
REWILDING
TEXTILES
Design for a Regenerative Epoch
A Maison/0 Project

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Design for a Regenerative Epoch

A Maison/0 project produced for
The Sustainable Angle 10th Future Fabrics Expo,
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Photography front cover: Raajadharshini

MAISON/0 LVMH ual: central saint martins FUTURE FABRICS EXPO

Maison/0 is the Central Saint Martins – LVMH creative² platform for regenerative luxury. Our mission is to leverage the agency of creativity and education to help regenerate our climate and biodiversity and to empower emerging talents to design a better future.

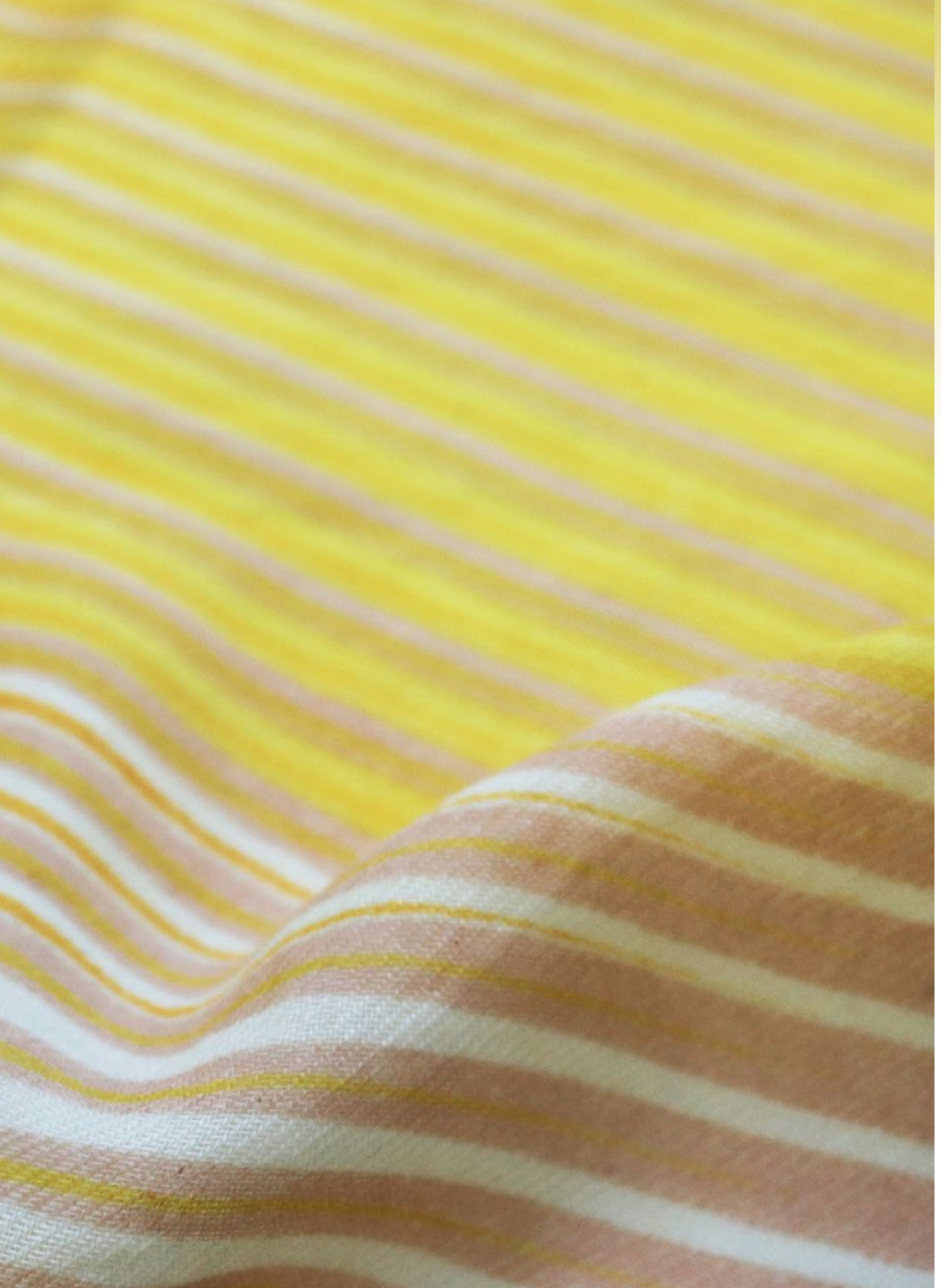
Photography: Maison/0

This publication provides an entry point into the world of regenerative design for textile and fashion designers.

In the midst of a planetary emergency, we want to empower and facilitate creative decision-making for a nature-positive future. For the Future Fabrics Expo 2022 and in collaboration with the LVMH Group Environment team, Maison/0 has produced Rewilding Textiles, a project that celebrates a powerful emergent shift towards regenerative fashion and innovative bio-based textile colouring systems.

We hope this publication will help you start a creative journey that places regenerative eco-social values and the well-being of all species at the heart of your practice.

Professor Carole Collet
Director Maison/0



Rewilding Textiles is an exploratory research project from Maison/0 with three broad aims.

Our primary objective here is to celebrate farmers and suppliers who have made the just and bold transition to regenerative agriculture. In collaboration with The Sustainable Angle and the LVMH environment team, we have sourced a range of fabrics and yarns grown in regenerative systems or designed to foster our genetic biodiverse heritage. These extraordinary materials are grown using ancestral, indigenous and contemporary techniques that actively restore our biodiversity as well as draw down atmospheric carbon. In the midst of a planetary emergency, with an accelerating climate shift and a radical biodiversity collapse, we believe that designers need to use their creative decision making and material sourcing as a powerful means to accelerate change towards a nature-restorative textile system. It is therefore essential for us to support the production of regenerative textiles and to inspire our creative peers by showcasing a textile collection made with regenerative cotton, wool, mohair, nettle and silk.

Our secondary objective is to explore the intersection of bio-based and bio-circular colouring processes to establish the potential of these techniques when combined together. We are using bacterial dyes, algae dyes and inks, as well as food waste dye and print paste. We challenged our design team to develop a colour palette by integrating these processes together to expand their potential.

The majority of our global textile production relies on synthetic dyes that are derived from crude oil, a high carbon dioxide-emitting industry, and have a toxic impact on aquatic life and local ecosystems. We want to imagine a future textile industry not dependent on petro-chemicals. Although traditional natural dyes do not offer a viable alternative at global scale, we are witnessing the emergence of new possibilities with bacterial, algae and food waste dyes. Could we align a colouring textile system with regenerative principles? What are the challenges, limitations and opportunities offered when working with these bio-based processes? And what are their sustainable impacts? In Rewilding Textiles, we aim to prototype a bio-based colour palette for a post-petrol colouring system.

And finally, Maison/0 has created this publication for designers who want to engage with the regenerative textile movement and gain an understanding of their own creative agency to transform the textile and fashion industry. This is an entry point into the landscape of regenerative textile design, featuring a series of short articles, interviews and toolkits. We thank all the experts who have shared their viewpoints and guidelines and we hope this creative endeavour will encourage and support designers to proactively transition to a nature-positive and regenerative fashion system.

Professor Carole Collet,
Director of Maison/0.
@maisonzero

WHAT IS REGENERATIVE DESIGN?

Its relevance to the textile and fashion sector explained

By Professor Carole Collet

The stirrings of a momentous shift towards sustainable textiles and fashion have become more pronounced over the past decade. This shift involves the deployment of multiple strategies, usually focused on using better or less impactful manufacturing processes – in other words 'doing less bad'.

However, the concept of sustainability remains vague, even if a recent focus on circular fashion has enabled the industry to develop clearer and more effective goals. Sadly, as the industry gears up to engage more meaningfully with socio-environmental concerns, ecological degradation – both in terms of climate and biodiversity – is accelerating faster than scientists had previously thought. We have lost nearly 70 per cent of our wildlife population over the past 40 years[1], while up to one in five species is now at risk of extinction due to human-related activities. The latest scientific climate report forecasts alarming climate shifts, with a likely 1.5°C degree increase in global temperatures over the next five years[2]. Both climate breakdown and the rapid collapse of biodiversity have a direct impact on social justice: the most vulnerable communities are in the front line of our planetary emergency.

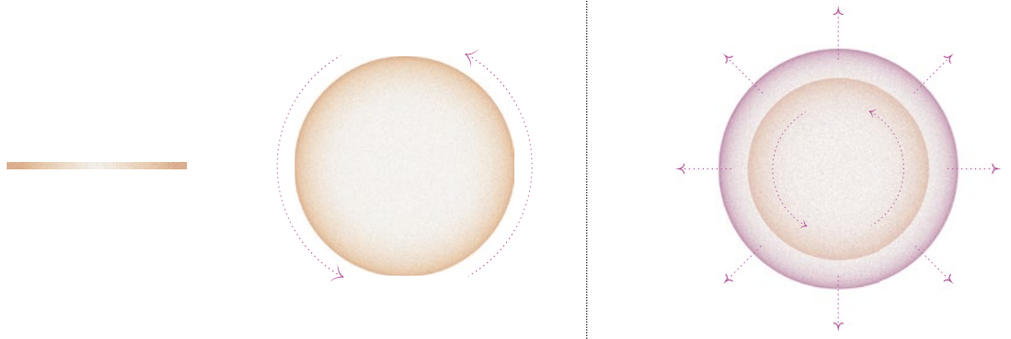
So, in turn we, as creatives, urgently need to accelerate change and use our design expertise to go beyond low-impact manufacturing strategies, defining how we can give back to nature and help regenerate our climate, biodiversity and our global communities. This is what regenerative design is about: a life-conducive, holistic approach to designing products, services and systems in a more than human world.

Aiming for neutral impact is simply not enough. We need to reverse the socio-ecological damage generated by the textile and fashion industry over the past decades and aim at having a restorative impact on the climate (principally through designing carbon negative products), replenishing biodiversity levels (by supporting regenerative agriculture practice) and enhancing the well-being of communities (by adopting a place-based approach to making and supporting fair labour).

All this is, of course, easier said than done. How can we adapt the creative process to respond to regenerative principles? The following diagram illustrates core principles across sustainable, circular and regenerative design (see figure 1).

{Anthropocentric Design}

{Earth-centric Design}



SUSTAINABLE DESIGN
FOCUS ON:
~Minimising impact often still relying on a linear economic model

CIRCULAR DESIGN
FOCUS ON:
~Circular material flow
~Removal of toxic processes
~Passive regeneration

CIRCULAR & REGENERATIVE DESIGN
FOCUS ON:
~Positive/restorative impact on biosphere and communities
~Holistic: designing for a more than human world
~Proactive regeneration

Figure 1: Shifting creative strategies for a planetary emergency, Carole Collet 2022.

In 1987, a report by the United Nations Brundtland Commission defined sustainability as “meeting the needs of the present without compromising the ability of future generations to meet their own needs”[3]. Sustainable textile and fashion design has since evolved to cover a wide range of practices from using better fibres and dyes (that are less toxic), aiming at zero waste or designing with recyclable mono-materials. However, too often the design process addresses only one part of the problem. Fundamentally, sustainable textile and fashion initiatives to date have remained part of a linear and extractive process simply aiming at minimising socio-environmental impact.

With circular design, the message is clear: by designing circular material flow, removing toxic processes and considering upcycling conditions and post-consumption protocols at the design stage, we move away from an extractive linear economy to one that promotes cyclic loops. This is a step closer to how nature works – in interconnected cyclic systems. As a consequence, we remove or reduce the need to extract new raw materials and leave 'more room for nature to thrive'[4].

With regenerative design, the core focus is on using our creativity to replenish what we have depleted and to give back to nature more than we take. This represents a fundamental paradigm shift. Rather than being anthropocentric, regenerative design is earth-centric and promotes a holistic approach to designing for a more than human world. Integrating multi-species thinking, biosphere impact assessment and community values are core to a regenerative practice (see figure 2).

Instead of designing with nature, we design as and for nature. We understand that the human species is a co-dependent of our living biosphere and a wide range of species. This leads us to design in a way that nurtures our relationship with the natural world. However there are many different ways we can adopt regenerative values in our design process. Figure three illustrates two opposite ends of the regenerative spectrum.

From Global to Local:

When working with a global supply chain, the first step towards regenerative design is for a creative team to source textile materials grown in regenerative agriculture systems. An example is luxury brand Stella McCartney working with Söktaş, a supplier of regenerative cotton in Turkiye. By sourcing regenerative materials, designers create a market demand that supports farmers in a transition to a form of farming that restores biodiversity and traps atmospheric carbon. It is also important to pay for these extraordinary materials with a fair price to support human labour as well as to value the services provided by nature (such as pollination by insect). Following on from this is the integration of circular principles to remove toxins from the manufacturing stages and ensure the circularity of the whole product.

From Local to Global:

A more holistic form of regenerative practice is a place-based approach, where the starting point of the creative process is a specific biosphere and its community. This is relevant for small design brands and collectives that have a regional focus, such as fashion designer Angel Chang working in southwest China, or for large brands invested in positive local regeneration across the globe, such as Loro Piana.

A key learning here is that regenerative design is not the remit of a solo designer or design team. It requires a collaborative approach that includes expertise from ecologists, farmers, indigenous communities and suppliers. What matters first for designers is to commit to a new mindset where the creation of a textile or fashion collection can lead to the restoration of nature and social justice. What comes next is to simply ask the right questions, find out the impact of our decision-making and begin a conversation with experts, whether they are soil scientists, farmers, biodiversity and wildlife specialists or communities custodians.

Be brave, be bold. Let’s turn around a toxic textile and fashion system and create a life-giving restorative industry.

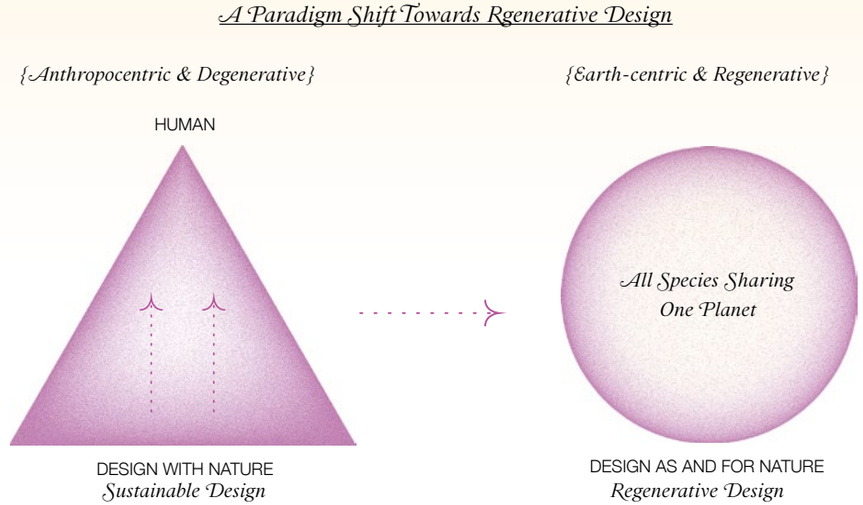


Figure 2: A paradigm shift towards regenerative design, Carole Collet 2022

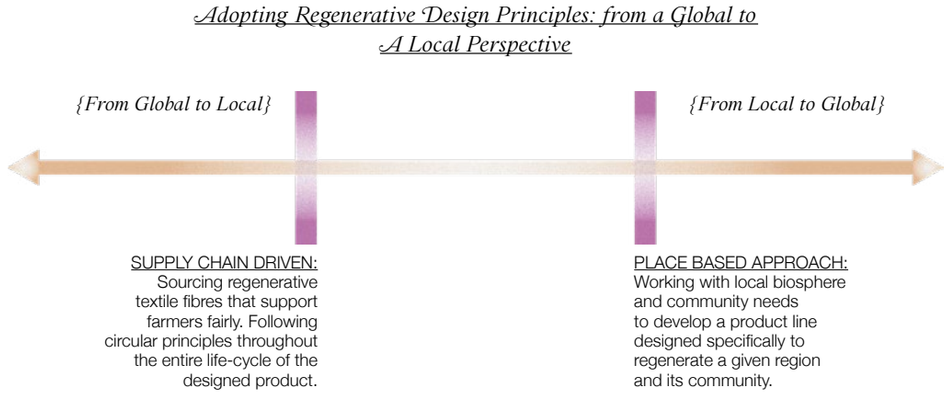


Figure 3: Adopting regenerative design principles: from a global to a local perspective, Carole Collet 2022.

THE EXTRA MILE

You're a designer who wants to support a regenerative industry, but perhaps you don't know where to start. Nina Marenzi, founder and director of The Sustainable Angle's Future Fabrics Expo, and Amanda Johnston, curator of the Expo, are with you all the way.

Interview with Nina Marenzi and Amanda Johnston by Pablo Roa

How did you become interested in regenerative practice?

Nina: It's an extension of what we were doing over the last few years at the Future Fabrics Expo. Rather than just always showing textiles with a lower environmental impact, it's starting to look at how we can have something that is positively influencing or impacting the natural world.

Amanda: I come from a design background. It's a real struggle within education and design practice to teach about the provenance of our materials. It involves really being aware of everything that it takes to make a product. Many designers aren't. They see a material at face value. They only appreciate it from a tactile and aesthetic perspective.

What we're trying to do is connect designers to suppliers directly, so they're having conversations about their sourcing practices and material choices. It's critical to becoming a truly regenerative designer. The word regenerative is now a buzzword. But it's a buzzword that not many people fully understand and what it encompasses, both in farming practice and its holistic design practice.

What are you most proud of achieving in this field?

Nina: That we're still going. That it's huge now and so many people are loving it. It's just really nice to make connections and see your ideas materialise and the traction that it's really creating.

Amanda: I'm most proud of the level of engagement we've had – and the size of the Expo is testament to that. We were knocking on everybody's door for seven years. We were saying, 'Oh, the fashion industry. They're gonna get it one year', and we just kept saying, 'When is the tipping point going to come'? When it came, it was like the floodgates opening. It is exciting to be able to feel like you've made a difference.

> "FASHION IS A DIRTY BUSINESS, BUT IT DOESN'T HAVE TO BE."
>
> *AMANDA JOHNSTON*

What do you hope to achieve over the next decade?

Amanda: To reach more people. You start to realise the effect of the scale of magnifying your voice and how you can be a part of tipping something.

Nina: It's very often a matter of funding and how you can reach students as well as the person in the street. Because fashion, after all, is one of the industries that really touches each one of us. It's a great industry to be in if you want to make a lasting systemic and behavioural change. And I make sure that people understand the message, not just in a negative way: that we can all have a huge impact. What can each one of us actually do to help absorb carbon emissions, for example?

Reducing emissions doesn't mean we're going to reach the goals for all targets by 2030. But if fashion could help with that and therefore our behaviour, then not only is the messaging being amplified but there's also an actual impact in terms of carbon dioxide emissions being

absorbed through fashion.

Amanda: We've got to connect industries together. It's still a revelation to many that food and fashion are really connected. It's grown in the same circumstances and often textile and fibres are grown in rotation with food. Making those connections between industries much more explicit is helpful to drive change because it can share best practice.

What are the challenges of the transition to regenerative decisions?

Nina: One of the reasons why we do what we do is to make it as easy as possible for designers to access this knowledge and these textile solutions. It's a focused sourcing platform for innovations. While we all know and admire designers for the way their brains craft solutions, you can't expect them to be experts in all things sustainability.

The designers are the ones that are most open to it. It's just that they need to be told that this actually exists.

"TRY TO GO THE EXTRA MILE AND THINK ABOUT WHAT YOUR ACTIONS CAUSE."

NINA MARENZI

Is it a growing market?

Nina: Yes. The other one is a sinking ship.

Amanda: Completely. What's my responsibility as a designer to what I've given birth to? When I create a product and put it out into the world?

We need to move away from the designer as God-like and work in communities because one person can't really grapple with all of that at once. It takes teams of people working together.

Nina: Conventional textile production is polluting and toxic, which should be forbidden and outlawed. By showing the route forward and what is in existence today, what is commercially available in terms of sustainable solutions, [we can help] convince the industry to change. But we now know that's not enough. We need to do this at more speed and scale, and that means companies that are producing in a polluting way should be punished and taxed for it. And those that are contributing positively, which are investing in solutions and innovation and sustainability, should be the ones receiving tax incentives, for example.

Tell us about the Future Fabrics Expo. How are you a platform for change in the fashion industry?

Nina: You walk in and you see all the solutions right there. And that is so inspiring. Why would you work with anything else? We're trying to make it as accessible as possible and try to convince the industry that even if there are still some hurdles, they should still persist and keep going down that route.

Amanda: We curate and we cut away all the noise, because obviously understanding sustainability is really complex. We forefront all of that information, we do all the research, make it absolutely explicit on all the documentation. It's like coming to a one-stop shop, a hybrid exhibition and sourcing platform, plus connector of innovators and the best thinkers in the industry. To change hearts, minds and practice and hopefully leverage more quickly.

What can designers do to source better materials?

Nina: Come to the Future Fabrics Expo. If you only ever go to the conventional trade fairs, you're going to miss out on a lot.

Try to go the extra mile and think about what your actions cause. Everyone needs to be responsible for their actions. There is a reason why certain garments cost only £1, why they are produced so cheaply. You just have to ask questions and be curious.

You open Pandora's Box and you can never close it again. Once you've seen inside, not only do you discover lots of ugly truths about fashion, at the same time there's this beautiful world that is regenerative, restorative, with safe chemicals, that isn't polluting, where people are paid living wages... And you don't ever look back.

Amanda: Fashion is a dirty business, but it doesn't have to be.

Thesustainableangle.org

Photography: Scott Bowlby

REWILDING TEXTILES

Prototyping Regenerative Textile Design
A Maison/O Research Project

In this section we present Rewilding Textiles, a printed and knitted textile collection produced with regenerative wool, cotton, mohair, silk and nettle. The design concept is informed by biophony, a process for assessing biodiversity levels by recording the sound generated by all species present in an ecosystem. Our designers began by listening to wildlife in Camley Street Natural Park in Camden, north London. The final print and knit collection is derived from sound map drawings and patterns informed by biodiversity data.

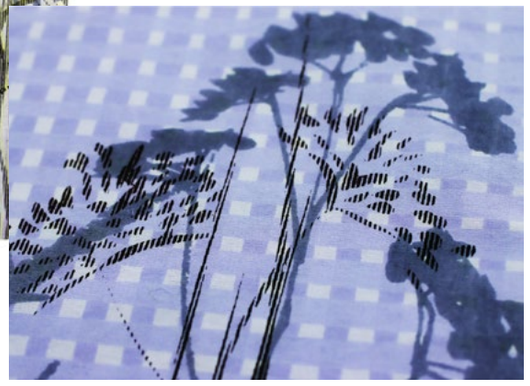
A key challenge for this collection was to intersect the use of bacterial dyes with algae and food waste dyes, a process that has not been accomplished to date. Each of these colouring techniques is currently limited in terms of colour range and requires specific protocols to be applied to fibres. Our aim was to establish their potential so as to expand their colour palette when intertwined together. By combining these processes and developing a set of technical protocols, we have developed new knowledge for bio-based textile printing.

There are key advantages to using these bio-based processes: bacterial dyes do not require the use of mordants and work on all fibre types. Algae pigments and food waste dyes are derived from the food industry waste stream and offer a bio-circular approach to textile colouring. In our collection we have used naturally occurring tannins (such as pomegranate skin) to mordant fabrics and have not used any toxic metal salts. The Detox Sequins are produced by CQ Studio and are biofabricated out of a filtration process that cleans textile dye waste water, whether dyeing with bacteria, algae or food waste.

We want to thank all the suppliers of regenerative textiles sourced with the Sustainable Angle and the LVMH environment team: Friendly Wool, Chargeurs (regenerative wool and wool-silk); Huston Textiles (Climate Beneficial Wool), The Woolist (wool, wool-soy, wool-nettle); Fibras del Viento, Samil, WTB (mohair), Söktaş (regenerative cotton), Nettle Circle and Himalayan Biotrade (regenerative nettle and organic cotton-nettle), and Cocccon (regenerative silk).

We also want to thank Colorifix for providing bacterial dyes, Living Ink and the Culture Collection of Algae and Protozoa (CCAP) for supplying algae-based inks.

DESIGN TEAM:
CREATIVE DIRECTION: CAROLE COLLET
DESIGNERS: RUTH LLOYD AND CASSIE QUINN
COLOUR & DESIGN CONSULTANTS: REBECCA HOYES AND JO PIERCE FROM COLOUR/MATTER
JUNIOR DESIGNERS: TILDA FULLER AND SILVIA ACIÉN PARRILLA
TEXTILE PHOTOGRAPY: HUNG-JUI TSAO



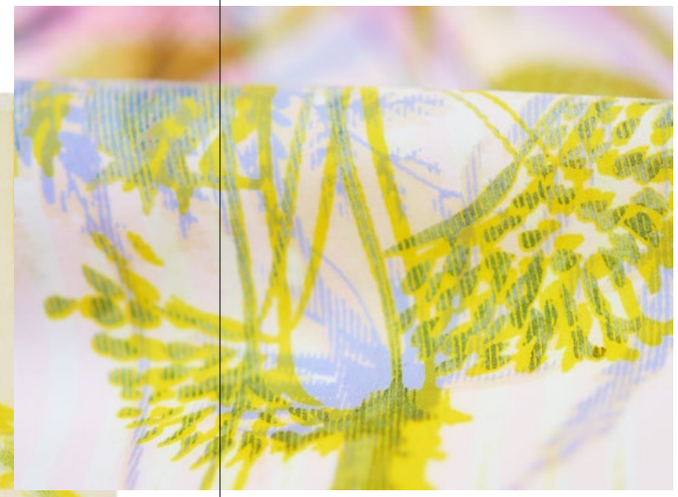
DYE SOURCES

- Bacteria
- Algae
- Algae
- Bacteria
- Bacteria
- Algae
- Algae
- Algae
- Food Waste (Turmeric) + Algae

Regenerative Fabrics:
Cotton (Söktaş)
Nettle (Himalayan Bio Trade)

Regenerative Yarns:
Mohair (Fibras del Viento & WTB & Samil)
Wool (The Wool Library & Chargeurs)

Detox Sequins (CQ Studio):
Bio-based sequins made via a filtering process that cleans textile dye waste water.



Regenerative Fabrics:
Wool (Chargeurs)
Cotton (Söktaş)

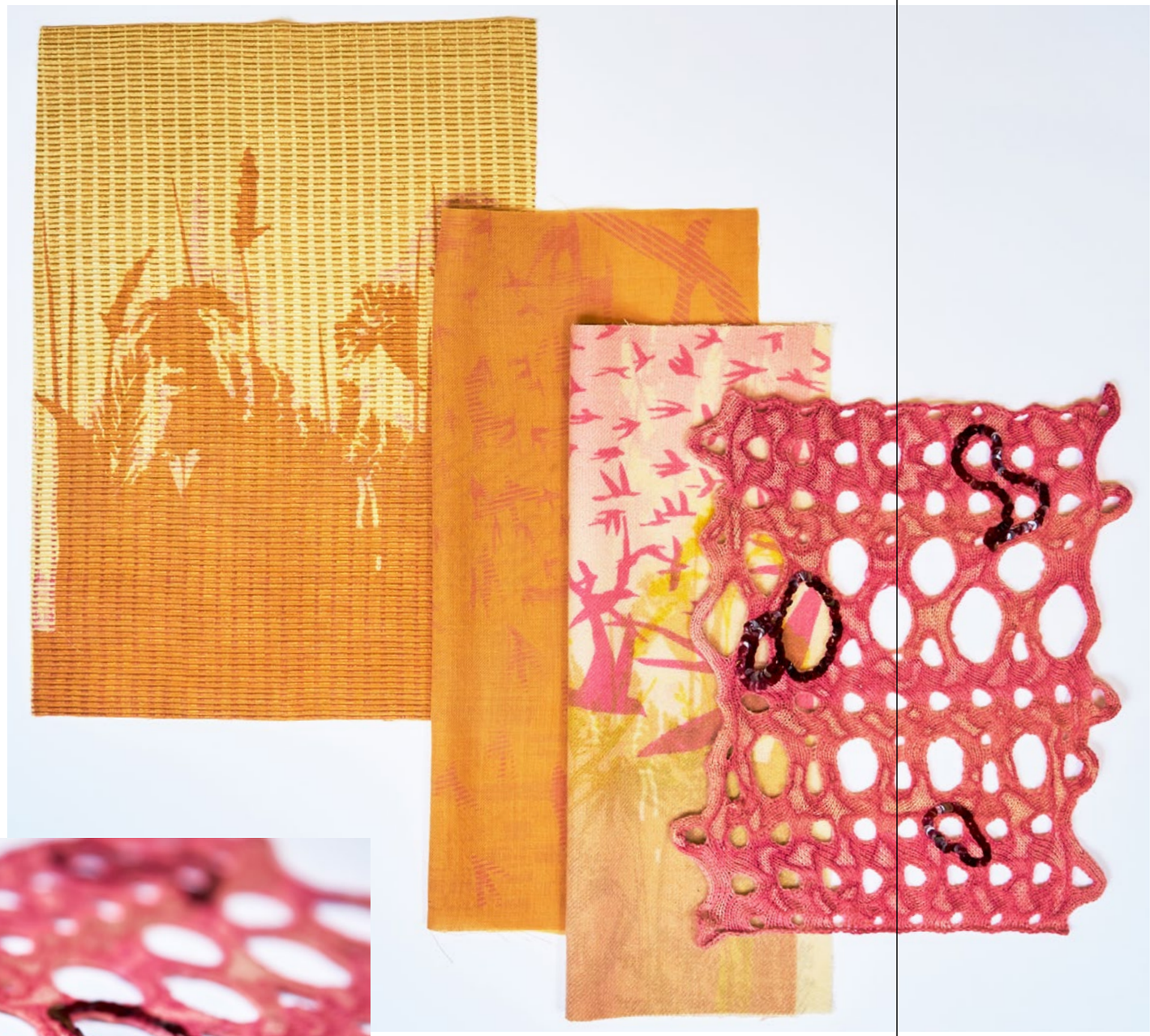
DYE SOURCES

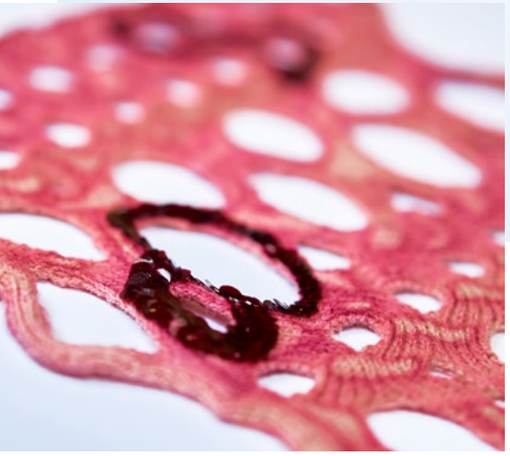
- Algae
- Algae
- Algae
- Bacteria
- Bacteria
- Algae
- Algae
- Bacteria
- Food waste (Turmeric)
- Food waste (Avocado)
- Bacteria and food waste (Turmeric)

DYE SOURCES

- Algae
- Food Waste (Avocado)
- Bacteria
- Bacteria
- Bacteria
- Algae
- Bacteria
- Algae
- Food Waste (Turmeric) +
- Food Waste (Pomegranate)
- Food Waste (Turmeric) + Bacteria
- Food Waste (Turmeric)

Regenerative Fabrics:
Wool (Chargeurs)





DYE SOURCES

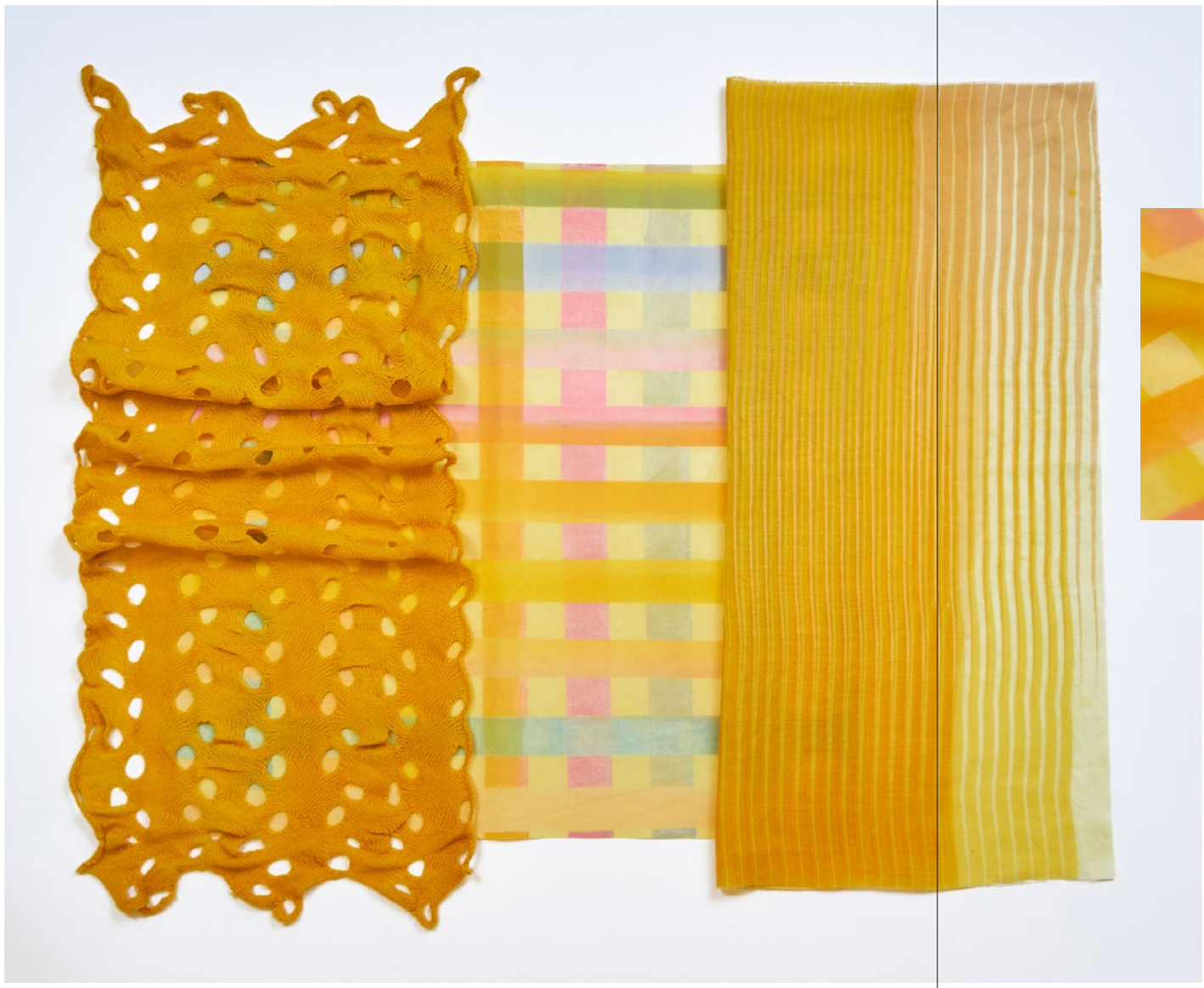
- Food Waste (Avocado)
- Bacteria
- Bacteria
- Algae
- Food Waste (Turmeric) + Bacteria
- Food Waste (Turmeric)
- Food Waste (Onion Skins)

Regenerative Fabrics:
Silk (Cocccon)
Wool (Chargeurs & Huston Textile)

Regenerative Yarns:
70% Cheviot 30% Nettle, 70% Cheviot 30% Soy
(The Wool Library)
Wool (Friendly Wool)

Sequins (CQ Studio):
Bio-based sequins made via a filtering process that cleans textile dye waste water.

Rewilding Textiles© Maison/0



DYE SOURCES

- Food Waste (Avocado)
- Bacteria
- Bacteria
- Bacteria
- Algae
- Bacteria
- Algae
- Food Waste (Turmeric) + Algae
- Food Waste (Pomegranate)
- Food Waste (Pomegranate)
- Food Waste (Turmeric) + Bacteria
- Food Waste (Turmeric)

Regenerative Fabrics:
Cotton (Söktaş)
Wool (Chargeurs)

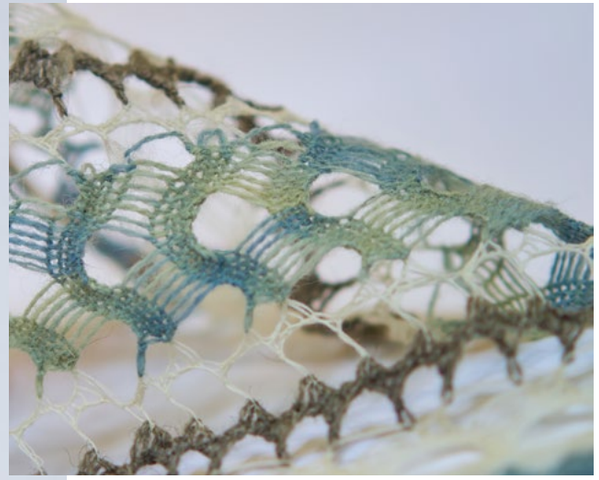
Regenerative Yarns:
Wool (Chargeurs)

DYE SOURCES

- Algae
- Algae
- Bacteria
- Food Waste (Avocado)
- Bacteria
- Bacteria
- Bacteria
- Algae
- Bacteria
- Algae
- Food Waste (Pomegranate) + Algae
- Food Waste (Turmeric) + Bacteria
- Food Waste (Turmeric)
- Algae
- Bacteria

Regenerative Fabrics:
Wool (Chargeurs & Huston Textile)

Regenerative Yarns:
Wool (Chargeurs)
Mohair (Fibras del Viento)



Regenerative Fabrics:
Wool (Chargeurs)

Regenerative Yarns:
Mohair (Fibras del Viento)
Wool (Chargeurs & Fibras del Viento
& The Wool Library & Friendly Wool)

DYE SOURCES

- Food Waste (Turmeric)
- Bacteria
- Algae
- Algae

DYE SOURCES

- Bacteria
- Bacteria
- Algae
- Algae
- Bacteria
- Bacteria
- Bacteria
- Bacteria
- Food Waste (Avocado)
- Bacteria
- Algae
- Algae
- Food Waste (Turmeric) + Algae
- Food Waste (Turmeric)
- Food Waste (Turmeric) + Bacteria
- Food Waste (Pomegranate)

Regenerative Fabrics:
Nettle (Nettle Circle)
Cotton (Söktaş)

Regenerative Yarns:
Wool (Chargeurs
70% (Cheviot 30% Soy, 70% Cheviot)
30% Nettle (The Wool Library)

THE FUTURE OF DYEING

Natural dyes on an industrial scale are not the solution to the polluting impact of colouring – but new sustainable dyes offer hope.

Article by Charlotte Ballard and Gabrielle Colas

Speak to any of the pioneers exploring sustainable alternatives to the complex process of adding colour to clothes and they'll tell you the days of petrochemical-derived synthetic dyeing are done. The challenge is to work out how to replace synthetic dyeing effectively. Natural dyes, so often heralded as the answer, present plenty of problems in turn.

The solution may well rest with emerging and bio-circular technologies, such as the use of bacteria and algae. Collaborations across fashion brands and startups are helping to scale progress, such as the recent partnership between clothing brand Pangaia and biotechnology company Colorifix. These kind of projects offer real hope for sustainable and scalable alternatives to synthetic dyes.

Promising innovation is discussed within The Dyers' Circle, founded by Jackie Andrews-Udall. It's a participative hub and sharing platform bringing together colourists, dyers, historians and designers who specialise in dyed fabric. Collaborators share their experiences as they work to measure the impact of dyes and develop strategies towards environmentally friendly natural textile dyeing.[1]

The impact of colouring techniques has often been overlooked in rethinking sustainable practices of textile production. While it's widely acknowledged that the clothing industry has hugely polluted the environment, until recently the focus has been on the development of sustainable fabrics – rather than sustainable dyes.[2]

Throughout the garment life cycle, from production to landfill, the remnants of non-biodegradable chemical dyes, which are mostly petroleum

based, are absorbed by surroundings such as water and soil.[3] Synthetic dyes were originally created to replace natural dyes, enabling the industry to keep up with soaring global demand. However, we now know the full impact of synthetic dyes, understanding how they endanger the environment (including aquatic wildlife) and often pollute the drinking water of dependent communities.[4] Studies also show that a variety of medical issues are linked to the use of synthetic dyes, including skin conditions for the workers handling them.[5]

A common misconception suggests that natural dyes and the processes behind them are more sustainable and environmentally friendly than their synthetic counterparts. While this might be true enough at small-scale, artisanal level, when upscaled to meet modern industrial demand they can be just as damaging as synthetic dyeing processes. In order to meet global demand, the natural dyeing process would have to expand on such a scale that it would require unfeasibly large expanses of land as well as water, human and energy resources. Since the use of arable land for food production is already compromised by accelerating climate change, the use of a portion of cultivated land to grow plants for natural dyeing is not a realistic option – and nor is foraging, a very small-scale option.

Consider the pigment indigo, which currently produces 50 kilograms of dye per hectare per year. That's a drop in the ocean of the 80,000 tonnes required to support the global denim market. In order to meet current industry demand, a landmass equivalent to the size of Germany would be required.

What's more, important human rights issues should be fully integrated into our thinking. The global dye industry has historically relied on cheap labour, often linked to exploitation of low-paid indigenous workers. For a fairly paid workforce, the cost of naturally dyed textiles would be exceptionally – indeed, unfeasibly – high.[6]

Besides the environmental and human complexities of upscaling the natural dyeing process, natural dyes have limitations in their use. Unlike synthetic alternatives, they're often only applicable to natural fibres such as wool, cotton, linen and silk. The colour range offered by the natural dyeing process is more limited, while the colours created can be inconsistent and difficult to reproduce.[7]

A further limitation of natural dyes is their variable colour fastness depending on the mordanting process applied. Mordants are used to help the dye adhere to the fibre. But unfortunately, they are often made of metal salts and are very toxic for the dyer and the environment, particularly when managed and disposed of incorrectly. Alternative plant-based mordants or tannins are effective and recommended.[8]

So where can we look instead? Researchers are beginning to develop and offer alternative methods of dyeing. These range from using food waste, algae biomass or bacteria grown in fermentation closed-loop dyeing processes. Although not perfect yet, sustainability is at the heart of these methods.

Bacterial dyes, in particular, have seen considerable growth, with new technologies using microorganisms to create a range of colours. Colorifix, a Cambridge-based company, has pioneered the development of bacterial dyes and is in the process of upscaling its technology, recently collaborating with Pangaia Lab for a capsule collection.[9] French company Pili has also developed a bacterial dye system that has the potential to replace synthetic and natural dyes.[10] The key point with microbial dyeing is that it uses no petrol and no chemicals and has the ability to grow in five times less water, with no heat required. Bacterial dyes can also be used across fibre types, from synthetics to natural fibres. They are produced by a fermentation process much like that of brewing beer, exploiting ancestral techniques with a proven track record already in big-scale production of products such as insulin for the pharmaceutical industry. It's a breakthough disruptive system – dyes that can be made on an industrial scale at a low cost and with accurate production.[11]

Both wild-type and engineered bacteria can be used to create a range of colours, with researchers currently working on expanding the colour range. Colorifix uses renewable resources such as sugar, yeast and plant byproducts to grow bacterially-induced colours. The result? A process that uses zero harmful chemicals, less energy and less water and requires no mordants to fix the colour onto the fibre.[12] *(see also interview with Jim Ajioka and Ruth LLoyd/ Colorifix)*

Both scientists and designers have fostered innovation in bio-informed colour strategies over the past decade. Natsai Audrey Chieza, founder of biodesign lab Faber Futures and a TED speaker, has pioneered a design-led approach to bacterial dyeing since 2011 with her R&D project, Coelicolor. By exploring design-driven protocols, she has developed the creative patterning potential of colouring bacteria and inspired a next generation of designers[13] such as Ruth Lloyd, now creative resident at Colorifix.

Also of note is Huue, a startup that has made significant progress using bacteria. The company uses E. Coli to produce indican, the chemical from which we derive indigo. Indican is then turned into the indigo dye, using the enzyme β-glucosidase. This process offers an equivalent effect to traditional

"THE CHALLENGE IS TO WORK OUT HOW TO REPLACE SYNTHETIC DYEING EFFECTIVELY."

methods of indigo dye creation without the use of harsh chemicals.[14]

Besides bacterial dyes, algae are showing potential as a sustainable alternative to traditional dyes. Here again, we witness both science- and design-driven innovations. Living Ink in the US was set up by biologists to develop bio-circular inks made from the by-product of algae food production. The advantage of using algae biomass is that algae grow very fast using sunlight, eating carbon and releasing oxygen. Living Ink says it's producing a black algae-based pigment that has a negative carbon footprint.[15] *(see also interview with Scott Fulbright/Living Ink below)*

On the design side, Studio Blond & Bieber initiated Algaemy in 2014, a design project to research the potential of micro-algae for textile printing. While we tend to think of algae as green, there are many different species offering a wide range of colours for algae textile printing.[16]

The Culture Collection of Algae and Protozoa (CCAP), located in Scotland, is a biological resource centre dedicated to furthering algae-based research. It holds an impressive collection of more than 3,000 strains of a wide range of colours from green to pink, red and brown, and supports researchers and businesses developing innovative algae-based processes, including for textiles. [17]

Furthering a bio-circular model, there are also a range of initiatives developing textile printing from food waste. Archroma has patented a process to transform agricultural and food waste into textile dyes. Its EarthColors are derived from non-edible agricultural and herbal industries waste such as leaves or nutshells.[18] Designers Jo Pierce and Rebecca Hoyes are exploring the design printing potential of food waste via ColourMatter, their experimental studio.[19] Designer Cassie Quinn from CQ Studio is using chitin, the food by-products of seashells, to clean up textile dye waste water and generate a coloured translucent biofilm used for sequin production.[20]

Meanwhile, as research gathers momentum to make the fashion industry more circular, there's a big focus on integrating textile dyeing within closed-loop process. DyeCoo's technology uses reclaimed carbon dioxide from existing industrial processes, recycling 95 per cent of it in a closed-loop process that can be scaled up to meet industrial-scale needs. The DyeCoo process, which uses pressurised carbon dioxide and 100 per cent pure natural dyes, allows the dye to be dissolved deeply into the fibres, resulting in more than 98 per cent uptake of dye and producing vibrant colours. Carbon dioxide dyeing is a dry process that requires no chemicals or water (and therefore no waste water treatment). It's highly energy efficient and cost effective.[21]

Separately, Officina+39, an Italian company, has developed a sustainable dye range called Recycrom using recycled clothing and dead-stock textiles. Officina+39 has developed an eight-stage process in which fabric fibres are crystallised to make a fine powder that can be used as a pigment dye for a variety of fabrics including wool, cotton and nylon. Recycrom dyes can then be applied to fabrics using a variety of methods, such as spraying, screen printing, and coating. The dyes don't fully dissolve into the water used in the dyeing process, making them an advance on traditional dyes which use a chemical solution, and enabling them to be easily filtered from the water, reducing the environmental impact.[22]

Through energetic experimentation and technological innovation such as this – with the full-on involvement of designers and creatives – solutions to the dyeing dilemma are now within sight.

DOES THE FUTURE OF TEXTILE DYE LIE IN FOOD WASTE?

Food waste shouldn't go straight into the bin. To respond to the climate crisis, we need to reuse every resource we have, rather than continuously produce new ones. In 2018, Jo Pierce, pathway leader of Printed Textiles on BA Textile Design at Central Saint Martins, and Rebecca Hoyes, associate lecturer, founded Colour/Matter, a colour research studio that is exploring natural ways to dye and print fabric, especially with food waste.

Interview with Jo Pierce and Rebecca Hoyes by Nina Maria

Photography: Farid Renaïs Ghimas

Jo: Collaborating together on Colour/Matter has enabled us to investigate colour with the intention to develop more sustainable approaches to print. It's born out of what we've been teaching and working on with our students. We wanted to evolve that practice.

Rebecca: We formalised the studio to explore approaches to colour through textiles and materials. Although we have a key focus on colour, we also have a real interest in sustainable materials. The two feel very connected.

Why the emphasis on food waste?

Jo: The textile design industry relies heavily on chemically based dyes and processes to attach colour to cloth. In this project, we want to move away from the petroleum-based system for applying colour and look into a non-petroleum based biological process. Chemicals are standard within conventional dyes and they are very harmful to the water systems. Natural dyes are thought of as a more natural way of colouring textiles, but traditionally natural dyes have used very harmful mordants [dye fixatives] to fix the colour. Food waste offers a more environmentally friendly approach through which we are able to put safely back into the composting system or cycle after the food waste has been used for dyeing. It enables us to develop a circular dyeing system.

How are you developing mordant and chemical free printed textiles with food waste?

Jo: We are working with the principles of natural dyes. But we are taking a step further in that we are removing the metal salt mordants traditionally used with natural dyes. We use only bio-based naturally occurring tannins and natural modifiers to fix or to change the colour. In that way, we can create a wholly biodegradable, non-toxic paste.

Rebecca: We have also been looking at natural binders. It might sound straightforward, but how you fix the colour to the fabric during the printing process is actually quite complex.

Is any colour possible?

Rebecca: Different plants grown at different times of the year in different places will create different colours. So it's not very easy to standardise. That is also the appeal. Blue is quite tricky to obtain in a 100 per cent natural way and is not achievable from food waste. You can get colours, but they will fade. They are achievable, but not necessarily permanent.

Can this be scaled up in the future?

Rebecca: As Colour/Matter, we look at colour with a conceptual eye. At the moment, it's possible to scale up colour production from food waste, but it would need investment and further investigation. It works on a small-scale artisanal level. There are all kinds of interesting things happening with dyeing and printing. There are already examples of materials that are made from food waste that have been scaled up.

Jo: It would be really interesting to think about how you could find larger sources of these waste products for colour. To connect different industries in order to be able to scale a whole system – food waste to dyehouse.

What are you most proud of achieving in this field?

Rebecca: We are proposing alternative approaches to colour and we are connecting our students with new ideas. We're not necessarily proposing results or solutions, but perhaps we are proposing a way of thinking around problems.

Colour-matter.com

What are you aiming to achieve over the next decade?

Jo: Our aim is to build discussion and dialogue and to build awareness on other approaches to textile colouration. We would be really excited to continue collaborating with partners to take some of the ideas to industry to encourage fascination with sustainable colour.

Rebecca: Bringing together different expertise would be very interesting. Collaborating with people outside our immediate field allows us to expand our ideas. We have an interesting residency coming up where we are going to be working with materials and colour specialists to further inform our research.

"WE ARE PROPOSING ALTERNATIVE APPROACHES TO COLOUR AND WE ARE CONNECTING OUR STUDENTS WITH NEW IDEAS."

REBECCA HOYES

Photography: Raajadharshini

BACTERIAL DYEING: A FIX FOR FASHION'S WATER WASTE PROBLEM

Colorifix, based in Norwich, eastern England, uses synthetic biology to produce, deposit and fix bacterial pigments on textiles cost-effectively and ecologically. Jim Ajioka, co-founder, and Ruth Lloyd, designer in residence, explain how chemistry is replaced with biology at each step in the process to build sustainable industrial dyeing systems.

Interview with Jim Ajioka and Ruth Lloyd by Riya Jain

Photography: Farid Renaïs Ghimas

How does the Colorifix dyeing process work?

Jim: Online DNA sequence databases are used to identify the exact genes that lead to the production of a specific naturally occurring pigment. The DNA code is translated into engineered microorganisms that impart the hue to textiles. The bacteria are then used to dye textiles and are killed in the process. These engineered microbes concentrate nutrient salts and metals present in water to levels that facilitate dye-fabric interaction, thereby eliminating the usage of harsh chemicals at the fixing stage.

What dyes can be replaced?

Jim: When you talk about replacing dyes it can be very contextual because of the vast variety. The hue and tone will differ based on the fabrics used and factors like light and colour fastness. In context to replacing synthetic dyes in terms of colour, we're developing a palette within the visible spectrum, but they're not meant to be one-on-one replacements.

Ruth: The goal is to create a full colour range encompassing every hue, but some colours are more challenging than others. However one of the key advantages of bacterial dyes is that we can use them across all fibre types (synthetic, artificial and natural), which is not the case for synthetic or natural dyes.

How fast can it be scaled up?

Jim: We are already collaborating with textile mills and we recently released a limited run of garments with [the brand] Pangaia.

Ruth: These dyes are biological and we can grow a lot in a short amount of time. In contrast to traditional plant-based dyes that require acres of monocultures, large quantities of bacterial dye can be fermented directly in mills. This is a real advantage in terms of upscaling as it also saves on transport, energy and land use.

How does Colorifix ensure sustainability?

Jim: When you look at sustainability, you have to look at it holistically. Fermenting bacteria requires the use of amino acids, derived from animal products in most standard protocols. However, we have chosen to only use feedstock from plant sources. Also, traditional dyes require several washes to prevent colour bleeding, generating large quantities of contaminated water waste. Our method only uses one wash. A recent third-party Life Cycle Analysis (LCA) for dyeing cotton showed that our process uses 50 per cent of the water and reduces carbon dioxide emissions by 31 per cent.

Ruth: The idea is that you would ship very small quantities of these engineered microorganisms to a location [where it would be] fermented to avoid exporting large quantities of extracted dyes. From a local sustainability angle, that's better.

How can designers support your research and help accelerate the transition to a post-petrol dye industry?

Jim: Involving designers helps them understand the limitations and benefits of our systems. In turn, this helps us understand the creative interaction with our processes. Designers need to become aware of the impact of their decision-making process when using harmful synthetic dye chemicals.

Ruth: Some people don't like the idea of using bacteria or microbial pigments. If you can show people beautiful design work that has been produced with bacterial dyes, then their industrial and aesthetic potential is communicated better. Colorifix established my current position as creative resident to integrate design thinking into the scientific and technological process. In the last year as a textile designer, I have been exploring how their bacterial dye technology can be adapted for textile printing.

What are the opportunities and challenges for a designer when working with Colorifix?

Jim: There's a huge possibility for different colour palettes because our process allows for the discovery of pigments that occur in very small quantities in nature.

Ruth: One of the challenges is the lack of an immediate full colour range comparable to synthetic dyes. Some colours are more challenging to obtain than others via bacterial colouring, but this is a fast-evolving new technology.

What does Colorifix hope to achieve over the next decade?

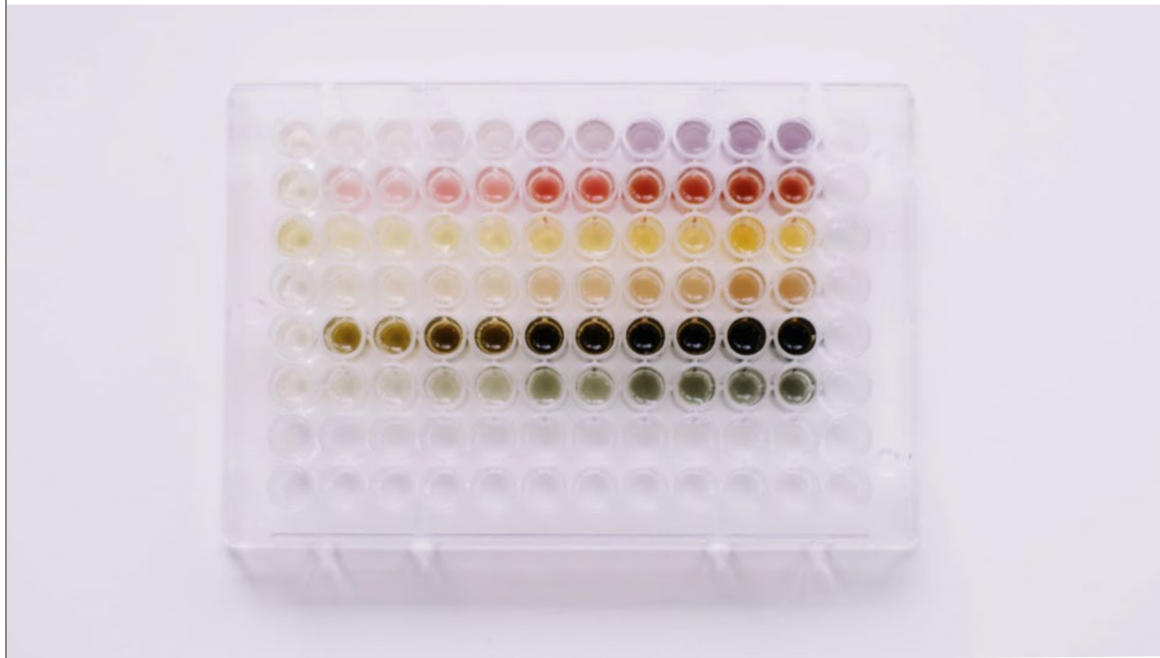
Jim: I hope our system challenges the current global textile dyeing industry with water-saving and chemical-free bacterial dyes. We have decades of work [ahead] to explore the vast colour palette out there and the potential translation of the beneficial properties of these pigments.

"WHEN YOU LOOK AT SUSTAINABILITY, YOU HAVE TO LOOK AT THE PROCESS HOLISTICALLY."

JIM AJIOKA

colorifix.com

Photography: Colorifix



INK FROM ALGAE: CAN IT WORK?

Scott Fulbright, CEO and co-founder of Living Ink Technologies, which develops renewable, safe pigments and ink products from algae, explains how microbial waste is converted into fine black powder, used as a pigment for inks, plastics, rubbers and leathers.

Interview with Scott Fulbright by Shiphrah Parry

Why is Living Ink a potential replacement for conventional dyes?

Currently, carbon black is being used in many inks and dyes in the textiles industry. Carbon black is made from petroleum, which has a large carbon footprint. Carbon black is also on Prop 65 [a list of toxic chemicals] in California as potentially cancer causing. Living Ink makes a carbon black replacement that is carbon negative, safe, renewable and uses waste material.

What are the benefits of using algae ink? And how do you source your algae biomass?

For every 1 kg of black pigment used, there is 4.16kg of carbon dioxide equivalent removed from the atmosphere. Thus, the process sequesters more carbon dioxide than it creates during the process. We work with an algae farm in California that has been growing algae for many decades. They recycle their water, use renewable energy and harvest the algae every day due to the speed of growth. They extract their products of interest – for example, a blue colorant for their natural colour business. There is a by-product stream produced of waste algal biomass. Living Ink then uses this material as the starting material for our process.

What percentage of your ink is bio-based vs. petrochemicals?

We have ink that is 86 per cent bio-based materials. This includes algae pigment, linseed, soya oil and other bio-based components. We are constantly talking to suppliers about getting more bio-based materials. The next goal is to do full LCA [life cycle assessment] on ink – not just pigment- creating 100 per cent biobased inks that perform the same as traditional inks. The two missions at Living Ink are: firstly, to transition all materials away from fossil fuels, and secondly, to create and scale carbon negative materials to have impact.

What colours does Living Ink produce and how would you scale it up?

Currently we work with a partner in one of the process steps. The remainder of the steps are completed internally at Living Ink. We have scaled all the steps to a point where we can make 600kg of ink per day with the capability to print 100,000 T-shirts (6g per shirt). We are focused on black right now – scaling it and integrating it into global supply chains. We have developed other colours of algae such as red, brown, green and purple. However, there is more work to do in improving scalability and performance. There might be a few brand launches of green in the coming year though!

What are you most proud of achieving in this field?

Developing a carbon negative material is extremely difficult. I am proud that we have found a way to put together a supply chain that functions well and has a carbon negative result of the pigment.

What do you hope to achieve over the next decade?

We have developed a model tracking the volumes we hope to create in the future. The goal is to scale this up so we can make a massive amount of material and continue to lower price points. This will allow Living Ink to enter the mainstream ink and pigment markets. We plan to bring in new suppliers and continue to optimise the process steps to refine products and LCA. Lastly, we would love to continue to develop new sustainable technologies, including colours.

livingink.co

Photography: Courtesy of Earthrise Nutritionals

TOWARDS A REGENERATIVE TEXTILE AND FASHION SYSTEM

Viewpoints from Changemakers in the Textile Sector

In this section, we share a range of perspectives from voices leading change. The interviews are intended to serve as an inspirational starting point for designers beginning their journey towards a regenerative fashion system.

Here, we share some of the key ideas and developments in the field of regenerative practice. What are the benefits of regenerative agriculture versus conventional textile farming? Why does restoring soils take centre stage when it comes to climate action? How can we actively connect farmers to designers? Why is the preservation of our genetic biodiverse heritage so important and how do we design with multi-species in mind? And what colour systems offer alternatives to oil-based synthetic dyes?

We would like to thank all the expert contributors for their support and time as well as our editors, writers and photographers.

REGENERATIVE AGRICULTURE: GROWING A BETTER FUTURE

How regenerative farming offers a real alternative for a nature-positive fashion system with its fundamental rethink and reset of how we treat the land and its farmers.

Article by Sameerah Balogun

All the main natural raw materials used by the fashion industry come from the land. Cotton and linen are derived from plants, while wool, cashmere, exotic fibres like alpaca and leather are provided by animals. Silk is obtained from the larval form of the silk moth. Cellulosics such as viscose are derived from wood pulp.

Although leather is generally regarded as a by-product of the meat industry, the other fibres are grown specifically to feed the textile and fashion supply chain. The industry has a grave responsibility to improve its performance in many types of farming to reduce its environmental impact, help alleviate the climate change crisis and improve the life of many millions of workers who toil on the land.[1]

Historically, farmers were seen as being close to nature, understanding the importance of biodiversity and not over-cultivating their land. Conventional farming now, unfortunately, is more likely to involve intensive farming methods for short-term gain of high yields – an approach that came to dominate farming in the second half of the 20th century. It involves excessive use of toxic pesticides and fertilisers, overgrazing and monocultural farming, massive use of water resources and poor conditions for its workforce.[2]

Too often, biodiversity all but disappears, while direct and indirect pollution endangers all species, including humans, and adds to the global carbon footprint.[3] Common Ground, a 2020 report by the International Union for Conservation of Nature (IUCN), outlines how, in many parts of the world, intensification and expansion of agriculture have degraded soils and ecosystems, depleted water sources and reduced

biodiversity. “As a result, farmers often have no choice but to search for new land to work, or to use soil as a substrate with massive synthetic inputs,” says the report.[4]

At its worst, intensive conventional farming is a cause of social and environmental misery. Organic farming is viewed as a better option, typically using ‘natural’ methods to grow crops and raise livestock.[5] It has a long history. The Bristol-based Soil Association, for example, has been campaigning against intensive farming and the over-use of pesticides since 1946.[6] Effectively, intensive farming, whether for food or textile production, has a degenerative impact on climate, biodiversity and human health.

The quality of organic farming is monitored by a number of certification programmes, including the Global Organic Textile Standard (GOTS) and Organic Content Standard (OCS), which the Soil Association uses to confirm products are “organic”.[7] In countries as far apart as India, Türkiye, China and the USA, organic fibre production – especially for cotton – requires the withdrawal of synthetic fertilisers in favour of natural alternatives. Pesticides are replaced with beneficial insects, which are natural enemies of the pests that are harmful to plants (or animals) during the growing season.[8]

“IF YOU DON’T ACKNOWLEDGE SOCIAL INEQUITY... YOU ARE MISSING THE WHOLE CONVERSATION OF REGENERATIVE AGRICULTURE.”

Rebecca Burgess

Fundamentally, the difference between conventional and organic textile agriculture is that the latter does not use GMO crops and does not rely on synthetic pesticides and fertilisers. It is concerned with replenishing soil health and biodiversity.[9] For all its benefits, however, organic farming is regarded as requiring more financial resources and labour than conventional production of natural fibres.[10]

The economic issues relating to organic farming – more time, more labour, lower yields – have meant the shift towards eco-friendlier and more benign practices has been rather slow. The fashion industry needs to build relevant support systems to help farmers transition to organic growing.

But there is now a third farming option – regenerative agriculture – which goes beyond and above organic principles and is rapidly gaining interest as the ultimate nature-positive agricultural model. Championed initially by the food industry, it is now picking up traction in the fashion sector.

Aiming to reverse the effects of industrial conventional farming, regenerative agriculture adopts holistic farming and integrated livestock grazing practices that, among other benefits, reverse climate change by rebuilding soil organic matter and restoring biodiversity in the soil, resulting in carbon drawdown and improvements in the water cycle.

Practices used to improve soil health may include organic techniques such as not using toxic pesticides and herbicides, but they also seek to understand nature’s own way of restoring balance in the local ecosystem to make decisions that work in harmony with it. This includes, for example, the introduction of livestock to complement the cycle.[11]

Aras Baskauskas, CEO of Los Angeles-based womenswear label Christy Dawn – its motto is “Honoring Mother Earth” – has said: “What are we trying to sustain? The fires, the tornadoes, the mass extinction? We don’t need to be sustainable, we need to be regenerative.”[12]

Regenerative agriculture aims to rethink and transform our current extractive, growth-driven and unjust textile supply chain systems. Its intention is to improve overall soil health, replenish biodiversity, improve the availability and quality of water, increase yields, as well as promote animal welfare and the resilience and empowerment of local communities.

While there is no agreed international certification for regenerative agriculture yet, it is now acknowledged as the premium approach – a form of agriculture that can help us reverse the socio-ecological damage of intensive farming and combat climate change.

It is critical for designers to work closely with farmers and suppliers of organic and regenerative textiles to support the transition.[13] Söktaş, for example, is currently collaborating with Stella McCartney and its cotton was showcased in the COP 26 exhibition, Future of Fashion: An innovation conversation with Stella McCartney (November 2021). The company is also working with a soil scientist to evidence how regenerative farming can rebuild living soils and trap carbon.[14]

The holistic approach of regenerative agriculture goes further than organic farming in terms of confronting social injustices and intersectionality – the term for overlapping and interdependent systems of discrimination

or disadvantage. “If you don’t acknowledge stolen land, if you don’t acknowledge social inequity, if you don’t acknowledge systemic racism, then you are missing the whole conversation of regenerative agriculture,” says Rebecca Burgess, founder of California-based Fibershed, a not-for-profit organisation committed to “developing regional fibre systems that build soil and protect the health of our biosphere”.[15]

Since European powers began building global empires from the late 1400s onwards, indigenous people have suffered at the hands of foreigners taking their lands and depriving them of their rights. The problems persist today.

“As indigenous peoples, we experience firsthand the environmental degradation and impacts climate change has on our plants, animals and other nonliving things that are an integral part of our ecosystems,” says indigenous environmental scientist Dr. Jessica Hernandez, who is of Mayan heritage and is based in the Pacific north-west of the USA.

The textile and fashion industry has been as guilty as any sector of eco-colonialism. Predominantly white corporations’ practices of governing indigenous land and its assets without respecting indigenous sovereignty are now being challenged. Instead, the emphasis is shifting to involving communities in decision-making or offering them resources.[16]

“WE DON’T NEED TO BE SUSTAINABLE, WE NEED TO BE REGENERATIVE.”

Aras Baskauskas

Western environmentalism and its ideologies have tended to overthrow local sustainable traditions and exchange them with harmful ones. Regenerative agriculture can be seen as a return to longstanding traditional practices, which are being rediscovered by large Western multinationals.[17]

Part of the holistic approach involves including farmers on a decision-making level from the beginning of a project, committing to the building of longstanding relationships and the development of new supply chains. Several companies, small and large, have now made it their mission to help navigate a transition to regenerative agriculture. The Textile Exchange, a leading global non-profit organisation, has recently published a very detailed analysis of the emerging regenerative textile landscape. It puts forward a powerful message for the fashion sector to proactively support radical and much needed shifts towards a regenerative textile system.[18]

The Savory Institute has at its core the regeneration of the world’s grasslands and the restoration of biodiversity through holistic management. While focusing on regenerative sourcing solutions for raw materials, including leather and wool, the Institute supports other companies in reducing their global impact on land and species through sharing knowledge on holistic management via online courses, as well as providing an extensive resource library.[19] *(see also interview with Sheila Cooke)*

Founded in England in 1999, Earthworm Foundation is an internationally active non-profit organisation that is focused on the transformation of traditional supply chains into regenerative ones. It aims to improve the relationship of people and planet and so create incremental value for society at large. Through its membership scheme, Earthworm guides brands and retailers on ongoing journeys of transformation.[20] *(see also interview with Bastien Sachet/Earthworm Foundation)*

Putting such ideas into fashion reality is Nishanth Chopra, who in 2016 founded the Oshadi Collective as a womenswear label in India. He is now cultivating a new fashion system by bringing traditional Indian agricultural practices and the artisan heritage of the country to the forefront. Operating under the slogan, “Cultivating a regenerative fashion system from the soil up”, Oshadi works with a network of local farmers and artisans, who are focused on giving back more to the earth than they take, ensuring their production is sustainable and fair.[21]

Transforming conventional farming practices into regenerative ones has more benefits than just getting us a step closer into reaching the 1.5° goal. Transforming agricultural practices via a holistic approach brings us closer to replenishing our ecosystems while inducing the systemic change needed to achieve social equity.

Photography: Camille Lemoine

DESIGNER PERSPECTIVES: THE NUANCES OF REGENERATIVE AGRICULTURE

Textile Exchange, a global non-profit campaigning to advance the use of sustainable fibres and materials, is supporting regenerative agriculture. Beth Jensen, director of its holistic Climate+ strategy, discusses the indigenous roots of regenerative farming and how designers can respond.

Interview with Beth Jensen by Hitanshi Kamdar

How do you advise designers who want to transition to a regenerative design approach?

The first thing I would talk about is how we think about regenerative design. A general way to think about it is making apparel in ways that support circularity concepts that are going to leave the planet and its people better than we found it. There's a great diagram that defines regenerative as going beyond sustaining. As an industry, we have to move away from having this idea of "tell me the checklist of things to do, and I'll do it". We have to be more nuanced and educate ourselves about the different context-specific considerations and trade-offs that are involved in everything.

From a designer perspective, it's thinking about how you might use regenerative materials in your product. There's all this material out in the world – how do we make sure that it stays in circulation? Leather, cottons, animal fibres are all great candidates for regenerative agriculture or regenerative grazing practices. Depending on if it's a designer who's doing it all or working in conjunction with a sourcing team, it's about what your supply chain looks like. Are there suppliers who might be interested in building a more regenerative approach that the designers can partner with? Companies need to build those relationships with their farmers and growers as well.

Why should we acknowledge the indigenous roots of regenerative agriculture?

It's important that we, as a sector, don't ever delude ourselves into thinking this is some sort of new brand new concept. These concepts may feel new and exciting to a lot of companies in the apparel and food sectors right now. However, these are not new practices to Native people. Just consider the example of America: Native people had their land stolen by white settlers who put extractive agricultural practices in place. And we're now trying to reverse the negative impacts of those practices.

It's about recognising the historical patterns of primarily western appropriation of Native cultures and learning from Native understanding of how to do things in tune with nature and the environment in ways that we're able to be sustained and regenerate the earth. This is about going back to the way things used to be done. How can we do that in a way that's fit for today while taking the lessons and wisdom of those cultures.

"THERE'S ALL THIS MATERIAL OUT IN THE WORLD – HOW DO WE MAKE SURE THAT IT STAYS IN CIRCULATION?"

Beth Jensen

Why does a holistic approach to regenerative design matter?

There's this great diagram that references the concept of carbon tunnel vision. The climate crisis is the defining crisis of our times and we need to reduce GHG [greenhouse gas] emissions drastically. But what ends up happening is that companies focus solely on that, not necessarily taking into account other impact areas like biodiversity, soil health, deforestation, water pollution, social labour impacts, community impacts and animal welfare impacts. If you only try to optimise GHG emissions, you can often see unintended consequences in other areas if you're not actively bringing them into the discussion. For example, say you convert a bunch of land to being farmed regeneratively – that is a great idea in principle. But if you are cutting down a bunch of forests to do that, it's going to have consequences in other areas.

What do you hope to achieve over the next decade?

We've set a goal for the industry of 45 per cent reduced GHG emissions related to the production of fibres and materials at the farm or ranch level. But we also need to create beneficial impacts in other areas, so we have a strategy called Climate+. This recognises that we can't ignore other interdependent impact areas. We've also done extensive greenhouse gas impact reduction modelling which includes three levers – materials substitution, regenerative agriculture and degrowth.

Additionally, the United Nations fashion industry charter for climate change, which we actively support, has the goal that by 2030 all main materials used by the apparel industry will be considered preferred and low-climate impact, which would either be clothes that are closed-loop recycled or use natural materials regeneratively produced.

Getting to 45% in Tier 4

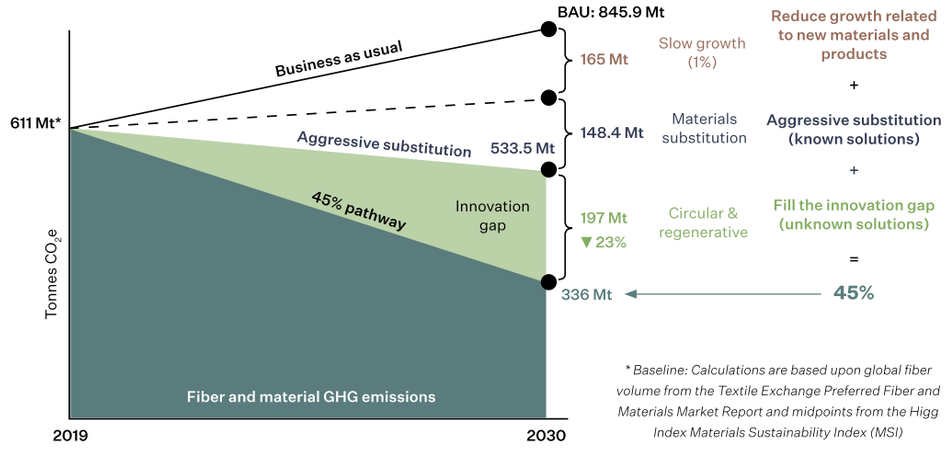


Figure 1: Modeling of interventions needed in the apparel and footwear raw materials extraction phase in order to achieve 45% GHG impact reduction by 2030, as measured against a 2019 baseline. Image credit: Textile Exchange

textileexchange.org

WHY SOIL MATTERS

Soil (and worms) are in the spotlight right now thanks to the work of the Earthworm Foundation, a non-profit organisation that focuses on the restoration of soil health – which is vital for biodiversity and the climate as well as for fashion and textiles. Bastien Sachet, CEO, explains more.

Interview with Bastien Sachet by Pablo Roa

Photography: Raajadharshini

How did you become interested in the idea of regenerating our soils?

It started when I worked as an agronomist. I was sent to Cornwall, England, to sell fertilisers to British farmers. All their soils had gone acidic. They had lost the clover that grows in pastures. Cows were sick because their stomachs were acidic from not having a balanced diet. I met some farmers who were putting in calcium carbonate to regulate this. When they do that, clover grows back. Clover stores nitrogen from the atmosphere, so it does the job of the fertiliser. I told farmers to look after the acidity in their soil – they would save money, and their cows and pasture would be healthier.

When I joined Earthworm, we developed a model that allows companies to protect and regenerate forests. We realised that to regenerate, you need to work with farmers. Farmers were in a vicious cycle, using more nitrogen, which is a very acidic fertiliser – [they were] thinking that it would boost production. But by doing that they were increasing their costs and making a monoculture pasture.

Regenerating soils is about letting nature do things by itself – trying to look at what is off-balance compared to what the natural environment should be, and to act and pilot it so that nature can function at its maximum potential.

Why is the restoration of soil health so important?

There are three key ecosystems – oceans, forests and soils – in which most of the biodiversity, most of the carbon, is stored alive. By protecting these ecosystems, you have the biggest impact you can have on biodiversity and climate. Most of what we consume comes from soil. Cottons you wear, food you've eaten today, all of it comes from soil.

So if you act on the root cause, which is the origin of food, of how climate and water cycles are balanced, how biodiversity is created, you have a good chance to address many of the subsequent problems. It is necessary because we don't have time. Pesticides only attack the problem's symptoms.

"DESIGNERS ARE THOUGHT LEADERS – THEY CAN SAY THINGS AND CARRY MUCH MORE THAN A DESIGN. THEY CARRY A SPIRIT."

Bastien Sachet

What can be done to rebuild soil health?

All we need to restore soil is to do more photosynthesis – produce more vegetable matter on soils and let them degrade. Because most of what we produce, we harvest and take away. We leave nothing. We plough and destroy the soil.

To reverse this process and to regenerate, we need to grow crops and vegetables that we leave decaying and decomposing on the soil to feed all the bugs that are hungry. As these bugs develop, they produce all sorts of molecules that will eventually make that soil richer in organic matter. To regenerate soils, you need to grow more vegetation, more photosynthesis that you let decompose. And as you do this, organic matter in the soil will increase. As it increases, soil regenerates.

How can brands help farmers transition to more regenerative practices?

The challenge for a brand in fashion is two-fold. Knowing who is making your fibre and where it was produced is a key thing. And then what to ask to those who are producing, and how to deploy enough leverage to get them to transform their practice.

Today, brands are disconnected from where their fibres are produced. It comes from a long chain of processing that puts the farmer far away. So the first thing is to reconnect with the farmer. Maybe you will discover that you're connected to farmers in India or Peru and that they are producing your cotton. Many farmers don't have a clue how their cotton or their viscose is used. Suddenly, you make that reconnection. Once that channel is established, you can go to step two. What can we change together?

The second step is to assess the leverage that you have as a brand. If you don't have enough, you group with brands or partner up with the supplier and ask what can be done. And there is a necessary reinvestment into how we help farmers transition. Farmers who transition create savings – it becomes more profitable to farm in a regenerative way. But there is a three to five year transition period, which is risky, because they have to learn new things. Brands have the possibility to mobilise money, funds to help pay for experts, and folks who can support the farmers' transition.

What can designers specifically do to help?

The first thing designers should do is reconnect with nature. The fashion industry can be very urban. And although there is a sense that sustainability is key, the reconnection to something that is not very fancy is hard. A farmer is far away. It's far away from the codes promoted in the brand. If designers are aware of what their decisions will be, they will think about conceiving in a different way.

Designers are thought leaders – they can say things and carry much more than a design. They carry a spirit, they propose something to society. I believe they need to be aware of these ecosystems. If they do this, they will create and inject some of that into their designs. Just reconnect with nature, reconnect with how the products you design are made. And then you will think about it when you create.

Earthworm.org

Photography: Maison 0

Photography: Raajadharshini

LVMH: THE TRANSITION TO REGENERATIVE LUXURY

Luxury giant LVMH is working hard to become more regenerative across all its Maisons, launching Life 360, an ambitious sustainability plan, in 2021. Alexandre Capelli, Environmental Deputy Director, discusses driving a shift in mindset across LVMH brands and offers advice for designers ready to make the change.

Interview with Alexandre Capelli by Lara Grobosch

How is LVMH accelerating the transition to regenerative supply chains in fashion?

The environmental direction of LVMH has existed for almost 30 years now, so it's not a new commitment. We had a first programme called Life 2020. Now we have Life 360. [It's called] 360 because we have set three key deadlines – 2023, 2026 and 2030 – and we are convinced that we need this holistic vision of sustainability.

It's a programme based upon four main pillars: creative circularity, traceability/transparency, climate and biodiversity. Creative circularity is mainly about eco-design of products, accelerating the implementation of new circular services like renting, upcycling and second-hand. Traceability means being able to trace all our raw materials back to the field and mine. Transparency is about sharing the environmental footprint with consumers at the product level. For climate we have a commitment on scope 1 and 2, reducing carbon dioxide emissions at our stores, offices and manufacturers. We also have a target on scope 3, the rest of the value chain: raw material production and transport.

For biodiversity, we have set an objective to restore five million hectares of habitat for flora and fauna by 2030. We believe that, as part of civil society, we need to work on our supply chain, but we also need to help global efforts outside the supply chain.

"TRY TO ASK YOURSELF WHERE IT COMES FROM AND HOW IT WAS MADE."

Alexandre Capelli

How do you incorporate regenerative practices on a larger scale into all the LVMH Maisons?

Whether it's a large, medium or small company, it's a challenge because moving to regenerative practices is about rethinking and redesigning the whole concept of producing raw materials and designing products. We take it step by step by defining first what this means concretely in the field. I don't think we will have one single solution for all raw materials – it will be for cotton in Türkiye, cotton in India, cotton in Africa, each time defining what regenerative means for different parts of the world, and for this commodity.

How do you deal with the challenge of cultivating a shift in mindset across all LVMH brands so that all teams work towards the same goals?

All we need to restore soil is to do more photosynthesis – produce more vegetable matter on soils and let them degrade. Because most of what we produce, we harvest and take away. We leave nothing. We plough and destroy the soil.

It's a journey and it's a lot of training. We have training sessions to explain to our teams internally – buyers, designers, developers – what transitioning means for them. I think in 2022, everyone understands that the biodiversity and the climate crisis are here. It's just a matter of explaining

and defining the criteria and we work with experts from the Earthworm Foundation, the Savory Institute and reNature.

Who are your key collaborators? We are working on cotton in Türkiye, for example, with a company called Söktaş. We cooperate with local NGOs and farmers on the ground to implement regenerative agriculture. We are also working with a French supplier called Chargeurss, which has a programme dedicated to regenerative wool called Nativa. We are partnering to accelerate this programme in Uruguay, but now we are also looking at Australia, because it's the main country for merino wool. In addition, we are collaborating with a South African organisation called BKB that produces mohair.

For LVMH, what is the significance of Maison/0, the platform you have developed with Central Saint Martins? For LVMH, Maison/0 is our laboratory to think outside the box. We have the ambition to move to regenerative luxury, and we are convinced that this is not only about agriculture, but also about design. Through Maison/0 and Central Saint Martins, we are collaborating with students, academics and our own brands to explore what this means and find concrete practices to move to regenerative design.

What are you most proud of achieving with LVMH so far in relation to regenerative luxury? In less than two years since the beginning of the LIFE 360 programme, we have been able to launch a regenerative agriculture programme in all our areas of activity – perfumes, fashion, and wine and spirits. This is the biggest success for me.

We stopped using herbicides in all our vineyards and we got a picture of our vineyard in Champagne two months ago, and for the very first time there was grass everywhere. A few years ago, you only had bare soil. I'm very proud of this picture, because it's a concrete illustration showing that we can move and that it can happen quickly. We are not perfect, but at least we have started in all sectors.

What do you hope to achieve with LVMH over the next decade? If we are able to have a healthy ecosystem and happy farmers in our main countries of sourcing for wool, cotton and leather, I will be very proud. When I see the vineyard covered with grass, it gives me hope. I would be proud if we could see such a picture for all our raw materials everywhere in the world. Another great success will be if, together with Maison/0, we manage to convince designers to adopt regenerative practices and make them understand what transitioning means for them.

By 2030, we want all new LVMH products to result from eco-design. We have defined eco-design criteria for all our divisions and now we are working on implementing IT tools to monitor and track them.

What would you advise designers to do to incorporate regenerative practices within their brand? Be open-minded, think outside the box, look for innovations and new materials and challenge yourself. I know that most designers are looking for quality and colours, but also try to ask yourself where it comes from and how it was made. Try to become a bit more of an engineer.

Lvmh.com

"FOR LVMH, MAISON/0 IS OUR LABORATORY TO THINK OUTSIDE THE BOX."

Alexandre Capelli

Photography: Hung-Jui Tsao

FIBRESHED: RESTRUCTURING THE FASHION INDUSTRY

Fibreshed is a global grassroots organisation that develops regenerative regional fibre systems. Local communities around the world identify their own priorities within the framework of core values: labour, dyes and fibres all sourced locally, and soil to soil textiles. Deborah Barker of the Southeast England branch explains how they are reimagining the structure of the fashion industry.

Interview with Deborah Barker by Alice Lindsell

Explain how Fibreshed UK operates. As it's a grassroots organisation, although I can tell you about Fibreshed UK I can't speak for it. The way we operate is that we're all independent. We promote scaling through replicability, and not scalability. The fashion industry is obsessed with scalability, which amazes me, given the problems with global supply chains. As soon as they're disrupted, they collapse. What Fibreshed is developing is a network that's the same as nature – the biodiversity in nature is what we're seeking to replicate. Our priority at Southeast England Fibreshed, because of our proximity to London, is focusing on connecting farmers and designers, the rural and the urban.

Why is it important to connect designers with farmers? There are lots of organisations doing brilliant work that are raising awareness of the environmental and social injustices caused by the global fashion industry, and the problems of having large, industrialised, global supply chains. But there aren't many organisations that offer a new paradigm and can model that. I think Fibreshed's strength is that it can do that – it's demonstrating what that new paradigm could look like.

Fibreshed offers a way of producing clothing and textiles in a localised regional system that can sequester carbon, reduce the use of fossil fuels, support biodiversity, and is resilient to extreme weather. It can create meaningful and fairly paid livelihoods for people throughout the supply network. Everybody who's involved in creating the fabrics, clothing,

and textiles has an equal stake in that system. By working within our bioregion and regional boundaries, we can better understand the planetary boundaries that we're working within. We see first-hand the impact that we can have.

What projects are being developed in the UK? I'm in the process of setting up a project mapping regenerative fibre farmers in Southeast England to understand the volume of wool being produced through regenerative farming and the wool quality. From that knowledge base we'll facilitate partnerships between designers and farmers to show what's possible to create – building on the work we did with the Phoebe English studio in 2021. Related to this we are about to start work with South West England Fibreshed to produce resources for farmers to help them to improve the value of their wool clip and to support designers and farmers to work together.

I am also working with South West Fibreshed on a podcast for Farmerarama Radio that will be launched in the autumn. Alongside this work is an ongoing project to understand the barriers to growing natural dye plants in the Southeast.

Looking forward to 2023 we are working with Arizona Muse, the British-American model, on developing a project to increase the production of biodynamically farmed wool through her charity, Dirt. And the Berlin based Lissome Magazine has funded a series of on-farm events for BA and post graduate fashion students to understand the connection between fashion and farming.

In the North West, a project titled Homespun/Homegrown is creating homespun, homegrown blue denim made from flax. Then there's a flax growing project in Wales, and in the North West they're growing woad and flax. Emma Jane Hague, director of the South West Fibreshed – the longest established – created a film last year called Reconnecting Fashion with Farming and she's just established a bursary fund to support local Fibershed members to develop projects. There is also a Fibreshed that has been just set up in Ireland and two in the process of being established, one in Scotland and another in the Midlands.

What are you most proud of achieving in this field? I think opening a dialogue and exploration, as well as facilitating an understanding between farmers and designers. When we launched Fibreshed in London I invited farmers and designers to come. My favourite comment from the evening was from a designer: "When I looked around this room you couldn't tell who's a farmer and who's a designer." A lot of designers have admitted to being scared of farmers because there is quite a big cultural divide in many ways. But bring them together and they're both passionate about fibres, the planet and doing better.

Also, the project that we did with Phoebe English last year. We looked at how we could create the most regenerative garment possible within the resources of the Southeast England Fibreshed. It was shown at the British Library as an exhibition as part of London Fashion Week.

What are you hoping to achieve over the next decade? I'd love a diverse and resilient network of producers, growers, makers and consumers – though I feel we should have another word for consumers. What is foreseen with Fibreshed, when it's working, is people who are wearing clothes being actively involved in that process – part of it is to have that transparency. So it's about growing a regional resilient network to produce bioregional clothing within an equitable and socially just system.

southeastenglandfibreshed.org/

"WHEN I LOOKED AROUND THE ROOM, YOU COULDN'T TELL WHO'S A FARMER AND WHO'S A DESIGNER."

Deborah Barker

Photography courtesy: Walter Bailey

GENETIC BIODIVERSITY: THE ROLE OF THE DESIGNER

Genetic biodiversity, or ecological variety, is a crucial factor in determining the long-term survival of plant and animal species on troubled Earth. Designers have a part to play in a big reassessment.

Article By Kiera McMillan and Pia Benthien

New thinking – or the readoption of old thinking – is desperately needed by the textile and fashion industry as species are going extinct at an unprecedented rate.[1] Our non-stop attempts to shape and mould the planet to our liking, even down to something as banal as ridding supermarkets of "wonky" vegetables, has created massive environmental problems. A lack of diversity is likely to make crops and animals genetically weak, rendering them less able to stave off infections or survive changing weather conditions.[2]

Design has a role to play in resolving this crisis. It's an essential part of the process of reinvention that is needed to create a more sustainable society.[3]

Genetic biodiversity must be at the heart of this process. Supporting biodiversity through design is just one element of holistic regenerative agriculture, which opposes the current growth logic economic model of the apparel industry by prioritising the acknowledgment of indigenous practices and ecosystems, recognising the fight against climate change to be intersectional and inter-species dependent.

Supporting and learning from indigenous communities are crucial for any designer striving to meet emerging industry guidance regarding conscious design practice (such as the COP 21 Paris Agreement and the Convention on Biological Diversity). While Indigenous Peoples make up only 6.2 per cent of the global population, they are the stewards of 80 per cent of the remaining biodiversity, according to a Textile Exchange report published this year.[4]

Innovative designers, non-profit organisations and various companies are pioneering the movement toward degrowth within the fashion industry and beyond, with biodiversity central to conscious textile production.

An early pioneer is Sally Fox, a cotton breeder based in California who helped rediscover the value of endemic species of naturally coloured cotton. While most of us think of the cotton plant as producing white fibres, in fact there are different varieties of cotton – and some were used by ancient civilisations because of their brown or green coloured fibres. Since the late 1980s, Fox has been developing an organic cotton called FoxFibre in various shades of brown and green to adapt these early species to industrial use.

Although other farmers have also developed naturally coloured cotton, Fox's cotton was the first that could be spun into thread on an industrial machine. She utilises a unique cross-pollination technique that encourages biodiversity. As she has put it, "The seeds that develop in these cotton balls will be hybrid seeds, and the beginning of a lot of potential, new variability."[5]

It can take Fox about 10 years of crossbreeding before a new shade of cotton is ready to be sold on the commercial market. This biodiversity pioneer has expanded from cotton to add a flock of 140 merino sheep and almost 30 acres of Sonora wheat fields to her farm.[6] The sheep eat and predigest the invasive weeds that grow in Fox's crop fields, making them more palatable to soil microbes. This reduces the need to risk damaging the soil by tilling it with a tractor and plough.

"I MEASURE MY SUCCESS BY HOW MANY LIVING THINGS ARE BENEFITING FROM WHAT I AM DOING."

Miguel Santistevan

Fox describes the merinos as "such an integral part of this farm's life. Plus, of course, they produce super-fine and colourful wool".

Sonora wheat is a soft, white winter wheat that is believed to have been introduced into the Sonoran Desert region of modern-day California and Arizona by Spanish missionaries in the mid-17th century. Sonora plants have extra-long roots that aid carbon sequestering – an important regenerative practice that every aspect of Fox's farm is designed to encourage.[7]

In a similar approach, Zoe Fletcher and The Woolist are working towards re-valuing the genetic heritage of native wool production in the United Kingdom. Fletcher has carefully documented and archived the types of wool (quality and colours) generated by the 72 different native breeds. She has teamed up with farmer Maria Benjamin to create The Wool Library, a platform to source fully traceable native wool. No other country in the world has as many pedigree sheep breeds as the UK, and this new platform enables designers to access a wide range of fleece beyond the main breeds.[8] *(see also interview with Zoe Fletcher and Maria Benjamin below)*

Another fashion industry player known for its commitment to natural genetic biodiversity is Italian luxury manufacturer and retailer Loro Piana, which has been part of LVMH since 2013. A specialist in using rare fibres such as cashmere, the company creates garments from the ultra-soft fleece of the vicuña, a relative of the llama in the Andes region of South America. The Incas considered the wool so luxurious that only royalty was allowed to wear it. By the late 1970s vicuñas were close to extinction due to an exodus of local shepherds who quit their rural existence to find better-paid work in cities.[9]

In the 1980s Loro Piana worked with the Peruvian government to create conservation programmes to save the few remaining wool farming communities. Its interest also ensured it was one of the few businesses allowed to buy the fleeces for commercial purposes. (British luxury brand Johnstons of Elgin has also worked on similar initiatives to protect its sources of vicuña fleece). The strategy has included keeping poachers at bay – a perennial problem for the small camelids.

Vicuñas roam free across the high Andes. They are rounded up, typically every two years, so the small quantities of the precious fleece can be shorn. It takes 35 vicuña fleeces to make enough cloth for a (very expensive) overcoat. In the past some animals were killed to speed up the shearing process. Today, Loro Piana has encouraged indigenous farmers to shear and process the wool with sustainable, cruelty-free methods, thereby keeping local communities viable.[10] The daily wages of workers on vicuña farms are four times higher than they were before the Italian firm's involvement.[11]

Working on a much larger scale to preserve genetic diversity is Canopy, which is one of the world's leading non-profit organisations prioritising biodiversity and forest protection in the fight for greener design practices.

Founded by Australian activist Nicole Ryecroft in 1999, Canopy has been campaigning to transform attitudes to sourcing and production. Including companies as varied as Asos, Alexander McQueen and LVMH, Canopy partners with over 750 brands throughout the fashion industry and beyond to create systemic change throughout the supply chain.

Acknowledging that the actions of all people are needed to act together as a species on a planetary scale, Canopy prides itself on its collaborative approach to the biodiversity crisis. From policy development to supply chain innovation, it provides a practical framework for forward-thinking brands and companies.

Protecting endangered forests is at the top of the organisation's manifesto for innovative change, providing brands that purchase wood-derived products like pulp, paper, packaging or viscose with regenerative alternatives.

Our endangered forests and ecosystems play a vital and irreplaceable role in the conservation of the climate and biodiversity, which cannot be replicated by technology. Revealing the bleak future of forests, Canopy notes that in a typical year 3 billion trees are logged for packaging alone, while 150 million trees are cut down to make viscose for fashion apparel.

Paper packaging is widely regarded as a viable alternative to plastic, but it comes partly at the cost of valuable and endangered forests, says Canopy. This results in irreversible damage to biodiversity as forests that are industrially disturbed are fundamentally changed, particularly in terms of tree species and wildlife.

With a dramatic loss of biodiversity, the extinction of threatened species is accelerated and people who call the forest home are displaced, their livelihoods damaged. Biodiversity, therefore, is central to the maintenance of our forests, and vice versa; the healthier the forest, the more carbon dioxide is absorbed, maintaining a climate in which people and planet can thrive.

Alternatives to wood-based materials are becoming increasingly important, and Canopy provides several tools and resources to encourage brands to consider such options.

As part of its CanopyStyle initiative, Canopy has generated a Hot Button Report in which fabric producers are ranked based on a number of factors: production capacity, completion of audits, conservation legacies, next generation solutions, sourcing policy, transparency, supply shifts, and chemical use and emissions. This list of factors provides an accessible profile through which brands and designers can assess the efforts their industry partners are making to proactively engage with innovative textile production.[12]

An equally important tool to help designers discover makers globally whose practices establish a harmonious, conscious relationship with nature and biodiversity is the Making Nature project. Revealed in the exhibition Gaining Ground: Learning from global craft practices, staged at the Crafts Council Gallery in London (April-June 2022), the project is led by Prananda Luffiansyah Malasan from the Institut Teknologi Bandung, Indonesia, in collaboration with Nicholas Gant of the University of Brighton.

It uses digital technology to map regenerative craft practices across Indonesia and the UK, connecting makers with a shared goal of promoting biodiversity through design. The project aims to elevate the importance of community craft practices and their contribution to bio-diverse methods and solutions to the climate crisis through collaborative knowledge-exchange.[13]

While there is still a lack of genetic biodiversity across agriculture and textiles, the work of Sally Fox, Loro Piana, Canopy, Making Nature and others represent an encouraging shift in how the fashion industry thinks about regenerative design processes. Their efforts are good examples of how collaboration is key to increasing biodiversity and combating the climate crisis.

An ecosystem is only as strong as its most vulnerable members. Ethnobiologist and farmer Miguel Santistevan, who is based in Taos, New Mexico, has inspiring words for today's biodiversity-conscious designer: "I measure my success by how many living things are benefiting from what I am doing."[14]

HOLISTIC AGRICULTURE: HOW TO NURTURE THE ECOSYSTEM

Fashion design disrupts biodiversity through the growing of natural fibres, a process that typically involves the use of fertiliser chemicals, huge volumes of water and culls of livestock. By developing regenerative farming, the food chain remains intact while soil is replenished organically. Sheila Cooke, co-founder of Land and Livestock Management for Life (3LM), a member of the Savory Institute, discusses the benefits of conscious agriculture.

Interview with Sheila Cooke by Alice May Stenson

How did you become interested in holistic management? I've always been keen on how humans evolve and I'd like all of humanity to learn how to take care of our earth and ecosystem processes. When we do that, we will all be healthy and happy, so I hope that people will continue learning and gaining an interest in this field.

How are species affected by the practices of conventional farming? In nature, we have functional groups of animals, plants and microbes in the soil. When a group is missing, especially an apex predator, everything goes out of balance. As the human population grew, people wanted to control nature and they didn't understand the unintended consequences, so farmers killed off animals like the coyote, bear and wolf intentionally. That's a reason for deer overpopulation, low life quality and an increase in deaths from starvation.

By not sourcing regeneratively, we impact on the health of the planet. Plastic-based clothes can never be recycled. As we wash them, particles are going into the ocean and our waterways – 60 per cent of seabirds in the UK have been found with plastic in their stomach. Farmers use petrochemicals, nitrogen phosphorus or potassium, which disrupts all life in the soil – plants get very imbalanced nutrition. Ingested by livestock, it creates proteins that can grow incorrectly, leading to laminitis [a painful condition of the hoof] in sheep, infant mortality, conception problems and mastitis [udder inflammation].

There's a chemical called glyphosate commonly used in farming for wheat desiccation. It remains legal to use in the EU despite being toxic to humans and animals. Transgenerational research on rats, conducted by Dr Zach Bush, suggests it leads to

forms of cancer, insomnia and obesity from malnutrition. It impacts genetic cell transcription and scares me far more than climate change. It means that conventional farming methods have the power to exterminate the human species and animal life on earth.

"FASHION DESIGNERS SHOULD CONSIDER THE STARTING PLACE OF FIBRE – IT IS MINED OUT OF THE SOIL."

Sheila Cooke

How can species benefit from regenerative farming? In holistic management you learn to work with natural, non-harmful substances, which benefits the cellular animals, the bacteria and the soil. These have a symbiotic relationship with plants. With regenerative farming, you will put sheep into a paddock, but only for a short time – it might be [a few] days – but we use a grazing plan and move those sheep to the next paddock. So they're getting fresh grass and the need for artificial wormers is greatly reduced. It's helpful because they don't have any toxins ingested, and this has benefits across multi-species: so dung beetles will be quite healthy, then birds can eat those dung beetles and not get sick.

What we very often see on holistically managed farms is that insect life returns and birds become abundant. But it requires more than just farmers – it requires everyone who's buying the products that farmers are growing to become aware of this, be willing to buy it and use it. The more that we do that, and the less we use plastics in our clothing, the less we will harm animal life.

What can designers do to help? Fashion designers should consider the starting place of fibre – it is mined out of the soil. In holistic management, there are three classifications of wealth: mineral, paper and solar. Mineral wealth is anything mined out of the soil, including petroleum-based polyester, fertilisers and insecticides that degrade the ground. Paper wealth is human labour and financial subsidiaries given to farmers. Solar wealth is everything naturally derived from the sun.

What fashion designers can be interested in is helping farmers get 100 per cent of their wealth as solar wealth – it's a reliable means to regenerate our planet without any unintended consequences. Since farmers control 70 per cent of land in the UK, this could be hugely influential. If designers started demanding that they want wool grown on natural, regenerative soil, it would transform market demand and have the potential to change agriculture overnight.

Photography: Maison/0

Photography: Maison/0

WOOL LIBRARY

The Woolist is a designers' toolkit created to help designers gain better insight into the rich and diverse history of British wool. Now, founder Zoe Fletcher has teamed up with Maria Benjamin, co-owner of Dodgson Wood Farm in the Lake District, on a new project, The Wool Library. It's a platform for designers that helps them to source and develop fully traceable yarn and knitwear.

Interview with Zoe Fletcher and Maria Benjamin by Eva Pramschuefer

How did you become interested in valuing the genetic diversity of sheep in the UK?

Zoe: I was looking into what knitwear designers needed to know. Making a jumper out of a Herdwick wool yarn turns out to be very different to one made out of Shetland yarn. It's about being able to compare and contrast these types of wool in an aesthetically pleasing way – while still being really useful on a commercial level.

Maria: For me, I joined my partner John on his farm about eight years ago, and I wanted a little flock of my own sheep. That got me started in researching how each breed has its own history and its own unique qualities.

Why is it important to support biodiversity of sheep breeding?

Maria: Because the genetics are really important. When something goes extinct, there's a loss and they are gone for good. Since the RBST (Rare Breeds Survival Trust) started in the 1970s, we haven't lost any British breeds, but there were definitely lots lost before then.

Zoe: Something that is dangerous as well is the reliance on one breed. Take for example the Australian Merino. Breeding ewes account for around 75 per cent of the Australian flock. If something happened to them – a disease or illness – then that's a huge chunk of the farmers' livelihood taken out. However, with the vast variety of sheep breeds kept within the UK, there's more chance of finding a resistant strain, which could then be utilised to minimise flock loss. We've got a far more variable foundation to build back this integral agricultural infrastructure.

How can the Woolist and The Wool Library help designers?

Zoe: I wanted to make this knowledge accessible to a lot of different people, That's why I started doing The Woolist, providing toolkits for designers. You can get

virtual ones, but I also created a physical toolkit where you can touch and feel the yarns. I analysed them under the microscope, so we can see the different scale structures, which affect how they react to the different dyes and washing methods. I think the versatility of creating this toolkit then naturally evolved into The Wool Library. It fits into a real-world scenario – we have proven that this adds value to a lot of different people, from the spinning mills through to the designers and the consumers.

How can designers support the revival of breeds?

Zoe: Use more wool!

Maria: We found it shocking when we talked to brands. We realised that so many high street brands endorse a fast fashion value system. Smaller designers that would like to work more ethically have struggled with the system because it is geared up for big producers. So there isn't that support for designers that want to buy smaller quantities of breed-specific single-farm yarn. By giving them the option, the hope is that they see the value in what we can offer.

"FASHION IS AGRICULTURE – AND SO MUCH OF THAT HAS BEEN LOST."

Zoe Fletcher

What are you most proud of achieving in this field?

Maria: I think that we're part of our system, so I don't think we can kind of take any credit. But I do see the prices have gone up for farmers and the wool board [British Wool] is changing how they work so that they can support businesses like us. That's actually pretty amazing.

Zoe: And I think having that kind of visibility as well. People are coming to us now and wanting to talk through the opportunities. So they don't just want to buy yarns, they want to know the story, they want to figure out how they can play a part in that journey as well. That's really exciting.

What do you hope to achieve over the next decade?

Maria: We want to be seen to be really supporting a lot of different designers and brands and we want to increase the value and understanding of British wool production.

Zoe: Definitely. And also to be seen as facilitators for others as well. So it's not just about growing our company, but being able to bring more people in on that journey. The re-education is part of bringing designers in. Fashion is agriculture and I think so much of that has been lost. And yes, it takes a lot more work, but the rich variations that we could have just within this small little country can have such an impact on so many different people.

Thewoollibrary.uk

Photography: Camille Lemoine

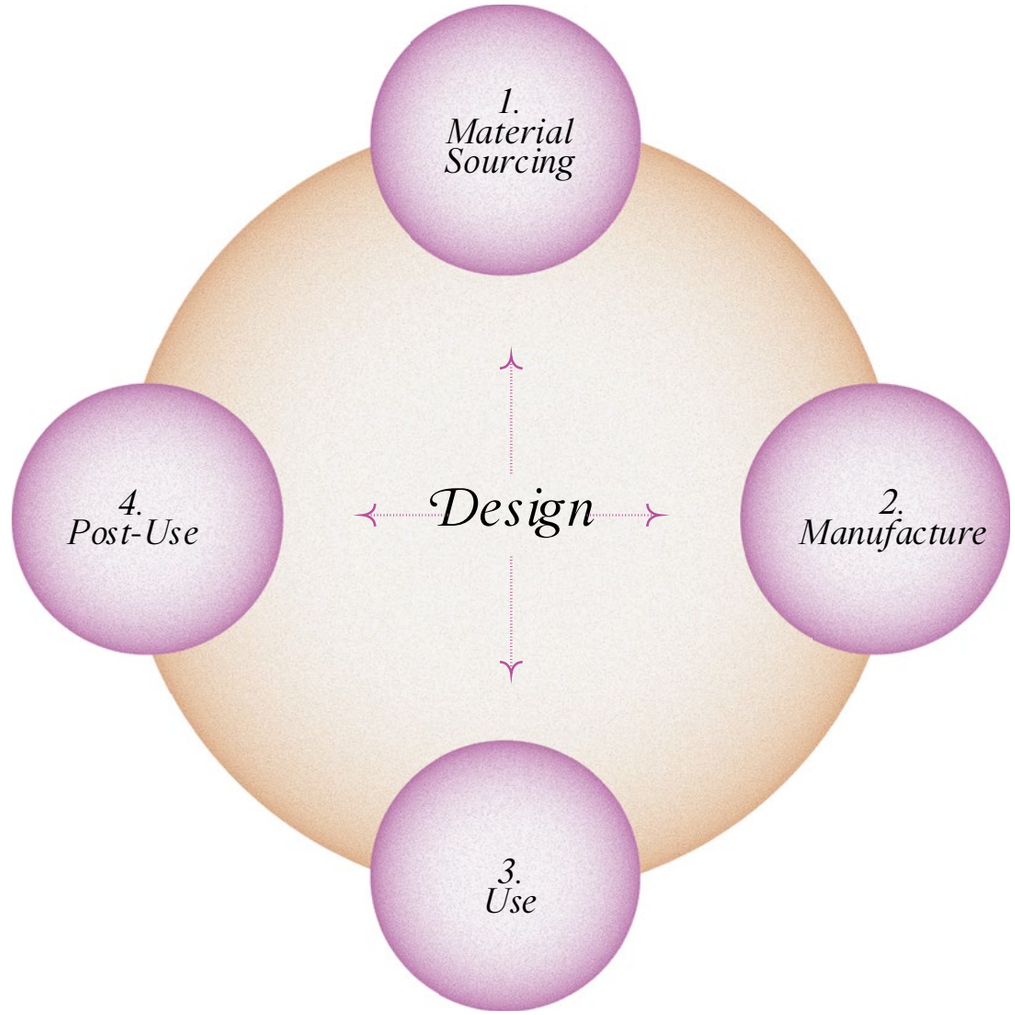
LET'S BE CHANGE-MAKERS

How to begin your journey towards regenerative design

Here, we've gathered references, tools and further readings that can help textile and fashion designers transition to a regenerative practice. This is not intended to be an exhaustive list of information, but we hope it serves as a helpful starting point for further research and exploration.

TOOLKIT 1: REGENERATIVE CIRCULAR DESIGN

Use this tool to explore how your design decisions can inform regenerative circular fabrication throughout the life-cycle of a product.



Use the worksheets below to identify how you can have a positive regenerative impact on climate, biodiversity and communities at the design stage. (beyond low or neutral impact)

1. **Material sourcing:**
   How can my design specifications lead to sourcing materials that have a positive restorative impact on climate, biodiversity and communities?

- What information is available/missing?
- Identify gaps in expertise
- Identify relevant collaborators and supply chain
- Identify latest innovations in sustainable textiles

NOTES

Examples: choose to design with textiles grown in organic regenerative agriculture; engage and support farmers who are adopting nature-positive methods; work with a deadstock sale platform; source bio-based and upcycled materials. Develop action plans that ensure fair trade and social justice at the sourcing point.

2. **Manufacture:**
   How can my design specifications lead to manufacturing processes that have a positive restorative impact on climate, biodiversity and communities?

- What information is available/missing?
- Identify gaps in expertise
- Identify relevant collaborators and manufacturers.

Examples: Work with your suppliers to identify clear targets for positive impacts on climate, biodiversity, and local communities. Remove toxic processes to ensure no pollution (air, water, soil) by integrating closed-loop systems or developing nature-based solutions. Adopt eco-certification labels.

3. **Use:**
   How can I maximise the use and care of my products?
   How can I plan product re-circulation at the design stage?

- Identify the relevant business strategies and collaborators (rental, re-commerce, returns, repair).
- Clearly identify best care and repair information for consumers.

Examples: Explore different design strategies for rental and re-commerce: what are the implications for your brand?. Consider how the product can be repaired at the design stage, and ensure clear communication to consumers.

NOTES

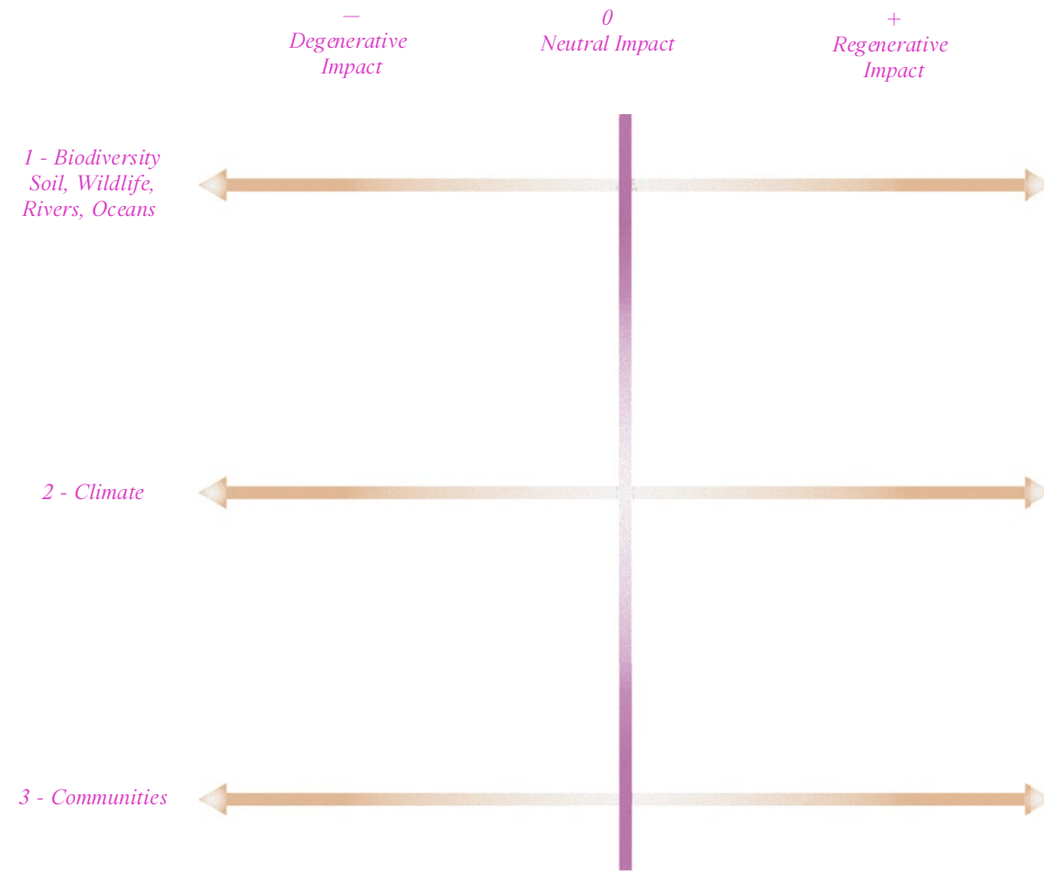
4. **Post use:**
   How can my design specifications enable the recycling and reuse of product post consumer use?

- What information is available/missing?
- Identify gaps in expertise
- Identify relevant collaborators.

Examples: Consider the recyclability of your product at the design stage so that your product can be recycled within existing schemes. Develop circular ecosystems with your supply chain.

TOOLKIT 2: DESIGN TO RESTORE LIFE AND SOCIAL JUSTICE

Use this tool to assess the current impact of your design collection on biodiversity, climate and communities. Explore design strategies to progress to positive impacts.



Explore how your design decisions can shift your collection to creating positive and regenerative benefits.

1. What is the current impact of my design decisions on biodiversity?

Example: if you currently source cotton from conventional farming models, your design decision leads to the depletion of soil life, the destruction of wildlife habitats, the poisoning of insects, mammals and aquatic life. If your textile finishing supplier releases untreated dye water in river streams, your choices directly impact aquatic life.

Be a change-maker: design to restore and nurture life

Identify the points of concerns or where you lack knowledge and information.

Identify where you can impact change via your design process and think of the consequences of your design decisions on all species.

Identify organisations that can help you develop nature-positive supply chains.

2. What is the current impact of my design decisions on climate change?

Example: some materials have a higher carbon footprint than others: are you taking this into considerations in your design process? Have you developed a design strategy to be in line with a 45% carbon reduction by 2030 in the fashion sector?

Be a change-maker: design to trap carbon

Identify the points of concerns or where you lack knowledge and information.

Identify where you can impact change via your design process in relation to your brand's carbon footprint.

Identify organisations that can help you develop a climate positive strategy.

3. What is the current impact of my design decisions on human communities?

Example: do you know who grows your materials, who makes your clothes? Are you insuring fair wages and equal opportunities in your supply chain?

Be a change-maker: design to restore social justice

Identify the points of concerns or where you lack knowledge and information.

Identify where you can impact change via your design process in relation to your brand's social responsibilities.

Identify organisations that can help you develop integrate social justice in your design and brand strategies.

FURTHER READINGS

This list serves as a starting point for further research into the issues and ideas explored in this publication. We list key online resources and include references to our expert contributors as well as suppliers contributing to the regenerative textile collection.

On climate
IPCC: The Intergovernmental Panel on Climate Change
UN Climate conferences (COP)

On biodiversity
IPBES: The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IUCN, International Union for Conservation of Nature
WWF Living Planet Reports
Campaign for Nature
Global Footprint Network

On social justice
Fashion Revolution
Activist Aditi Mayer

Platforms for change
Canopy
Change Now
Common Objective
Earthworm Foundation
Fashion for Good
Fibershed
Future Fabrics Expo by The Sustainable Angle
La Caserne
The Mills Fabrica
Nonasource
ReNature
Savory Institute
Science Based Targets Initiatives, Apparel and footwear guidelines
Textile Exchange
Regenerative Agriculture Landscape Analysis

Circular and regenerative economy
Ellen MacArthur Foundation
The Doughnuts Economics Action Lab

Bio-based textile colouring
Colorifix
Couleurs de Plantes
Culture Collection of Algae and Protozoa (CCAP)
Dyeco
EarthColors® by Archroma
Huue
Living Ink
The Dyers' Circle
Pili
Radiant Matter
Recycrom by Officina +39

Design-led textile colouring research (UK)
ColourMatter
CQ Studio
Deborah Barker
Faber Futures
Phoebe English
Ruth Lloyd
Jackie Andrews-Udall

Growing naturally coloured fibres
Fox Fibre
Naturally coloured organic cotton

List of textile suppliers for the Rewilding Textiles collection
Chargeurss
Friendly Wool
Huston Textile Co.
The Woolist & The Wool Library
Fibras del Viento
Samil
WTB
Söktaş
Nettle Circle
Himalayan Bio Trade
Cocccon

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