have mainly designed products that are disposable after being used. Design is how our worldview and value systems are expressed in the material culture through the products and processes we create. Design decisions made in the past - such as the clothes we wear and how we produce them -in turn- shape our values. Design is a conversation through which different perspectives are integrated into culturally creative action.

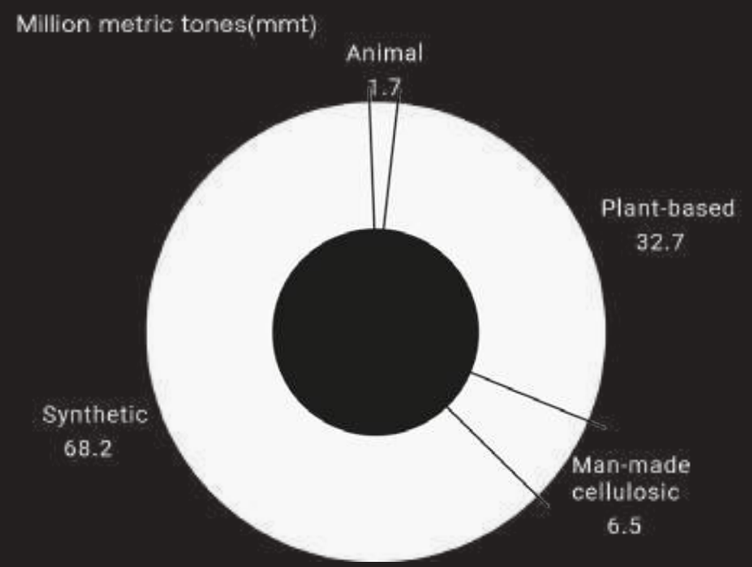
I want to introduce the term Dirty Design, a way of referring to products on the market that we don't know their origin, who made them, or even the components they are made from. Things are not what they seem; they pose, hide behind the surface, and pretend to be something they are not, and there is often a discrepancy between how they look and what they are. Garments with an almost perfect finish have a doubtful source, a price tag that gives rise to doubt, and possibly contain chemicals that poison the earth and take years to degrade.

In the book "Fashion Design in Conservative Times," the designer, Marjanne van Helvert, mentions that ¨we may wonder who wore our second-hand dress before. Still, a new T-shirt doesn't remind us of all the individual hands of the Bangladeshi workshop workers it passed through, or the weeks it was packed in a container at sea. Our cell phone doesn't seem to have had a life before it arrived in a box at our house as if it wasn't made of oil and metals, as if it never went through a conveyor belt in China. These objects function in the capitalist system; they have an ideological dimension concerning how we are supposed to consume, buy, use, and discard them¨ (Van Helvert, M. Fashion Design in Conservative Times. 2021. P.6).

Nowadays, the linear way products are produced is also troublesome, as this is a production system where only the economy is prioritized. Under this idiosyncrasy in which we design for what we want the users to consume, we instill fictitious needs; we design what the consumer will want. If this weren't enough, lately, these production industries have increased their volumes, thanks to the prospective design methodology. With data collection, it is possible to predict consumer trends and manufacture products in a brief period without having a record of how, what, and by whom it is managed. A predictive production and consumption model. The steps are fragmented and thought of individually in this whole chain. An excellent example, in this case, would be Shein. The company improved the ultra-fast fashion model by leveraging actual time retail, quickly turning fashion trends into clothes. This kind of model contributes to savage economic growth and ignores the damages.

Transforming our production and consumption systems can be a creative design challenge that requires a systematic view. Thus, I question how to trust production systems and have a record of the material being used, reduce production flows, embrace fair labor, control how it is produced, and become seriously aware of how we can stop creating and promoting dirty design.





1.2. An Extra shot Tool

While we move towards the awareness of what we call dirty design, methods are being developed to help us designers reflect on and improve the objects we bring to market.

Circular design can broaden our vision, drive our creativity and create a more resilient and thriving fashion industry. Circular design is a practice based on the principles of circular economy and systems thinking. The circular economy is a systemic framework that empowers people to address global challenges, including climate change, biodiversity loss, waste, and pollution. It relies on three principles, all driven by design: eliminate waste and pollution, circulate products and materials, and regenerate nature. In this model, nothing becomes waste, and everything has value. These circular models can be a tool that approaches us toward regenerative practices. It is resilient, distributed, diverse, and inclusive.

"Circular design is underpinned by a transition to renewable energy and materials. A circular economy decouples economic activity from the consumption of finite resources. It is a resilient system that is good for businesses, people, and the environment. The circular economy gives us the tools to tackle climate change and biodiversity loss together while addressing important social needs. It gives us the power to grow prosperity, jobs, and resilience while cutting greenhouse gas emissions, waste, and pollution¨ (Ellen McArthur Foundation, 2021).

The first principle of the circular economy is to eliminate waste and pollution. Currently, our economy works in a take-make-waste system. We take raw materials from the Earth, make products from them, and eventually throw them away as waste. Much of this waste ends up in landfills or incinerators and is lost. This system can not work in the long term because the resources on our planet are finite. There is no waste in nature. When a leaf falls from a tree, it feeds the forest. For billions of years, natural systems have regenerated themselves. Waste is a human invention. Although it sometimes seems like waste is inevitable in certain situations, waste is actually the result of design choices. Indeed, waste optimization practices have been commonly used in the field for decades. Suppose we combine these traditions with the ability to design from a zero-waste point of view. In that case, we could enhance both practices, eliminate the concept of waste, and work towards environmental restoration.

Within the design, infinite factors can be considered to improve the industry and the products. It is essential that when approaching these principles, think beyond fashion, think holistically, and understand that everyone is part of the ecosystem. If the design approach is from a consequence, if the creation considers the region in which it is immersed, it materializes solutions. "Waste and pollution are not accidents, but the consequences of decisions made at the design phase, where about 80% of environmental impacts are determined." (Ellen McArthur Foundation, 2021). This is why It is crucial to perceive the system as a weft and interact with the environment to produce with and not for it.

Taking this concept into everyday life brings me to imagine a model that intends to redefine waste, circulate materials and take into account their regeneration. A weft where waste that some industries need to eliminate can be a resource for others. Humans biologically consume and discard, but scrap is a consequence of decisions made in the design phase. If waste is considered a design tool, there is a possibility to change the perspective from the design perspective. ¨A circular economic model has been proposed to keep products and materials valuable, minimize waste generation, fight against resource scarcity and reduce our footprint on nature¨ (Ellen McArthur Foundation, 2013; Ghisellini et al., 2016). Inspired by natural cycles, the circular economy aims to close the loop of industrial material flows by using waste as a source to produce new products and services.

¨In this vision of a sustainable industrial society, all products, materials, and wastes will be either biological or technical nutrients. Biological nutrients will be designed to re-enter ecological cycles to be consumed by microorganisms and other creatures in the soil¨ (Capra, F. and Luisi, P.L,2019).

Adopting the three principles of the circular economy makes it possible to move from the throw-away mentality that has dominated much of our culture towards a regenerative future. There is a gap to reshape the way design is perceived and start creating with resource optimization in mind. By pursuing a regenerative alternative, it might be possible to reorient the current fashion industry into a solution instead of a problem and restore it not only for the present but also for future generations. As Daniel Wahl, in his book "Designing for regenerative cultures," highlights that ¨If we engage in creating circular regionally focused biomaterials economies — carefully adapted to the bio-cultural uniqueness of place — we can begin to regenerate the damage we have done by learning how to live well within planetary boundaries¨. (Daniel Wahl, 2017 p.43)

Toward a Regenerative Fashion Design Paradigm

2.

2.1. A Revitalizing alternative

The third step in the circular economy principles is to regenerate, but what exactly does this refer to? Regenerative productive practices might be an alternative solution for restoring the planet. ¨Originally, these practices can strengthen the soil, help combat climate change through carbon sequestration, increase water quality and biodiversity, and improve ecosystem resilience. The regenerative mindset focuses on achieving positive outcomes rather than simply doing less harm, matches the rhythm of nature, and establishes a supportive relationship with ecological systems and future economic growth¨ (Ellen MacArthur Foundation, 2017).

The regenerative capacity of natural systems has been severely affected by human action, and there is an urgent need to restore, renew and revitalize ecosystems to think of a brighter future. One possible solution to rebuild the damage already done is a regenerative and restorative land use in agriculture, which combines conservation and rehabilitation practices to foster resilience and improve ecosystem health.

"Most practices based on a regenerative approach come from agriculture. Industrial agriculture originated in the 1960s when petrochemical companies introduced new methods of intensive chemical farming. But a few decades later, the dark side of chemical farming became painfully evident. The long-term effects of excessive chemical agriculture have been disastrous for soil and human health, our social relationships, and for the natural environment. However, agroecology can be a small part of a more sustainable alternative" (Capra, F. and Luisi, P.L,2019).

Agroecology is based on farmers farming organically, using technologies settled on ecological knowledge rather than chemistry or genetic engineering to increase yields, control pests, and improve soil fertility. Instead of chemical fertilizers, these farmers enrich their fields with manure and tilled crop residues, thus returning organic matter to the soil to re-enter the biological cycle. Organic farming is sustainable because it embodies the ecological principles that evolution has tested over billions of years. Fertile soil is living soil that contains billions of living organisms.

If it is understood that humans are part of nature and that it is necessary to co-create with nature and not exploit it, we can implement specific practices to restore it. Instead of perceiving the system as fragmented into different units that work separately under centralized thinking, it is possible to change the point of view and understand the system as a whole and that the role of design is to bring improvements to the entirety and not to the part. These practices focus on rethinking how we design and build the environment to improve societal resilience, restore the planet's health, and regenerate ecological systems. Instead of starting the designing process from an anthropocentric viewpoint that leads to the depletion of our underlying life support systems, we can start from a multi-species approach where human and non-human species cohabit holistically. Regenerative practices act under a change of consciousness; in a social system, looking at the weft of interactions. As Daniel Wahl pinpoints, ¨To shift in time, we need to be more sustainable, engage in widespread ecosystem restoration, reconcile nature and culture and change the guiding cultural narrative about who we are and what we are here for¨ (Daniel Wahl, 2017 p.40).

In this contemporary World, we can do more than learn from nature; we have the knowledge, capacity, and technology to design with nature to maintain ecosystem integrity, nurture systemic health, and strengthen the planetary life support system on which we depend.

2.2. Regenerative Design

After clarifying what regenerative practices are, I will introduce from now on the term ¨Regenerative Design¨. I first heard of it from Ellen McArthur Foundation, which refers to ¨A process-oriented whole systems approach to design. The term "regenerative" describes processes that restore, renew or revitalize their own sources of energy and materials. The regenerative design uses whole systems thinking to create resilient and equitable systems that integrate the needs of society with the integrity of nature¨ (Ellen McArthur Foundation, 2021).

Considering the different characteristics of regenerative practices, I have the intention to design towards a regenerative fashion future. If we design regeneratively, we can try to promote fashion that not only improves the current industry but also restores the environment and repairs past mistakes. Nowadays, we have the dimension and awareness of how we must reorient ourselves to detoxify our planet; it is only a matter of building with these regenerative parameters in mind. In this sense, I think the existing fragmented system can be restructured into a weaving one.

I imagine a unified kilometer zero production methodology, which is local but at the same time applies globalized knowledge. This means that all the steps that a supply chain includes while creating a garment are made in the same place, with local resources (raw materials are produced or supplied from nature), co-creating with the environment and not only without damaging it but also helping it to enrich the composition of the soil by giving back to landfills bacteria microorganisms and natural compositions which can be biodegradable without the use of toxic chemicals. By implementing advanced technology from open-source knowledge, we can equip the farms with additional tools to help close the loop. This also benefits the sense of community by creating local weft technology where citizens can build and share the same machines and unify knowledge to optimize different supply chains. An example of how to empower regional economies. With this self-sufficient production chain, we can reduce international exchanges of goods, thus significantly reducing our carbon footprint. We can have a transparent production chain and know the community behind each step. We can produce with resources offered by the ecosystem. We can avoid the dirty composition of products that pollute the earth when they reach landfills. We can reconnect with the local community and provide job offers where people can apply their legacy knowledge of the region. We can slow down the flow while contributing to the growth of the regional economy.
Furthermore, suppose that we know about working with bio-fabrication. In that case, we can eliminate the concept of scrap and propose a zero-waste design technique that can enable us to transform waste into a new material by creating bio-composites. By understanding the cosmovision of the world as an interrelated system in which we are part of a weft and live within living systems, fashion can be enhanced as a regenerative design practice supported by the social system and a collaborative methodology to create with and within nature.

Carole Collet, Professor in Design for Sustainable Futures, in conversation with WGSN, asserts that "Currently, the way we design today only starts from natural resources. In contrast, in regenerative design, the product results from a restorative process. In this way, the focus is on benefiting the soil, climate, biodiversity, and people. Work is done locally." The key point becomes investing in the land, replanting seeds, restoring biodiversity, and the waste generated from this is reused in a new product or perhaps in another industry. Thus the products created by these practices are the consequence of restoring the land and biodiversity and not the leading actor in the production ecosystem.

Regenerative fashion appears as a possibility to continue producing garments but in a way that can repair the environment despite being immersed in this capitalist world. I believe that within fashion, we can make an outstanding contribution, narrow down the main principles of regenerative fashion design and create design methodologies to design within the planet earth's boundaries.

Having a vision from the weft, I propose to design from closed-loop cycles, create with the resources that are in the immediate context, take care of the cycles that maintain the essential functions of the ecosystem, and use both organic and wasted resources to be sure about that the final disposal of the products will come back to the soil as fertilizer to support further biological growth.

In the design process, I experiment with knowing the material, where it comes from, how it behaves, and how it can be joined with new materials to give it a new function and aesthetic. I find new ways of connecting between what grows in the environment (matter) and the tools (technology) to manipulate and shape. For a regenerative future, I seek to dialogue with the matter, explore what can be done, how to treat it, where it comes from, and how and with what tools and machines it reacts, without leaving Aesthetics aside.

2.3. A gap in the Emerging Design

In this section, I will introduce four projects that, in a way or another, establish a dialogue with this thesis. This chapter gathers Regenerative practices and Regenerative design within fashion. The projects presented helped me to understand the existing references in the field, analyze them and even establish alliances to collaborate, looking forward to increasing the frameworks of the area. As regenerative design practices are still emerging, there is a gap in the field, making it difficult to find specific fashion references. Moreover, as the boundaries of this topic are highly extensive, I bring, as examples, professionals who work with regenerative practices and a platform that connects and educates for a regenerative future. Lastly, I introduce a model of a designer who works with bio-fabrications using bacterial cellulose.

The first practice to be introduced is also one of the main collaborators for the ideation of this project. To know more about this practice, in the Appendix is attached the text "0km bridge, a conversation with Wool Dreamers".

Ramon is a third-generation wool farmer. Although his work has always dealt with the wool business, his priority is the welfare of the field, his sheep and the small environment that sustains and regenerates from generation to generation. This is why he created "Wool Dreamers," where he applies permaculture practices in the field, preserves land for its fortification, and uses ancestral techniques to maintain a self-sufficient structure. Ramon also collaborates with other small neighboring producers from the village community, offering them the possibility of doing the whole process involved in spinning yarns on his farm. Instead of going by transport to England to shear their sheep and goats, spin the yarn and return. Ramon also offers them to bring him the wool; depending on the request, they will clean it and make the yarn. The most important of this service provided by wool dreamers is that they ensure the whole traceability of the process. As he highlights, ¨Yarn processing is an art¨. This is why he looks for all possible mixtures to find marbled, uniform, and gradient effects, mixing yarns in different colors from natural dyes. On this farm, he works with biomass energy and provides jobs for locals. The mission of Wool Dreamers is to vindicate the proximity business and to change the textile industry, which synthetics, artificial, and remoteness, for the opposite have always marked. A natural, authentic, and close market. From Sheep to the user's hands. They work with a 0km supply chain, and natural practices, embrace local communities and create within nature. Although they have assembled the entire raw material chain, they would like to produce not only yarns but also complete knitted garments. They would like to collaborate with designers who can promote using their raw materials by creating km0 and transparent fashion production. Ramon and his brand Wool Dreamers is an excellent example of how to implement regenerative practices and turn them into a business.

The Second practice to be introduced is the Farmlab of Silvia Brandy. In the appendix, there is also a conversation where she explains in detail the Farmlab, a farm that combines the knowledge of the farmers with advanced technology. She is also a great example to re-think the future of the industry. Silvia introduced regenerative practices in her daily life and managed to profit with them while still preserving nature and co-creating within it. The Farm-Lab comes with the idea of bringing to the farm the logic of the Fablabs to solve problems of the countryside with the help of digital technology, but not with an orientation towards technology as a solution to all situations, but thinking on applying it when it is needed. This goes hand in hand with the circular economy and the Km 0 courses. In the Farmlab, they Experiment and think about what can be done with all the resources at hand, especially with the wool. This is why they started to set up a Fablab and to think about how a small farm could produce machines to process wool in all its steps. This allowed them to go from throwing wool away (as hundreds of farmers do) to recognize it as a resource that has value and that should not be wasted. Nowadays, all the production process that the wool needs is done on her farm. From this project, they proved that it is possible to carry out projects that take advantage of the resources at Km 0.
In Farmlab, they are thinking about the next phase of this project, which involves developing garments with their wool in a process completely Km 0.

Silvia explains, "The countryside is full of logics that are sometimes discovered in the city as a great novelty, but that in the countryside have always been so. Logics of self-sufficiency and circular economy have always been so in the countryside¨.

The Farmlab is an outstanding project that applies the basis of regeneration, looking forward to designing garments in the future. This is as much about an honest exchange between humans and nature as it is about the reactivation of human communities at the local level.

As Daniel Wahl pinpoints: ¨The only way to safeguard the privilege of abundance is to share it collaboratively with all of humanity and all of life. Our individual and collective success depends on this integration through collaboration and empathy¨. (Daniel Wahl, 2017 p. 463)

This project is finding its expression in integrating human diversity, global awareness, and contributing to nature. It is a great example that proposes a possible solution for systemic problems. It's one of the few examples I could find to exemplify a project toward a regenerative fashion future.

Another project worth mentioning regarding regenerative practices is Fibershed, a digital platform that connects farmers working with regenerative practices and designers. This platform is based in California, and they work to decentralize natural fiber and dye processes to strengthen economic opportunities for a diaspora of Fibershed communities. Their practice connects and empowers grassroots stakeholders from soil to skin, providing precise engineering and financial technical assistance to attract the funding required to build local ownership

of manufacturing systems that supply increased opportunities for building prosperity in rural communities.

Fibershed promotes regional fiber initiatives, producer networks, and a cooperative marketplace. They offer a fiber certification, a verification program that gives farmers direct technical and financial support for implementing carbon farming. Furthermore, they have an educational program where they spread knowledge about carbon farming in their local community and expand broad awareness of how fibers and dye-producing landscapes can restore balance to the earth's climate, build resilience to drought, and increase agricultural productivity naturally. In the platform, it is possible to find a producer directory,

Fibershed is a non-tangible reference that works to improve the system and embrace regenerative education. This is also a way of working towards a regenerative fashion future because to help people understand how to consume, produce and discard, it is necessary to spread the knowledge on how to do it.

The last reference I would like to introduce is Suzanne Lee from BioCouture. Suzanne is one of the pioneers in working with bacterial cellulose. This material can be grown in any container and be used to create a wide variety of biodegradable household items and fashion accessories. Microbial cellulose is an efficient material. From a single production method, at least three direct products can be obtained: a health drink, a food product, and, potentially, a 'plant' material. Suzanne is building an open innovation resource to enable collaboration within the global biological materials community to advance innovations never imagined. Biocouture, her business, envisions future manufacturing systems that inevitably consist of bio-designed living organisms. Suzanne is experimenting with new materials and understanding how to manufacture a raw material self-.

I find a unique opportunity to have the ability to self-supply materials and make them grow to use them in a design process. Suzanne also stands out on the importance of developing biobased and biodegradable materials when we design new products. The concept of self-manufacturing might be a key concept for designers to adopt towards a regenerative paradigm. As I have already mentioned, it is essential to think about an alternative production process, to design with whatever we have at hand, to know the materials we work with, and to be able to self-supply the manufacturing process, thus maintaining zero-kilometer productions.

These cases show that methodologies can be implemented to solve problems that regenerative design can solve in the future. With the zero-kilometer method, the origin and materiality are known; the raw materials do not go from here to there and are designed locally. Actions are applied such as:

- The creation of self-sufficient methods for the supply of natural raw materials.
- Creation of zero-kilometer products
- Collaboration with local communities,
Information sharing and open-source education
-Application of advanced technology,

As Daniel Wahl mentions: ¨In the process of global-local collaboration in regionally focused and locally implemented regenerative development, we are facing the needs of people through elegant solutions that pay attention to the story of place, and local ecosystems¨ (Daniel Wahl, 2016,p.246)

Thanks to these references, I can dimension that this future is not that far. The union of all these facts can help to solve systemic problems and that it is possible to design from regenerative practices. They are pioneering contributions to advance toward a future paradigm of regenerative fashion.

Creation of self-sufficient methods for the supply of natural raw materials.

Creation of 0Km products.

Collaboration with local communities, Information sharing and open-source education.

Application of advanced technology.

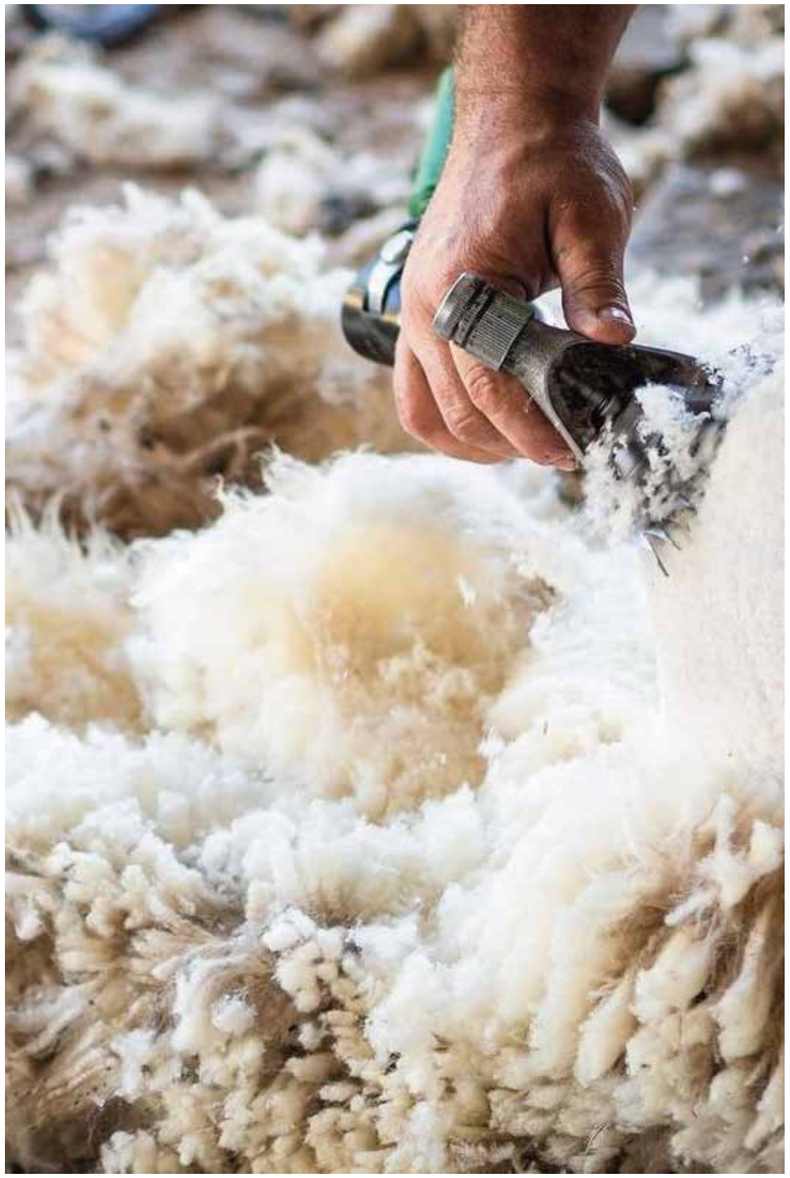


Figure 17: Wool Dreamers. Source: Wool Dreamers
Figure 18:Wool Dreamers short fibers. Source: Wool Dreamers

Figure 22: Fibershed platform. Source: Fibershed

Figure 23: Suzanne Lee - Eco textile fashion.

In Conversation With:

Andrea Saltzman

Silvia Brandi

Wool Dreamers

Lara Campos

Federico Scidá

Leila Tanus

Bioma Kombucha

Gema Gomez

Before moving on to the next section, I delve into a set of dialogues with professionals from diverse fields to reflect on contemporary fashion design and identify significant factors to create a regenerative design methodology.

"Any activity that involves a community, a business, or an entire region in an open dialogue aiming to envision a more desirable future is the beginning of a design conversation that has the potential to become culturally transformative. " (Daniel Wahl, 2015, p.318)

For the initial formulation of my design process, I seek an idealistic, creative, poetic, aesthetic, ethical, intuitive, and imaginative vision. The creative process has to be inclusive, collaborative, non-dogmatic, and participatory. The design conversations that are part of this process invite me to listen to multiple perspectives value the contribution of diverse points of view, and co-create a common ground from which we can move forward together with mutual understanding and respect.

¨The mere act of engaging in transition design conversations with others is culturally creative. By learning from multiple perspectives, we learn to co-create a deeper systemic understanding. We begin to co-design our future together and thereby contributes to the emergence of regenerative cultures." (Daniel Wahl, 2015, p.325)

grow process is with the least interaction of humans

bacterial cellulose

Suzanne Lee

biofabrication

mentor of Daniel Wahl

cosmovisión from the weft

weft/collaboration

Andrea Saltzman

design from consecuenses not products

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kombucha pulp recipes

Bioma Kombucha

biomaterials

Lara campos

Capra, system view of life

open source knowledge

advanced technology

waste do not exist in nature

cellulose can not do any harm when degraded

Bacteria, fungi, biodegradable facilitators

local exsisting materials

Networking

Silvia Brandi

contemporary and vernacular practices

Federico Scida

farm and city dialogue

farmlab

works with wool end loop

local and collaborative practices

0km supply chain

Fibershed

permaculture practices

Everything that comes from nature can go to it

deign with responsability

empower local comunitiy

Gema gomez

garments and interactions

zero pattern making

local design

Leila Tanus

artesanal zero waste knitting

Ramon Wool dreamers

design for longevity

body diversity

works with wool till the yarn

Studio Cumbre

first family business in the wool field with rugs

3.

Studio Cumbre: Toward a Regenerative Fashion Design Process.

3.1. Envisioning a Purpose

On the one hand, this research has been guided by the study of regenerative design principles. On the other hand, it is based on how to make Cumbre; my design studio can become regenerative garments in the future.

By contrasting these two approaches to design, material and manufacturing, I consider the material and fabrication, the implications of a hybrid practice that combines intuitive exploration to create new materialities. Still, at the same time, as a tangible business scaled in today's market, these methodologies will need to evolve to be put into practice.

The practice seeks to apply a bio-manufacturing process and understand the materials' behaviors and the relationship between process variables and results.

In my experience as a fashion designer, I always look for design strategies to encourage the reduction of consumption and environmental impact and reduce overproduction and waste. With my studio, Cumbre, I explore inclusive and versatile design by changing how we think about clothing through adjustable garments that fit most body types, redefining how we dress and perceive fashion. The expertise field is hand-tufting knitting pieces. I work with raw materials of natural origin and techniques such as zero-waste pattern-making and hand-tufting. Scarcity is at the core of the business model.

In this experimentation, I seek to find tools that help me to transform Cumbre's fabrication practices into regenerative design practices. When moving the studio from Argentina to Spain, while looking for materials and suppliers for the manufacturing side, I realized that it is almost impossible to find 100% local raw material, not even mention a 0km supply chain. This is why I decided to create new materials and labor that can be found in the same place, supplied by the tangible resources of the area's ecosystem, and have self-sufficient characteristics.

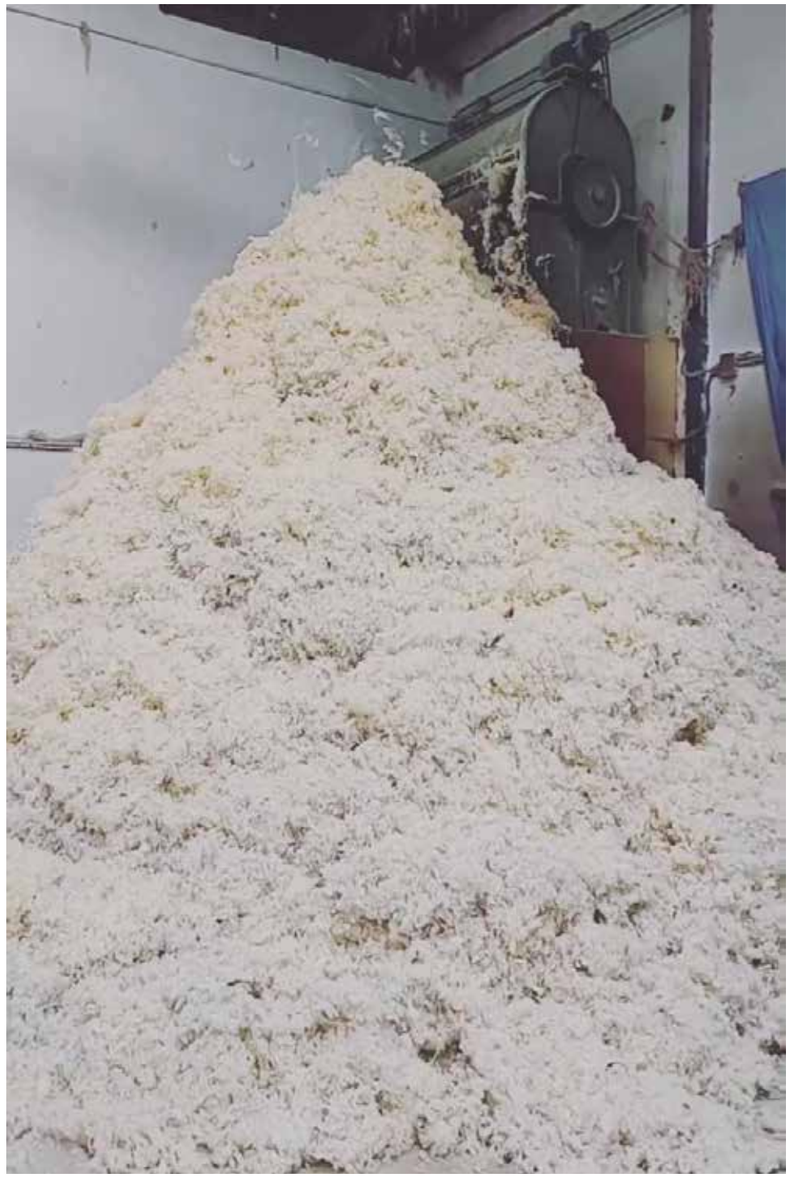


Figure 25: Wool Dreamers production Source: Wool Dreamers.

3.2. A Mindset Tipping point

The first step to immersing myself in this experimental journey was to dialogue with professionals from different backgrounds and look for existing theoretical information. This is how I contacted Ramon's farm, Wool Dreamers (See appendix: A 0 km bridge). By getting to know this ecosystem more closely and analyzing what relationships they establish in their work process (with themselves and with the environment), I understood what kind of lineages they are embracing or strengthening and what can be improved or eliminated within the processes. Moreover, I could classify what things could be disregarded for creating a new chain. Two of the most important notes that stood out in their production system were: on the one hand, the need to shear the sheep to preserve their well-being and, on the other hand, the need to discard short fibers that do not have a second use but end up directly in a landfill, which is also a high cost in the entire chain, since they must pay for generating waste, no matter how organic it is.

At the same time as I got these first insights, I had a conversation with Andrea Saltzman (See appendix: The cosmovision of the weft), who, through her last book, led me to reflect on the concept of the systemic within regenerative design. While I was immersing myself in this regenerative experimental journey, I began to see the world as a weft (when I refer to the concept of the weft, I imagine the world as a living system interconnected in a net. The weft is used as a metaphor because it alludes to something that still has no name) and to understand the rhythm of what is happening around us to detect what materials I have and can create with.

This moment in which I could chat with Ramon and Andrea was the tipping point in the development of this work. It was the moment I understood that regenerative design starts from a consequence, which has systemic implications. This led me to consider designing by analyzing potential materials that I could find on Wool Dreamers farm and to start working with virgin threat wool and scrap material and try to turn it into a new resource.

Figure 28: Material samples - By the author.

3.3. The Concept of the weft

Not only does nature function as a weft, but humans also do.

In the next step of this process, I worked on networking and collaborating. What may be a problem for some can be a tool for others. Once I detected the problem I wanted to work with, I began making coalitions, looking for my allies to start working together. I forged and created a new bond by assuming a mutual commitment. The union of the knowledge of every part was the hinge that made me pivot my gaze towards the weft and the interactions. The coalition of forces allowed me to dive into this experimental research.

At this point, I already had the primary materials I was going to work with and the technique (since the mastery of the summit is to work with the hand-tufting gun). One important thing to keep in mind is that hand tufting is also based on using a fabric base and an element that makes glue secure the embroidery. This is where my third conversation gains momentum. I contacted Federico, an engineer who is an expert in soils (See appendix: "We do not need heroes but soil"). I explained to Federico that I was working with mono compositions from natural origins. However, what I wanted to know was what things we should take into account when designing garments (considering that they may end up being buried in landfills), what type of materials the soil can absorb organically, and how we could not only maintain it but also give it more resources.

The conversation with Federico could be endless, but I will limit myself in this section to provide specific details that facilitated my project's decision-making. One of his comments was that since tracking what the customer would do with the products is almost impossible, we should design things that we already know will go on the floor. So, the important thing is to ensure that when the products go into the ground, their composition is as similar as possible to the compounds in the soil, i.e., organic compounds. He highlighted that the clue is to try not to damage the earth and to help it maintain a balance. Another interesting fact regards how to help the ground decompose most of what goes into it. At this point, soil engineering touches on a very emerging topic in the fashion industry: new materials. Federico pinpoints that the two ways nature decomposes are fungi and bacteria.

Based on this data, I moved forward with my design process, intending to create with these biodegradable materials that come from nature and can return to it.

In this sense, in addition to wool, I needed to find a third material with which I could generate a new mixture to investigate new aesthetic alternatives and solve the need to use glue. To make biocomposites, there are different options. However, one of them fits perfectly with the requirements that Federico mentioned. Bacterial cellulose, a biomaterial known as kombucha, is a material generated from the union of yeast, fungi, and bacteria. When going into the soil, this bio-material will not necessarily regenerate it (this depends on how enriched the soil is). Still, we know that giving it fungi and bacteria not only helps recycle natural waste and organic matter but also produces many nutrients.

After acquiring this information, two new collaborators came into the picture. First, I contacted Lara Campos, an expert in the field of biomaterials. Lara invited me to work in her laboratory and shared her methodology and knowledge about how to work with bacterial cellulose. For a matter of time, leaning on her experience and expertise would help me to start with already-explored recipes.

The other collaborator with whom I have linked to carrying out my experimentation is a collective called Bioma Kombucha (See appendix: Fueling new growth), which does a beverage with bacterial cellulose as a right. They provided me with this fermented material since I used more than I could produce on my own.

3.4. Material Gains for the Future

Dominating a material means understanding its properties and how it can be processed or transformed. By acquiring this knowledge, new production processes can create shapes and identities. In my research to work with regenerative practices and to be able to move from a linear to a circular production system, I am experimenting with materials in their totality. This implies changing the way I relate to materials and their sources.

Once I weaved my network of collaborators, I gave myself time to investigate, get to know the materials, and understand their properties. This moment is a game of adaptation; it is to think of matter as a living material with the capacity to transform itself. As materiality is a live system, it is not static and is in constant movement. In this period, I considered the matter in its natural state, the form in its new state of composition, and its alterations over time. Matter and technology are concatenated. They are a unit that mutually enhances each other and are linked to move from one state to another. The possibility of designing takes me from projecting what technically can be done to being able to project what could be done. As Andrea Saltzman explains, the field of design speaks of what could be, not about what is. I take up this concept because by being in the place of what could be, the form does not yet exist. In this sense, exploring the material allows me to build something new from experience and intuition. This projective process, this constructive narrative, takes me to a new place. This raw material, intervened by practice and applying different tools and technologies, gave rise to a new textile resource from discarding. A material that opens me to a new regenerative production system, a methodology that re-signifies a discard in a resource and invites me to rediscover how technology can help me approach the body from another interaction in this weft of the environment and experience.

As mentioned before, in a regenerative practice, it is essential not to use any chemical product that could contaminate the soil, so to work the material at an aesthetic level, I limited myself to work with what I had and at most experiments with natural dyes. As I worked with cellulose and wool, I began to understand how to work with them. Thanks to the collaboration with Lara Campos, I worked the kombucha from a paste by processing it. Once I had this paste, I did many tests with different types of wool and then with Ramon's short fibers to generate Biocomposites. I used this as a coating on the wool felt I made and applied it as a scaffold for the hand-tufting pieces.

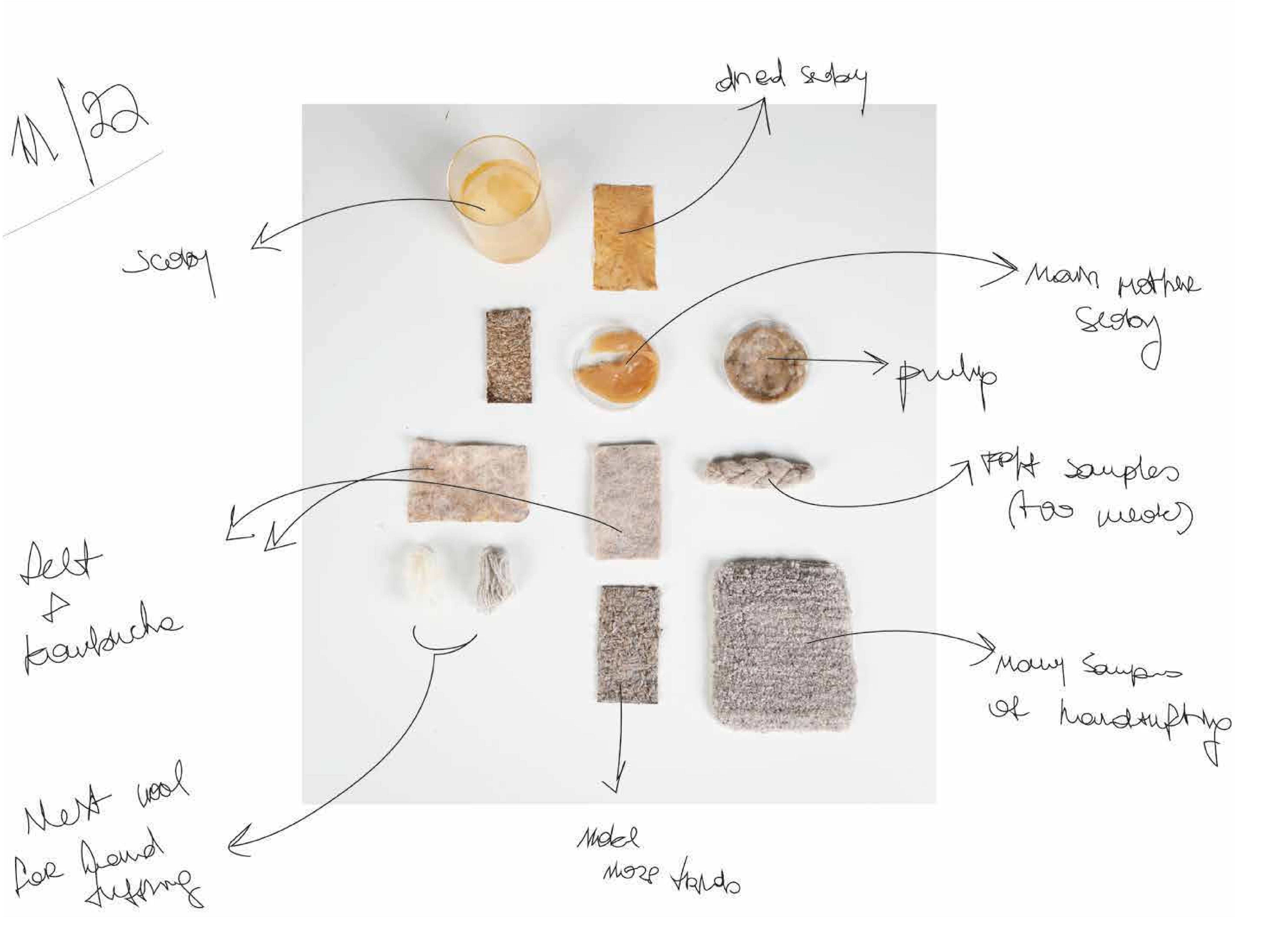
Kombucha has a property that differentiates it from other materials: it can be grown with a mold shape. However, as the cellulose was already grown and Bioma gave it to me, Lara shared her knowledge and alternatives to work its pulp and make the most of it. In this way, we enhance the material so that its application is more diverse, and we are not limited by the shape of the material to create. Another essential property to mention is that today kombucha is not stable enough; if it gets wet, it hydrates again, depending on what could be amusing or possible.
The bio-fabrication technique allows us to control the whole supply chain and helps us be more transparent. Still, the most important thing is to invite the designer to work with the material and experiment. Sometimes, making mistakes is the best way to learn a new, improved method.

While the samples have their interesting qualities, kombucha is a material that has a long way to go but may have great potential. The material of the first prototype is far from pleasant to the touch. However, the application within hand tufting looks very favorable compared to the one used in the summit. It feels much lighter and has an attractive finish.

As for the felt, the short fibers are so small that they don't contract and intertwine with the rest. But I see exciting potential to mix it with another composite.

By observing the tinkering practices and aims, my contribution as a designer in this research is the experimentation of wool and kombucha, what new properties it can acquire, how its materiality can be enhanced, and what kind of things it can be implemented. In this case, I venture into the field of new bearings through various textile samples and hand-tufting.

See the chapter "Research Methodology" for a detailed step-by-step methodology to implement these materials.


11/22
scoby
dried scoby
main mother scoby
pulp
felt samples
felt & kombucha
many samples of handtufting

Steps I followed to work the kombucha in the samples and in the prototype:

1- Obtain bacterial cellulose from bioma.
2- Wash it and then boil it (if you want to dye the cellulose with a natural pigment, is the moment).
3- Processes the material to obtain a paste.
4- Keep it in the refrigerator until use.
5- If it is to be used for hand testing, it is placed directly on the reverse side of the embroidery, and if it is to be mixed with wool fibers, first place the fibers in a frame and then place the paste on top, spreading it evenly.
6- Once it is spread, it can be sprinkled on top with the mineral mica.
7- Leave it dry for at least one week. (this step is variable as kombucha is very sensitive to climate and humidity.)

Figure 29: Raw Scoby - By the author.

Figure 30: Boiled Scoby - By the author.

Figure 33: Pulp with mica powder - By the author.

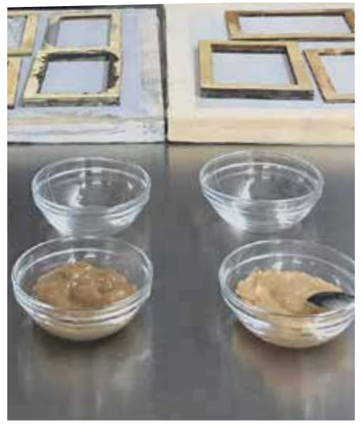


Figure 31: Framing pulp - By the author.

Figure 32: Diverse pulps - By the author.

The steps to make the felt from the natural short fibers:

1- Place the wool fibers as open as possible in two directions.
2- Start rubbing it with hot water and soap.
3- Smash it with plastic between my hands and the felt to give it warmth for a long time.
4- Take off the plastic, and add some hot water and soap. Continue smashing it
5- Use a kneeler to maneuver the piece while stroking it.
6- Once it is compact and fastened together, wash it to remove all the soap.
7-Let it dry and test resistance.

Figure 34: Raw Scoby - By the author.

Figure 35: Boiled Scoby - By the author.

Figure 38: Pulp with mica powder - By the author.

Figure 36: Framing pulp - By the author.

Figure 37: Diverse pulps - By the author.

The steps to work the bio-composite of short felted fibers and kombucha pulp:

1- Disinfect the wool fibers by spraying them with alcohol.
2- Place the short fibers inside a frame
3- Cover the fibers with the kombucha pulp inside the frame.
4- Leave them to dry; the time depends on the climate around them and how much material and place them in.

Figure 39: Bio-composite samples - By the Author.

Figure 40: Applying-Bio-composite - By the Author.

Figure 41: Bio-composite samples - By the Author.

Figure 42: Bio-composite samples - By the Author.

Kombucha as scaffolding for hand-tufting parts:

1- As for the hand tufting technique, they are the same as the traditional technique except that the base fabric, in this case, we reuse textiles used on the farm that are of natural composition, the threads i use are only wool.
2 - The tools used are a hand-tufting gun for embroidery and frames to tighten the fabric.
3- Generate the embroidery
4- Disassemble the piece
5- Place the cellulose pulp on the back side of the piece.
4- Let it dry for at least four days.

Figure 43: Bacterial cellulose as Scaffold on hand-tufting sample.

Figure 44: Application of Bacterial cellulose as Scaffold on hand-tufting prototype.

Figure 45: Application of Bacterial cellulose as Scaffold on hand-tufting prototype.

Figure 46: Application of Bacterial cellulose as Scaffold on hand-tufting prototype.

Technical material Information

Date: 10/11/2022

Materials: kombucha scoby

Technique: - on the frst sample what i did was to sew with a cotton thread the piece of scoby and let it dry
- The second one is the same scoby but with no intervention.

Sample.1 , Sample.2

3.5. Reshape Face

When the material development reached a mature stage, and once I discovered how to biofabricate and work with these new resources, I started to think about how this garment could look like. In my personal practice, I work with zero-waste pattern making, a technique in which the value of the material prevails and nothing is wasted. It is estimated that 30% of the textile is waste in traditional pattern making.

Another tool that I implemented (that this master taught me) is the value of digital materialization. Before creating the garment physically a good way of reducing waste is designing the collection in digital software. When the digital pattern was approved, I moved to make the first sample. The physical model is essential because the flow of the material is not always the same. After trying different samples and before prototyping.

I designed a small drop collection of three garments using felt short fibers wool and hand tufting pieces (which can be seen in the following pages) and that are thought to complete the carryover of Studio Cumbre

For the material prototype, I designed a pattern where to spread the kombucha pulp and wool fibers in a rectangular textile base. This textile, used as the base for tufting comes, is sackcloth used in Wool dreamers' farm. I realized on this occasion that although I achieved hand-tufting pieces with a much lighter finish that improves the touch, it is a complex technique to wear on the body. That's why it's an excellent way to make more accessory garments that don't necessarily have to tan all the leather.

When it came to assembling the garments, I used a handmade stitch in which I used the same wool composition to avoid adding other material that I don't know its origin, as well as to facilitate future degradation.

One of the central values in this process is the composition of 100% biodegradable elements so that when they end up on the earth, they do not generate any negative impact and enrich the soil with beneficial properties.

Through the concept of bio-manufacturing, what I look for is to create a production chain as centralized as possible. Everything supplied and manufactured must be grown, molded, sewn and finished in the same place, thus creating a local zero-kilometer production.

Within this phase, it is essential to highlight how to produce with regenerative criteria. If we think about the amount of production we can create, we must pay attention to all the parts mentioned above; we cannot saturate and surpass the market or the factors involved in the above processes. The production capacity will depend on the natural cycle; as we are creating as nature, we respect its rhythm.

In addition, as materials have always been considered one of the essential elements, I am also aware of the number of products I want to put on the market and what happens over time if they are not sold. So the way to avoid dead stock and waste of energy, material, money, and carbon footprint is to work under an on-demand system. That is, the product is manufactured based on a sale already made. A make-to-order system means that only garments that have been made will be produced.

Since everything is interrelated, we must remember that every action we take has an impact and therefore a type of interaction with the environment. The choice to develop this process stems from the fact that a bio-fabricated material responds to the need of being able to trace a zero kilometer regenerative production chain and be a self-sufficient practice. The project and technology must be in line with how life and living systems are structured and how they maintain their vital functions.

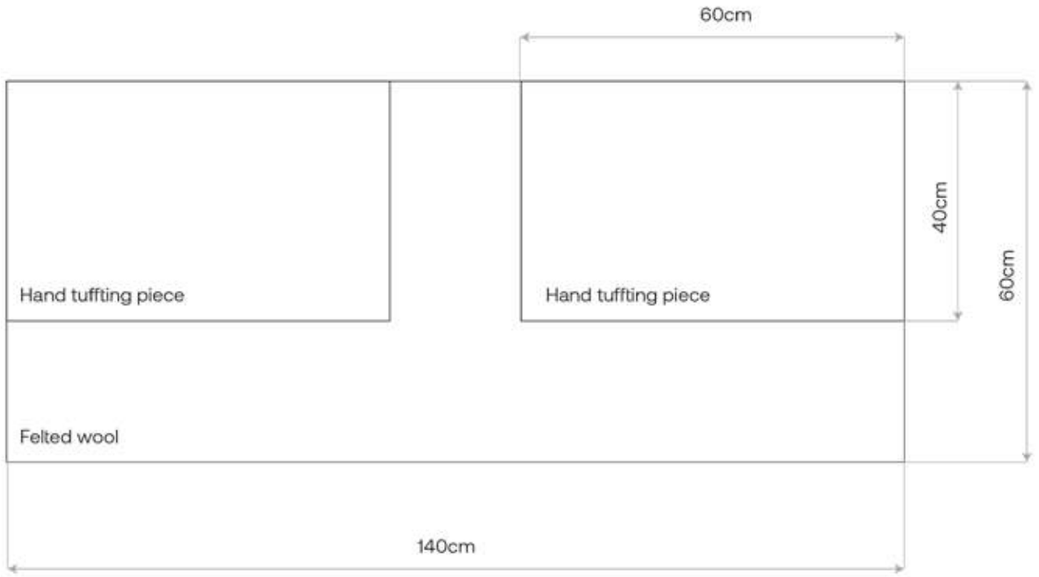
Figure 47: Prototype piece 1 - By the Author.
Figure 48: Prototype piece 1 - By the Author.

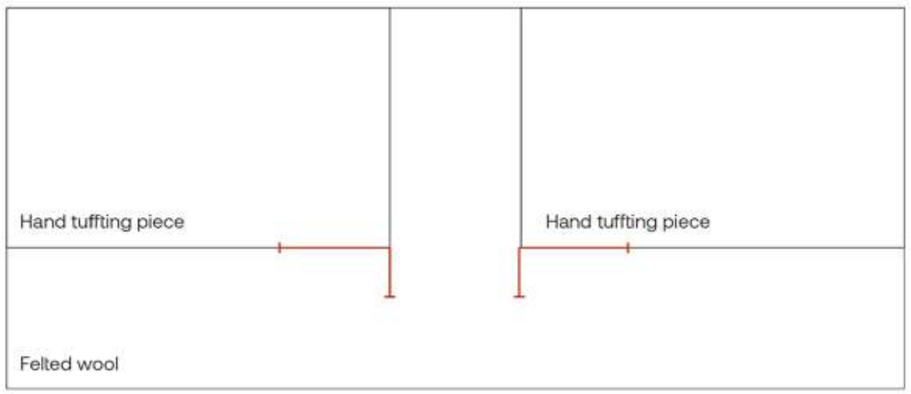
Figure 49: Prototype Piece 1 - By the Author.
Figure 50: Prototype Piece 1 - By the Author.

Figure 52: Digital Model, Piece 1 - By the Author.

Figure 53: Digital Model, Piece 2 - By the Author.
Figure 54: Digital Model, Piece 2 - By the Author.

Figure 55: Digital Model, Piece 3 - By the Author.





reference to cut arm hole

Figure 56: New Prototypes First Sketches- By the Author

Figure 57: New Prototypes merge with Studio Cumbre collection SS 2022 - By the Author

3.6. Getting in Touch

Although this research is still under development and has not yet reached the stage of use, the whole project is designed for a long-life projection of the garments and complete biodegradability. To design regeneratively, I seek to dialogue with the matter, explore what can be done, how to treat it, where it comes from, and how and with what tools and machines it reacts, without neglecting Aesthetics. A critical factor that can give the user a reason to keep an object for a longer time and have an emotional aspect so that the user becomes attached and keeps an object in use, even reusing it differently.

For this reason, when projecting the interaction between the garment and the user, I project that the user can be linked to the garment in the most responsible way possible. Therefore, my commitment is also to communicate and transmit the care taken when interacting with the garment. Since I researched the material's durability, longevity, resistance, and biodegradability in the creation phase, I am responsible for teaching the users how to bond with the articles created. By producing on demand, you have direct contact with the consumer, so reaching them is much easier. This is the moment when the whole process is put to the test. Here begins a relationship of intimacy between the user and the garment. This is where the emotional bond of this weft is reinforced. These garments were meant to merge with our bodies and begin to interact closely with us and the environment. Thinking about the interaction between users and regenerative garments is reconsidering new interaction links. As we dialogue with Leila, we seek to develop a different relationship with these pieces, engaging from another approach. We started to play, explore, and even interact in another way. We looked for new spaces, new ways of getting into a garment, or new ways of taking it off. We ask ourselves how to care for it, treat it, and store it. By wearing it, we connect with the feeling of being unique and that something contains and protects us. Re-reinforcing an emotional bond will ensure the piece's longevity.

When wearing a garment, it not only rubs against the skin and its different states but also begins to be exposed to the effects of time, wear and tear, and subjection to washing or the environment, such as humidity and rain. In this process, garments come into play with the concept of adaptability and lifespan capacity. From the design phase, we can think about the multiple lives of the things we create, but it is vitally important to pass them on so that when they are no longer dependent on us, they can continue their predetermined course. The less we wash a garment, the more we take care of it, the more people wear it, the more the garments adapt to our biological changes or to society's bodily diversity, and the better the performance of this regenerative methodology.

We are used to washing garments every time we wear them, which is unnecessary unless they become stained. Garments can be left perfectly aired and washed every time we take them out. Another point to consider is how we wash them, the amount of water or energy we consume, and, above all, the additives we use. We should stop adding chemicals to the water. For this type of garment, in particular, the ideal is not to expose them to water washing. Ideally, it should be kept in the closet in a cover you have at home made of a natural, non-synthetic textile and stored in a place away from humidity, ideally hanging, not folded. This practice invites us to create a new bond with the garments. We empathize with them because of their origin and through the way we take care of them and biodegrade them in the future. We can see how it accompanies us in time, and, in turn, we can accompany it in its decomposition process.

At this stage, it is essential to highlight that within a kilometer zero chain and open source technology access; we can consider the possibility of creating machines that can have the ability to possess wool that comes from finished garments. In this way, small farms would have the ability to be collectors of their garments at the end of the life cycle, process the wool that they can reuse, and the rest bury the same material that was obtained with and from this ecosystem. Advanced technology allows the expansion of cultural access, and in a degenerative design, the system would contribute a lot to the empowerment of the local community.

3.7. A Living System, The Regrow Face

Regenerative design is heavily influenced by a systemic philosophy rather than product-centered design. Bringing new garments into the world will increasingly require considerable evaluation of ethical responsibility. The materials from which new things will be made must be cyclical like those in nature: infinite resources, reusable, and biodegradable by organic composition.

With the evolution of technology, today and designers' continuous exploration and interpretation, the last phase of a garment's proper life cycle should be predetermined. As a final step of the regenerative design methodology, I work on the concept of decomposition. One of the most important things is how we will regenerate the earth and how the product that was born as a consequence can be turned into a new methodology that reduces the impact and makes it optimistic. When I mention this, it does not only imply that the creations should have the ability to leave the earth better than it was, but also society and all the members that make up the ecosystem. This world is constantly reshaping and has the power and intelligence to regenerate itself. Nature can recover its state as long as we do not poison it. Therefore, it is essential to foresee that if products go into the soil, they have to enrich it, regenerate, and thus allow the restoration of biodiversity. By creating products that fungi and bacteria can degrade, we ensure that if any consumer does not use the product correctly, no matter how much they dispose of it, it will not only disappear in the soil, but it will also provide prolific properties.

This is the grand final phase. This is where all the previous steps come into play. Once the garment has been used a thousand times, once we can no longer reuse its materials, it is time to biodegrade it in the soil. The choice of working with Kombucha and wool contributes crucially at this stage. Burying bacterial cellulose and natural wool in the ground is a way of avoiding chemicals that can pollute the soil. Our natural degradable composition garment goes into the earth and might bring new bacteria to the soil.

3.8. The end of the Experimental Journey

This is primarily an investigation into the composition of blended materials. The final pieces are a subjective response to the research and, as such, are the results of the study for art and design. However, they are still in the experimentation phase as they still need to be consistent enough to develop garments, and I have yet to prove their durability and decomposition over time. Some of the materials used in the experience still need to be stable as a material.

The aesthetic ambition of the research was to produce samples that were not only simply resistant but also attractive in their own right. Initially, I had envisioned a set of more delicate textures, but as my test sheets compared to garments previously produced in the studio show, I was unable to achieve the expected result. Not only did I not arrive at the ideal look in terms of feel and visuals at this stage, but also at their superior strength.
Observing how to respect the rhythms of nature and learning to create as such, it became challenging for me during the research time to make further improvements for its refinement. The growth cycle of a bio-material is complicated to predict as it is ultra-sensitive to the changes that the environment proposes. The capacity to alter in terms of climatic variables is high.

For this relationship to be successful, a designer not only needs to understand the materials and techniques but must also go through the practical experience of experimenting with them and try to understand how to design as nature. A future need for experimentation is to make the first approach to the body and how these new blends can get closer to the body to start designing shapes on it.
To conclude, I want to underline that the development of this project is not a regenerative fashion design practice yet. But through time, it can be turned into a methodology to help other people to understand how to implement regenerative fashion design practices into their projects.

The small model I developed in this thesis could be scaled to a more extensive production. I would like to continue with this research and work with Cumbre toward a regenerative fashion future. By implementing natural composite materials, bio-fabrication, regional and self-sufficient models, 0 km production practices, feeding soil with bacteria, and collaborating with the local community, I believe we are getting closer to the future we all envision. Only in this way can we design, build and evolve as equals. Regenerative fashion will be successful, but the transition speed cannot be forced.

As this project has only been under study for a few months, the next phase is to continue investigating its properties, life cycle, biodegradability, and, above all, measuring its impact. In regenerative design, we generate actions that reduce the impact and infect the process environment, leaving it better than it was.

This regenerative methodology is characterized by creating scarce goods. Scarcity transforms it into luxury, into something unique and unrepeatable. Although this technique can be scalable, the raw material will never be the same, so even if we perform the same processes, each garment will be unique. All pieces created from a regenerative approach are unique and of absolute value because there is no more positive commitment than regeneration.
Small solutions that impact the systemic will contribute to a more significant cultural change. The first experience of this design process applied in Cumbre practices within the case study shows me that everything is possible and feasible. Still, it will take time to happen, and the transition to turn Studio Cumbre into a regenerative design fashion design methodology. To make a complete transition, we would need the support of governments, industries, and the determined commitment of society; this includes financial aid and support to do things differently. It means moving to different systems from the current extractive systems we are used to. If we want this to stop being a niche practice, it will require a kind of support that we have never seen before. I believe that policies and regulations will be necessary, as well as subsidies to small producers. The transition from conventional to regenerative practices often requires a change of pace, awareness, and reduced tillage. Over time, these practices can significantly increase yields and instill a new exchange flow. This methodology favors new forms of interaction between humans and their environment. Only in this way can we design, build and evolve as equals.

Regeneration is one of the few opportunities that allow a designer to begin to have a measurable positive impact, not only on the products but also on the source of materials and their entire production chain. The alternative of being able to know that we are working for the recovery of the environment begins with a controlled and self-sufficient.











4.

An Approach to the main Principles of Regenerative Fashion Design

Mindset

(how we should think for regenerative design)

Systemic Cosmovision:
We design within weft systems. Economies, societies, and environments must all benefit each other.

Waste as a resource:
In nature, the waste does not exist, as in regenerative design.

Solutions to specific problems:
Designing a process starts from a consequence, not the decision to create an object.

Adaptive:
Regenerative design is a living system. It changes according to its immediate environment and through time. It grows, decomposes, and regrows again.

What

(what we do and how we design: defining the practice)

Respect Life-Cycles:
Design as nature.

Non-toxic materials:
Organic biodegradable compositions. Free use of chemicals.

Self-sufficient materials:
Co-creation from what nature offers, reducing human intervention.

Zero-waste practices:
Zero waste pattern making or bio-fabrication.

Km zero supply chain:
A Unified supply chain that starts and ends in the same place.

Local Resources:
Local and self-sufficient manufacture

Design with longevity in mind:
Hold a long-term view and envision a better place for future generations and ecosystems.

Re-circular:
Regenerative design must be circular, but circular design can not be regenerative.

Real end-of-life:
Absorbable by the earth

How

(how to work to implement a regenerative system method)

nterdisciplinary, interconnected, and Collaboratively:
Work together for the welfare of people, places, and soil in equal measure.

Fusion between vernacular and contemporary practices:
Advanced technology gives access, helps to reduce unnecessary waste, and helps to reinvent ancient practices.

Open source knowledge:
share global and local knowledge.

The principles presented focus on holistic and ethical actions to work for the restoration of the fashion industry within a systemic regenerative approach.

Timeline History

Company History Timeline

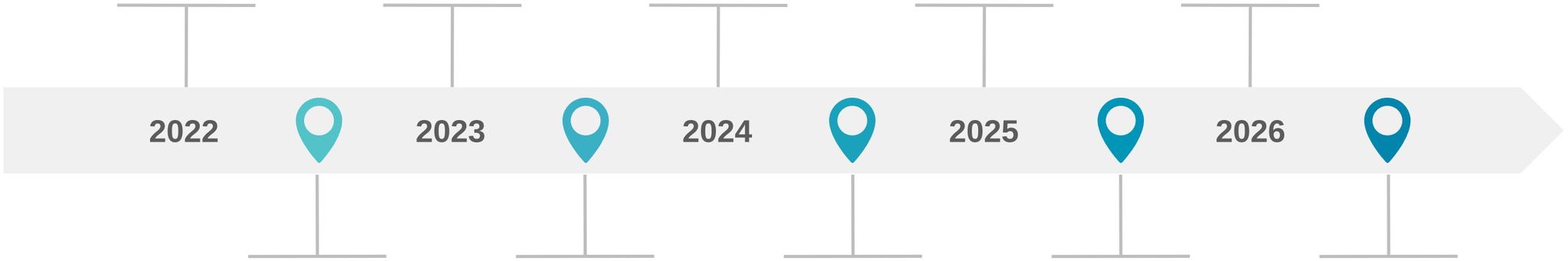
Phase 1
Developing the business idea, products, and branding.

Phase 2
Reaching producers, farmers and manufacturers

Phase 3
Contacting customers farmers and partners in a community that is able to join forces and practice regenerative strategies.

Phase 4
Stable the business And be a recognized brand in Spain.

Phase 5
replicate the production system in other countries.



Milestone
website and collection finished

Milestone
lunching educational programs in order to build community

Milestone
Being recognized as one of the first regenerative fashion brand business of Europe.

Milestone
having support from the government

Milestone
multinational business

Appendix:
In conversation with

5.

Andrea Saltzman: The Cosmovision from the Weft

Micaela (M)- Most definitions of regenerative design begin and end with agriculture. When we talk about regenerative design, we must consider how our creations can improve the state of the earth before them. It is important first to explore how to build into the system of life and source from things we have around us that already exist but may not be appreciated. To begin by understanding how a designer can engage with the environment and how this integrated system is not only a way of acting but also a way of thinking.

Andrea (A)- Here, there are two significant issues: on the one hand, the main factor is the change of consciousness, and on the other, the construction we have made of the world and ourselves, a world of complete fragmentation. All industrial productive thinking, which talks about productivity efficiency, is a total view of things. That is why there is so much talk about product design. To me, it seems very simplified; we always design interactions; if you focus on the product you look at, that is the efficiency to do it faster, even if you waste whatever amount of material, and energy, mistreat people, damage the environment and destroy resources. That is to say; there is no global view; there is a totally limited view of the situation. So you can call it regenerative design, sustainable design, whatever you can think of, but nothing happens if there is no change of consciousness.

M- It's not about good product design; it's about what you say, the link with the rest, with the environment as a whole, and not in a garment that itself is regenerative.

A- It is the look of the weft and the interactions; it is not the look of the thing. It is very interesting because looking at the weft first allows you to discover the product systems, what is a resource, and what are the connections with how in what way, and with whom. To rediscover how technology is also a way to reach the body and adapt to the body.

In my construction, I can tell you a little of my history; my dance training is before architecture. I always looked at everything in movement in dance, but in architecture, the body is here, and the space is there. So the costume allowed me to unite this knowledge. An excellent reference is Fritjof Capra, a physicist and theorist who, in 1985 wrote a book called the turning point. He talks about how the Newtonian and Cartesian vision, the whole idea of conventional physics, led to a total rationalist and fragmented view of the world. Then the atomic view breaks the scheme with the whole of quantum physicTheHis last book that I read, The system view of life, is about how to think of an epistemological vision that comes from the system of life.

Therefore something is or is not part of the system of life. And for that, you have to describe the system of life. This epistemological system talks about working within the cycle of life. What does this mean? Life has its processes and times, life is a weft, and everything we recognize as life is life. The other day we were asking ourselves at home, what things are here that have a life? You turn on the faucet, and we have water, which is very different from seeing the river. Or for example, the milk in the supermarket, we know the product but not the cow, which distances us from the life system.

All nature has its intelligence and its logic. This living system, it is interesting that I do not classify myself in the field of fashion, it is not that I make skirts and dress shirts, but I make a new skin, which is a place of connection between the body and the world. I speak of the skin as a metaphor because it is alive, and if it is active, this is not a fabric that I use today and tomorrow is thrown away, if it is happening and belongs to the system of life and has a moment of use could be in a body and another moment that will have a purpose in something else. But it is not that only in that instance, and then I disconnect. We must consider clothing as the life spent within that weft. In my books, I talk a lot about the concept of metaphor because it alludes to something that still has no name. It is as if it were skin. I always talk about a living system; if we enter that system, everything we regenerate enters this whole period. Because what the residing system has is that the residue does not exist. So everything is a nutrient of something else.

M- If a system discards something, another may be able to incorporate it.

A- I bring an image from a trip I made to Patagonia. We were watching a sea lion give birth, and suddenly a seagull came and ate the placenta. After what seemed like fierce chaos, after two minutes, everything settled down, and the whole cove was silent; an order returned—the system of life.

We understand that life is a weft when we have this vision of things. We begin to think of both technology and materiality as living systems; when I say living materiality, for example we can feel that it is one thing to standardize everything in a system of sizes: small, medium and m, large, and another thing to think that first, it is a game of adaptation between millions of different bodies. So here appears another critical factor which is the idea of adaptability.

M- I always wonder how we can design for bodies that are in constant change; we are living bodies that are in permanent transformation; how can we dress with bodies that keep changing over time?

A- When I talk about the metaphor of the skin, I refer to the fact that this skin is the relationship body/context, which can interact with light, air, and movement, making the concept of materiality a static but also as a living issue.

M- What you say leads me to think about this system of constant interaction where these skins adapt to the environment, where the body responds to the continuous changes, and everything is read as a living weft.

A- If I go back to the living materiality, to the relationship between skin, body, and context, I can think that even wear and tear can be something new that happens in the material. The same with biting is not something separate. For example, we can cut fabric and approach the body in textile work. Without demanding a bite. Then I choose which techniques we invent according to and thinking that materiality can be something alive, our perception changes. That is why Capra's book brings me very close to these concepts and his systemic vision of life.

M- Understanding the system of life within a weft, characterized by being a unified and living system, we can perceive everything as a link of interrelated experiences, of situations that interact over time, and everything adapts to that; there is not something static.

A- And that is the marvel of the possibility of designing in this plot. The technician has the vision that this is done this way, and the designer has the vision of how it could be done. The design always talks about what could be, not what is. It seems to me that to understand my work, design is key. Design is what it could become, not what it is. It is always in that situation that is why I take up again the concept of metaphor because of how it is in the place of what could be, the form does not exist; when the form does not exist, and the name does not exist, I work with metaphors. The metaphor is the way to approach something, but I still don't know how to do it. For example, suddenly, I take something from the field of biology, get inspired by a detail of a work of art, and experiment with an architectural technique. I take things to build something new, something that I intuit, but I still don't know what to do. That project process that project narrative will help me get to that place. That is another of the great things about design. How to mobilize those processes, make those processes juicier, and overcome the uncertainty that it is not something you can give a recipe of how to do.

M- Also, how this system is articulated and how it pivots our idea. How they change according to what we perceive in practice. That's why the process of creation and exploration is very fruitful and intuitive. I don't stay in theory.

A- Design is not a theory; it is a practice. I often tell in conferences that I write my books based on practice. And I don't only talk about my processes as a designer but the experience together with the students of finding a way to discover and start designing.

M- We can have a methodology, but then the experience and the creation is a path that is walked personally.

A- Here, we come back to the concept of adaptation, a practice that adapts to different interrelated factors. This adaptation is closely linked to the concept of life capacity, which is related to the concept of intelligence. The intelligence of nature, intelligence as the capacity of adaptation to living. This is reflected in any manifestation of life between being able to live and not being able to live. Because adaptation is not only you; it is linked to the climate, objects, affections, and everything. When you look at the system as a plot, everything changes.

M- As we started the conversation, talking about regenerative design is much deeper than staying in agriculture; it is to value how we think and rethink our behavior toward the environment. Networks are the basic patterns of organization of all living systems. Instead of seeing the world as a machine, we understand it as a weft. If we change the rationalist and fragmented vision of the world, we will be able to understand our existence within this living, unified and infinite weft.

After having this conversation, I understand that one of the main principles of regenerative design is that this process starts from the weft and the systemic view of life.

The way of designing from within this living system implies that the design and its methodology do not focus on the object but on its entire circle. The creation begins with a problem, an existing consequence that needs to be regenerated and reconstituted with what is already there. As a result, the concept of discarding does not exist; every resource is a metaphor for a new design that will constantly interact with the environment from its origin, use, and degradation.

Federico Scidá: We don´t need heroes but soil

Micaela (M)- How can we reduce the impact on a production line?

Federico (F)- This is a complex question. Reducing impact depends on several factors and varies according to the type of industry we are referring to, the specific products, and the components of these products. However, if we generalize, the common denominators for reducing impact are usually related to the resources we use as feedstock, the energy management, and the social structures needed to produce the particular good in question. From there, as I said at the beginning, we should delve into more detail on the type of industry and the product.

M- What actions and strategies can we include in production practices to reduce the footprint?

F- This question is a continuation of the former one. Several very extensive international standards and regulations considered "good production practices" ensure that the impact is minimized as much as possible.
When we talk about these issues, we have to accept that there will always be some impact, but what is important is finding ways to mitigate or reduce it. That depends on how we set up the production process, how we get the energy for that process, and very importantly what we do with the waste from that process. These are the three significant factors that affect it. Then, as I mentioned before, we can talk more specifically about each industry.

M- Waste is often generated in these production processes, and this waste usually goes into the soil. How can we ensure that we do not poison the earth both in production and once a product is no longer used?

F- This is a whole topic itself. An entire section on "safety, hygiene and environmental practices" refers to this topic. In general terms, we could say that in the course of the production process, spills and infiltrations into the soil must be avoided.

Regarding the second part of the question, it is a matter of deciding which additives or substances are used in the final product. There are certain substances that we know once they degrade are toxic and that they will return to the soil in one way or another. For those who produce consumable products, it is impossible to control the final disposal

of the products, this is an unmanageable issue and therefore we must assume that the products will end up in a landfill or a garbage dump. With that in mind, we should not generate products with anything that could be poisonous for the soil.

M- Continuing with your argument, what kind of compositions could be absorbed by the soil without damaging it?

F- To answer this we have to be clear about one concept: What does it mean to damage the soil? Damaging the soil implies not only giving it foreign compounds but also breaking its natural balance. Depending on where the soil is located and its type of biome, it has a certain composition. Therefore, the important thing is to make sure to use feedstocks that when decomposed in the soil generate compounds or substances that are the same or very similar to those already in the soil, that is, organic compounds or mineral salts. When we talk about absorbable compositions it is not only important that the type of substance is organic but also that it does not alter the original balance of the soil.

M- I understand that when we talk about components that can be absorbed by the soil we are talking about biodegradability. What characteristics should a product have to be biodegradable in soil?
F- The answer is very simple. Everything that comes out of the soil without going through a chemical process in the environment can easily return to the soil with the ability to degrade. Today the novelty in this area is bioplastics. Nevertheless, the problem with biodegradable products today is twofold: either they lack the properties needed for a given application or they become economically unfeasible. The truth of the matter is that biodegradable products today present a technical challenge because, as the name suggests, environmental aspects degrade them.

M- What are the differences and similarities between biodegradability and compostability?

F- I understand that compostable is a subset of biodegradable. The compostable generates material that allows to generate compost for plant species but I believe that this is not a characteristic per se of all biodegradable.

M- What defines what is biodegradable and what is not? Is it possible that everything is biodegradable and the difference is the time?

F- Biodegradability implies not only a matter of time but also a matter of chemical composition. Biodegradable is everything that can be degraded by living matter. In certain compounds, such as plastics, this does apply, since plastics are ultimately organic matter which takes many centuries to degrade, but they do degrade. This is not the case with, for example, metal or other materials that bacteria or life forms as we know them today cannot take advantage of. If we restrict the discussion to organic materials, yes, it could be said that biodegradability is a matter of time.

M- In that sense, could biodegradation processes be accelerated without the use of chemicals?

F- There are many ways to accelerate these processes. One of them is with heat. Heat usually stimulates the bacteria, making them act faster. Another way to do it would be with oxygenation, seeking to generate a more favorable environment in the mixtures for the reproduction of bacteria. In the end, it is all about generating the right conditions for bacteria to reproduce and act. Bacteria, and also fungi, are the cheapest labor we have to carry out these processes.

M- What does a product generate when it biodegrades? In my case I am working with wool and kombucha (bacterial cellulose) do you think this can make the soil even more fertile?

F- Organic products with the ability to biodegrade generate organic compounds. What specific organic compounds they generate, what composition they have, or how long they take would need to be looked at in detail.
We could assert that cellulose is the main sugar of all plant compounds and therefore we can say that it can not do any harm when degraded. What we cannot affirm is that it will make the soil more fertile, since, as I commented before, we should first observe how the soil was before pouring the kombucha.
If that soil is already fertile and rich in minerals, it will probably not fertilize it even more. However, if you pour it on sandy soils, it will surely make them more fertile.

M- Is it possible to accelerate these processes and what technologies can I use to facilitate biodegradation?

F- There is a whole industry dedicated to biological waste treatment. The first thing that comes to mind is bacterial cocktails, which can be purchased and poured together with the organic waste in tanks in which optimal conditions for bacterial growth are generated. As a result, a very rich organic sludge is produced, which is used as a fertilizer. Although it sounds easy, since it is necessary to follow up the measurement of PH, temperature, humidity, etc., it is not.

There is also landfarming, which involves mixing organic waste with uncontaminated soils. The bacteria in the non-contaminated part gradually treat the organic waste until fertilizers are obtained. All biodegradation processes take time and require monitoring.

M- Having discussed all these things I have one last question. What is the capacity of soils to self-regenerate?

F- Soil has the capacity to regenerate itself but this capacity is not infinite. The limits of self-regeneration are given by contaminants, contaminant concentrations, and extension. These three factors generate several variables that allow us to understand the extent of the soil's regeneration capacity.

Biodegradable materials are materials that can be reduced to simpler substances or that can be completely decomposed into minerals through natural processes catalyzed by microorganisms such as bacteria and fungi. There are types of fibers that have very good biodegradability such as wool and cellulose. Biodegradability generally refers to natural decomposition, while compostability is based on managed decomposition processes such as industrial composting. Therefore, to start thinking of a regenerative system through design, the composition of materials and their biodegradation must be taken into account as another principle. This is a key factor because considering the final step of a garment is also referring to the re-circulation of life and the nourishment of biodiversity in the soil. This means that if garments are developed from materials that can be nutrient-rich for degradation, the soil will absorb these compounds and become fortified. Biodegradation is also part of the life system, it is the one that gives continuity and new origins. By the way, it is usually the last step of the supply chain but on the contrary, is the starting point for what is next.

SIlvia Brandi: Building a Future from the Farm

Micaela (M)- My project is focused on regenerative design, circular economies, and how to apply them to fashion. I am interested in the Farmlab from a conceptual point of view. What is Farmlab and how can we frame it?

Silvia (S)- The Farmlab is a personal project that was born for very personal reasons. For a while, my partner and I wanted to develop our project on this farm, but we needed to learn how to do it because it is in a very remote environment.

Both my partner and I have been working with Fablabs for a long time, me as manager of IAAC which is the parent institution of Fablab Barcelona, and Marti working at Fablab Barcelona in the Fab-Academy area. This background has given us a lot of familiarity with the maker movement and the Fablabs. From this experience, we came up with the idea of the Farmlab which is based on the idea of bringing the logic of making to the countryside, (which has a completely different logic from the city), to solve problems on the farm with the help of digital technology, not with an orientation towards technology as a solution to all problems, but thinking about opening the doors to it when it is needed.

M- In short, it could be said that the Farmlab consists in bringing the logic of the Fablabs to the countryside to respond to the needs of life on the farm.

S- Yes, but obviously all this is also linked to the circular economy and the Km 0 courses. In the farmlab we are interested in experimenting and thinking about what can be done with all the resources that are at hand, not only thinking about food (which is what we have less developed) but also experimenting with other things such as wood, natural dyes, and wool.

M- I am interested in the wool case in particular. I saw that you work a lot with the local wool community. How is the project linked to the local community?

S- Wool is a particularly interesting case study but it needs to be framed in another project in which we were participating called "Shemakes: Rethinking wool". This project consists of a network of makerspace around Europe that explores the role of women in the fashion industry claiming a leadership that they do not have despite being the majority in this industry. The project encourages, through making, innovation and recognition of the role of women. One of the case-studies we analyzed is the wool cycle, because small farms do not have the facilities to process it, and for that reason the wool, which is a fantastic feedstock, becomes waste. This is a double problem because it not only increases the volume of waste but also wastes a particularly valuable resource. In this sense, the idea in this project was to think about how to equip the little farms with technologies to be able to take advantage of wool and turn it from waste into a resource.

The project was divided into three stages. The first stage consisted of each Fablab mapping all the small wool producing entities in their region of Europe. In our particular context, in Austria, due to the alpaca wool boom, wool processing facilities are being reactivated that can also be used by those of us who have sheeps. This situation happening in Austria is quite interesting because it allows small producers to take advantage of facilities that were not initially intended for them.

The second stage was centered on the design part and focused on natural dyes. In our particular case, because the idea of the farm-lab is to use resources at Km 0 and due to the winter season, we developed dyes with tree bark, the only resource we had at our disposal.

The third part was the most interesting one and consisted in making machines and thinking how a small farm could produce technology to process wool in every step of the process, carving, felting, iarning, spining, etc. For this purpose we developed "do it your self" machines thinking that a small farm could make them. This allowed us to move from throwing wool away (as hundreds of farmers do) to recognizing it as a valuable resource that needs to be used and not wasted.

From this project we were able to prove that it is possible to carry out projects that take advantage of both the resources at Km 0 and networking, something that in the city is given organically but that does not happen in the countryside. As I said before, bringing the logics of the Fablabs to the Farm, to the countryside, is in itself a question that helps to move ideas and find solutions, without losing sight of the fact that without digital technology, such as laser cutting machines, this could not be done.

M- What do you do with the wool you produce? How do you (or other) small producers market your raw material or products?

S- There is a next phase of the project that we have not yet managed to develop but we would like to do it, which is to develop garments with our own wool, in a process completely Km 0. We have not yet been able to do this but we would like to do it soon.

M- You mentioned earlier that as a small farm you didn't take advantage of the wool. What did you do with it?

S- What we used to do, which is not legal, was to bury it in the forest. The wool itself is a fertilizer, so it does not affect the soil, but still this is not allowed even if it is not an excessive amount.

M- Were you able to check the effect of this wool that was buried in the soil? Does it really work as a fertilizer?

S-: This is very difficult to verify because when we bury it in the forest we cannot return with precision to the place where it was buried. However, since it is an organic material, we can know its capacity for bio-degradation.

M- How do you use the waste in your field? Do you make compost for the plantations?

S- Yes. But sometimes before composting we also separate certain wastes to use them in other ways. For example, we make natural dyes for wool, a very common practice in any Textile-lab, or we use certain waste as vermin repellents. We have also realized the

importance of raising chickens as they not only give eggs but also fertilize the soil and eat the sheep's pests. In the countryside everything is an interrelated weft that works as a system. I believe this is the basis of any circular economy.

M- How did you acquire this knowledge?

S- My partner already had a lot of this knowledge from growing up here. As for me, I am more aware of the network and new ideas. The network fosters horizontal knowledge with quick and superficial ideas while in the field the knowledge is vertical and ancestral. This crossover generates a very interesting dynamic that allows the development of new ideas. An example of this is a Japanese technology that we have brought that allows us to treat wood for facades by burning it. This allows us to generate a super weather resistant material without the use of any chemicals. This is just an example of an idea that is not native to our country but can be implemented and applied with our resources.

M- Earlier you told me that you did not get to realize your idea of making garments. What technology do you have to produce these garments?

S: Well, we have more machines here than we can actually use. We have a vertical loom, a knitting machine, a laser cut. We actually have several machines. We also developed a carving machine, which is a machine that was not in the set of open-source machines of the Fablab, but we needed it to be able to load the wool and make felt. We planned to cut that felt with a laser machine and make garment patterns.

M-Could you tell me what your process consists of?

S- Our process begins with shearing in April. Then there is the washing process that we do in one of these facilities that I was telling you that have opened for alpaca wool. The wool can be conserved as long as you want when it is not washed because it has a natural antiparasitic, but once it is washed it has to be processed and well conserved. Once it has been washed it has to be carded and then felted. Once we have the felt we cut it with the laser machine. We like the idea of combining a super-traditional technique like felting with laser-cutting.

M- Do you think that the idea you had of taking the Fab-labs technology to the farm has worked? How do advanced technology and nature coexist in the project?

S- Yes, of course. This is exactly what the farm-lab is about. I insist on this idea of implementing city logics in the countryside and also the other way around. The countryside is full of its own logics that sometimes are discovered in the city as a great novelty, but that have always been so in the countryside. Logics of self-sufficiency and circular economy that have always existed in the countryside. Therein lies the value of this exchange of knowledge. Bringing networking and technology to the countryside to be used when it is needed and the circular economy and 0 Km resources to the city. The theme of circular economy and self-sufficiency is basic in the countryside and always has been. Here waste has always been separated to be used, water has been extracted from the well, solar energy has been used and heating has been generated by bio-mass.

Bioma Kombucha: Fueling new Growth

Micaela (M)- How would you define what you do?

Bioma Kombucha (K)- In Bioma Kombucha, we co-create with the environment and admire the goodness and fruits of nature; that is why our Kombucha production system is based on sustainability and tradition, following natural fermentation processes using a SCOBY and our organic fair trade tea. We infuse and ferment our Kombucha with European aromatic and medicinal plants and seasonal fruits in each brewing, respecting the times and cycles of nature.

M- Why do you believe that Kombucha is a beneficial product?

K- It is scientifically proven that Kombucha has properties that help our immune system. It is a living beverage full of the benefits of bacteria and fermentation by-products and the medicinal plants with which we have infused the kombucha. All of this positively impacts our body as it is a drink that not only helps with digestion but is also low in sugar and alcohol-free.

M- What is the kombucha, and how is the process to generate it?

K- Kombucha is a green tea fermented by a symbiotic colony of bacteria and yeasts called SCOBY. Fermentation begins with the exponential growth of yeast, acetic, and lactic acid bacteria that form a matrix of bacterial cellulose on the surface in the presence of oxygen. This indicates that fermentation has started, and the sugar begins to be consumed, generating CO2, alcohol and lactic acid. The alcohol is oxidized and converted into acetic acid, which gives a slightly vinegary taste to the Kombucha.

M- What are the growth times, and under what conditions should it be gestated?

K- The SCOBY grows as long as you have a live and healthy Kombucha; between 4-5 days begins its growth, and the conditions must be aseptic to avoid microbiological contamination, have the appropriate medium concerning sugars, water, and tea concentration and above all the right warm temperature.

M- how does the environment affect your fermentation?

K- Temperature is one of the main parameters for the start of fermentation since low temperatures cause fermentation to stagnate. Yeast in the environment also affects the growth of yeast colonies, which is why production must occur in a hygienic environment.

M- What waste do you have in your production chain and why?

K- We have leftover green tea, scoby, yeast, aromatic herbs, fruit peels, and cardboard boxes. The organic materials come from fermentation; we only make an infusion and juice extraction, so they are removed from the process when the fermentation has stopped and gone out as waste in the process flow. The cardboard boxes come from raw materials; we try to reuse them as protection for our six packs, but sometimes we do not use all the cardboard.

M- What technologies are involved in creating the product?

K- Refrigeration for cold maceration of the tea leaves and conditioning the Kombucha.

M- How do the production process and nature coexist in the project? How can you collaborate for the preservation of the environment?

K- At the level of food production, with all the regulations of production and processes, it is a challenge to combine the elaboration of Kombucha with our sustainable philosophy. In addition, at the logistical level, the selection of 100% organic materials in all our development is a work based on the search, selection, and verification before finding suppliers. We are committed to the environment from the selection of our raw materials, packaging materials and labels, and the infrastructure of our ship made in bio-construction. The elaboration of the Kombucha is usually aligned with the lunar cycles, and the electric energy we use is renewable, the delivery of our product in Barcelona is done by electric car, and we reuse materials from other industries such as plastic baskets used in Mercabarna to transport the bottles on delivery days and reduce the use of cardboard boxes, also the office materials are recycled, the cleaning detergents of our ecological premises... Our product development is based on the production free of additives and sweeteners because we want the Kombucha to be natural and express the powerful properties of green tea leaves and medicinal, aromatic herbs that nature gives us.

To summarize, I would like to highlight how an industry can co-create with nature and its rhythms. In this case, the production cycles are strongly linked to the lunar cycles since the growth and reproduction rhythm of the ferment depends a lot on the weather conditions around it. This allows one to project the number of products produced depending on the season and environmental conditions. To do this, they manage their high and low production seasons where the manufacturing rhythm depends on a factor that is not controllable by humans. Another significant factor in regenerative design. The course of nature's growth with the most minor interference of man in the whole process. Bacterial cellulose reproduces itself without human intervention and complex technology in its manufacturing process. Therefore, another principle of regenerative design to highlight is to respect growth cycles with as little human interference as possible. In other words, it should not accelerate its times, and the use of technology should be to improve the preservation of properties and not its speed.

This is the best example to show that nature can co-crate with a capitalist system without being invasive.

Leila Tanus: Inclusive but Exclusive

Micaela (M)- When designing, we often focus on the object to be designed, the consumer trends, or even the type of user we want to reach. Still, we don't consider the impact that garments can have on the bodies of the people we are designing for. When we talk about the impact in the fashion industry, it turns around the environmental aspect and we don't talk about the impact on the body. How do you think our designs influence society?

Leila (L)- I can describe a situation that changed my understanding of what we do. I came across an image of a person on his back with an outfit whose silhouette consisted of a pair of pants with a low rise and a very long t-shirt; there was a very strange proportion and next to it was the drawing of what could potentially happen to the body underneath this silhouette. Then we saw that the tail was at the knees and the torso was huge. When I saw that, I realized that what you and I and all the people who went through the apparel and design industry did, essentially that, we modified as much as the flesh and the conception we have of that body underneath. And for me that was a revolution, I realized that this is it, that here I have to think, here is the solution, to think that we are affecting that flesh, that flesh that moves, that flesh that experiences the world in a way determined only and exclusively by how it dresses. If I have to lift my pants every half a block because they fall, it is because the experience of that world of what I am giving you with what I have designed is that and no other. You could lift it, figure it out and put a belt on it, but you don't do it. So for me, that meme was the turning point, I always bring it to all the theories and classes I give, that is the starting point. Then there are also discourses; there are theorists, a philosophy and a feminist perspective, and various issues that begin to cross that I continue to learn from this meme.

M- In your narrative, you take me to the image of the architect Rudolsfky, which you have also shown a lot in your classes and leads us to ask ourselves, how are the bodies that we dress? What happens to the body underneath the clothing? How are the bodies we dress?

L- dressing bodies, that's how they are

M- We have the power to alter them as we dress them.

L- Both symbolically and physically and materially,

because it's not that it's only the theory of what I imagine under that cloak because I mean, almost everyone can experience it without being excellent academics and theorists, when there was fashion (I mention this word not because I choose it but because I am referring to that, to a system that determines what you have to wear to be included), when we used to wear clothes anchored to the hip some time ago, I see that today that mark is in my body, in my skin, in my flesh, in my adiposity. So it is not only the symbolic construction of those bodies that we make when we build them through clothing, design, and fashion production, but also the marks we leave on those bodies; if we go back in history, we see it much more with those extremely flagellated bodies with garments that subjected the body in a much more invasive way, but I have no doubt that if we undress we see marks of our adolescence and how we wanted to be included in a fashion, and it is not wrong, it is being human.

M- Well, you touched on a critical concept in the human being and fashion, that social construct of belonging that fashion imposes and that we build. In order to belong or to feel included, we demand and force our bodies, our way of relating and compromise what surrounds us.

L- It is challenging to know what is natural and what is not. What is inside and what is outside, because it is all a bit diffuse, what we exclude and what we include, to be able to do it we must have a reference and that is a danger because where you place the reference point delimits everything. To think of a system that determines certain issues as being left outside or inside, it is even better to separate and try to analyze it from the outside. But we do it constantly; no matter how innovative and inclusive a project is, we always leave someone out, marking a lineup to here.

M- It is inevitable; there is such a great diversity that it is impossible to approach everything from the clothing. You always make decisions and choices, what happens with that is that you must first understand your purpose and then be able to sustain it over time.

L- I think it is also good to decide what we want to cover. If we try to deal with more than we can, it will lead us down a rather vague path, but if I choose what I want to work on, I will solve the problem much better. We are afraid of the word discriminate, but sometimes it is good to delimit, if only a part of what one poses as a problem is solved, it is already a lot. And even more so in corporealities where the construction is vast, multiple, and differentiated. You will never be able to satisfy everyone.

M- When you design, you could consider doing it for the regional body; the contexts are also particular for the country where we are. At the same time, globalization also means that a consumer can be from any part of the world. So we cannot limit ourselves. Changes are constantly happening around us, and we can think about how to design generically. But it is true that designing a garment, we could also feel that we are designing an intimate link, almost personalized.

L- But something interesting also happens, people also have that ability to relate. But if we understand that we don't have to complement each of the particularities of that body but contemplate the ones we want, people will experience them that way. Letting the user take charge generates a link with that something that perhaps as designers, we are not used to, but we can let it flow. It happens a lot with non-gender garments, we tell the user how they are and we are cataloging things. And we have to be careful because that also indoctrinates.

M- The adverse effect happens, trying to be inclusive we end up delimiting and labeling.

L- For me it is more important to think about what I want to solve and the rest to give the user a free hand to experiment when testing the garment. Give them room to ask themselves what it generates and what it invites them to do.

M- As designers we not only design garments but we also build bodies and we manipulate the silhouette of the time, we can determine guidelines and structure the bodies. How can we imagine the shape of these times?

L- I always think about what will be the body of the 2020's, we know that the body of the 2010's was not very different from that of the 2000's. But I think, I feel that we are going to get closer to the silhouette of these times. But I think, I feel that we are getting closer and closer to this silhouette in which a garment can be modified according to what it needs—thinking about the universal silhouette. As if we were talking about the Little black dress but from the silhouette. We are approaching more neutral figures, without wanting to intervene, without interfering so much in the body but that the user has the freedom to intervene throughout history. The idea of a body lost in a galaxy can be a super utopian but more concrete goal.

M- Even though releases change and consumers easily adapt to new trends, it is still very difficult to accept the body's natural changes. Bodies biologically are constantly transforming and do you think as designers we should have a more inclusive look about this?

L- Well, in many countries the old, older people are very neglected, they are no longer a possible user. We sell the baton to all the ladies. And that affects a lot. The lady whose body is affected by time, marks, and changes also believes it is no longer appropriate to wear certain things. The patriarchy very much accepts maternity but at the same time we do not design for that belly, we do not think of garments that include that volumetry but when it disappears that can be transformed. But in generic terms, we don't talk about the transformation of bodies, from a small body to that of a teenager, about weight changes, nor about a body with gender transformations.

M- Without realizing it, this directly impacts mental health. We label our bodies in a size and do not give room for change. People do not naturalize changes, so if we no longer fit into that garment it means that something bad is happening to me. Fashion is responsible for this denial and suffering.

L- It is crazy to think that we get in touch with our body only when we try new clothes. But how important can be the role of a garment that contemplates the transformation. This is the only way we can modify this naked body's perception in the mirror. The label will say what the user perceives the look and feel on this occasion.

Many times we are not aware of the maelstrom of the world in which we are immersed, we do not think in general terms that we are building but how. But life is a plot, it is so complex that we cannot speak separately of the body, the product, the production process. Everything is interrelated. How I produce that garment will be the way the wearer perceives that garment.

M- Fashion is an industry that crosses all of us.

L- We are all consuming fashion all the time because it is very difficult to escape but as designers we can also change. The yardstick from which we stand is moving.

M- Because the problems are also different, we change our points of view. And then what happens when we talk about how we interact with the garments? At the level of links...

L- The timeline is very shortened, we don't think back who made it, we also buy with that short term view, if it doesn't suit me later I give it away. We prefer not to think because it is overwhelming and distressing to ask yourself many questions. Binding with an object in a different way implies a decision. What are we going to use it for, how will we use it, how does it fit, what

do I have to unfasten to take it off. Or ask ourselves how we go to the bathroom with the garment, how I get on the bus, how I wear it to the office. But by force you end up creating a spatial link with that garment, with the experience of dressing but then with how I am going to wash it, how I am going to take care of it if it comes undone, I will have to think about it because the garment obliges me to. Fast fashion doesn't force anything, it's a t-shirt you put on and take off. But if we design a complex finished product, we will make the user think about it. The moment he/she grabs it, he/she decides how he/she relates to the objects.

Just as we push the silhouette of the story to be a certain way, we have to start pushing the link between people and objects.

M- We design new spaces, new links of intimacy between the garment and the user.

L- The key word in all this is time. The time you want to invest in that object, interact, preserve, and wait for it. Having to think about it, we are not used to it.

What are we talking about when we say emotional bond?

M- The emotional talks about time, about knowing the garment, its history, origin, and establishing links over time. The versatility to survive trends, changes and transformations. If this garment fulfills all this, my emotion towards it will change.

L- In my philosophy, the emotional talks about connecting, saying time to instruct, to tell, so that the object that we sell in the way we do it also has to be linked, because it is not only the garment that I take with me, it is the time to establish links. And this can also be done on a large scale this way of linking, not only in small brands. Everything builds and then affects the link we will have with the garment and how we will link with it.

Everything is interrelated, so it is not only enough with communication but as designers to open a link. It is very difficult because the designer ends up doing everything in a certain comfortable way.

M- And that's what it's all about, if you want to change something in a very long process and you need time dedication, follow-up, maintenance and presence. That makes me wonder if there is a way to design with and for the user.

L- I don't understand that there is any other way. This is a interrelated web; the only way to improve it is from the user experience. Design with the People, without them I wouldn't think of the idea of solving something. And I need time to pass to understand what is going on.The time factor is key but we never saw ourselves in a timeline. We never set out to think about the road ahead, I'm doing it as I go along. That's how it works, you have to reduce anxiety and think about the here and now. A phrase of sustainability says to make the now in function of the future generation. If you are clear about the present, the now and the body you are building today, you are including yourself in the future.

M- The whole circle is a linked weft.

To summarize this deep dialogue, clothing is how people learn to live and feel comfortable with their bodies. As far as this is concerned, clothing is an intimate experience of the body and a public presentation of the body. Moving on the border between the self and others is the interface between the individual and the social world, the meeting point between the private and the public. Bodies leave traces on clothes. And clothes leave traces on bodies. There is a parallel between taking care of the body and taking care of the garment. When designing garments we are designing bodies.

With this I want to emphasize the responsibility that designers have when creating. Not only produce objects that can affect the climate and the environment but also human beings and their health. We can alter both their social inclusion and their mental health. Designing regeneratively is designing responsibly. In the ecosystem, every action impacts other things, in other people.

Gema Gomez: A Worldwide Local Society

Micaela (M)- I have heard you say several times that we are transitioning and experiencing a paradigm shift regarding a sustainable and ethical fashion approach. Moreover, you always emphasize the value of communities. How do you think communities and collaborations can contribute to driving this change?

Gema (G)- I believe that to improve the industry, we must create communities. A group of people with the same goal of sustainable fashion. If we intend to create an alternative system, and promote sustainable and circular fashion, thus creating a contrast to fast fashion, we must do it together. Everything counts; as Eduardo Galeano says ¨"Many small people, in small places, doing small things, can change the world." Of course, here I am not only talking about creating a community among designers or consumers; I believe that all the members of a production chain are crucial. I think that we must all be interrelated and connected. The more communication flows and the more unified the system is, the more possibilities we will have to reduce the impact.

M- The sense of community is a powerful feeling for this type of change, that feeling where members have a place to retreat to, a substance that members are important to each other and the group. With a shared purpose, everyone pulls in the same direction. In these times, humanization is missing, and it is very necessary to return to places where we feel accompanied and contained.

G- I guess what people need today is support. A positive and constructive vision of what fashion and the world can be if we all work together. The Sustainable Development Goals help to integrate the concept of sustainability into the industry in the first instance. Still, the criteria are much broader than using organic, recycled, or certified material. It goes through concepts of how your company contributes to society, where it operates, what it is, what kind of governance, whether participatory or not, how you invest in innovation, and how you invest in education. Much focus has been placed on large companies that have the possibility and the capital and the opportunity to a great extent to change things.

M- Going back to what you mentioned before, it is not enough to change the materials; it is also extremely important to understand where it operates, how it educates, what innovations it implements, and how it interacts with the environment in which it is located. How can projects be linked to the local and regional community, and how can this improve the impact?

G- These topics begin as a first instance where they start to be talked about. When interest is awakened, industries and individuals begin to investigate these issues and generate content and theoretical frameworks that will be fed into the network. It is difficult to move companies away from their economic interests and get them to focus more on environmental and social issues. Still, I believe that, little by little, this is changing. Little by little, by force or by will, environmental issues are being put on the agenda

alongside economic issues. Because if the focus on the flow of money does not change, we will not be able to transform society. This will happen, but it will be easier if money is redistributed to local producers and new biodegradable and regenerated materials.

M- What you mention about the economic flow is important because if you adjust the production chain in terms of relocation, the local economy movement will empower the regional economy. That is, it is extremely valuable to work with local producers and thus be able to empower themselves. If we work with the nearby community and my raw material depends on the collaborator to sell, we will support our sales. On the other hand, do you think society is ready to adopt regenerative practices?

G- Society is in a moment of incoherence, there is chaos, and they confuse terms or do not believe anything. It is indeed complex, many things are in question, and we cannot demand that they have a sustainable education. Still, I believe that adaptation will change because we will be involved in a lifestyle with climate change that we will not be able to cope with.

M- We are in a post-truth phase. This term reflects the deliberate distortion of reality, manipulating beliefs and emotions to influence public opinion and social attitudes. It is true that consumers no longer know what to believe; they do not know what is true or what is greenwashing. I consider that the term sustainability has become banal, and many use it and it is no longer valued. It is also true that the term regenerative is somewhat complex for people who are not involved in the subject, but that is why I think it is very important to emphasize that we should all become aware and educate ourselves. It will take time, but it is extremely important to relocate our knowledge and consider who our neighbors are, what producers exist in our surroundings, and what the people around us do. By working with local industry, we can see things with our own eyes, get closer, and see what is going on. Instead of believing, we see and experience it in person. With so much virtual influence and everything so viral, it is hard to delimit what is true and what is not.

G- I am convinced that betting on regenerative practices and supporting local industry is the way; of course, it is the way. I think that instead of just saying that this is what is produced and I have to create only with it, it is necessary that we can start designing new materials. Materials that are easy to obtain can provide textile waste, recycle, take into account the fibers and toxic substances, return to nature and encourage diversity in the type of crops that regenerate it. The idea is to achieve smaller chains to supply a regional market. Because we do not need so much, the volume has to decrease. The purchase of fast fashion or second-hand products is an excess. We need to do some internal work to reflect on our consumption habits. It is inconsistent that we have plenty of everything, but in Africa, they are starving.

M- How do you think technology can influence these issues and practices?

G- I believe there is a technology that helps us and another type of technology that harms us. Nature has its intelligence; it just needs a little bit of our support. At least not to disabuse it; it only can regenerate as long as we do not leave it without resources and biodiversity. Everything works together; we are a living system. It is a matter of slowing down, rethinking, re-educating ourselves, and finally finding the purpose and sense of belonging within this ecosystem.

During this conversation, the term and concept of Localism stand out. It stresses the value of geographic proximity and the need to nurture informal forces rooted in regional traditions that can help local communities and natural systems thrive in the face of primarily profit-driven global economic decisions. In the context of fashion, localism contrasts with the global fashion system by offering a decentralized version of manufacturing. This is why regenerative design could be an alternative model. During this conversation, discuss how important it is to move from a globalized industry into a regional one which also begins closer to a sense of community and collaboration. Another primary principle for regenerative design and its practices in the fashion field.

Lara Campos: Hybrid Material Models

Micaela (M)- How would you define what you do?

Lara (L)- Materials designer, researcher, and artist driven by curiosity, process, and exploration. My practice delves into diverse narratives about materials, technologies, and living beings while questioning ontologies and interactions with ecocentric approaches and multi-species ideologies. I use local resources and artisan techniques, and sometimes combine them with digital manufacturing.

M- Why do you think it is important to investigate new materials?

L- It's important to me because I seek to explore new sensory and interactive experiences while trying to devise new material worlds and, consequently, other forms of co-existence. I also believe it is important to know the material world, its origins, processes, cycles, and rhythms until its decomposition, which we are completely unaware of. I believe that researching materials with all the processes they imply gives us tools to make conscious decisions about our ways of producing and consuming. On the other hand, I focus my research on the emotional response, trying to understand matter as something vital, vibrant, with agency in our lives, seeking to dispel the living/non-living binarisms and their consequent hierarchization.

M- How are these new materials produced or reproduced?

L- From the bases of material construction and according to my textile training, woven or non-woven, mono-materials or composite materials can be generated, depending on the intention and function. Sometimes it's a intentional 'bottom down' approach, choosing ingredients based on the properties I want the material to have. Other times it is a completely playful process, guided by the material and my perception of it, in which the last step is to analyze the properties of the result. In both forms, it is an iterative approach in which I combine different ingredients, in different amounts, in different ways/processes.

M- How can we transform everyday waste into a new raw material to generate new materials?

L- The first step to transforming them is exploring them. We usually consider them not useful, beautiful, or nice, but I think that is only due to a lack of effort and creativity. I would also say that the main thing is to separate them, identify them, and process them in as many ways as possible to later understand what we can do with them.

M-Do you think that these processes produced today on a small scale can be industrialized?

L- Power, sure. But I don't support industrialization. I believe that producing more than what is demanded and, above all, more than what is needed is the main obstacle that prevents sustainability. Also, not being aware of the processes of things is the blind spot that makes us dependent on an industry that provides it to us. That dependency, in turn, is the one that does not allow us to look for other alternatives because we are capable of consuming only what is offered to us.

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Gema Gomez *is a speaker, facilitator of accelerated learning processes, and promoter of projects and companies. She has taught courses in different Universities and Business Schools such as IED, IE, EOI, Universidad Fco. de Vitoria, and Universidad de Navarra. She has been a consultant for companies such as El Corte Inglés, Línea Directa (Colombia), and Gioseppo (Alicante). She has led workshops and awareness talks in Spain and abroad and has also been the Coordinator and National Co-Coordinator of Fashion Revolution in Spain.*

Lara Campos *is a Material driven designer, researcher, and textile artist. Her practice blurs the boundaries between materials, technology and biology, proposing new perspectives on biocentric design. Her research focuses on emotional response, merging biomaterials with digital fabrication. She has been granted with several prizes such as Future Wardrobe (2020, 2021) and Be grounded (2019).*

Ramon *is a third-generation wool farmer. His work has always dealt with the wool business and his priority is the welfare of the field, his sheep, and the small environment that sustains and regenerates from generation to generation. He is the creator of "Wool Dreamers," where he applies permaculture practices in the field, preserves land for its fortification, and uses ancestral techniques to maintain a self-sufficient structure.*

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