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SME NATURE POSITIVE INNOVATION FINANCE REPORT

Support For SMEs' Contributions to Tackling the Nature and Biodiversity Crisis in the Fashion and Textile Industries

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Executive Summary

Against the backdrop of an urgent need for change of the fashion and textile industry towards more sustainability, this report explores how nature positive action can be embedded in Textile and Fashion SMEs. It examines what financial and other support is required to achieve this, and how SMEs can develop their environmental reporting to aid investors and other stakeholders in making decisions.

Given that the main pressures on nature in the fashion and textiles industry occur at the beginning of the value chain, the main focus of this report is on innovative SMEs that seek to transform value chains towards more sustainability, with some attention also given to SME adopters of nature-positive practice (e.g. retailers, brands) and their sourcing practices. The case studies highlight businesses that provide natural fibres from regenerative sources for products and brands. The report draws on a rich qualitative dataset consisting of 28 semi-structured interviews with businesses, financiers and intermediaries, as well as on relevant academic and grey literature.

Key findings

The report includes the following key findings:

In relation to the investor perspective

- Impact investors have an interest in investing in scalable solutions (with strong IP), which in the fashion/textile space tends to be tech (e.g. for data gathering / measuring in supply chain) as well as new innovative materials/processes including dyes
- Start-up funding for innovative SMEs providing sustainability solutions in fashion/textiles is increasingly provided by family offices of large apparel brands/manufacturers
- Impact investors do not believe start-up firms should be burdened with intensive metrics reporting but metrics should organically develop as the company grows and matures
- Investors themselves currently tend to use broader impact frameworks (e.g. SDGs, GIIN/IRIS), only starting to grapple with more nature-specific frameworks such as TNFD
- For start-up impact investors, climate is the primary interest, although they recognise climate can also act as proxy for broader nature-related approaches and measures (e.g. water, land)
- There is a role for impact investors to enable the development of nature impact bonds that benefit farmers and encourage practices to enhance nature and biodiversity
- A number of start-ups and/or heritage industries in the UK focusing on natural fibres are not suitable for traditional start-up impact investment as scalability is challenging or limited, therefore provision of grant funding and other sources of private and public finance remain important

In relation to SME nature-related reporting

- Traceability/full chain of custody is an important feature in any reporting, which is more easily achieved by vertical integration or a direct working relationship with farmers and other stakeholders at the bottom of the value chain
- Narrative of how the business venture follows a more nature-positive approach than conventional alternatives is a key reporting approach
- Measures currently used include: Land use (including *how* the land is used, e.g. regenerative farming/agriculture), Carbon (including potential for carbon sequestration), Water use, Chemical use reduction, Biodegradability potential, Animal welfare, Soil health, Biodiversity (such as presence and diversity of microbes, fungi, mycorrhiza, pollinators, vascular plants, small and large mammals, birds)
- The social dimension is also emphasised by a number of SMEs, especially by those partnering with suppliers in the Global South
- Certifications, standards and partnerships are seen as important to substantiate sustainability commitments
- Some certifications are onerous and costly for SMEs
- There is an emerging and growing emphasis on *regenerative* as an ethos underpinning nature-positive practices
- There is a growing use of technology (apps) to help report on nature-related performance

Reflections and recommendations

From the research, the following reflections and recommendations emerge:

- SMEs have the capacity to develop / contribute to nature-positive fibre and fabric supply chains for the fashion and textile industry, both in the UK and globally
- The strong narratives of innovative SMEs around their nature-positive business models will be strengthened by the adoption of SME-friendly, simplified reporting frameworks
- There is an opportunity to (re-) build UK-related value chains for natural fibre production, in particular through the offering of high value / premium products
- Re-shoring fibre production also has skills-development opportunities
- Natural materials such as wool, hemp and flax and their nature-positive properties are currently undervalued in the UK
- Growing interest in provenance should encourage more nature-positive re-shoring
- (Re-)building such value chains will require R&D and infrastructure funding
- Wider finance options should be offered including low interest loans, green grants, smaller R&D funds (especially to tap into innovation potential and interest of smaller ventures)
- Smaller scale ventures should be integrated in UK Net Zero strategy (e.g. potential of regenerative farms to sequester carbon)
- Farmers should be supported to help to convert to agroecological/regenerative farming methods¹
- Funding for farmers should acknowledge fibres alongside food
- SMEs should be supported when seeking accreditations and certifications

¹ See *Footnote 8* for a brief explanation of the terms

- Public funding should also support UK-based ventures for their efforts in the Global South
- Virgin man-made fibres should be taxed to enable a level playing field for natural fibres
- Pension funds should be encouraged to invest in higher risk asset classes (e.g. nature-positive focused start-ups) as they have longer horizon than politics.

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1 Introduction

This report explores the development of fashion and textile SMEs aiming to have a positive impact on nature and biodiversity, and the implications for those wishing to fund the green transition of the sector. Attention is given to the emerging reporting issues as businesses seek to demonstrate the extent of their positive (and negative) impacts on nature and biodiversity. Investors and other stakeholders in nature positive businesses are also seeking meaningful reporting to aid them in making decisions.

Drawing on a rich qualitative dataset consisting of 28 semi-structured interviews with businesses, financiers and intermediaries, as well as on relevant academic and grey literature, this report examines how nature positive action can be embedded in Textile and Fashion SMEs, and what financial support is required to achieve this. While this report makes some reference to SME *adopters*, its main focus is on SME *industry innovators*. More specifically, it focuses on those that innovate to make natural materials for textile/fashion production more nature-positive, removing negative impacts associated with high intensity agriculture and farming while at the same time maximising on the benefits of natural materials vice versa synthetic ones (e.g. no micro-plastic shedding). The case study companies' business models focus on connecting different actors along the value chain (e.g. farmers and brands) and transform value chains in a way that nature as well as fashion and textile brands benefit. The building of these new value chains also raise interesting questions regarding the funding of these ventures.

This report will address the following research questions:

1. What are the business models and practices that aspire towards nature positive enterprise?
2. What is the current environmental understanding of investors regarding approaches to measuring and reporting biodiversity?
3. How do SME innovators that are developing new business for nature positivity and net zero currently report on their impacts?

The report will begin with some background information on the fashion and textile industry and their need to address nature impacts. After a brief methodology section, the report will delve into the research questions set out above. This will be followed by a section providing recommendations regarding effective ways to assist SMEs, their investors and funders in seeking Net Zero and Nature Positive, including reflections on suitable and practical nature-related metrics for SMEs. The report concludes with the presentation of three SME case studies. Some more technical information is included in the appendices.

1.1 Background: The environmental impacts of the fashion industry

The UK Fashion and Textiles sector makes a direct contribution of £28.9bn GVA to the UK economy plus an indirect contribution of £18.9bn GVA along its UK supply chain (indirect channel of impact) and £19.8 billion in the UK consumer economy (induced channel of impact) (British Fashion Council and Oxford Economics 2022). The sector is dominated in the UK by retail (providing two-thirds of the GVA contribution), followed by wholesale (19%

contribution) and manufacturing (12% contribution) (ibid.) At the same time, the UK Fashion and Textile sector is part of a global sector: 74% of fashion retailers source internationally with China and India being particularly popular sourcing regions (Source 2025), and even UK garment manufacturing often sources materials globally.

Notwithstanding its significant contribution to the national and global economy, the Fashion and Textile sector is seen as one of the most resource-intensive, polluting and wasteful industry sectors, driving biodiversity and nature loss. This is due to its mainstream business models being extremely growth orientated as they constantly encourage more and more fashion consumption through ever faster seasonal fashion cycles, and due to production often taking place in regions with low regulation thus leaving environmental harms unchecked (Werner et al. 2025). Figure 1 provides some insight into the damage that the global fashion sector causes to the environment (overproduction and waste, carbon emissions, and chemicals and plastics use) and contributes to the drivers leading to biodiversity loss as identified by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2022): land use change, over-exploitation of resources, pollution, and climate change. More detailed insights into the pathways in which the fashion and textile industry can cause nature and biodiversity loss can be found in Appendix 1.

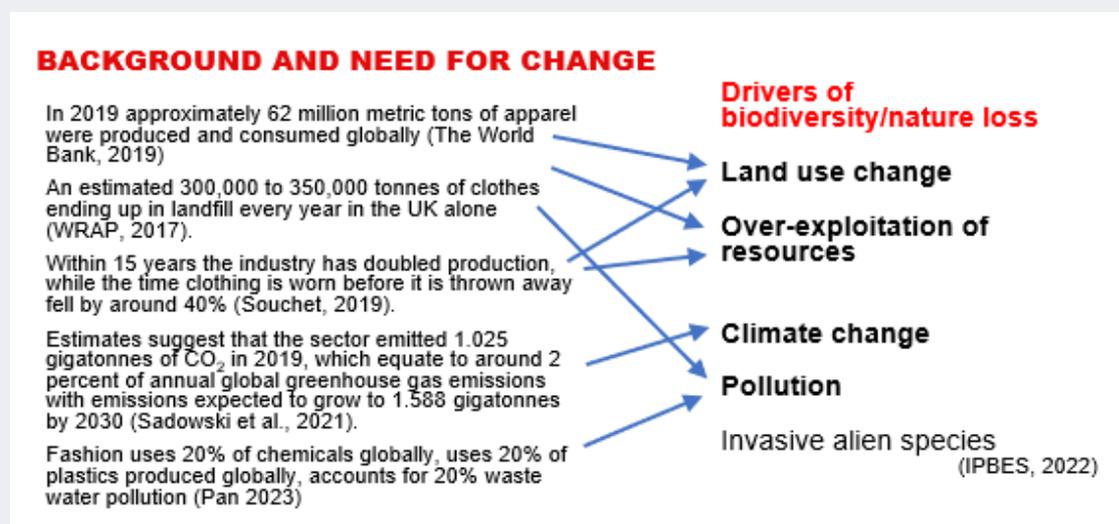


Figure 1: Background and need for change

Reports highlight that the most severe biodiversity impacts of the fashion and textiles sector occur at the beginning of the value chain (raw material production, and material preparation and processing) and at the end of life (MacKinsey 2020, Textile Exchange 2023) (see Figure 2). The fact that the most significant biodiversity impacts occur at the beginning of the value chain – which is also where the sector relies most on biodiversity and eco-system services (Textiles Exchange 2023) – points to a **specific responsibility for the sector to focus on their supply chain and ensure that materials are sourced sustainably.**

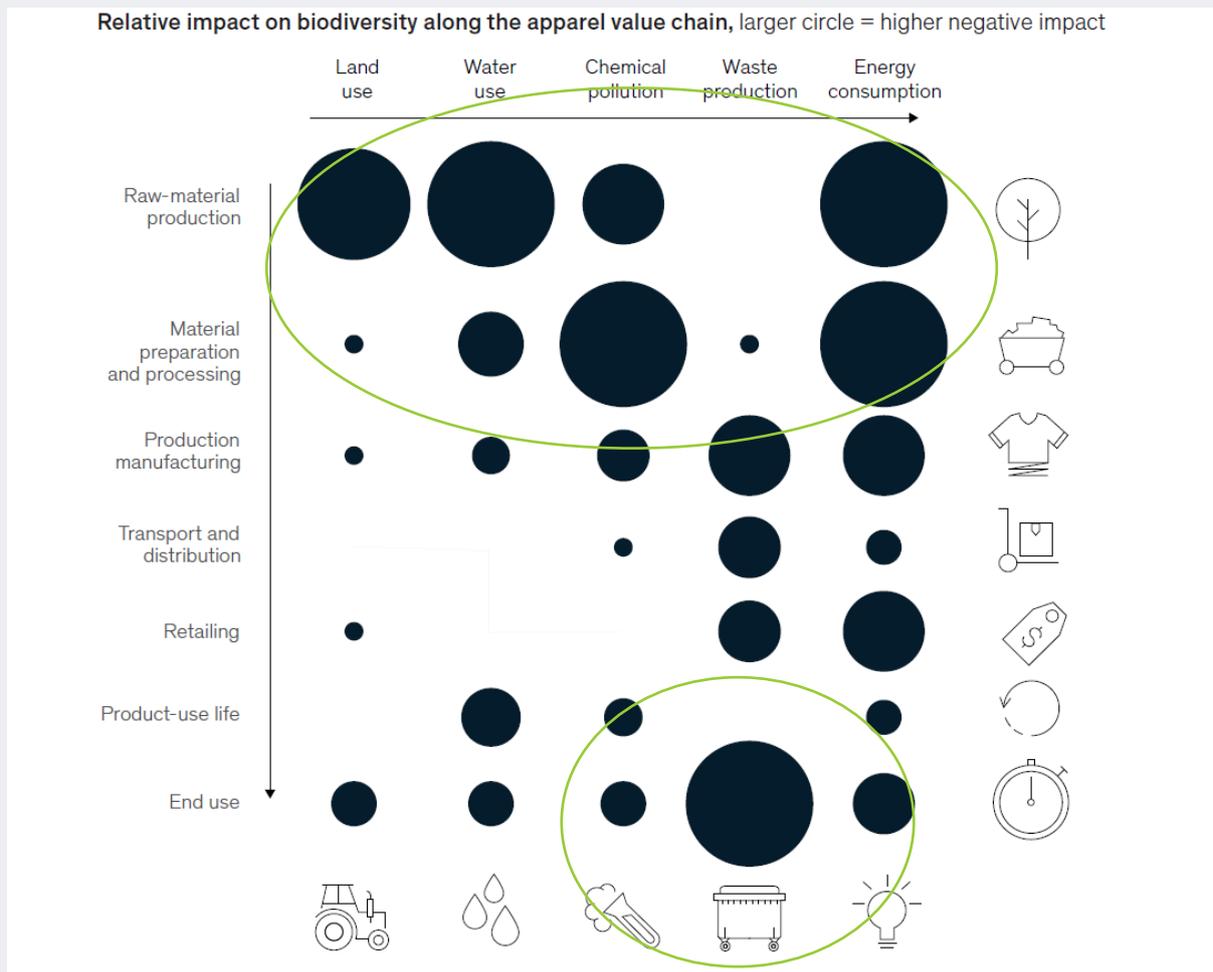


Figure 2: Relative impact on biodiversity along the apparel value chain (source: McKinsey, 2020)

At the same time, **fashion and textile companies are beginning to take an interest in addressing their biodiversity impacts.** A member survey by Textile Exchange (2021) showed that 51% of the 157 participants recognised biodiversity risk as a priority, 59% made public commitments to address it and 8% already had an explicit biodiversity strategy in place. Further, 80% of companies were increasing their uptake of preferred materials (see below) as a way of managing their impact on biodiversity. And over a third have been starting to take action to remediate biodiversity loss by implementing restorative/regenerative measures in support of biodiversity. However, only 14% of the surveyed companies knew the countries where their key raw materials are grown or extracted, pointing to the need for greater transparency to track biodiversity impacts and outcomes. And only 11% of companies had a programme for monitoring biodiversity-related activities or projects. More commonly (44%), companies were monitoring and evaluation methods anecdotally and indicators of progress tended to be anecdotal or project specific. The report argued that monitoring allows for continuous improvement and adaptive management, and that over the longer term, indicators should show positive impacts for biodiversity using methodologies consistent with science and potentially laddering up to local, national, and global biodiversity goals.

This Textile Exchange report echoes findings of other research (e.g. Addison et al. 2020) showing that where companies pay attention to biodiversity, they tend to focus on and report on **activities** that reduce impacts on biodiversity such as ensuring the sustainability credentials of their suppliers and reduced water pollution, and that tracking **outcomes** for biodiversity is still something that companies have yet to develop. This is a topic we will return to in our research findings.

1.2 Policies and Regulation

An industry that has traditionally not been regulated a lot, there are current and upcoming pieces of nature-related EU legislation that will affect the Fashion and Textile industry (Carbonfact 2025), applying to all companies (including UK based ones) wishing to sell their goods in EU countries. There are also some small pieces of UK regulation, for example, the Green Claims Code, that are of relevance to businesses operating in the Fashion and Textile industry; as well as global reporting frameworks that are being adopted by investors and industry (e.g. TCFD, TNFD), and in some jurisdictions will become part of the legal framework. While SMEs are – due to their size and smaller resource base – often exempted from regulation, regulative frameworks are nevertheless important for them as their stipulations may be extended to them if they are part of value chains involving large businesses, and also for reasons of competitiveness. Appendix 2 sets out relevant regulations, policies and frameworks in more detail.

2 Research Methodology

Table 1 outlines in detail the interview participants drawn from business, impact investment, and intermediary organisations. The data was collected between June 2023 and December 2025. The interviews lasted between 30 minutes and 1 hour and followed a semi-structured approach probing into the research questions drawn up to explore the topic. The interviews followed standard research ethics protocols, assuring anonymity to the respondents. The three named case studies were approved by the interviewees.

Business	
Case Study 1 (CS1)	Papillon Bleu (cotton, hemp)
Case Study 2 (CS2)	British Pasture Leather (leather)
Case Study 3 (CS3)	Materra Tech (cotton)
SME1	Wool-spinning mill (interviews with CEO [SME1.1], and two employees [SME1.2., SME1.3])
SME2	Organic cotton T-Shirt brand
SME3	Retail brand of natural-fibre garments/home interiors (interviews with CEO [SME3.1], and one employee [SME3.2])
SME4	Flax craft venture
SME5	Start-up developing leather alternative from bio-waste
SME6	Fashion tech
SME7	Nature friendly dyes
SME8	Wool trading and non-woven wool products
SME9	Social Enterprise growing natural dyes and supporting adults with learning disabilities
Fashion designer entrepreneur (FDE1)	Luxury fashion designer and educator
Fashion designer entrepreneur (FDE2)	Founder of fair-trade fashion company and fashion activist
Large enterprise (LE)	UK-based heritage fashion brand
Finance	
Tech investor (I1)	
Sustainability impact investor (I2)	
Philanthropy impact investor (I3)	
Family office fashion investor (I4)	
Intermediaries	
Industry/trade body (IB1)	
Industry/trade body (IB2)	
Fashion incubator (FI)	Services include provision/brokering of finance
Industry expert (E1)	
Industry expert (E2)	
Charity (C)	Charity connecting designers with regenerative wool farming

Table 1: Interview Sample (total n=28)

3 Findings

3.1 The business models and practices that aspire towards nature positive enterprise (RQ1)

The Apparel, Accessories and Footwear Sector Guidance of the Taskforce on Nature-Related Financial Disclosures (TNFD 2025) proposes a range of business models and practices designed to move fashion and textile businesses towards more nature-friendly practices.

The Guidance emphasises circular designs (e.g. design for durability, repairability, disassembly, recyclability) as well as circular production and distribution systems (use of recycled fibres, rental, resale, repair) as important means to increase resource efficiency and reduce resource use and extraction, that is, to **reduce negative impacts on nature and reduce nature loss**.

Further, the Guidance emphasises **nature-based and regenerative business models** as contributing towards a move towards a nature positive future of the sector².

The main contributions that fashion and textile *SME retailers and brands* can make in this regard are to develop circular business models (e.g. offer of resale or rental) and/or ensure that products are sold made from circular and/or certified natural-fibre sources, using, for example, Textile Exchange's [Preferred Fiber and Material Matrix](#) (PFMM) and [Materials Impact Explorer](#) [with geographical data] for guidance.

They can also take one step further and **work with their suppliers to ensure their suppliers are able to obtain relevant environmental certifications**. For example, SME3, which specialises in retail of garments and home accessories made from natural fibres, has worked with its suppliers in India to help them have their recycled wool certified ([Global Recycle Standard](#)), and cashmere suppliers in Mongolia to adhere to the [Responsible Wool Standard](#) in order to obtain BCorp accreditation for itself. The company prides itself in its long-term partnership model with producers and herders, which enables such supplier engagement. Similarly, SME2, a company that sells 'blank' cotton T-Shirts to merchandisers, has built an integrated supply chain in India, starting with sourcing certified organic cotton ([Global Organic Textile Standard](#)) to helping build a state-of-the-art factory, which conducts all the processes from spinning through to the production of the finished garment, and which adheres to strict environmental standards (powered by renewable energy, a water treatment system with zero discharge into the environment).

Of particular interest for the present project are SME innovators, that is, in this context, **SMEs that seek to transform fashion and textile value chains towards a more nature-positive approach**. There are **A) companies that develop new innovative materials and dyeing processes using nature-based and/or circular solutions** that drastically reduce the environmental impact of conventional materials and processes (chemical pollution, water usage, land use) that lead to nature degradation and loss and **B) companies that focus on**

² A full and detailed overview of nature friendly practices and business models that both TNFD (2025) and Textile Exchange (2023) propose can be found in Appendix 3

sourcing natural fibres from regenerative sources for products and brands, connecting different actors (e.g. farmers, manufacturers, brands) along the way.

Examples for A) include

- SME5, that has developed a low-impact plant-based and plastics-free leather alternative using spent grain, a waste product from beer breweries and whisky distilleries that is transformed in a chemical process that manipulates the protein in the grain; and
- SME7, that has developed a natural dyeing process that uses DNA sequencing and microorganisms to develop colour pigments and transfer them directly to fabrics, thereby drastically cutting the chemical pollution that is associated with fabric dyeing.

Examples for B) include:

- CS1 (Papillon Bleu), that has created a regenerative cotton programme in India, and now grows regenerative hemp in the UK with the aim to create local hemp-blend fabrics for use in home interiors
- SME8, originally a traditional wool trader, that now works with farmers across the UK to increase the value of wool through getting farmers to engage regenerative farming practices and obtaining certifications for adhering to animal welfare and environmental standards (Organic Wool, Responsible Wool). They then turn the wool into products, selling them on to manufacturers (for example, as garment insulation).
- CS2 (British Pasture Leather), that has built a nature-positive leather supply chain as an alternative to conventional leather production which is linked to deforestation and other problems linked to intensive industrial farming; with the leather being entirely sourced from regenerative farms in the UK and processed in local supply chains. The company taps into designers' desire to work with materials that have a clear and nature-positive provenance, as opposed to working with materials from commodified arms-length supply chains that are the hall-mark of the mainstream leather sector.
- CS3 (Mattera) that works with cotton farmers in India to encourage them to convert to regenerative agricultural practices and thereby avoid the negative impacts of conventional cotton monoculture (e.g. extensive pesticide use, soil degradation). The company has developed an app that directly links them to brands, enabling hyper-transparency and providing relevant environmental and social metrics for the brand.

The goal of creating such supply chains is thus a) to increase the value of the fibre to benefit the farmers and b) to help brands source nature-friendly materials from regenerative sources. A key feature of these **nature-positive supply chains** is that the SMEs ensure that the materials are fully traceable, offering a high level of transparency. It is of interest to note that these SMEs work with the notion of 'regenerative', even though that is still an emerging and thus far only loosely defined concept. We will return to this in Section 3.3.

3.2 Current Environmental understanding of investors regarding approaches to measuring and reporting biodiversity (RQ2)

With the focus of this report's case studies on SME innovators, finance provider interviews focused on impact investors to gauge their interest in, and requirements for, investment in innovative fashion and textile start-ups. Their perspectives are complemented by the views of an industry incubator, an industry body, and drawing on accounts of the businesses interviewed.

The impact investors, all of which had invested in fashion/textile related innovative start-ups, included a tech investor, a large climate fund, a smaller philanthropy investor (an employee-owned philanthropy arm of a private investment fund), and a family office of a large fashion and textile company. The latter is one of **a growing number of family offices that large fashion and textile companies establish to fund sustainability solutions for their own industry**, with case study CS3 being one beneficiary of a family office.

All of the interviewed investors would typically follow an exit model, although they are happy to entertain a longer time horizon than conventional VC investors for sustainability-focused investments. Especially, the family office investor regarded their investments as strategic investments with less pressure on timelines:

A VC wants to see an exit in X amount of years, which is usually the life of the fund, and has a specific allocation of money per company. They just are looking for one company to be their unicorn now to perform their portfolio. With us, that's not the case because it's a strategic investment so there are different ways to realise strategic values, which would be we work with innovators ..., so it's very different. There's not even a fund structure per se, so obviously we would like to make money and have exits, but there's no pressure in terms of timeline for it. (I4)

Impact investors are typically interested in investing in easily scalable solutions, underlined by their philosophy that company growth (and growing revenue) and impact go hand in hand, with one investor emphasising the need for the venture to have strong IP³. In the textile and fashion space that generally means investing in ventures that develop technology, for example for environmental data gathering and measuring in the supply chain, as well as innovative materials and dyeing processes. And start-ups in our sample that focused on, or incorporate, tech (CS3, SME6), and innovative materials and processes (SME5, SME7) have been the beneficiary of impact investment. The predominant interest in tech and innovative materials/processes was confirmed by a fashion incubator (FI), that stated that investors are not typically interested in fashion, and fashion designer start-ups, per se, but more in environmental impact, and the sector would just be incidental to them. This in turn is confirmed by the three general impact investors, for which the fashion/textile companies

³ "One of them's gotta be strong IP behind it. So there's gotta be some form of defensible technology that can't just be replicated easily by others. There's gotta be a strong value proposition for customers. So that we know people are ultimately gonna buy the products. Even when we invest before there's any revenue. So kind of taking a leap of faith, there's need to build the evidence base possible. There's got to be a strong team to be able to execute on the plan, and then there's got to be a big enough market there for us to be able to get the return that we need as an early-stage venture capital fund." (I2)

they have invested in is just one small part of a much wider investment portfolio incorporating a range of sectors (the family office being an exception as they are specifically set up to search for and fund solutions that address the problems in the industry, in particular issues related to raw materials extraction and raw materials processing where the highest environmental impact occurs).

An interesting observation is that for impact investors (echoed in particular by I1, I2 and I4) **the primary interest is still carbon and climate, although they recognise that climate can also act as proxy for broader nature:** *“We use carbon. We don't necessarily mean just carbon, but we use it as a proxy for any kind of impact. It currently gets a lot of attention because of the Net Zero. But I mean, we're interested in resource usage land usage, environmental quality, water quality, they're all important to us. But yeah, we just call it carbon.”* (I2) The quote also highlights that the focus on carbon and climate also derives from Net Zero being a mandatory UK government target. The focus on carbon and climate, for example, explains why SME5 was funded by a climate venture capital fund, although its nature-positive impacts go way beyond reducing carbon emissions.

The impact investments are seen to be helping address a specific problem or help change a current (environmentally damaging) societal ('status quo') norm (I3), to help create long-term value (I3). Materra (CS3) being a case in point, as it addresses the norm of resource-intensive and polluting conventional cotton monoculture for textile production by using tech to help farmers to convert to regenerative cotton growing (with all the biodiversity and other nature-positive impacts attached). Investor I3 also provided the example of [PondaBio](#), which rewets carbon-emitting peatlands (the current norm) by growing bulrushes on them that can be used as insulation material in clothing, thus increasing carbon-sequestration and helping to create biodiversity-friendly habitats.

Investors in particular look for solutions where an economic benefit can be found (as in the PondaBio case – the creation of a new insulation material going hand in hand with carbon sequestration), or where those who benefit the most from the solution will pay for it (e.g. in the case of CS3, fashion brands will pay for the tech and advice given to farmers for converting their agricultural practices)⁴, hence partnerships with larger companies will be key for such investments (fashion brands, food brands etc) (I1, I3, I4). Another example is where farmers can be in receipt of carbon credit money through carbon trading schemes if they engage in farming practices that sequester carbon (I1). SME8, similarly, mooted that **participation in carbon and nature impact bonds**, would help farmers develop their regenerative practices.

As the start-ups focus on providing a specific solution to existing problems/(environmentally damaging) norms), investors did not believe that these start ups should be burdened with intensive metrics development and reporting from the start but that they should focus on

⁴ As a related point, the view was also shared that those who benefit the most from the new practices (i.e. those large entities at the top of the value chain should also carry the cost and burden of environmental KPI reporting) (I3)

what they are doing⁵ (i.e. their business model and actions) and metrics should organically develop as the company grows and matures:

The challenge for us is always these companies often don't yet have a finished product, so getting them to forecast forward how much impact they're gonna have before they've even made a pound of revenue. It's really hard, probably somewhat meaningless, because it will be so abstract and theoretical, that it probably wouldn't have a huge amount of impact. We focus much more on what they're doing and what that commitment to impacts is rather than specifically on day one setting them with metrics that they probably just fail. (I2)

Our experience at the very early stage companies is, you know, they're trying to meet payroll at the end of the month. That's the main priority is making sure still keep surviving. And then when they get they get that probably second funding round, and they've got a bit more money in the bank, and they can hire a few more people. That's when they tend to look a bit more detailed at the impact side of things. (I2)

I think there's a real danger in driving the responsibility to the start-ups. If I require a start-up to do something really burdensome in its early stages, A, I might fix them to something when they need to be able to change a little bit. B, I might overwhelm them with reporting requirements. In the start-up investing, at the stage that we're at with our process and the stage that most companies that we invest in are at, we are not going to burden them with a reporting responsibility beyond what we would ask for anyway. What we would ask for anyway is stuff that does inform, how is that impact progressing? ... [B]ecause of the strong connection between impacts and cash flow that we're looking for, I don't have any extra reporting requirements. Now, that might change a little bit in that we are going to define the norm for each of the companies, or the set of norms for each of the companies. Then we might say to them specifically, "We think this is the KPI for that. Are you planning to report on that? Oh great, you are, thank you." I think that it would be a part of our process to begin to require that. ... [Reporting KPIs] should be no extra burden because of the way we view impact. (I3)

I don't have specific KPIs, I don't have to see an LCA because also we invested so early. If there is a third party LCA, it's very welcome, but at the same time, even having an estimate from the founders on the impact that I can also check, because I understand the space. So I think generally speaking, it will be CO2, water waste, chemicals are key focus areas, and social as well, the social impact is definitely very important. (I4)

When following up on KPIs with I4 (industry investor) to ask about biodiversity, the answer implied that in her view biodiversity is addressed where start-ups engage in 'regenerative practices': "Yes, *within regenerative, we will look at biodiversity, but unfortunately not many companies have that [yet] ... it's part of the regenerative story. But it's safe to say that most*

⁵ Also because start-ups are currently excluded from any incoming reporting legislation (I2), and detailed reporting on biodiversity is an expectation currently falling on the big-caps (I3).

companies have yet to have a regenerative story in what they're doing", adding that biodiversity frameworks are also still being developed.

What seemed more important for investors rather than extensive environmental metrics were a firm business plan and strong leadership that enable the company to grow and carry out their stated mission:

We have an impact monitoring and measurement framework. We would typically be talking about that at exactly the same time at the beginning of our due diligence process that we're talking about the commercial aspects of the business. I look for three levels ... They don't have to have all three levels, but it's good if they're there and we might encourage a company to work towards it. Those three levels are personal motivation. So, at the founder level, is the founder intending to do that? Then have they written that into their business plan? So, is it in their planning, is it in their written documents and then is it in their governance? If it's at least their intention at a personal level, then we'll go forward with the due diligence process that we run. If it's not their intention, then we may interview them to get a sense of whether their actual intentions are essentially aligned with that or not. (I3)

There's got to be a strong team to be able to execute on the plan, and then there's got to be a big enough market there for us to be able to get the return that we need is as an early stage venture capital fund. (I2)

Interestingly, impact investors themselves tend to use rather broad frameworks to report on their impact investing to those providing them with funds (and other interested parties), together with qualitative narratives related to each of the ventures they have invested in. Investor I2, for example followed the [GIIN/IRIS framework](#) and reported against the SDGs in their report, while admitting that they had not yet cracked consistent metrics across their portfolio. The investor also added that their capital providers seemed satisfied with the level of impact reporting they engaged in.

I3, who were self-funding, stated that they made use of the IMP⁶ Framework, which covers five dimensions of impact: what, who, how much, contribution, risk⁷.

Interestingly, one investor said that they had not yet paid much attention to the TNFD framework although they were aware of it (I2), whereas another one emphasized that TNFD is "big cap' stuff' (I3).

Above considerations apply to companies where scalability is (relatively) straightforward and easy, and case study companies have, not surprisingly, been able to receive substantial amounts of impact equity investment where their business models focuses on tech (CS3) or innovative materials and processes (SME5, SME7).

Some SMEs that we interviewed, e.g. CS1 and SME1, expressed a preference for grant finance; and investors recognize this too, such as I2, which as an organization also provides business support: "Startups do not usually seek loans, so it is grant funds and equity that are required.

⁶ Impact measurement project

⁷ <https://impactfrontiers.org/norms/five-dimensions-of-impact/>

Of course, not all are suitable for equity, as they do not have the scale-up potential. A separate service which we selectively offer is grant writing to assist SMEs – on a no win no fee basis.”

On a slightly different yet related note, SME8 highlighted the importance of grants to help farmers be educated about the benefits of regenerative agriculture in preference to the provision of low-interest green loans: *The single biggest lever that we could pull [for farmers is] to do with grant initiatives which are stimulating that education change from being an extractive industry to a regenerative industry.*

Other companies that have a high degree of vertical integration (SME2, LE) are self-funding any investments towards making their business more nature positive.

Alternative sources of finance for companies where scalability is limited or challenging, and/or where investments in infrastructure are required is a topic we will return to in the recommendations section.

3.3 How do SME innovators that are developing new business models for nature positivity and net zero currently report on their impacts? (RQ3)

Creating **transparency** and **traceability** in relation to their supply chains is seen as a first step for fashion and textile companies to address their nature-related impacts, and is also a key component/requirement of upcoming relevant regulations (e.g. Digital Passport, CSRD/CSDDD, TNFD – see Appendix 2 for details). But as Textile Exchange (2021) research shows, creating transparency and traceability remains a challenge for the majority of companies which traditionally rely on long, complex and opaque supply chains (TNFD 2025).

By contrast, and as set out in section 3.1, (innovative) SMEs that engage in nature-positive actions are able to offer high traceability and transparency, often because they set up their own value chains and/or are very familiar with the value chain they are using.

For example, CS1, which has created transparent cotton and hemp supply chains, uses digital passports to help customers understand the entire journey of the material: “from seed through all of its processing, through its manufacture to finally to you”.

SME8 guarantees that every step of the wool’s journey that they trade is carefully documented and traceable back to farm with each wool bale being individually uniquely tagged directly linking back to its farm of origin, with the farms being holding environmental certifications. Similarly, SME1, a wool-spinning mill, can trace the wool they sell to specific UK farms that are committed to animal welfare and other ‘good’ farming practices.

As another example, creating transparency is the core of CS3’s business model, as it seeks to connect farmers that are engaging in regenerative practices with fashion brands via the app the company has developed, enabling brands to disclose exactly where their cotton is sourced from.

A key reporting approach for smaller innovative ventures is the narrative or storytelling they provide to their stakeholders to explain *how* their business model is nature-positive such as CS1’s story of the journey of the garments originating from organic rain-fed cotton fields in India (see above), or CS2’s story of sourcing leather from regenerative farms that engage in practices that improve land and ecosystems and ensure the highest level of welfare for the animals by guaranteeing that the animals are fully pasture-fed. Even where, as in the case of CS3, metrics development is core to the nature-positive business model of the company, narrative also plays a role as the stories of how farmers improve their land and livelihoods through regenerative practices.

Aside from storytelling, innovative SMEs report on a number of nature positive metrics, although this is a (challenging) area of development for SMEs. The metrics reported are often a comparison with the mainstream ‘business as usual’ production of the fabrics.

With regards to **land use** the key metric for a number of case studies SMEs is the fact that they source from regenerative/organic sources (CS1, CS2, CS3) as opposed to pesticide- and irrigation-heavy monocultural land. CS1 and CS3 report how much land they help convert from conventional to regenerative. Similarly, SME5 reports that their business model reduces the need for converting e.g. forests into grazing land and land for animal feed as it makes the new natural material from a brewery waste product. As a qualitative indicator, CS2, reports

that all their leather is sourced from land that is ‘Pasture for Life’ certified (see below, and case study for more information)

SMEs also report on **carbon reduction**, e.g. SME5 estimates how much less carbon their business model needs compared to conventional leather production, and CS1 reports on how much carbon the company has taken from the atmosphere and stored in the soil (carbon sequestration).

SMEs may also report on their **water footprint**, with CS1, for example, reporting a reduction of 281 million water through their rainfed cotton programme in comparison to a conventional cotton model.

Reduction of use of chemicals is also something that companies might report, as CS1 reports on the reduction of toxic herbicides and insecticides and chemical fertilisers.

Another key nature positive qualitative indicator is **biodegradability** potential, referring to the ability of materials to biodegrade without leaving harmful residues in the environment. CS2 for example seeks to ensure ‘good’ biodegradability of their leather as they use vegetable instead of the more common chrome-based tanning processes.

Animal welfare is another qualitative indicator, with CS1, for example reporting that their leather is sourced from farms that pasture-feed their animals and have other high animal welfare standards. And SME8 ensuring sheep animal welfare standards through certification programmes (see below).

CS3 has a very sophisticated reporting system through the Co:Farm app that the company has developed and that is at the heart of its business model. It captures a range of different data including **carbon, water, soil and biodiversity**. The company uses soil testing for below ground biodiversity (for example, presence and diversity of microbes, fungi, mycorrhiza). It also develops above ground biodiversity baselines (for example, in relation to pollinators, vascular plants, small and large mammals, birds) and asks farmers to help with that (for example by counting and describing bird species they observe on their land). CS3 observes that “*about 50% of ... biodiversity [in cotton fields] is below ground*”.

Similarly, SME8 encourages farms to use the [Environmental Outcome Verification](#) framework by the Savory Institute, which also checks a number of nature metrics:

“...checking things like the soil health, checking the level of biodiversity, checking the water carrying capability of the soil. It's also then ultimately checking the carbon capture or the amount of carbon that's been captured within the soil, so various different metrics”.

Many of the interviewed businesses also have a social dimension in their reporting (CS1, CS3, SME2, SME3, SME9).

SMEs do rely on **certifications, standards and partnerships** to lend credibility to their nature-positive efforts. For example, CS1 works in partnership with [Raddis Cotton](#) and [GVK Society](#) to ensure the best environmental and social practices in its regenerative cotton programme. CS2 work with the ‘[Pasture for Life](#)’ farming certification programme. CS3’s Co:Farm app is informed by the [Cool Farm Tool](#), as well as [RegenAgri](#) and [ROC](#) standards. SME8, in addition to the use of the EOv framework, ask farms they source from to adopt the [Red Tractor](#)

Animal Welfare standards as well as the Responsible Wool standard. SME9, finally, who grows natural dyes, has organic BDA certification.

However, some certifications, such as some organic standards are sometimes seen as costly and onerous for SMEs and their smaller scale operations, as this intermediary expresses:

Soil Association for one is one that's quite stringent and the complexity of it and the cost involved in testing various elements. So an example of a manufacturer bits of machinery. Machinery needs to be oiled and each type of oil they need to be tested £1000 a year and they used 27 different oils each needs to be tested annually to show that it doesn't have any impact or anything that will impact the product and that's not something that's going back directly into the garment. It's just used in the machinery, so you can see the costs that are involved in these things. (IB1)

And another intermediary, while echoing above sentiments, also highlights the bureaucracy but also the unhelpful attitude of some certification bodies:

I think [certifications are] needed, but they're problematic and I think with the biggest issue is that a lot of sheep farmers in this country, given that we're working with the wool and also given that our farmers are really quite small scale generally is how to find the certification that's meaningful but not onerous and not too expensive. [And it's not] just farmers but processors like weaving. There's only one weaving mill that will do organic weaving so that you can get an organic certified blanket at the end of your process in the UK and they recently gave up their organic certification. They haven't changed their practice, but they gave up their organic certification because the person that came up to certify them turned up in a BMW from London while they're in a kind of weaving shed in Wales, you know, kind of working all hours. And it's interesting actually, because I was talking to some farmers the other day and there were saying when the Soil Association first started and [when the] certification people came along there was a real excitement like oh come and see what I've done and I'm doing this and you know really a real buzz around it and now there's a kind of dread so it's more like Ofsted you know people are preparing and up at night and so it's how I don't know what the answer is but they're all I can think is if you keep things local then you don't have to make them so bureaucratic because there's accountability to your community. (C)

Another one of the interviewed businesses, a spinning mill, highlights the lack of a full organic infrastructure and the lack of demand as being problematic for organic certification:

So, customers who we spin yarn for, they can grow their wool organically. We can spin it organically. They can have it woven organically, but they can't have the fabric finished organically, so they can't get a fully organic gloss anymore in the UK.... We didn't do an organic run this year and we will do it again next year if there's enough for one scour. We have to stop all production in the mill. We have to do a full organic clean down. We can only have organic wool in the in the mill at the time, so you're taking probably about six weeks for our production time out for 800 kilos of organic wool. ... There isn't really the

demand for that the moment. If our customers want us to do it, we'll do it. If they don't, we won't bother.

The problems around, and lack of uptake of, organic certifications is something that is being debated in the wider sector as well (see, e.g. [Regenerative Agriculture Focus: Positive Impacts | Future Fabrics Expo 2024](#)). It is a reason that there is a growing emphasis, also among our interviewed sample, on ‘regenerative’, which is referred to as an ethos on how to farm the land as opposed to a strictly prescriptive standard, encompassing a range of practices to improve soil health and biodiversity, among other things⁸.

Are you talking about an ethos, or are you talking about a certification, because one thing that is really well understood, ... is that the ethos of regenerative has not yet been codified into a certification. And so it's really used as a kind of shorthand term to describe practices that are supporting biodiversity and ecosystems and soil, health and animal health. (CS2)

Even the new inquiries that I'm getting a lot of them are starting “we're regenerative farming”, a lot of them are going down that route. [And their] wool is wonderful... A lot of people are going, going down the regenerative for 100%... [Interviewer: What does regenerative farming entail?] It's all about putting back into the land so they're not overgrazing. They're using more natural things ... It's about adding back to the ground. (SME1.1)

⁸ It is vital to note here that while this report uses ‘regenerative’ as shorthand to describe holistic practices that aim to maintain and restore eco-systems, a distinction is being made between ‘regenerative agriculture’ and ‘agroecology’. The terms have overlapping notions but their different emphases (see below) will likely lead to resonating differently with different stakeholder groups.

Regenerative agriculture is a farming method that combines conservation and rehabilitation practices to restore, renew, and revitalize agricultural land in the ways that recognize and value the mutual interdependence of all human and natural systems. In contrast to conventional industrial agriculture methods, based on continuous extraction and depletion of resources, regenerative agriculture promotes practices such as: regeneration of topsoil and enhancing soil fertility; increasing biodiversity; improving water cycles; capturing carbon in soil, improving carbon capture through better feedstock and better livestock management, strengthening resilience to climate change; increasing yields over time; and revitalizing connections between farms and their surrounding communities (Williams and Burcikova 2020).

Agroecology is a scientific discipline that applies the study of ecology to agricultural systems and farming practices. While agroecology developed as a science in the first decades of the 20th century, many agroecological techniques have been used in traditional indigenous agricultural practices for centuries. Examples may include crop diversification, crop rotation, rotational grazing, or agroforestry (combination of trees and other woody plants with agricultural crops and livestock). The ultimate goal is to increase ecological and economic resilience of food producing systems. Agroecology connects science with global grassroots initiatives and local knowledge. It adapts its practices to suit local conditions, with strong emphasis on diversity, gender equality and re-valuing indigenous knowledge. (Burcikova 2025)

With regards to regenerative approaches and practices, process is important but the routes to get to an improved outcome (which could be measured for example, by EOv) can be different for each farm.

Our research also noted a **growing use of apps and technology** to help monitor nature-positive indicators, with CS3 and its Co:Farm app being an advanced example, but also regenerative farms increasingly using app such as Soil Mentor to monitor soil health (use of this is encouraged, for example, in the Pasture for Life farming community – see CS2). Respondents (e.g. CS3 and SME8) mentioned the need for cost-effective technology to capture environmental outcome data at farm level, with many available technologies (satellite systems, recording systems) still being prohibitively high.

4 Effective ways to assist SMEs and SME investors seeking Net Zero and Nature Positive – Reflections and Recommendations

Our research has shown that fashion and textile SMEs have the capacity to develop, or contribute to, nature-positive fibre and fabric supply chains for the fashion and textile industry, both in the UK and globally.

4.1 Suitable Measures and Metrics for SMEs

As established in section 3.2, **innovative start-ups** that develop nature-positive solutions to the problems that the Fashion and Textile mainstream industry produces, are generally not required by their investors to engage in intensive metrics reporting. Over time, however, they should develop key indicators that help measure the impact that the alternative they offer compared to the existing ‘status quo’.

Interestingly, the **Taskforce for Nature-Related Financial Disclosure Additional Sector Guidance for ‘Apparel, accessories and footwear’ (2025)** places an emphasis on ‘response’ and ‘impact driver’ metrics based on the expectation that companies will change their materials and practices to reduce pressure on the natural environment. The TNFD sector (core and additional) and global metrics are set out in Appendix 4. While such extensive reporting will not be expected by SMEs, we have seen in section 3.2 that SMEs can and do report on selected nature-metrics.

As part of this research project, the University of Reading has proposed a **user-friendly, simple reporting framework that can be used by SMEs to report on their environmental performance**, based on the more widely known **DPSIR framework**. It focuses on metrics related to **pressures** (that is, activities that cause negative impacts on biodiversity, in particular in relation to land use and pollution), habitat **status** (the current measure of an aspect of biodiversity, e.g. focusing on butterflies, birds etc.), and **responses** (the actions taken to reduce impacts and pressures), alongside a colour-coded scheme that indicates how easy it is to measure each metric (see Appendix 5 for more detail). A number of our SME respondents are already using a range of these metrics (as seen in section 3.2), such as land use, (reduction of) fertiliser/pesticide use, biodegradability potential of materials, water footprint, traceability. The most challenging metrics are the ones that relate to habitat status, that is, metrics that measure species abundance and diversity. Technology (e.g. apps) will be required to measure species levels etc (see Owen and Burnett 2025).

For SME **adopters**, that is, textile and fashion brands and retailers that seek to source sustainably, support and advice should be focused on the sustainable **sourcing of (certified) materials** (as outlined in section 3.1), as this is where the biggest impact on nature occurs. Wherever possible companies should determine exactly where materials originate from as

biodiversity and other nature impacts are site specific. Textile Exchange (2023) highlights that the site level is critical but regional level can be useful too⁹.

There are also tools such as SBTN's *Avoid – Reduce – Restore – Regenerate – Transform* framework, used by fashion companies such as [Kering](#)¹⁰, or the [Natural Step](#) and [Future Fit Business Benchmark](#) used by a number of fashion/textile businesses that can help SME adopters to improve their environmental performance (these tools are also suitable reporting frameworks). Encouraging SMEs to gain **BCorp certification** (see experience SME3) has the potential to kick-start the credible development of an overall nature-positive approach to doing business.

4.2 Potential of Venture Capital Impact Finance and Need for Other Sources of Funding

The ventures most likely to attract VC funding are those that are easily scalable. They will in most cases relate to **technology-based solutions as well as innovative materials and processes** (CS3, SME5, SME6, SME7). Our research has shown that the main imperative for such start-ups is to show to investors how their solution has lower environmental impact / is more nature-friendly than the existing status quo, as well as show their potential to make significant (global) impact (One investor alluded to the three criteria of: additionality (innovation, materiality (scale) and intentionality).

Another area where VC impact funding is likely to have potential is in the **development of nature impact bonds**, which may encourage farmers more to start engaging in regenerative practices or strengthen their commitment to what they are already doing, thus also increasing supply of regenerative fibres (see next section).

As our research has shown, a number of nature positive initiatives will not lend themselves to easy scaling and/or are focused on specific locations, sites and infrastructures, **other forms of investment and finance** are likely to be required, in the form of local economic development finance, R&D funding, or philanthropy funding, for example. The following section will expand on this.

4.3 Nature-friendly fibre and fabric supply chains in the UK

Our research has found that there is an exciting opportunity for the UK economy to **(re)build UK-based, nature-positive supply chains for fashion and textiles**, connecting UK farmers and regenerative agriculture with designers and fashion and textile manufacturers; in particular in view of the UK's skills development, Net Zero, and growth policy agendas. This is shown in relation to leather (CS2), hemp (CS1), wool (SME8, SME1, IB1, IB2, C) and flax (SME4). Growing

⁹ A number of tools are available to assess local/regional biodiversity and water risks: [WWF Risk Filter Suite – Home](#) and [IBAT | The world's most authoritative biodiversity data](#)

¹⁰ Kering is also well-known for its Environmental Profit and Loss accounting, which is matrix along the stages of garment production (raw material production, raw material processing, manufacturing, assembly, stores, warehouses, offices) and focusing on air emissions, GHGs, land use, waste, water consumption, and water pollution

interest in the provenance of materials (CS2, IB2) and the drive for traceability may aid in these re-shoring efforts, and offer opportunities for creating high-value/premium products.

There are some challenges that need addressing if the potential to (re)build such supply chains is to be utilised:

1) The first pertains to the fact that **some materials** such as wool (including their nature-positive attributes) **are currently undervalued**. In the UK, sheep are mainly raised for meat consumption, and the market price for wool is very low (sheep shearing is thus not done for generating an income but for animal welfare purposes mainly). The quality of wool in the UK needs improving in order to be able to compete with wool from other parts of the world. It will require a renewal of the tradition of keeping sheep for fibre quality alongside meat quality (and associated up-skilling) (SME8), as well as increased appreciation of the unique properties of UK native and rare breed wool (SME1.3). More value can be generated when efforts to improve wool quality go hand in hand with obtaining animal welfare, responsible wool and/or organic wool accreditations, and use of regenerative frameworks, tapping into the growing demand of manufacturers to source traceable responsible materials. This was an approach encouraged by SME8, which, in addition to helping develop/adapt responsible wool standards for the UK context, had also developed a suite of high quality non-woven wool products for use in textile manufacturing, enabling UK farmers to sell their wool at a higher price.

A somewhat similar challenge pertains to hemp, where the nature positive capacities of the fibre are not yet sufficiently recognized and farmers need a government license to grow the crop because of its associations with drug use (CS1).

2) The second challenge is the fact that currently **the UK has little infrastructure left to process fibres, and those facilities left are often in need of upgrading to be in step with the latest technological and environmental standards**. These challenges were highlighted by a range of interviewees (CS1, CS2, SME1, SME4, C, IB2, SME8). For example, SME1 has machinery more than 100 years old, CS2 reported on the challenges of finding tanneries that would process its leather in a nature-friendly way, CS1 commented on the scarcity of decorticating and spinning facilities, and IB2 highlighted that there are only 2 wool scouring plants left in the UK. In the words of one respondent: *I think that having primary industry I think is very, very important if you're going to capture the majority of value in a local environment*. However, the preservation of those industries requires policy support.

A related challenge is **the need to engage with farmers to encourage them to convert to regenerative/agroecological farming methods**, in order ensure the nature-positive effects of local fibre production, and this comes also with the challenge of accreditation and certification of regenerative approaches (see discussion Section 3.3).

From these considerations a range of policy and finance recommendations arise:

- **Infrastructure and R&D funding** will be required if we wish to see nature-positive textile value chains established in the UK. Currently businesses often rely on local economic development grants or UKRI grants (see CS1, SME1, see also Gottschalk et al. 2024), which are competitive. A better availability of such grants, especially for

smaller ventures will be desirable (to tap into their innovation potential and interest). It is important, however, to see that the ecosystem around fibre production and processing is considered in its entirety in order to maximise environmental as well as economic and social benefits in the UK.

- **Smaller scale ventures should be integrated in UK Net Zero strategy** especially in view of the potential of regenerative farms to sequester carbon. Similarly, regenerative farms should be valued more for their capacity to restore biodiversity.
- **Support should be provided to farmers to help them convert to regenerative agriculture/agroecological methods¹¹**, and fibre should be considered alongside food (e.g. food and fibre might be grown together in a crop-rotation approach [e.g. hemp, flax]; meat and fibre production (e.g. wool, leather) should be considered as going hand in hand). Both fibre and food should be considered when making funding opportunities available to farmers. SME8 also highlighted the importance of education grants for farmers so that they can better understand how regenerative agriculture/agroecological methods generate value for their farms, and they can develop the skills to convert from current mainstream (industrial) approaches.

4.4 Some wider policy and finance related considerations

The following lists some further policy and finance considerations that respondents raised:

- Green funding support should be provided also to companies that are already expending efforts to building a more sustainable business rather than the laggards (IB1, SME3). This should at least involve the offering of tax incentives when switching to greener methods (IE1, SME3)
- Virgin man-made fibres should be taxed to enable level playing field for natural fibres (SME3, IB2, I1)
- Policy makers need to ensure a level playing field of UK grown fibres vs fibres imported from abroad (IB2)
- There is a need to make certifications less complex and onerous and more affordable for smaller ventures (e.g. farms, manufacturers) (C, IB1, IB2, SME1, SME8)
- To increase the funding base, pension funds should be encouraged to invest in higher risk asset classes (e.g. start ups) as they have a longer horizon than politics (I2)
- Public funding for developing nature-positive solutions should also be available to UK-based ventures for their efforts in the Global South, given the global nature of textile supply chains (UKRI should not focus on UK alone) (see CS3)

4.5. Conclusion

In summary, our research has shown that the potential of SMEs to contribute to a transformation of the fashion and textile sector towards more sustainability is huge. However, appropriate financial and policy support, as outlined in detail in this report, is required to enable SMEs to develop and sustain themselves, and make a growing and lasting impact.

¹¹ See Footnote 8

5 Case studies

Papillon Bleu

<https://papillonbleu.com/>

01 | Introduction

Papillon Bleu was founded in 2006 by Vanessa Barker. The business started out as a ready-to-wear label with a commitment to 100% natural fibre, revival of ancient craft techniques, embroideries and block printing, and fair trade, to ensure that workers in the supply chain receive an income they can live on. In 2012, the company pivoted its business to enabling other brands to incorporate Papillon Bleu's value systems into their collections by helping them to source and run their production, and find the most sustainable fabrics possible. As part of this, Papillon Bleu's founder built a large sustainable fabric library with the aim to bring the company's clients along on the story of sustainability.

The quest for sustainable fabrics led the founder to regenerative agriculture and textiles, which she sees as the best way to reverse climate change. She has created a successful fully traceable, regenerative cotton programme in Southern India, which is about regenerating land through organic textiles, and about supporting female farmers. This programme engages in practices (which will be described below) that avoid the negative effects of conventional cotton growing such as extensive water use, pollution and soil degradation. In 2022, Papillon Bleu started a new venture focusing on growing hemp in Leicestershire in the UK to replicate the nature-positive practices of its regenerative cotton programme. The founder regards the UK as a good place to cultivate this alternative fibre, which is fast-growing, needs less water and is a versatile material that can be used both for textiles and building materials. This new venture started small – on five acres – but has now grown to 20 acres, and it is looking to expand by bringing farmers on board. In 2024, Papillon Bleu launched its [first hemp-blend interior fabric](#) at Milan Design Week, which is a blend of hemp with post-consumer cashmere waste.

02 | Good practice and environmental reporting

Papillon Bleu works in partnership with [Raddis Cotton](#) and [GVK Society](#) to ensure the best environmental and social practices in its regenerative cotton programme.

The programme works exclusively with small scale tribal farmers, paying a 10-15% premium on market price, and non-GMO cotton-seeds are provided to the farmers at zero interest. Crops are only grown once a year to ensure that they are entirely rain-fed, making use of the monsoon season. The farms do not use any pesticides and herbicides (thus saving the farmers money), engage in multi-cropping (that is, food crops such as chia seeds, chillies and aubergines are also planted on the land, providing the farmer with food and/or additional income as well as improving soil health), and zero-tilling (to avoid soil erosion).

Papillon Bleu provides a range of metrics to evidence its programme's positive environmental impact. For example, in 2023 the regenerative cotton programme led to a 281 million litre water reduction, 28 kg of toxic herbicides and insecticides were removed, as well

as 15.6 tons of chemical fertilisers. Papillon Bleu also reports on the substantial carbon reduction achieved through the programme, with 450 tons of CO₂ having been taken from the atmosphere and 25 tons of CO₂ having been stored in the soil in 2023 annual report. This carbon sequestration also offers additional income opportunities to the farmers from carbon markets in addition to revenue from additional crops grown.

Papillon Bleu offers full traceability to its clients through QR code enabled digital passports, which shows the complete journey from seed to sewn garment. This does not just evidence the environmental credentials but also helps demonstrate that no modern-day slave labour exists in Papillon Bleu's works to the most stringent of industry standards working conditions and wages, that no modern-day slave labour exists in this food and fiber cotton eco-system and value chain.

Papillon Bleu seeks to replicate the nature-positive approach of its cotton programme for its new venture of growing hemp in the UK. The hemp crop is also 100% rain-fed (which the climate in the UK lends itself to), leading to a reduction of the water footprint. It is cultivated using multi-cropping/crop-rotating practices as well as no tilling, and all seeds are non GMO. Papillon Bleu's founder especially emphasises the substantial carbon sequestration potential of hemp (which will provide additional income opportunities for UK farmers) and soil-regenerating and biodiversity enhancing capabilities of the hemp plant.

03 | External Financing

Papillon Bleu has kick-started the hemp project with self-funding, as the founder used her own farm to grow the hemp trials to carry out R&D. The company has also received a grant from the [EU WORTH Partnership Project](#), which – in collaboration with the University Politecnico di Torino in Italy – has enabled a value mapping exercise as well as the promotion of the project at Milan Design Week in 2024. Papillon Bleu has also teamed up with DeMontfort University in Leicester, a local university that has a lot of experience of bast fibre R&D, to apply for grants to develop the project.

In line with her vision to grow the production of regenerative textiles globally (see next section), Papillon Bleu's founder looks to work with international farmers internationally, including partner in Romania who also looks to grow hemp for fibre. This partner has received a substantial experience in hemp cultivation and with 2,000 hectares of land available to grow hemp, the limitations arise from the necessity to buy hemp processing machinery and install locally, an example of how more growing of regenerative fibres could be supported by connecting with national financial infrastructures.

04 | Future Plans

Papillon Bleu's vision for the next ten years is “to have 100,000 hectares of land regeneratively being grown worldwide, whether regenerative cotton or hemp”. The founder specifically regards her hemp project as an opportunity for a UK grown green fibre and re-shoring. She plans to roll the project out to other farms and build the entire value chain in the UK from growing to processing (decorticating – spinning – weaving) to finding clothing manufacturers and brands interested in UK grown hemp-blend fabrics, and to do this at scale at the right

price point. The challenge lies in the fact that infrastructure for textile production has been diminished in the UK in the past few decades and there are only few processing facilities left. For example, there are only three decorticating facilities left in the UK; Papillon Bleu has access to one with near distance to the farm in Leicestershire, where the hemp project was started. There also only remain very few spinning facilities. To rebuild that infrastructure would require government support and infrastructure investment. This would also include encouraging farmers to make the switch from conventional to regenerative farming, and to review hemp licensing rules, as currently hemp growers need a licence from the Home Office, despite negligible THC content in industrial hemp plants. At the same time, growing a green textile such as regenerative hemp, would help meet the UK government's 'net-zero' target due to the huge carbon-sequestration potential of hemp, and also have positive biodiversity impacts. As part of this, carbon credits could serve as additional income for farmers seeking to grow regenerative fibres.

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British Pasture Leather

<https://britishpastureleather.com/>

01 | Introduction

British Pasture Leather was founded in 2021 by Sara Grady and Alice Robinson. Its purpose is to provide brands and designers with a finished leather product entirely sourced from regenerative farms in the UK and processed in local supply chains. British Pasture Leather's vision is to link leather with exemplary agriculture and to forge new connections between farming, food, and material culture.

The company's business model challenges mainstream leather production where raw animal hides are regarded as an anonymous commodity with no distinction to indicate the type of farming they originate from. Leather is often linked to environmental problems arising from industrial farming such as deforestation and greenhouse gas emissions. British Pasture Leather, by contrast, offers a nature-positive alternative, as their leather is – fully traceable – sourced from animals raised for food production in beneficial regenerative systems. As such, British Pasture leather returns value to the farmers through meaningful use of the hides.

British Pasture Leather's founders believe that the UK with its pastured landscape and existing heritage industries processing fibres and materials coming from farms, as well as a strong design community, is particularly suited for their business venture. To create their leather supply chain, they have worked with farms and their local abattoirs, with tanneries and finishing facilities, all based in Britain, to champion local production. Being mindful about sustainability and environmental impact, they have chosen to use a vegetable tanning process for their hides. Although this is a longer process than conventional leather tanning, it not only creates a beautiful quality of leather, but also makes the leather fully biodegradable.

Still in the development phase of the business, the company has thus far produced small volumes to present to designers and brands, and in 2024 the company's first commercial product was brought to market.

02 | Good practice and environmental reporting

British Pasture Leather works with farms engaging in regenerative practices. As 'regenerative' is not (yet) a codified concept, the company conceptualises regenerative practices as farming practices that are improving land and ecosystems and ensuring the highest level of welfare for the animals involved in those systems. Such farms raise their cattle in a way that is aligned with the animal's instinctive nature: the cattle are pasture fed (which is the diet they are meant to be eating), and are living on the land.

Apart from having full traceability to the farms that they source from, British Pasture Leather has also chosen to work with the '[Pasture for Life](#)' farming Certification programme to lend credibility to its efforts. Pasture for Life champions the grazing of animals on pasture, as this brings "positive impacts for biodiversity and carbon¹², human health and wellbeing, and animal health and welfare". In other words, when holistically managed, herds of cattle on pasture have a beneficial impact on the eco-system and the services it provides. Pasture for Life certifies farms with 100% pasture-fed livestock, and a certification requirement is engagement in farm practices that take biodiversity into account (e.g. mapping of habitats, maintaining and managing of wildlife habitat, water pollution control, allowing for diversity within pasture and maximising the environmental value of field boundaries) Currently, the organisation provides evidence for positive biodiversity impact of pasture-fed farming in the form of qualitative case studies but also promotes technology and tools for certified farms to utilise such as soil health and biodiversity monitoring apps and carbon toolkits.

Given the nascency of metrics development related to regenerative practices, British Pasture Leather emphasises the importance of a strong narrative around their nature-positive business model. At the same time the founders recognise that fashion brands are interested in the story but also demand metrics related to the environmental impact of leather production. A specific challenge that British Pasture Leather encounters is the measuring of the environmental impact of leather processing, due to the current limitations of the local infrastructure of the UK processing facilities.

03 | External Financing

Apart from the founders having put personal funds into the business, British Pasture Leather has thus far benefited from a range of external funding streams.

They have benefited from a successful application to the UK Small Business Lending scheme, and they have also received a loan from an individual who supports the mission of the business.

¹² I.e. potential for carbon sequestration

Further, British Pasture Leather has been successful in obtaining grants for specific R&D projects. This included grants from the Royal Countryside Fund, which supports rural sustainability. As this fund only gives grants to charitable foundations, British Pasture Leather partnered with Pasture for Life to conduct the first pilot production of its leather. Other grants were obtained from the Royal Society for the Encouragement of Arts, Manufactures and Commerce; the West of England Creative Business Programme; and the Business of Fashion Textiles and Technology (BFTT) project, which focuses on delivering sustainable innovation within the entire fashion and textile supply chain. The BFTT grant enabled British Pasture Leather to utilise a researcher, who engaged in some R&D around the leather finishing process.

As a next step, British Pasture Leather, is looking for equity investment. The company has received approval for the UK Government SEIS programme, which provides a tax incentive for investors, and the founders hope that they will be able to raise investment through the programme in order to grow and develop their business. They expect, however, that their investors will align with the mission of the business and fully buy into British Pasture Leather's business model. A business model which is more time and labour intensive, and therefore carries a higher cost than conventional leather production, but which is beneficial for nature, the farming community and the UK leather production industry.

04 | Future Plans

British Pasture Leather looks to expand the number of farms and processing facilities it works with to make their business venture more efficient and more commercially viable. As part of this, the business seeks to encourage more farms that engage in pasture-fed, regenerative practices to join Pasture for Life. The company also seeks to engage with more UK leather processing facilities. The founders highlight a need for infrastructure support to preserve the UK leather industry, which has been diminishing over the years. This would also mean an enabling of modernisation or rebuilding of leather processing facilities so that they become state of the art with regards to environmental credentials. Such support would also include incentivising farmers to produce higher value raw materials, and assisting them with measuring positive environmental impact.

British Pasture Leather envisages a public-private partnership focused on developing a nature-positive leather production eco-system in the UK, which would involve government support as well as support from private investors, industry, and charities.

"We are the only ones that have visited every type of facility along that supply chain. So from the farm to the hide yard to the tannery, to the finishing facility to the design workshop, to the retail environment. The farmers don't move up that supply chain, and the designers don't move down it, and the ones in between don't go see each other. And so we are really interestingly positioned to propose a new way of looking at leather production from the perspective of connecting those dots with a real ethos of sustainability at the heart of it."

...

01 | Introduction

Materra is a fashion-tech company whose mission is to design scalable solutions for growing and sourcing future-proof cotton, that is, cotton that is climate-resilient, transparent and equitable. The company was founded in 2018 by Edward Brial, Edward Hill and John Bertolaso. After piloting the growing of hydroponic cotton in polytunnels in the UK, the company quickly expanded into India to be present in a region where substantial amounts of cotton for the global textile and fashion industry are grown. Materra raised funds both to launch industrial hydroponic pilots and to start a regenerative cotton programme in India.

The aim of the regenerative programme is 1) to engage Indian cotton farmers to encourage them to pivot from conventional cotton growing, which is polluting and resource intensive, to using regenerative methods, and 2) linking these farmers to fashion brands, which are – motivated by legislative and consumer pressures – increasingly interested in credibly sourcing materials that are grown in a sustainable manner. Materra connects farmers with fashion brands via the Co:Farm app that the company has developed, which enables full transparency and provides a range of data related to social, environmental and economic impact (more details below). Materra aims to create partnerships with fashion brands, which – using Materra’s data services – can ensure themselves of the provenance of the cotton they source. Such approach overcomes the limitations of other cotton programmes such as the Better Cotton Initiative, which has no fully traceable chain of custody between brands and cotton farms.

Materra has grown to date (2024) to over 50 staff across their offices in London and Ahmedabad, and the company supports over 5000 farmers in central and western India.

02 | Good practice and environmental reporting

Materra’s regenerative cotton programme is based on three principles: raising farmers’ livelihoods, restoring biodiversity and reducing resource inputs (chemical, water, carbon). One key aspect of the programme is to shift farmers to using traditional (non-GMO) cotton seed varieties that are more climate- and pest-resilient.

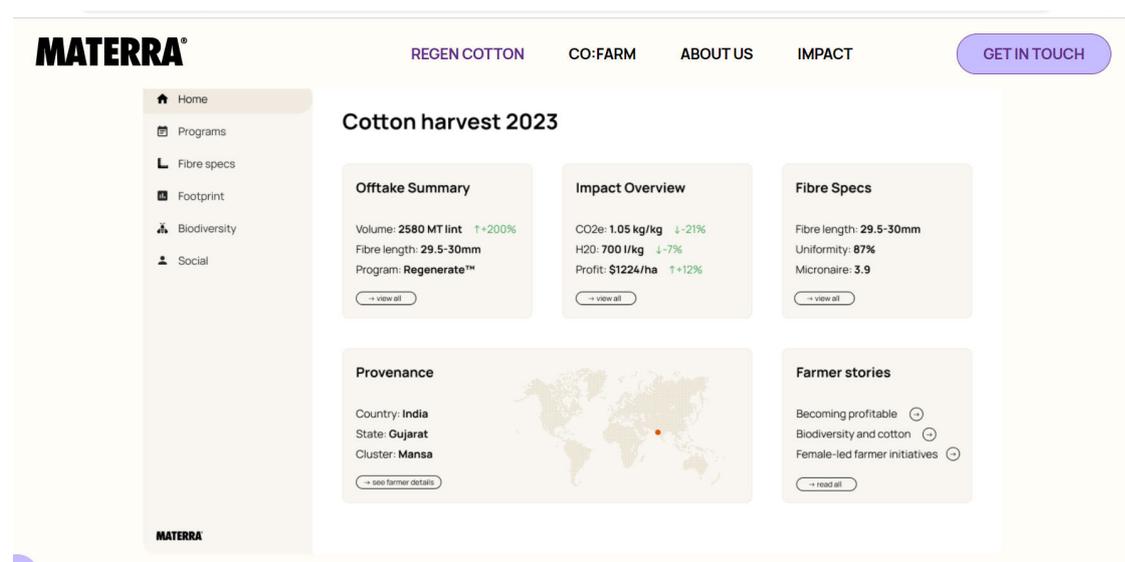
Materra supports the farmers through live contact with Materra’s field executives and through training. Farmers also receive support through the Co:Farm app, which has a knowledge portal (for example, on green manuring) and through which they can request advice (for example, they can take a picture of an insect that is unknown to them and ask whether this is a harmful or beneficial insect; or they can use an audio function in the app to ask for advice). The Co:Farm app also acts as a diary, where farmers can track their expenses and activities.

Materra emphasises that it is important to provide bespoke support to the farmers, as soil, crop and climate varies from location to location. Some farmers might find it easy to shift to chemical pesticide-free farming immediately, while others may have more of a challenge to find bio-based alternatives to combating certain pests.

On the other side of the coin, the Co:Farm app enables “radical transparency” for the brands participating in Materra’s programme – as brands will be provided with information on a range of data points including demographics, carbon, water, soil and biodiversity. These meet the requirements for GHG and water assessments using [Cool Farm Tool](#), as well as [RegenAgri](#) and [ROC](#) standards. Materra uses soil testing for below ground biodiversity (for example, presence and diversity of microbes, fungi, mycorrhiza). It also develops above ground biodiversity baselines (for example, in relation to pollinators, vascular plants, small and large mammals, birds) and asks farmers to help with that (for example by counting and describing bird species they observe on their land). The aim of increasing biodiversity in the cotton fields enables the (re)building of a functioning ecosystem that helps the farmer gain a decent yield from the field without having to employ chemical fertilisers and pesticides, as beneficial insects and a more varied crop cover can provide these inputs too (ecosystem services perspective).

Materra’s approach focuses on outcomes and practices and therefore also emphasises the importance of narrative in their Co:Farm data. This narrative data sets out what farmers do to improve their land and what outcomes they seek to achieve in the near and mid/long-term future, which then enables brands to build their own narrative too.

A challenge for Materra is to find cost-effective Measurement, Reporting and Verification technologies that can be used in Southern markets such as India as currently most available technology – satellite systems, audio-based recording systems, soil kits etc – are designed for Northern markets with high price points and/or high initial costs.



Co:Farm Information Dashboard

Source: <https://www.materra.tech/co-farm>

03 | External Financing

Materra started out with grant funding from EIT Climate-KIC – an EU funding body that supports early stage climate start-ups, which helped with renting offices, prototyping, and getting ready to pitch for pre-seed investment. (This scheme is currently no longer available

to UK start-ups due to Brexit. In the UK, the grant funding landscape for start-ups such as Materra is challenging, as UKRI's farming innovation pathway is not available for innovations taking place outside the UK.)

Materra was successful in getting some small impact investments, but the majority of the company's funding comes from the fashion industry itself: family offices or early stage investment arms of large fashion groups or fashion sourcing companies. In 2021, Materra launched a [partnership](#) with Kering, PVH, Arvind and Fashion for Good that funded the development of a hydroponics pilot in India. In 2022, Materra raised \$4.5 million seed funding, co-led by H&M Group Ventures and Invest FWD (BESTSELLER Group), which enabled them to develop its regenerative cotton programme. The investment from fashion brands presents a long-term commitment (with an expected 10-20 year turnaround time) as fashion brands are in the first instance interested in investing in the development of solutions that address the environmental (and social) issues that 'business as usual' fashion has caused over the past few decades.

Materra would like to also attract more general VC impact investment but this remains challenging, as agriculture and fashion are currently not well understood as fields of investment. An additional challenge is that much farming R&D and innovation funds are focused on food crops and less on fibre production for textiles and fashion – and there is a need for a shift in focus to support the important work of start-ups working in sustainable fibre-growing agriculture.

04 | Future Plans

Aside from seeking to support more farmers in India to enable a shift to future-proof cotton, Materra seeks to develop more partnerships with fashion brands that will use their services. In 2024, Materra announced a brand partnership with [Mango Fashion Group](#), which will use Materra's regenerative cotton in their products. Sustainable Menswear brand LESTRANGE has also begun to stock [T-Shirts](#) made from Materra's cotton.

In order to develop standards and practices, Materra has also teamed up with Textile Exchange, an NPO that seeks to support "materials sourcing that respects our planet, its ecosystems, and its communities", to trial their [Regenerative Agriculture Outcomes Framework](#).

Appendices

Appendix 1: Environmental impact and contribution to nature and biodiversity loss of fashion and textile industry

Some facts and figures concerning the environmental impact of the fashion and textile industry

Overproduction and waste: In 2019 approximately 62 million metric tons of apparel were produced and consumed globally (The World Bank, 2019). An estimated 300,000 to 350,000 tonnes of clothes ending up in landfill every year in the UK alone (WRAP, 2017). Within 15 years the industry has doubled production, while the time clothing is worn before it is thrown away fell by around 40% (Souchet, 2019).

Carbon Emissions: Estimates suggest that the sector emitted 1.025 gigatonnes of CO₂ in 2019, which equate to around 2 percent of annual global greenhouse gas emissions with emissions expected to grow to 1.588 gigatonnes by 2030 (Sadowski et al., 2021).

Chemical and plastics use: Fashion uses 20% of chemicals globally, uses 20% of plastics produced globally, accounts for 20% waste-water pollution (Pan 2023).

The impacts of the fashion sector on biodiversity

Textile Exchange (2023) and the Taskforce on Nature-Related Financial Disclosures Apparel, Accessories and Footwear sector guidance (TNFD, 2025) provide an extensive list of the specific pathways in which fashion/textile production can cause nature and biodiversity loss. This includes:

- **Conversion of natural ecosystems** (including deforestation) is relevant to the textile industry where land is converted for fiber crop production and pastures for livestock species. Conversion has impacts on habitat fragmentation and wildlife corridor function. Fragmentation impedes species' feeding and reproduction patterns, reducing populations and increasing extinction risk. (Textile Exchange, TNFD)
- **Fossil fuel extraction** to produce synthetic fibres requires site preparation for construction and surface mining. (TNFD) Fossil fuel extraction often takes place in regions with high levels of biodiversity and conservation importance, potentially leading to the loss and degradation of natural habitats, which affects associated species. (TNFD Oil and Gas)
- **Monoculture planting for natural fibres** reduces the availability of nutrients and leads to soil exhaustion. (TNFD)
- **Nitrogen-, phosphate- and potassium-based synthetic fertilisers** leach into groundwater, polluting waterways and leading to oxygen depletion in aquatic and marine ecosystems, the acidification of soils and waters, and reductions in bird, insect, amphibian and soil biological diversity. (TNFD)
- **Large-scale livestock farming for animal-based fibres can result in soil depletion and biodiversity loss.** Overgrazing leads to bare unprotected soil with higher erodibility, higher temperatures and reduced soil microbes and organic matter, causing structural changes that affect the soil's ability to infiltrate water. (TNFD)
- In natural fibre and man-made fibre production, **complex effluent containing several dyes, heavy metals and other organic agents can accumulate in soil** if disposed of without

treatment or after incomplete treatment. This has negative effects on soil productivity, as the excessive concentration of pollutants in soil reduces fertility and the quality of soil and ingress in food web. For instance, heavy metal enriched soil adversely affects the density of earthworms (TNFD). **Runoff from improperly managed wastewater or agricultural inputs also leads to pollution of waterways and bodies of water**, with detrimental effects on biodiversity in those watersheds and downstream (Textile Exchange).

- **Solid waste** contributes to the degradation of the ecosystems where it is disposed of and disrupts the ecosystem services those assets provide. Discarded textiles can harm wildlife when not disposed of appropriately. When waste is disposed in landfills, it decomposes or degrades slowly. Moreover, chemicals and constituents from the waste leak into surface water, groundwater, soil and plants. This affects their physicochemical parameters and results in heavy metal concentration. (TNFD)
- **Water use** in natural and man-made fibre production and processing can lead to the depletion of aquifers, subterranean freshwater ecosystems and other water resources, especially in arid and drought-prone areas. This can lead to reduced water flow regulation and increased drought severity and frequency. Such water use affects the supply of water to other users and to nature. (TNFD)
- **Changes in climate** influence the environmental conditions that species rely on to exist in their habitat. These changes could impact where a species can be found and how well it is thriving under the new conditions.
- **The textile industry has been highlighted as a significant contributor to carbon emissions**, with raw material production accounting for a quarter of the sector's emissions. (Textile Exchange)
- **Microplastic pollution in soils originating from synthetic fibre** significantly affects the composition and abundance of the effects of soil fauna. Microplastics strongly cascade through the soil food webs, leading to the modification of microbial functioning, with further potential consequences on soil carbon and nutrient cycling. Microplastics entering waterways and the ocean are also a material issue for the sector. (TNFD)
- **Chemicals and dyes used in the textile manufacturing process can result in soils in a poor physical and chemical state and susceptible to erosion**, leading to loss of productivity, sustainability and diminished food chain quality. (TNFD)

Appendix 2: Relevant nature-related regulations and policies for the fashion and textile industry

Large fashion and textile companies will be affected by *The EU Corporate Sustainability Reporting Directive (CSRD)*, which will require all large and listed companies to publish regular reports on their social and environmental risks and impacts. The CSRD will require companies to assess their material impacts and dependencies based on geographic locations and the raw materials they use (Textile Exchange 2023). Sister legislation *EU Corporate Sustainability Due Diligence Directive (CDDD)* will require large and listed companies to while companies under the CSDDD are required to conduct human rights and environmental due diligence to identify their sustainability impacts and, where adverse actual or potential impacts are identified, to take appropriate measures to prevent, mitigate and remediate them ([KPMG 2024](#)). These pieces of legislation require that companies know their supply chains and their supply chains' impacts and be transparent about it.

An important policy framework for reporting – which although not yet mandatory is being increasingly adopted by (large) companies to meet investor expectations and to stay ahead of regulatory compliance – is *The Taskforce on Nature-related Financial Disclosures (TNFD)* recommendations and guidance for companies on assessing, reporting and acting on their nature-related dependencies, impacts, risks and opportunities. TNFD (2025) has published **sector specific guidance**, which highlights the nature-related dependencies, impacts and risks that are likely to occur across the entire value chain (see above). It also acknowledges that textile value chains can be relatively complex and opaque, and therefore reporting can be challenging, yet emphasises that over time sector organisations will need to build the processes and capabilities to collect more nature-related data from their value chain partners. Following the LEAP approach,¹³ the sector guidance applies core TNFD indicators to the sector and proposes indicators specific to the sector (see RQ3).

The sector is further being affected by a raft of legislations that is being prepared under the umbrella of the *EU Strategy for Sustainable and Circular Textiles*. The strategy envisages that “by 2030, textiles on the EU market should be durable and recyclable, largely made of recycled fibres, free of hazardous substances and produced in an environmentally friendly way while respecting social rights. Fast fashion should be ‘out of fashion’ and re-use and repair services would be widely available. Textiles should be collected at the end of their lifetime and their incineration and landfilling reduced to a minimum thanks to innovative fibre-to-fibre recycling.”

Specific pieces of legislation that are currently being prepared include:

The *EU Green Claims Directive* will require companies to substantiate each claim they make with regards to the environmental performance of their products, with regards to content (e.g. percentage of recycled fibres used) or GHG emissions. This piece of legislation is designed to counteract ‘greenwashing’. The UK currently has a ‘[Green Claims Code](#)’ in place, which albeit ‘soft law’, enables court proceedings against companies if they make false claims about their green credentials.

¹³ LEAP means: Locate your interface with nature, Evaluate your dependencies and impacts on nature, Assess your nature-related risks and opportunities, Prepare to respond to nature-related risks and opportunities and to report on your material nature-related issues.

EU Digital Product Passport regulation which will require nearly all products sold in the EU to feature a Digital Product Passport (DPP). It aims to enhance transparency across product value chains by providing comprehensive information about each product's origin, materials, environmental impact, and disposal recommendations. The DPP is designed to close the gap between consumer demands for **transparency** and the current lack of reliable product data. It will include essential details such as a unique product identifier, compliance documentation, and information on substances of concern. It will also provide user manuals, safety instructions, and guidance on product disposal. By offering a detailed digital record of a product's lifecycle, the DPP will enhance supply chain management, ensure regulatory compliance, and help companies identify and mitigate risks related to authenticity and **environmental** impact.

The EU Deforestation Regulation (EUDR), which will ban the import of certain products into the EU if they are linked to deforestation anywhere in the world. Several raw materials important to the textile industry will be included in the scope of the EUDR, including leather and rubber. The aim of this regulation is to halt global deforestation and forest degradation, while reducing greenhouse gas emissions and biodiversity loss. Initially, the law will only apply to large and medium-sized companies but will be extended to smaller companies in the future. (Textile Exchange, 2023)

Finally, *Extended Producer Responsibility (EPR) schemes* will require companies to manage their products when they are discarded by consumers. EPR schemes in the main require companies to pay a fee towards the management of product reuse and recycling within national jurisdictions. Differentiated fees can stimulate sustainable and circular product design (Ellen MacArthur Foundation 2024). The EU has agreed on an *EPR directive* for Textiles.

Appendix 3: Detailed overview of business models and practices that aspire towards nature positive enterprise (TNFD and Textile Exchange)

Textile Exchange (2023) and TNFD (2025) propose a **range of solutions** as to how fashion and textile companies can engage in more nature-friendly practices. They include:

- **Avoiding deforestation and conversion of natural ecosystems**, such as grasslands and tropical forests. (Textile Exchange)
- Sourcing from **crop production** systems that
 - **use cover crops, crop rotation, and minimal tilling** to produce annual crops. This protects soil, avoids emissions, and sequesters carbon, resulting in healthier systems that will be beneficial to above- and below-ground biodiversity.
 - engage in production management practices that encourage **efficient and/or reduced use of synthetic pesticides and fertilizers**.
 - engage in **water management practices** and technologies that improve the efficiency of water resource use, such as irrigation scheduling, crop selection, drip irrigation, sprinklers, using natural water runoff, and sensors that monitor soil moisture and control irrigation systems automatically (Textile Exchange)
- Sourcing **animal fibre** from systems that
 - engage in **sound grazing practices** to encourage ecosystem function and to **avoid overgrazing**
 - engage in **livestock management practices** that stimulate soil through hoof action, grazing action, and natural manure application. (Textile Exchange)
- **Designing products for circularity**, i.e. ensuring that products are kept in use in use through rental, repair, reuse and remaking activities (to be prioritised over recycling). Following circular design principles including designing for maintenance, longevity and durability; designing for reusability, designing for repairability, using modular design, designing for disassembly and recycling at end of life. (TNFD)
- **Minimising excess waste** (pre-consumer) (TNFD)
- **Using recycled fibres** for apparel manufacture (TNFD)
- **Increasing water use efficiencies** across all processes (TNFD)
- **Ensuring that harmful chemicals** are phased out across the value chain (TNFD)

Appendix 4: TNFD Core and Addition ‘Apparel, accessories and footwear’ sector metrics and global metrics

Metric Category	Sector metric
Core Sector Metrics	
Response	Proportion (%) of land managed or sourced from (for agriculture, grazing and/or forestry) that employs practices with measurable regenerative outcomes , referencing the definition of regenerative agriculture used for disclosure (e.g. from OP2B or Textile Exchange)
Impact driver	Total weight (tonnes) of fibre and materials from recycled sources , by material.
Pollution/pollution removal	Weight (tonnes) of synthetic textiles washed and quantity (number) of washings during production. Average mass loss (g/kg) of the original sample weight, using The Microfibre Consortium Test Method for the quantification of fibre release from fabrics during simulated domestic laundering.
Additional Sector Metrics	
Impact driver	Percentage of production volume from land owned, leased, managed or sourced from that is determined to be deforestation- and conversion-free (DCF), by product
Response	Circular sourcing Weight (tonnes) and proportion (%) of physical products that are: <ul style="list-style-type: none"> • Non-virgin products and materials (e.g. using reused and recycled products and materials); • Sourced from by-products/waste streams (e.g. offcuts of a material that has not previously been in a product); • Virgin but renewable and regeneratively produced • Virgin but renewable and sustainably produced; • None of the above (virgin and not sustainably or regeneratively produced).
Response	Weight (tonnes) and proportion (%) of physical products designed following use phase circular economy principles .
Response	Weight (tonnes) and proportion (%) of products that enable longevity further down the value chain e.g. products with care instructions for washing and drying.
State of Nature	Concentration of key pollutants around key water basins in which the company is operating: nutrients (nitrogen and phosphorus levels), pesticides, organic loading (including crop and livestock excreta), pathogens, metals, other and emerging pollutants (including antibiotics and other veterinary medicines).

Global metrics (only those listed that have specific sector guidance), for full list see TNFD	
Land/freshwater/ ocean-use change	<p>Total spatial footprint</p> <p>In reporting the total surface area controlled/managed (km²), an organisation should include areas sourced from (km²).</p>
Land/freshwater/ ocean-use change	<p>Extent of use change</p> <p>In reporting this core global disclosure metric, an organisation should include:</p> <ul style="list-style-type: none"> • Agriculture-driven terrestrial natural ecosystem conversion, including, at least, conversion of primary forests, other naturally regenerating (second-growth) forests, savannahs, grasslands and freshwater natural ecosystems, linked to and owned, leased, operated, financed or sourced from; and • Natural ecosystem conversion driven by other activities for fibre production e.g. oil extraction, including, at least, conversion of primary forests, other naturally regenerating (second-growth) forests and freshwater natural ecosystems, linked to land owned, leased, operated, financed or sourced from.
Land/ freshwater/ ocean-use change	<p>Extent of land/freshwater/ocean ecosystem conserved or restored</p> <p>In reporting this core global disclosure metric, an organisation should include area of forest, wetland, savannah and grassland conserved and/or restored/reforested/rewettered in direct operations or in the supply chain of the organisation, noting if it is in a way that is likely beneficial to wildlife (e.g. with native plantations). An organisation should report area conserved and restored separately, if data is available. (Extent of land/freshwater/ocean ecosystem that is sustainably managed)</p> <p>In reporting this core global disclosure metric, an organisation should include:</p> <ul style="list-style-type: none"> • The area covered by landscape-level initiatives that the company contributes to, including the financial contribution of the company; and • The area managed or sourced from that deploys practices with measurable regenerative outcomes, including the definition of regenerative used for disclosure.
Pollution/ pollution removal	<p>Pollutants released to the soil</p> <p>In reporting this core global disclosure metric in direct operations and upstream, an organisation should include the following pollutants:</p> <ul style="list-style-type: none"> • Pesticides used by toxicity hazard level (either extremely hazardous, highly hazardous, moderately hazardous, slightly hazardous, or unlikely to present an acute hazard) against baseline. • Nitrogen balance:

	<ul style="list-style-type: none"> • Nitrogen input from livestock manure and fertilisers; • Nitrogen output; • Phosphorus balance: <ul style="list-style-type: none"> • Phosphorus input; • Phosphorus output; • If relevant, balances for potassium and other nutrients (e.g. micronutrients). • Hydrocarbons (including oil and grease).
Pollution/ pollution removal	<p>Wastewater discharged</p> <p>In reporting this core global disclosure metric, an organisation should include the pollutants in its direct operations and upstream that are listed on the Zero Discharge of Hazardous Chemicals (ZDHC) programme’s Manufacturing Restricted Substance List (MRSL),²⁴ such as:</p> <ul style="list-style-type: none"> • Allergenic Disperse Dyes; • Anti-microbials and Biocides; • Total heavy metals; • Organotin Compounds; • Perfluorinated and Polyfluorinated Chemicals (PFAS); • Bisphenol A (BPA); • Phenols; and • Phthalates – including all other esters of ortho-phthalic acid. <p>In reporting this core global metric, an organisation should also report the following pollutants in its direct operations and upstream:</p> <ul style="list-style-type: none"> • Microfibres; • Hydrocarbons (including oil and grease); • Nutrients (nitrogen and phosphorus);²⁵ • Pesticides; • Organic loading (including crop and livestock excreta); • Pathogens; • Other and emerging pollutants (including antimicrobials and other veterinary medicines).
Pollution/ pollution removal	<p>Waste generation and disposal</p> <p>In reporting this core global disclosure metric, an organisation should if applicable refer to the Cascale’s Higg Facility Environmental Module (FEM) for types of production hazardous waste (e.g. empty chemical drums and containers, expired/used/ unused chemicals).</p> <p>In reporting the weight of hazardous and non-hazardous waste (tonnes) diverted from landfill, an organisation should disclose in line with the waste hierarchy:</p> <ul style="list-style-type: none"> • The weight (tonnes) and proportion (%) of unsold apparel products and fabric waste by type in the company’s direct operations that are diverted from landfill in line with the waste hierarchy;²⁶

	<ul style="list-style-type: none"> • The weight (tonnes) and proportion (%) of apparel products by type in the company’s direct operations that are kept in use through rental, repair, reuse, and remaking activities in line with the waste hierarchy; • The weight (tonnes) and proportion (%) of unsold apparel products in all selling points that are recycled or donated for reuse; and • The weight (tonnes) and proportion (%) of apparel products and fabric waste by type in the company’s direct operations that have been diverted due to design choices (i.e. waste designed out).
Pollution/ pollution removal	<p>Plastic pollution</p> <p>In reporting this core global disclosure metric, an organisation should report:</p> <ul style="list-style-type: none"> • Weight (tonnes) of plastic material (primary, secondary and tertiary) used for textile products; and • Weight (tonnes) of plastics used in packaging and products commonly classified as problematic (PS, PVC, EPC, multilayer plastic packaging, undetectable carbon black). <p>For plastic packaging, an organisation should report:</p> <ul style="list-style-type: none"> • Weight (tonnes) and proportion (%) of plastic packaging containing virgin plastics; • Weight (tonnes) and proportion (%) of plastic packaging containing post-consumer recycled content; and • Proportion (%) of plastic packaging that is reusable, compostable, technically recyclable, and recyclable in practice and at scale.
Resource use/ replenishment	<p>High risk natural commodities</p> <p>In reporting this core global disclosure metric, an organisation should include:</p> <ul style="list-style-type: none"> • Natural fibre or raw material products on the SBTN High Impact Commodity List (i.e. cotton, leather, wool). An organisation should note that for wood products, types refers to biomass, pulp or wood and that it can refer to FAO’s classification and definitions of forest products; and • Wild species, indicating what proportion of these represent threatened species listed as vulnerable, endangered and critically endangered on the IUCN red list and species listed by the Convention on International Trade in Endangered Species of Wild Fauna and Flora, known as CITES.
Resource use/ replenishment	<p>Quantity of high-risk natural commodities (tonnes) sourced under a sustainable management plan or certification programme</p> <p>In reporting this core global disclosure metric, an organisation should include:</p> <ul style="list-style-type: none"> • Natural fibre or raw material products on the SBTN High Impact Commodity List (i.e. cotton, leather, wool) certified to a relevant third-party environmental, social, and/or animal welfare standard such as Global Organic Textile Standard

	<p>(GOTS), Regenagri, Textile Exchange’s Responsible Wool Standard (RWS), and Organic Content Standard (OCS).</p> <ul style="list-style-type: none"> • For forestry and pulp products, an organisation should report on planted forests and native forests respectively. An organisation should provide information on the forest management conditions for the wood or fibre, such as whether these are certified by a broadly recognised third party certification system with a global presence, such as the Forest Stewardship Council (FSC), Programme for the Endorsement of Forest Certification (PEFC) and Sustainable Forestry Initiative (SFI). ‘Controlled Wood’, ‘Controlled Sources’ or ‘SFI Fiber Sourcing’ are excluded. Organisations should refer to the UN FAO definition of ‘Sustainable Forest Management’ (see TNFD glossary).
<p><i>No sector specific guidance on climate change, state of nature, and invasive alien species</i></p>	

Appendix 5 Proposed Sector Metrics for SMEs in the Fashion and Textile Sector

Prepared by Dr Tom Breeze (University of Reading)

This is a simplified reporting framework, adapted from the well-known [DPSIR framework](#), focusing on pressures (land use, pollution), biodiversity status, and responses to improve biodiversity status.

The metrics outlined are not set in stone and can be adjusted, reduced or replaced. The idea is to give options as we do not know what is feasible for most businesses. They are designed to be international and focus on measurable aspects of biodiversity rather and are colour coded:

Easy to assess basic measures	Requires more detailed supply chain maps or some investment	Requires detailed information or time consuming data gathering	Aspirational and technical metrics
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The idea is that the orange boxes should be easy for all businesses to do with the aim of gradually expanding to the harder ones (or aspiring to do so)

Land use	Pollution	Status	Responses
Proportion of source materials from high-impact materials (leather, animal skins and metals) ¹⁴	Proportion of toxic and non-biodegradable materials in production	Habitat diversity within the source material production area (10km max) ¹⁵	Proportion of total materials that can be completely traced
Total land area used in production (all materials, including livestock feed) ¹⁶ per kg of product ¹⁷	Proportion of source material from certified organic management (e.g. organic cotton)	Diversity of species in freshwater (eDNA) in and around source material land and manufacturing sites	Proportion of product that is completely recyclable or biodegradable.
Proportion of source materials from (or from within 1, 5 and 10km of) protected areas ¹⁸	Estimated total fertilizer and pesticide use	Common bird species abundance in and around source material fields	Area of surrounding non-crop/pasture habitat that is actively restored
Average field size of cotton	Water footprint of source materials ¹⁹	Butterfly abundance around source material fields	Proportion of on-farm waste that is recycled (e.g. as green manure)
Proportion of source material from smallholders	Levels of Nitrogen, Phosphorus and pesticides found in local water bodies.	Abundance of rare or threatened species in and around the source material fields	Average total production efficiency (volume of inputs vs outputs)

¹⁴ Defined in [Sinclair et al \(2020\)](#)

¹⁵ Can be based on spatial datasets e.g. [Global Habitat Type map](#) or [Copernicus](#), although ground truthing is always preferable and can be done semi-autonomously with drones (UKCEH offers [a course](#) on this) but much of the work in this area concerns coastal habitats. This can be broad if the exact location of field is not known.

¹⁶ If the area of crop isn't known then take the total tonnage of each product from each country and use data from [FAO statistical database](#) on production to calculate area based on average yield For livestock, the number of animals can be converted into an area using e.g. the [HALF \(Human appropriation of land for food\) methodology](#) which uses FAO Statistical data.

¹⁷ This may include dyes etc. from organic sources

¹⁸ Using data from the UNEPs [protected planet mapping](#) to identify protected areas in each country. Protected areas usually only prevent or limit land use change, they do not stop agricultural activity. Distances cover a range of areas over which species may be active and which fit into standard 100m2 mapping

¹⁹ Water footprints are very high for many textiles and can cause serious water stress, affecting biodiversity as well as people.

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