PBL Netherlands Environmental Assessment Agency

POTENTIAL EFFECTS OF DUTCH CIRCULAR ECONOMY STRATEGIES ON LOW AND MIDDLE-INCOME COUNTRIES

Cotton production and post-consumer textiles

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FINDINGS

Findings

In its Government-wide Programme for a Circular Economy, the Netherlands presents its ambition to move away from a linear economy towards a circular economy by 2050. The overarching goals of this transition are to decrease and limit environmental pressures while addressing potential supply risks for critical materials. A successful transition from a linear to a circular economy will have consequences for global value chains, thus affecting people and the environment on a global scale. At the request of the Dutch Ministry of Foreign Affairs, this project by PBL Netherlands Environmental Assessment Agency explores the effects of Dutch circular economy strategies on low- and middle-income countries.

The effects vary per product group and type of circular strategy, as well as for the various processing stages and geographical locations in value chains. As a qualitative case study of a relevant product group, this study explores the effects of a Dutch transition towards a circular economy for textiles on low- and middle-income countries involved in cotton production and the disposal phase of Dutch textiles and clothing. More specifically, it analyses the possible implications of circular economy strategies on cotton production in West Africa and on the processing of post-consumer textiles (sorting, grading, recycling and refurbishing) in Pakistan.

The clothing and textile industry is part of a complex global value chain, which includes raw material extraction; production, processing and blending of fibres; weaving and dyeing; clothing and textile manufacturing; retail; use; and, finally, disposal/waste. The value chain is associated with a large ecological and water footprint, poor working conditions and rapidly growing waste streams. The Dutch Government's Policy programme for circular textile 2020–2025 addresses these issues by setting targets for sustainable resource production, reuse and recycling. Despite being a comparatively small industry, from a global perspective, in recent years, cotton production has increased significantly in the five leading African cotton-growing countries. Large shares of post-consumer textiles are traded internationally, with Pakistan as the most important recipient of textiles for recycling.

The study discusses potential positive and negative impacts related to cotton production and waste management of a range of circular economy strategies that target the textile value chain, and also reflects on the Policy programme for circular textile 2020–2025. The study uses trade data on the current trade in cotton, clothing and post-consumer textiles to and from the Netherlands. Literature review and expert interviews were used to qualitatively assess socio-economic and environmental impacts in low- and middle-income countries, both under current trade flows and those that would result from circular economy strategies. Furthermore, an expert workshop was held to gather further insights into the possible impacts of circular economy strategies and to present and discuss preliminary findings.

Impacts of current trade flows

A significant share of Dutch clothing is made in Bangladesh, a major importer of West African cotton

The most recent data available show that, in 2018, an estimated 276 kt of new clothing was put on the market in the Netherlands. Most was cotton-blend (53%), with Bangladesh as the largest supplier.

The production of cotton is mainly concentrated in a small number of countries (i.e. China, India, United States, and Brazil). However, despite African cotton production playing a comparatively small role on the global market, in recent years, production has also increased in the top 5 of West African cotton-growing countries (i.e. Benin, Mali, Ivory Coast, Burkina Faso and Cameroon). Historically, India had always been the main supplier of cotton to Bangladesh, but over the last 5 years, production in these 5 West African countries increased significantly and, by 2019, they were Bangladesh's largest cotton supplier, with a combined share of 40% (538 kt).

Cotton production in West Africa is associated with a range of sustainability challenges

Cotton plays a very important role in the economies of the top 5 West African cotton-growing countries. It is one of their most important export products, representing a sizable share of GDP, and provides a source of income as well as access to agrochemical inputs for many smallholders and their families. At the same time, cotton production is linked to a range of sustainability issues, with both positive and negative impacts:

- Environmental impacts: Cotton farming in West Africa is associated with high levels of land degradation and pollution from the use of pesticides. Degradation is further exacerbated by a very limited use of fertilisers. Although water scarcity is a major issue in cotton production around the globe, this is less the case in West Africa, as most cotton production here is rain-fed rather than irrigated. The low levels of fertiliser use and absence of irrigation also mean that yields are relatively low.

- Socio-economic impacts: Around 3.5 million farmers and their families work in cotton production in Africa. Most West African cotton farmers are smallholders and most farm labour is manual, with very low levels of mechanisation. Labour rights violations, such as child labour, are a key issue in this sector, and it is also associated with occupational health and safety risks, partly due to the high levels of pesticides. Local value addition by clothing or other textile production remains the exception. In 2018, only 1.5% of the cotton lint produced went into local processing, illustrating the dependence of cotton producers on foreign markets.

- Impacts on food security: In many West African cotton-growing countries, cotton is one of the few crops for which farmers can buy fertilisers and other agrochemical inputs on credit. These fertilisers are also used for growing food crops in a rotation system. Fertilisers used in cotton production, therefore, also have benefits for local food availability. As a result, in regions where cotton is grown, a higher degree of food security has been observed.

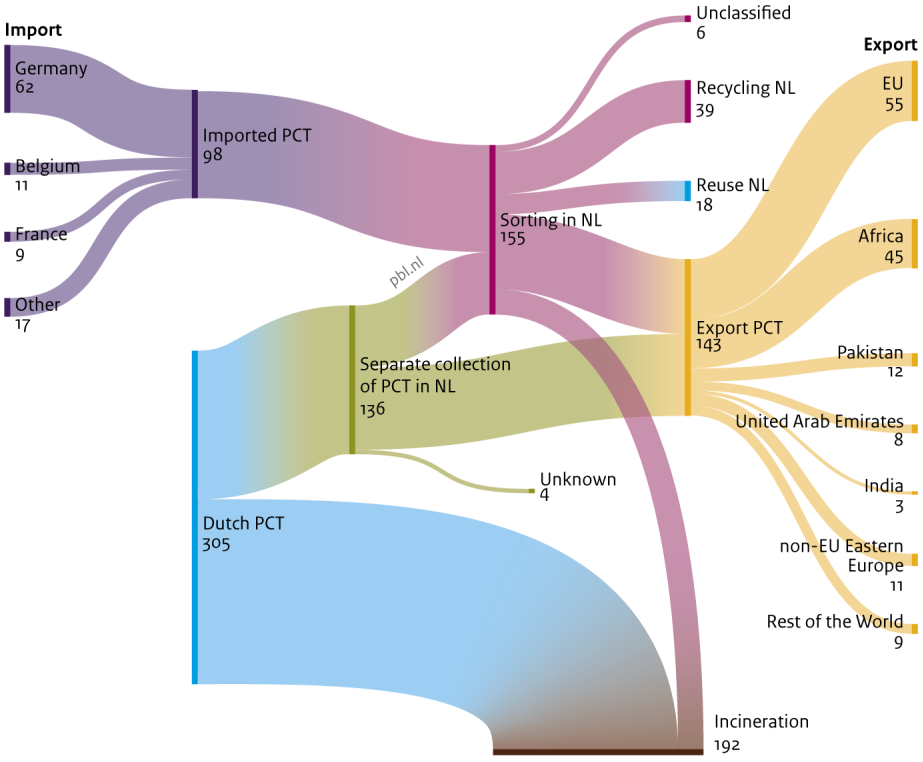
Most Dutch post-consumer textiles are incinerated or exported for reuse and recycling, with Pakistan as a major processing hub

The most recent data available show that, in 2018, around 305 kt of post-consumer textiles (clothing, footwear and linens) were discarded in the Netherlands, around 55% of which ended up directly as municipal waste and, therefore, was incinerated. The remainder was collected. Since 2012, the total volume of post-consumer textiles has increased by around 20 while the share that ends up in municipal waste remained more or less the same. In addition to domestically collected volumes, the Netherlands also imported around 98 kt of post-consumer textiles in 2018, mostly from neighbouring countries. Of the total in collected textiles (both domestic and imported), 8% is sold in the Netherlands, mostly at second-hand shops, 17% is recycled domestically for producing wipes, dusters and dishcloths and fibre products, 10% is incinerated and 4% is unknown. The remaining 61% is exported for reuse and recycling. While there are few data on what exactly happens with the exported Dutch post-consumer textiles, estimates show that around two thirds are eventually reused (mostly in Sub-Saharan Africa) and roughly one third is recycled.

Figure 1

Post-consumer textiles (PCT) imported into and exported from the Netherlands, 2018

kilotonnes



Source: FFACT, CBS, Royal HaskoningDHV, Eurostat

Global markets for post-consumer textiles are efficient cascades in value

Little material is wasted, when it comes to exported post-consumer textiles. When post-consumer textiles are collected in the Netherlands, a cascade in quality and value begins, which extends beyond the Dutch border. This cascade flows from country to country, mainly according to levels of income, followed by market preferences and price. A small amount, consisting of the most desirable items, is filtered out to be sold locally in the Netherlands or is exported to countries in Europe for local reuse. Medium quality clothes or those suitable for tropical climates are exported to destinations in Africa or to sorting hubs around the world. African markets are focused on recommerce. In some African countries, large shares of the population rely on imported second-hand clothes as their primary source of clothing. In the sorting hubs, such as in Pakistan, Tunisia and the United Arabic Emirates, the imports have additional purposes, including further sorting into specific categories for re-export, refurbishment and recycling. Re-export for reuse also mostly goes to African markets. Finally, the lowest grade items are typically imported by Asian countries (such as India and Pakistan) to be made into rags, or for mechanical recycling, which usually results in low-grade yarn.

Sustainability risks of PCT processing in Pakistan relate to pollution and labour rights

Pakistan is an important destination for post-consumer textiles from the Netherlands, and European countries in general. Although little specific information is available on what happens with these post-consumer textiles, general information indicates that used textiles are sorted, graded, resold or recycled. Pakistan imports large amounts of textiles with low value and it is likely that they are processed in the established local fibre recycling market, probably for recycling into rags, shoddy or fleece. Most garments or home textiles made from these fibres are likely sold locally, or in neighbouring countries such as Afghanistan. Second-hand items that still have retail value are either sold at local flea markets and thrift shops, re-exported to West and East Africa, or even transported back to Europe, for resale in second-hand shops.

Based on the scarce information available, the following sustainability issues stand out, with both positive and negative impacts:

- Environmental impacts: fibre-to-fibre textile recycling, in general, can have significant benefits compared to the production and processing of virgin material, in terms of resource efficiency (e.g. less pollution, less water and land use). At the same time, some negative environmental impacts can be expected from circular activities resulting from improper disposal of waste materials and the use of hazardous substances for recycling, such as bleach. The latter also affecting the workers' health.

- Socio-economic impacts: the conventional textile industry in Pakistan is known to be plagued by decent work deficits, such as gender discrimination, low wages, and barriers to freedom of association. Despite a lack of research on the post-consumer textile business in Pakistan, similar challenges for sorting, grading and recycling can also be expected in this country.

Impacts of circular economy strategies

The Netherlands is one of the circular economy front runners in the European Union. Other Member States look to the Netherlands when shaping their own circularity strategies and policies, while the European Union, in turn, is developing and implementing more and more regulation to further the circular economy transition. This explorative study is intended to gain an understanding of how larger shifts in consumption and production patterns in Western countries could affect countries in the Global South. The study does not assess the quantitative effects of circular textile policies and strategies on the environment and economy in the production regions, nor is it an analysis of current policies. Instead, it provides a qualitative assessment, analysing broad strategies in an explorative way, and points to potential opportunities and risks attached to specific policy strategies.

The strategies chosen for a circular textile sector can affect the whole value chain

Circular economy policies can be organised along the so-called R-ladder and clustered in broad strategies that are aimed at reducing the amount of material input (narrowing loops); keeping products or materials in use longer through repair and recommerce (slowing loops); recovering energy or recycling materials and preventing losses, ideally in fibre-to-fibre recycling instead of downcycling (closing loops); and cross-cutting strategies, aimed at synergies with all types of interventions, such as circular design to improve recyclability or durability (Table 1). The targets set in the Policy programme for circular textiles 2020-2025 link to these strategies.

The impacts of Dutch policies for the circular use of textiles on low- and middle-income countries depend on 1) the type of circular economy strategies implemented; 2) the role that low- and middle-income countries play in the circular economy loops of the Netherlands; and 3) the local conditions in the countries in question.

The effects of a Dutch circular textiles transition on West African cotton farmers may vary

Depending on the circular economy strategy and the further refinement/definition of the targets, cotton demand could increase or decrease, or fibre quality requirements may change. For cotton, the quality is determined mostly by fibre length, which influences the possibilities for durability, reuse and recyclability. To choose the most effective circularity strategies, it is important to have clear information about the amounts of water and land required for the various materials, their repairability, durability (also in terms of quality and appearance), and their recyclability.

A decline in cotton demand could occur if strategies induce a decrease in clothing consumption. Lower cotton production levels in West Africa also mean less use of pesticides, with positive implication for biodiversity. At the same, cotton is important for the livelihoods of many West Africans. Farmers may transition towards cereal or vegetable crops, thereby increasing local food security. However, if farmers can no longer access inputs, crop yields could decrease and soils may degrade.

Certain circular strategies could also favour cotton over fossil-based synthetic textiles; for example, for durability and bio-based renewable reasons; thereby, potentially driving an increase in cotton demand. If such strategies motivate West African farmers to cultivate significantly more cotton, they would need to expand their farmland and/or increase yields by using more inputs, such as fertilisers, water and pesticides. Acreage expansion onto marginal lands and increased pesticides and fertiliser use could threaten both aquatic and terrestrial biodiversity, while increased pesticides use also increases the risks to human health. Sustainable intensification may reduce these risks,

and requires careful monitoring and investment in capacity building for sustainable farming practices. The types of farming methods adopted by farmers will depend on an interplay between trade policies, global and local market demand, farmer access to knowledge and inputs, as well as on local soil and climatic conditions that determine which farming options would be available.

Finally, market preference for certain sustainability standards and the desired recyclability of specific fibres also affect demand. Different sustainability standards prefer different production systems, allowing or excluding genetically modified cotton and certain pesticides. Also, certain standards promote organic farming. To further the understanding of potential effects of circular strategies on cotton demand, it is important to have clear information about the footprints and socio-economic effects of various farming systems and mixes of material, their repairability, durability (also in terms of quality and appearance), and their recyclability.

Farmers have been relying on cotton as a way of accessing credit to buy fertiliser, which was subsequently also used for food crops. It is therefore important to view cotton as part of a cropping system, alongside cereal crops. Farmers rarely grow only cotton, and impacts on their livelihoods should be viewed from the perspective of this cash-and-crop system, rather than focusing solely on cotton.

Table 1
Overview of strategies, measures and policies for circular textiles (clothing)

CE strategy	Cross-cutting strategy	Examples of measures	Related current policy target	Targeting
Narrowing loops	Circular design for smaller environmental footprint; durability; repairability; and recyclability.	Reducing material use through the renting of clothes, design to substitute materials with more sustainable alternatives, or not buying certain items.	Minimum share of sustainably produced materials	New clothing
Slowing loops		Extending use phase and lifespan of clothing through, e.g., design for durability, repair and/or refurbishment, lowering VAT on repairs, buying second-hand clothes.	Targets for reuse	Clothing owned by consumers, or pre-owned/second-hand clothing
Closing loops		Design for recyclability. Recycling fabrics and other materials; recovering materials for reuse, energy recovery through incineration.	Minimum share of discarded clothes to be recycled, and recyclate for use in new products	Discarded or post-consumer textiles, and new clothing

Minimum requirements for sustainably produced raw materials have an impact on how cotton is grown in West Africa

The Policy programme on circular textiles 2020–2025 of the Netherlands includes minimum sustainability requirements for the production of raw materials. A large share of West African cotton is produced in line with a certain certification scheme. This is generally seen as an advantage as these types of cotton can be marketed as a sustainable choice, reducing health and environmental effects, with positive impacts on cotton price, communities and the position of women. The effects of a greater demand for certified cotton are different from the effects of an increase in demand in general, as the certification requirements determine the farming practices that must be employed.

The impacts depend on the type of requirements of the certification scheme. For example, the certification standard most used in Africa excludes genetically modified cotton, while others do not. Certified organic cotton is subject to debate as it can result in lower yields despite higher labour inputs, and low soil fertility requires more organic inputs, which may not always be locally available. The main certification labels used in Africa, however, leave room for certain inputs, such as synthetic fertiliser, and may be more appropriate depending on the local context.

Increased demand for higher quality cotton centres around improvements in, for example, the length of cotton fibres. Support programmes can help farmers to adapt to the requirements, and supply-chain actors, certification systems and local government could cooperate to establish these.

The nature of impacts of increased post-consumer textile processing on Pakistan depend on standards set by clients

Dutch circular economy strategies for textiles could affect the amount of post-consumer textiles exported to Pakistan. Furthermore, it can also affect the type, composition, or quality of post-consumer textiles exported.

The Policy programme for circular textiles 2020–2025 of the Netherlands also sets targets for recycled post-consumer material in new clothing brought on the market. A growing demand for recycled content incorporated into new clothing sold in the Netherlands could mean that opportunities arise for Pakistan's recycling and clothing manufacturing industry to process larger volumes of discarded textiles. Higher collection rates can also increase export levels to Pakistan, with less material being incinerated as waste. Alternatively, if circularity strategies are effective in reducing garment consumption (e.g. through increased repair and reuse) less material could become available for export. Given that little information is available on post-consumer textile processing in Pakistan, it is not clear whether this would negatively affect importers of post-consumer textiles.

A key question, here, is whether to pursue recycling within the EU or elsewhere, such as in Pakistan. The current Dutch policy programme targets for minimum levels of recycled material in new clothing can lead to growth for the Pakistani recycling industry, while not necessarily improving working conditions. At the same time, the circular economy also provides opportunities for the promotion of decent jobs. If client companies are incentivised to set standards or codes of conduct in their business dealings with sorters and recyclers, they can drive improvements in labour conditions while advancing the circular economy. Nevertheless, if these standards are only implemented for first-tier companies, in this case manufacturers, labour rights violations could still be present in recycling jobs further down the value chain. Therefore, to promote decent jobs in the

textile recycling industry, it is important that labour rights standards and monitoring and reporting policies are implemented at all levels, thereby including people working for sub-contractors, also including informal workers. These principles are reflected in the OECD Guidelines for Multinational Enterprises and the international Corporate Social Responsibility ambitions of the Dutch Government.

Considerations for Dutch circular textile policymaking

A sustainable and just transition requires monitoring beyond environmental impacts and alignment of circularity targets with impact targets elsewhere

The Policy programme for circular textile 2020–2025 includes both circularity targets and impact targets. Circularity targets are aimed at more efficient use of raw materials and products (e.g. increased use of secondary materials and more reuse and recycling). Impact targets are aimed at reducing the environmental and socio-economic impacts of the sector (e.g. increased use of sustainably produced materials and halving of the environmental footprint of the sector). With respect to impacts, there are also other issues that are closely linked to the textile value chain that require attention. For cotton production in Africa this includes food security, while for textile processing in Pakistan this includes working conditions. Although these issues are not directly priorities of the Dutch circular economy, they are part of the UN Sustainable Development Goals and key priorities for the Dutch Ministry of Foreign Affairs. It is therefore worthwhile to include improving food security and working conditions as a precondition and provide monitoring of these issues. Due diligence measures (i.e. appropriate care) could therefore be implemented both for upstream value chain partners, as for downstream partners.

With respect to effect targets and circularity targets, mismatches are easily made. In this case the example of clothing replacement rates is important. Circular actions such as buying second-hand or returning unwanted clothing to retail outlets, all can add up to higher resource efficiency, lower material use and lower environmental impacts. However, if consumers buy a second-hand item in addition to, and not instead of, a new item, overall benefits are negligible. Likewise, if consumers are incentivised to hand-in used garments for recycling at retail outlets for a discount on new items, it remains to be seen if overall consumption decreases. In both examples, the circularity targets might be achieved but related progress on impact targets is negligible. This means that both circularity targets and impact targets need to be aligned to achieve a truly sustainable circular economy with benefits for economies elsewhere. In the examples above, this could mean that efforts to increase collection, reuse and recycling are coupled with efforts to decrease overall clothing consumption.

Improved monitoring and reporting of trade flows is required across the whole textile value chain

The current systems used for monitoring trade flows of second-hand or post-consumer textiles not classified as ‘waste’ are insufficient. Reporting on second-hand textiles is limited to two trade codes (World Customs Organization Harmonized System (HS) codes 6309 and 6310), which obscure substantial amounts of information about the content and quality of shipments. In addition, data on trade in post-consumer textiles between countries in the Global South are also scarce. This study has indicated that there are global networks of trade in second-hand clothing for reuse and discarded textiles for recycling or refurbishment, in which large volumes of materials flow across the world. Understanding these networks and the potential for alignment with the Dutch circular economy is hampered by a significant lack of data. In a similar vein, the mislabelling of textile

products forms another challenge for effective policy development. It is essential that accurate, reliable information is readily available about the composition of the materials applied in garments, as well as the substances used to treat these materials. This specific lack of trustworthy information forms a serious challenge for high value, fibre-to-fibre recycling of textiles for recycling companies.

Coordinated efforts are needed across the whole textile value chain

A circular economy for textiles calls for policy interventions at every stage of the textile value chain; from design, choice and production of materials, to the phases of retail and recommerce, use by consumers, and finally the post-consumer phase. Coordinated efforts are needed to make sure policies targeting each of these stages are in line with what is happening in other stages. If this is not the case, they run the risk of achieving limited results or even form obstacles for circularity or sustainability elsewhere in the value chain. Working with a clear perspective on the whole value chain is therefore necessary when discussing new interventions.

For example, combining recycled polyester from PET bottles with mechanically recycled cotton fibres to form new yarn is only 'circular' in the short term and to a limited degree. If there is no affordable plan on how to recycle the polyester-cotton blend that is then made, the recycled garment's circularity ends after it is discarded again or the costs of recycling have only increased. This type of approach does not fundamentally address linear production and consumption patterns and potentially postpones more circular solutions. In this sense, fibre-to-fibre recycling would be a more truly circular strategy, across the life cycle of a garment, and making new bottles out of old PET bottles retains more material value. When circularity targets, such as increasing recycled content in new clothing, only focus on the short-term circularity targets, there is a risk of advancing circularity in a narrow, sub-optimal sense.

Furthermore, how circular economy strategies address opportunities and risks in textile value chains in practice will depend on several factors outside the control of a single country or part of the industry. Textile value chains are spread out across the world and include a diverse group of stakeholders. The influence of, for example, Dutch policymakers or Dutch retail companies is limited to certain parts of the value chain. It is therefore important to strive towards broad coalitions of actors and EU Member States, to achieve positive impact and address potential negative outcomes related to raw material production and exported post-consumer textiles.

Sustainable production of raw materials requires context-specific standards

Not all sustainability standards for raw materials work in all situations, and specific, local challenges may apply. For example, while organic cotton production may be one way of addressing sustainability concerns in certain regions, it is not necessarily a sustainable option everywhere. In the context of cotton production in West Africa, restricting the use of synthetic fertiliser, which comes with specific sustainability standards, on land with low soil fertility and limited amounts of organic inputs could have adverse consequences. The local context calls for an approach that considers the options available to local farmers, as well as the challenges they face. This means that policies with minimum requirements or exclusions in production standards need to take into account the challenges and possibilities within the local context.

A sustainable and just circular economy transition calls for inclusive dialogue

In line with the need for a context-specific approach, it is important to also include stakeholders from across the value chain in policy discussions, to identify potential synergies or dilemmas in a timely fashion. This means that stakeholders from the Global South who are involved in cotton production and post-consumer textile trade, sorting, grading and recycling can contribute significantly to the policy debate. For example, often discussions around global trade in second-hand or post-consumer products centres around a narrative of export and does not consider the importing parties. Policy discussions in countries such as the Netherlands requires dialogue with stakeholders in the Global South, to understand what motivates the import of second-hand clothing and post-consumer textiles. Only viewing post-consumer textile trade from the perspective of export obscures the fact that these shipments are actively imported, meaning they are paid for in advance by someone in the importing country. A circular textile value chain should therefore consider the reasons why this happens and include local stakeholders in the discussion about whether the trade benefits them or not, and in what way it may need to change.

More research is needed into environmental and socio-economic impacts abroad

Besides the need for improved trade data and monitoring discussed above, there is also a need for detailed insights into environmental and socio-economic impacts of raw material production such as cotton, and in the post-consumer textile industry. In the course of this study, it has become clear that, especially for textile reuse and recycling in low- and middle-income countries, very little information is available. Research is required that analyses not just export and import, but also collection, sorting and grading, as well as reuse and recycling. Furthermore, these analyses should look at both environmental aspects, as well as socio-economic benefits and risks. The gained insights into opportunities and risks can aid decision making of, for example, where and how to scale up recycling of post-consumer textiles, or best ways to facilitate or limit reuse of clothing and other textiles in countries where large groups of people buy mostly second-hand.

With the right preconditions, the circular economy transition can also contribute to achievement of the Sustainable Development Goals abroad

A circular textiles transition links to a range of sustainability challenges, including food security, sustainable agriculture, decent jobs, gender equality, human health and environmental issues like pollution, climate change and biodiversity loss. Not all these issues are currently discussed in the context of the circular economy or are part of the Policy programme for circular textile 2020–2025, while they are part of the Sustainable Development Goals (SDGs) the Dutch Government committed to. With the right preconditions, the circular economy can drive positive change and thereby contribute to the achievement of the SDGs, both in the Netherlands and abroad. For example, the circular economy can make use of already existing sustainability standards and potentially cost-effective circular infrastructure, providing opportunities to positively influence issues like food security (SDG 2), gender equality (SDG 5) and decent work (SDG 8). Achieving a circular economy without negative spillovers on low- and middle-income countries requires government-wide effort and policy coherence across policy agendas, including a cross-border approach with specific attention for policy coherence for sustainable development (PCSD) as called for in the SDGs.

FULL RESULTS

1 Introduction

Within the framework of the Government-wide Programme for a Circular Economy, launched in 2016, the Netherlands has described its ambition to move away from a linear economy and towards a circular system by 2050. The overarching goals of this transition are to decrease and limit environmental pressures while addressing potential security of supply risks with regard to crucial resources. Furthermore, with the transition towards a circular economy, the Netherlands aims to contribute to the realisation of the Sustainable Development Goals (SDGs) (UN, 2015). A circular economy can provide economic opportunities, contribute to a clean environment and make countries less dependent on domestic and imported scarce natural resources. A successful transition requires actions throughout the whole value chain: from the extraction of raw materials to product design, manufacturing, usage, repair, reuse and, finally, recycling.

To this end, policies are being developed that focus on increasing efficiency, substitution of scarce or non-renewable resources, and technological and social innovation. While several aspects of a circular economy transition in the Netherlands will most likely affect Dutch businesses, consumers and citizens, little is known about potential impacts on other countries that are connected through international value chains (de Ridder, 2017; IEEP, 2019; Rademaker, 2017). Several trade streams will probably be affected, including trade in primary raw materials, secondary raw materials, waste, second-hand products, and services (van der Ven, 2020). Existing knowledge on affected trade flows and related impacts abroad is however limited and fragmented. Furthermore, whether impacts will be positive or negative, and how severe, is highly context-specific (Circle Economy, 2020). The impacts differ per product group and its position in the circular economy, depending on the economic and ecological value of the product in question (Lucas et al., 2016). A focus on specific materials or products is advisable (Circle Economy, 2020), while scenario analysis can help to think through the various effects (Lucas et al., 2016).

At the request of the Dutch Ministry of Foreign Affairs, PBL Netherlands Environmental Assessment Agency has explored the effects of Dutch circular economy policies on low- and middle-income countries. Different case studies were conducted, each focusing on specific types of materials or products. The materials or products were selected on the basis of their: 1) relevance for low- and middle-income countries in terms of impacts; 2) relevance for the Netherlands; and 3) relevance for the circular economy (Figure 1.1). This report is about the textile value chain, with a specific focus on cotton produced for clothing manufacturing and the processing of post-consumer textiles. The latter category includes more material products than mere clothing and is therefore referred to with the more general term ‘textiles’.

Our clothing is part of a complex value chain, which includes raw material production, processing of fibres, weaving and dyeing, and manufacturing of clothing. In the context of a circular economy, there has been a large amount of attention for clothing manufacturing, in part due to serious labour rights violations and environmental pollution. At the same time, there is somewhat less attention for the production of raw materials such as cotton, as well as for what happens with textiles once they are discarded and exported abroad. Therefore, this study focuses on cotton production and end-of-life textiles.

Although the share of cotton in textiles has decreased significantly over the years, in 2019, it still accounted for almost a quarter of total global use of fibre (TextileExchange, 2020). Cotton is an important non-food crop and provides employment and income to millions of smallholders in low- and middle-income countries. A large share of the clothing sold on the Dutch market is produced in Bangladesh. In recent years, cotton supply for Bangladesh has shifted from India to West Africa (e.g. Benin, Mali, Ivory Coast, Burkina Faso and Cameroon). Cotton is very important for the economy of these African countries as one of their most important export products. At the same time, cotton production is linked to a range of environmental and social challenges.

In the last two decades, the average global annual consumption of clothing has doubled from 7 to 13 kg per person (Shirvanimoghaddam et al., 2020). Still, more than two thirds of the post-consumer textiles globally end up in landfills, while only around 15% is reused or recycled (Shirvanimoghaddam et al., 2020). Post-consumer textiles for reuse or recycling are traded internationally, with significant flows between high-income countries, from high-income to low- and middle-income countries, and vice versa. Pakistan is a key destination for Dutch post-consumer textile exports. Nevertheless, information on what happens to the imported textiles in Pakistan is scarce.

To assess the impact of circular economy policies that target textiles on low- and middle-income countries, the study has been divided into four parts:

- Chapter 2 presents trade flows of cotton-blend clothing and post-consumer textiles linked to the Netherlands. For cotton, this includes data on where garments come from, which countries are their main suppliers of cotton, and a more detailed discussion on the relevance of cotton export for West African countries. For post-consumer textiles, this includes data on global trade and more specifically volumes and trade destinations of post-consumer textiles from the Netherlands.

- Chapter 3 discusses socio-economic and environmental impacts, both positive and negative, of existing trade flows associated with both cotton production and post-consumer textile processing. This analysis focuses on impacts that arise from cotton production in Benin, Burkina Faso and Mali, three major African producers of cotton, and post-consumer textile processing in Pakistan, one of the World's main importers of post-consumer textiles. The chapter, furthermore, defines the main impact areas.

- Chapter 4 discusses the potential effects of a transition towards a circular economy in the Netherlands on low- and middle-income countries. Various scenarios are analysed with respect to their potential effect on the impact areas discussed in Chapter 3. The scenario analysis looks at different types of circularity strategies, and ways of including low- and middle-income countries in the circular economy loops of the Netherlands. Main challenges are identified and discussed, for each scenario.

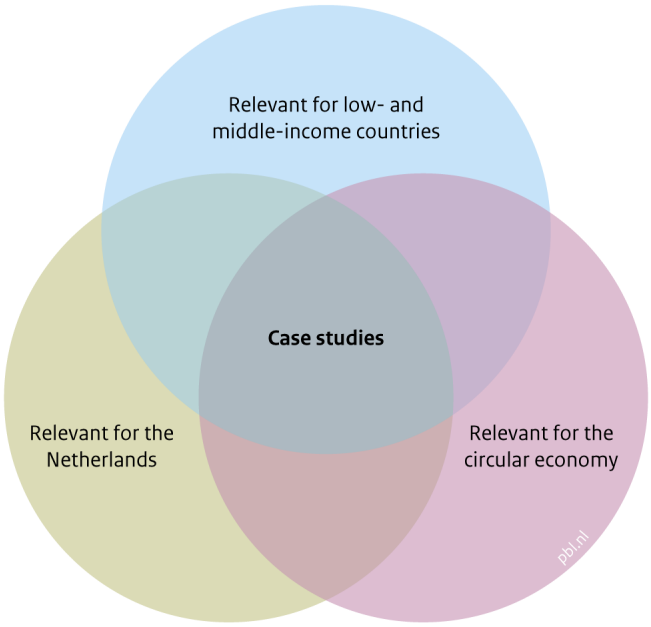
- Finally, Chapter 5 synthesises the results from Chapter 4 by discussing the preconditions for low- and middle-income countries to benefit from a circular economy transition in the Netherlands, as well as the required steps to mitigate potential negative effects.

The study did not allow to assess quantitative effects of circular textile policies and strategies on the environment and economy in production regions. Instead, it provides a qualitative assessment, analysing broad strategies in an explorative way. Furthermore, it is not an analysis of current policies, but points to potential opportunities and risks attached to specific policy strategies, and building on these insights, reflects on the Policy programme for circular textile 2020–2025 (IenW, 2020).

The study uses trade data to visualise the current trade in cotton, clothing and post-consumer textiles to and from the Netherlands. Literature review and expert interviews were used to qualitatively assess socio-economic and environmental impacts in low- and middle-income countries, both under current trade flows and resulting from circular economy strategies. Furthermore, an expert workshop was held to gather further insights into the potential impacts of circular economy strategies and to present and discuss preliminary findings.

Figure 1.1

Criteria for case study selection



Source: PBL

2 Trade in cotton and discarded textiles

Both cotton and post-consumer textiles are traded internationally. Cotton production is concentrated in a small number of large producing countries. However, despite still being comparatively small players on the global scale, in recent years production has seen an increase in the top 5 African cotton-growing countries — Benin, Mali, Ivory Coast, Burkina Faso and Cameroon. The clothing manufacturing industry in Bangladesh also links these African countries to the Dutch textile market. Post-consumer textiles are traded all over the world. While there are few data on what exactly happens with the exported Dutch post-consumer textiles, estimates on global flows show that around two thirds are reused elsewhere (mostly in Sub-Saharan Africa) and 30% is recycled. Pakistan is a major hub for grading and recycling.

In this chapter, we discuss how West African cotton producing countries are linked through trade with the Netherlands, as well as the export of post-consumer textiles (PCT) from the Netherlands, most notably to Pakistan.

2.1 Link between cotton production and Dutch clothing imports

This section provides a brief overview of the global cotton production and trade and zooms in on recent production trends in the top 5 cotton-producing countries in West Africa and links with the Dutch clothing market. The data on production and trade in cotton were sourced from statistical databases from the European Union (Eurostat) and the US Department of Agriculture (USDA Foreign Agricultural Service). These data are connected to uncertainties. Especially the cotton volumes traded between cotton producing countries in Sub-Saharan Africa and clothing processing markets in Asia should be treated as approximates, as reliable data are not always available. Furthermore, it needs to be considered that textiles are often made of mixed fibres. In this report, we refer to cotton-blend clothing for clothes that are made from fabrics that either fully or predominantly consist of cotton.

Cotton is the world's most important non-food crop

Textiles are made of a range of fibres, broadly divided in man-made fibres (e.g. synthetic fibres such as polyester and polyamide, or fibres made from natural materials such as viscose) and natural fibres (e.g. cotton, wool). Total fibre production, including for clothing, reached 111 million tonnes in 2019 and is projected to grow further to 146 million tonnes in 2030 under business-as-usual assumptions (TextileExchange, 2020). Until the mid 1990s, natural fibres dominated the market, however, especially the rapid growth in polyester production changed this picture in the last two decades. In 2019, synthetic fibres dominated the global market, while cotton still accounted for 23% of global textile production, of which around two thirds are used for clothing (TextileExchange, 2020).

Cotton is produced by more than 70 countries around the world on an estimated 2.5% of the world's arable land (Hortmeyer, 2020). Cotton is adapted to semi-arid and arid environments, with cultivation either in rain-fed or irrigated systems. More than 70% of the world's cotton growth areas rely on full or supplementary irrigation (Ton, 2011). In 2019, cotton production provided a livelihood to an estimated 29 million households, globally, and employment to around 140 million people (Townsend, 2020). In low- and middle-income countries, most cotton producers cultivate fewer than 2 hectares of land, mainly in Central and West Asia, Southeast Asia, and in Africa (Voora et al., 2020). The cotton plant yields lint and seeds that are turned into fibre, edible oil, and animal feed. The fibre is derived from the lint, which accounts for an average of 35% of the weight. Longer fibres are suitable for spinning and the share of the lint that is too short is used to make cellulose for the paper or cosmetics industries.

Sub-Saharan Africa is a relatively modest player in global cotton production, but takes a third place in global export

Global cotton production reached around 26 million tonnes in 2019 (USDA, 2021b). During the last two decades, cotton production has seen an overall increasing trend with plunges in 2015–2016, 2009–2010 and 2002–2003. The volatility in production is caused by various external factors, such as adverse weather conditions and pest infestations. The dip in 2009 was also influenced by the financial crisis as credit conditions tightened, input prices were high and low world market prices curbed cotton planting in some countries (ITC, 2013).

The top 5 cotton-producing countries, globally, are India, China, the United States, Brazil and Pakistan. Together, they accounted for almost 80% of global production in 2019 (USDA, 2021b). Global cotton production has increased significantly over the past five years, especially in the United States, India, Central Asian countries, China and Turkey. The top 5 cotton-growing countries in Africa accounted for a combined 4.4% of global production in 2019, up from 3.9% in 2000.

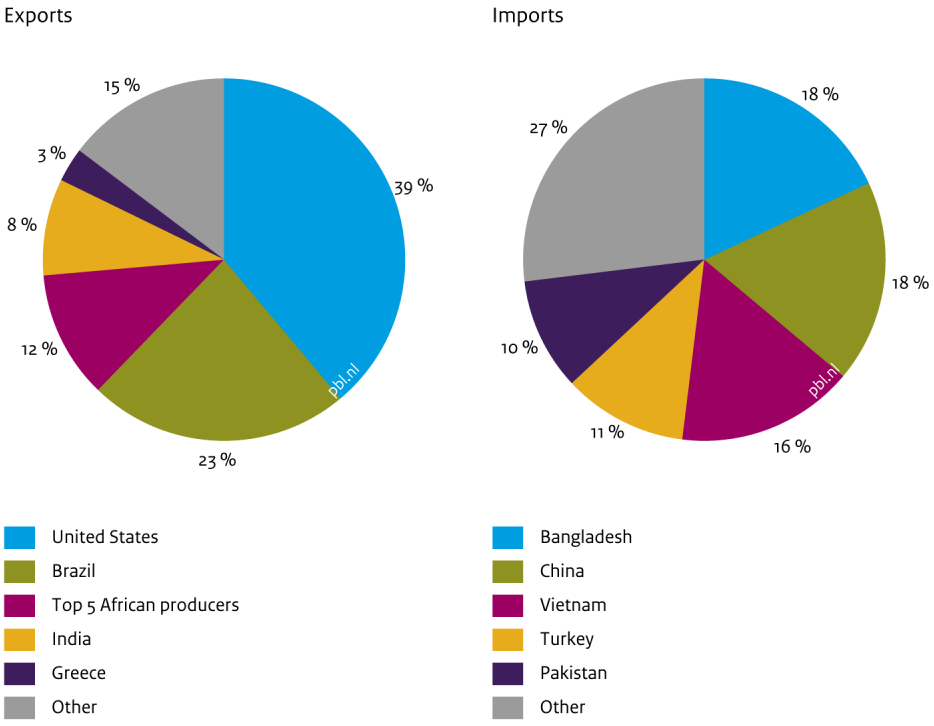
The largest exporters of raw cotton are the United States, Brazil, and India, jointly accounting for around 70% of exports in 2019–2020 (Figure 2.1). However, taken together, the top 5 cotton-growing countries in Africa exported more than India, with 11% of global export, compared to India's 8%. The leading importers are countries with large textile industries, namely Bangladesh, China, Vietnam, Turkey, and Pakistan, together accounting for 73% of imports in 2019–2020 (USDA, 2021c).

Annual fluctuations in international trade in cotton are caused, amongst other reasons, by changes in the output of domestic production as well as political influences, like the United States–China trade war (see Box 2.1). At the same time, cotton is a commodity that can be stored over longer periods of time. For example, in 2020 the world stocks to use (STU) ratio stood at 89%, meaning that world demand could be met for almost one year without additional production (Central, 2020).

Towards 2029, the OECD expects little changes amongst the global players in the cotton market, with China and India keeping their leading role in cotton production. In exports, the Sub-Saharan African share is expected to increase to 18%, keeping the third place behind the United States (35%) and Brazil (22%) (OECD-FAO, 2020).

Figure 2.1

Top exporters and importers of cotton, 2019



Source: USDA Foreign Agricultural Service

Box 2.1 Controversy around cotton from Xinjiang Province, China

In 2019–2020, around 85% of cotton from China was produced in Xinjiang Province, which is around 20% of global cotton production (USDA-FAS, 2020). In March 2020, the Australian Strategic Policy Institute (ASPI) published a report on forced labour in China's Xinjiang Province (ASPI, 2020). Shortly afterwards, the Better Cotton Initiative (BCI) suspended activities in Xinjiang for the 2020–2021 season due to concerns over labour abuses (Abdulla, 2020). A task force assessment report on forced labour recommended a cessation of all BCI field activities in Xinjiang (BCI Task Force on Forced Labour and Decent Work, 2020). In response, in January 2021, the US Government issued a ban on the import of products containing cotton from Xinjiang region, citing concerns about the use of prison and forced labour and repression of the Uyghur people and other ethnic and religious minority groups. In March 2021, several UN human rights experts also '[...] raised serious concerns about the alleged detention and forced labour of Muslim Uyghurs in China' (UN OHCHR, 2021).

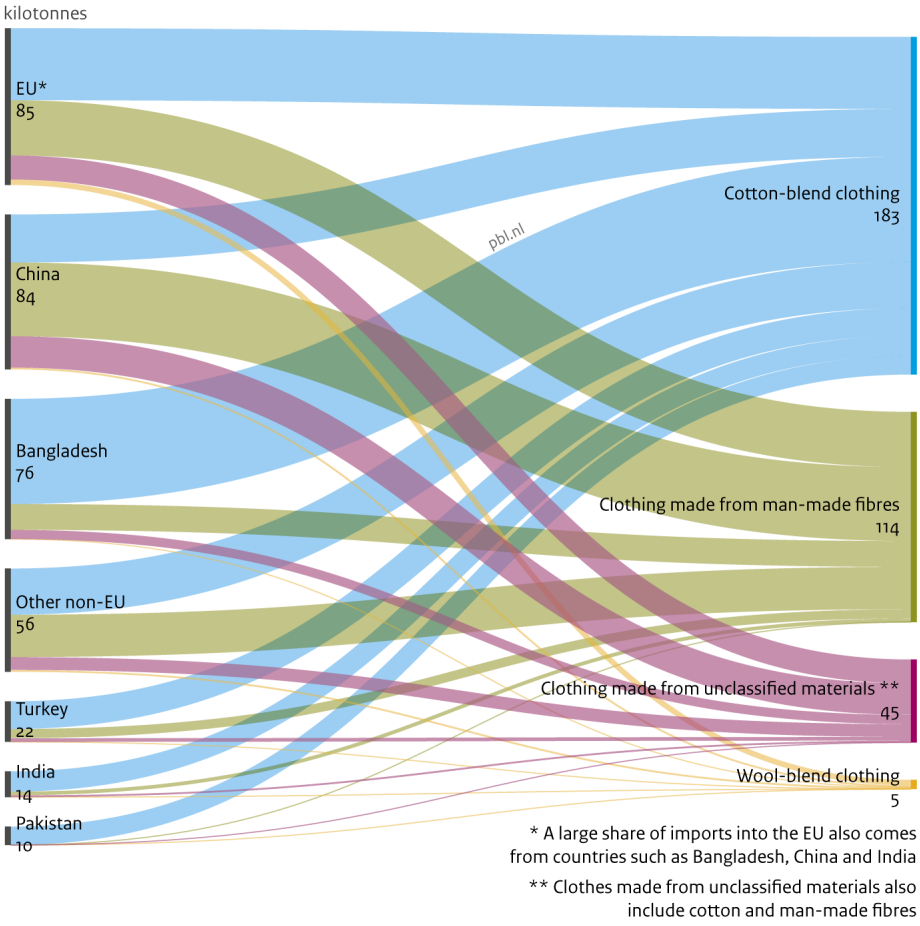
The US ban extends to downstream products produced outside the Xinjiang region that incorporate cotton from Xinjiang, such as apparel, textiles, and other goods made with cotton. Importers are responsible for ensuring that their products are not linked to forced labour at any point in the supply chain, including the production or harvesting of raw materials (USCBP, 2021). Since the measures have come into force, market sources point to an increase in demand for US cotton. At the same time, it is seen as unlikely that companies would be able to shift their supply chains fast enough to avoid disruptions (Carroll, 2021; The Star, 2021). For now, it is too early to understand the impact on global cotton and apparel supply chains of the US decision and various companies shifting their sourcing. Meanwhile, the ban reportedly fuels interest in innovative chemical-tracing technologies to identify the origin of cotton based on chemical profiling (Just-Style, 2021).

Most cotton-blend clothing in the Netherlands come from Bangladesh, which sources its cotton increasingly from Sub-Saharan Africa

Almost all clothes in the Netherlands are imported, 50% of which are re-exported, mostly to other European countries. Around 53% of the imported clothing is made from cotton and 33% from man-made fibres. In 2019, Bangladesh was the most important manufacturer and supplier of cotton-blend clothing intended for Dutch consumption (31%), followed by the EU (21%), China (14%) and Turkey (8%) (Figure 2.2). The shares of main sources from outside the EU are likely larger, as a large share of such imports from other EU Member States actually originates from other countries (e.g. Bangladesh, China and India), which enter the EU through other major ports (e.g. Antwerp and Hamburg).

Figure 2.2

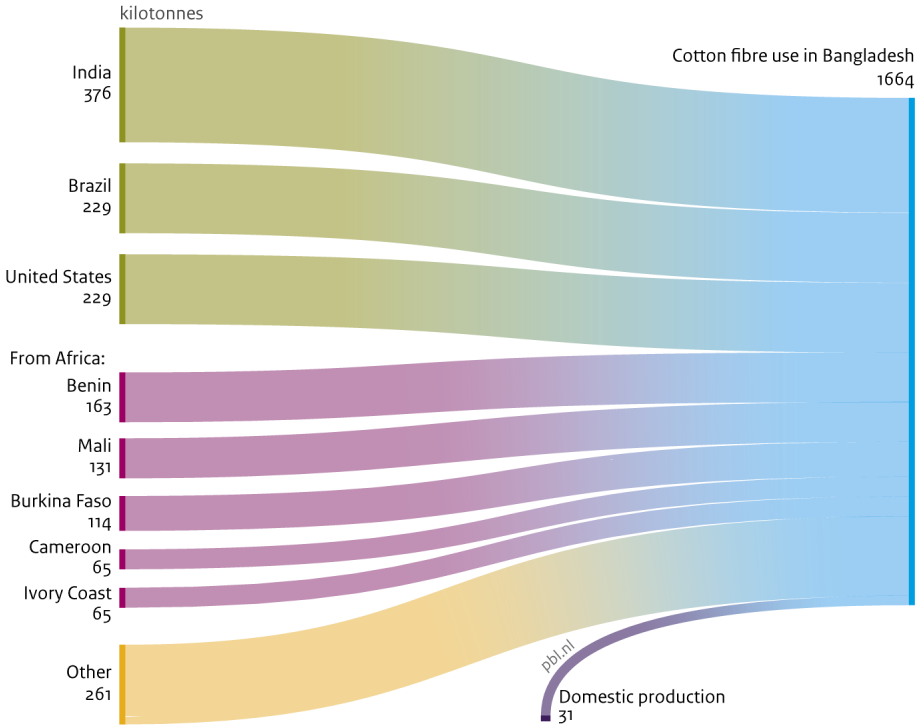
Clothing imported into the Netherlands, 2019



Source: Eurostat

Figure 2.3

Import and production of cotton fibre used in Bangladesh, 2019



Source: USDA Foreign Agricultural Service

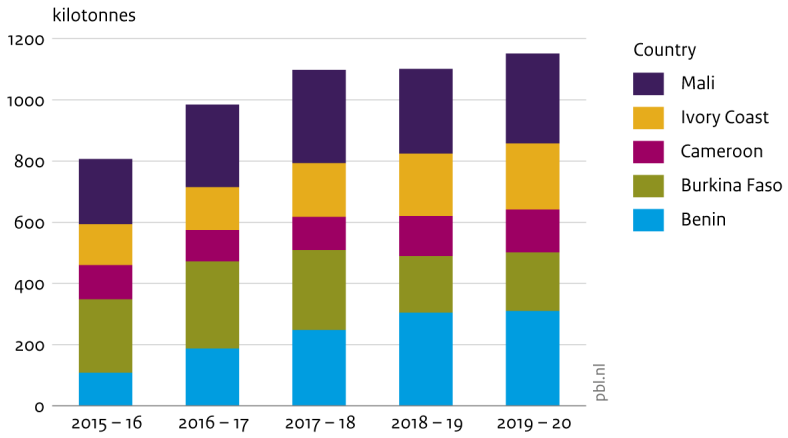
Bangladesh imports most of its cotton, with a negligible domestic production level (Figure 2.3) — India used to be its most important supplier of cotton, accounting for 60% of imports in 2016 (Mirdha, 2019, 2020). Since then, India's share decreased significantly, to 26% in 2018 and 18% in 2019. Meanwhile, African nations surpassed India as main suppliers of cotton for Bangladesh. In 2019, West African nations supplied almost 40% of total cotton imports. An important explanation for this is the objective of local spinners and millers to reduce their dependence on a single source of the important raw material. Moreover, the low quality of Indian cotton, logistical issues and higher moisture content are other reasons for Bangladeshi importers to look for alternative sources.

Most African producers saw a steady increase in cotton production levels

The top 5 cotton-producing countries in Africa are all in West Africa (Figure 2.4). In 2019, together, they accounted for 4.4% of global production, 11% of global export and almost 40% of Bangladeshi imports. In that year, Benin was the largest cotton producer in Africa; it almost tripled its output between 2015 and 2019. With a production of 310 kt in 2019, Benin was the 11th largest producer globally, with a share of 1.2%. Burkina Faso used to produce more than Benin, but its total production decreased by 20% between 2015 and 2019, with particularly low production levels in 2018–2019. Mali, the second-largest African cotton producer, increased its output by 38%, from 212 kt in 2015 to 294 kt in 2019. Furthermore, Ivory Coast and Cameroon showed a continuous production increase between 2015 and 2019.

Figure 2.4

Raw cotton output in top 5 producing countries in Africa



Source: USDA Foreign Agricultural Service

The economies of the top 5 cotton-producing countries in Africa strongly depend on cotton exports

The economy of Benin is heavily reliant on agriculture, which generates around 70% of employment and 30% of GDP (IFAD n.d.). Cotton is Benin's leading export product (World Bank, n.d.). In 2019, the value of cotton exports of USD 460 million accounted for around 55% of the country's total export value (ITC Trademap, 2021). Cotton alone represents around 12% of the country's GDP and provides income for around one third of the population (Westerberg, 2017; Zohoun, 2020). In 2020, initially falling cotton world market prices (minus 40% in the first quarter of 2020) and a drop in global cotton demand led to a decrease in the export of Benin's two main products: cotton and cashews. It is expected that this situation will improve in 2021 in line with rising cotton prices and an improving economic situation of trading partners (COFACE, 2021).

For Burkina Faso, the most important export products are gold and cotton, two of the few formal economic sectors that significantly contribute to economic output as well as overall employment. In 2016, gold exports made up 70% of total export revenues (USD 3 billion), followed by cotton with 12% (USD 500 million). Gold extraction and raw cotton are also the primary sources of foreign direct investment (FDI), attracting 45% (USD 765 million) and 22% (USD 374 million), respectively, between 2010 and 2018 (IMF, 2019). One reason for the drop in cotton production in the last years is the deteriorating security situation in the northern and eastern parts of the country (Reliefweb, 2021; Zohoun, 2020). Other reasons given include regional farmer boycotts over unfair treatment, bad weather and pest attacks (Gakpo, 2019).

Like Burkina Faso, Mali's economy also heavily depends on gold and cotton. In 2018, cotton exports accounted for 13% of total exports and gold had a share of 73% (Instat Mali, 2019). Exports in 2019–2020 reached around 190 kt tonnes, a decrease of 52% from the previous year, largely due to lower international demand as a result of the COVID-19 pandemic (Sylla, 2020). Around 97% of the cotton production is exported without value addition (African Development Bank Group, n.d.). The only factory processing cotton from CMDT into textiles is the Mali Textile Company (Comatex), in which the Mali Government holds a minority stake of 20% and the China Oversees Engineering Group (COVEC) a majority stake of 80%. However, the company is facing harsh competition from large volumes of cheap imported textiles (AFP, 2019).

As the African countries have almost no cotton mills or other ways of processing cotton, most cotton is exported as raw cotton. This makes the cotton producers dependent on foreign markets (USDA, 2018). Furthermore, the lack of diversification creates considerable vulnerability of the economy to commodity price developments on world markets as well as to climate shocks. Consequently, this narrow economic focus is a threat to stable and sustainable economic growth. In addition, the cotton is almost always blended with that from different origins, using a Truzschler machine. As the quality of African cotton varies significantly, blending cotton is important to achieve a desirable yarn. According to interviewed experts, this complicates the value chain and can reduce cotton's traceability in textile manufacturing and thus also reduces accountability. Finally, productivity in the West African cotton producing countries has stagnated over the last 30 years, while on a global level, it increased by an average of more than 2%, annually. The African countries are therefore in a worse position to deal with price volatilities and rising production costs (Vitale, 2018).

2.2 Export of post-consumer textiles from the Netherlands

This section provides an overview of the key trade flows of PCT, with a focus on the export from the Netherlands. The data on trade flows of post-consumer textiles were sourced from statistical databases from the UN (Comtrade), the EU (Eurostat) and the Netherlands (Netherlands Statistics (CBS)). Data on Dutch national collection, sorting and export were sourced from FFact (2020) and Royal Haskoning DHV (2021).

Statistics on the trade in used textiles broadly distinguish two categories or trade codes (Eurostat):

- 3609: Worn clothing and clothing accessories, blankets and travelling rugs, household linen and articles for interior furnishing, of all types of textile materials, including all types of footwear and headgear, showing signs of appreciable wear and presented in bulk or in bales, sacks or similar packings (excluding carpets, other floor coverings and tapestries)
- 3610: Used or new rags, scrap twine, cordage, rope and cables and worn-out articles of twine, cordage, rope or cables, of textile materials.

As some countries do not allow the import of rewearable clothing, it cannot be ruled out that certain shipments are labelled as rags while, in reality, they contain rewearable clothing. Furthermore, statistical data on second-hand clothing and used textiles do not provide details on the status of those goods. Finally, total export volumes do not allow distinguishing between types of textiles, such as clothing or linen, nor between reusable textiles and those ready for recycling.

In this report, 'post-consumer textiles' refers to the two categories of second-hand textiles above. The term 'clothing' is used when specifically discussing clothes or when post-consumer textile flows consists mainly of clothes. Discarded textiles increasingly reused or recycled, but the majority still ends up as waste.

In the last two decades, global average annual consumption of clothing has doubled from 7 to 13 kg per person (Shirvanimoghaddam et al., 2020). At the same time, the available research indicates that the average number of times a piece of clothing had been worn before being disposed of, declined by more than a third and by even more in emerging markets (Minter, 2018). For the Netherlands, on average, each consumer buys 46 new pieces of clothing per year, while disposing of 40 pieces (Maldini et al., 2017). Around 15% to 20% of global PCT is reused or recycled, while more than two thirds end up as waste (GBA, 2017; Shirvanimoghaddam et al., 2020):

- Reuse: the transfer of reusable clothing items to a new owner; for example, through second-hand retail;
- Recycling: recovery of material or fibres from clothes that cannot be reused, and apply them to create new material;
- Waste: textiles discarded together with household waste that ends up as landfill or is incinerated.

Globally, the trade in used textiles is on the rise

Large shares of PCT are traded internationally, with significant flows between high-income countries, from high-income to low- and middle-income countries, and vice versa. With new clothes being as cheap as used ones, the trend towards 'fast fashion' is also reflected in the amount of second-hand clothing that is traded globally. The value of international trade in PCT has seen an increase of 67%, in the last decade, from around USD 2.7 billion in 2009 to USD 4.5 billion in 2019 (ITC Trademap, 2021). Also, the volume of traded second-hand clothing showed a steep increase.

The largest exporters of post-consumer textiles are the United States and Germany, and, in recent years, increasingly also China. Main destinations are low- and medium-income countries in Asia and Africa, as well as certain high-income countries, such as the United Arab Emirates (UAE) and the Netherlands (Figure 2.5). Main importers are countries that mostly play a role in sorting, processing, and re-exporting of used textiles, either in the form of recycled products (e.g. industrial rags or insulation material) or rewearables destined to be sold as second-hand clothing.

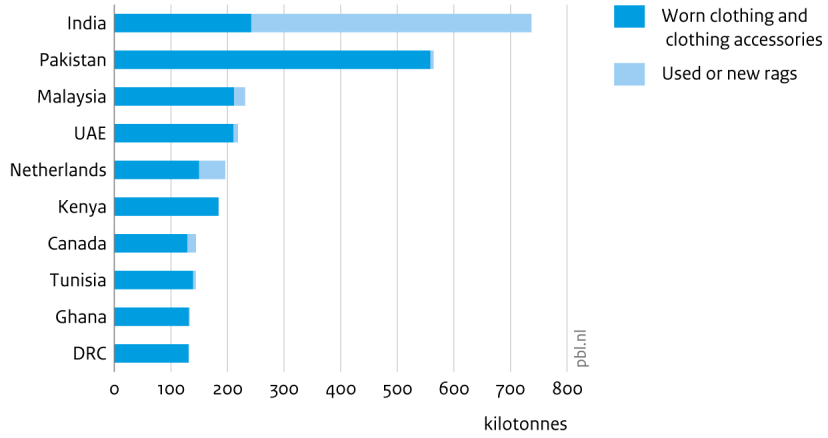
Flows of used textiles tend to follow the market according to price, and therefore rapidly respond to changes in global supply and demand. This can be viewed as a cascade of quality from high-income countries down to the lowest income countries. The crème de la crème remains in Europe, often in the same countries where the sorting takes place. The second highest quality grades and warm-weather clothing tend to be exported to Africa and the Middle East. The lowest grades are typically exported to Asia for sorting, grading and recycling (Watson et al., 2016).

Pakistan is the world's largest importer of post-consumer textiles

Pakistan is the world's leading importer of post-consumer textiles in the category 'worn clothing', with around 14% of the global volume and 7% of the value in 2019; followed by India with a much smaller share of 6% of the volume, with large quantities classified as 'rags' (Figure 2.5). Total imports in Pakistan increased from around 300 kt in 2010 to as much as 780 kt in 2018. In 2019, this decreased to around 560 kt, mostly caused by a drop in imports from the United States. The total value of imports of post-consumer textiles into Pakistan in 2019 was around USD 230 million (ITC Trademap, 2021). The quality of the data may be negatively impacted by smuggling and misdeclaration, as certain textile shipments are being mislabelled as second-hand clothes to evade taxes (Mirza, 2019).

Figure 2.5

Top 10 importers of used textiles, 2019



Source: UN Comtrade

Pakistan has become a key destination for post-consumer textiles because of its fibre-sorting, grading and recycling industry. It is difficult to obtain national data on employment and value created in this sector, partly due to the fact that the handling of post-consumer textiles is largely organised in the informal economy (Interviews). The Karachi Export Processing Zone (KEPZ) is the national hub for Pakistan's textile-processing industry. More than 50% of the material sorted in the KEPZ qualifies for reuse, mostly on markets in low- and middle-income countries in Sub-Saharan Africa. Items that are not fit to be reworn are sold for fibre extraction or processed into industrial wiping rags (Garson and Shaw, 2019). Export data on worn textiles from Pakistan vary, significantly, depending on the source. ITC Trademap (2021) reports a volume of around 48,000 tonnes at a value of USD 33 million in 2019. Meanwhile, data for the KEPZ alone suggest a much higher volume, based on an export value of almost USD 200 million in 2018 (Garson and Shaw, 2019).

In recent years, the use of post-consumer textiles as a source of secondary material in the production of new textiles is growing, also in Pakistan. The trend to repurpose material through recycling is influenced by the cotton price as well as the demand for more sustainability. According to interviewees, Pakistan has many factories that shred materials and use the fibres in combination with new raw materials to produce new textiles of relatively low quality.

Around half of all domestic and imported discarded textiles in the Netherlands is incinerated and a third is exported for reuse or recycling

In 2018, the Netherlands disposed of a total of 305 kt in clothing, footwear and linens (Figure 2.6), equalling 17.7 kg per capita (FFact, 2020). The total volume increased by around 20%, in comparison to 2012. During that same period, separate collection of these post-consumer textiles increased only marginally, from 43% in 2012 to 45% in 2018. The remaining 55% was disposed of in household waste and incinerated. In addition to domestic collection, the Netherlands also imports considerable amounts of used textiles, which totalled 98 kt in 2018, and mainly originated from neighbouring European countries (i.e. Germany, Belgium, and France).

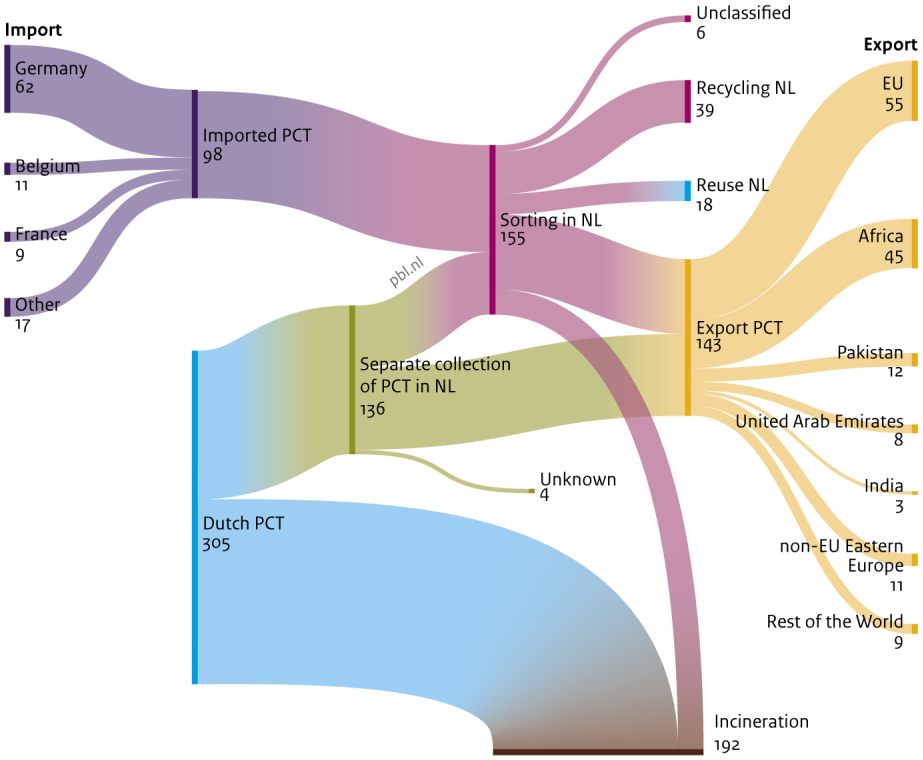
Around 42% of the post-consumer textiles collected in the Netherlands are sorted domestically, together with the imported PCT, and 55% is directly exported and sorted abroad. Of the PCT sorted domestically, around 12% is sold in the Netherlands, mostly through second-hand shops, 25% is recycled, for example into wipes and fibre products, and 15% is incinerated. The remainder is also exported abroad for reuse and recycling.

Overall, around 48% of the total in post-consumer textiles in the Netherlands (domestic and imported) is incinerated, 35% is exported for reuse and recycling and 16% is reused or recycled domestically. Although there are hardly any data on what exactly happens with the exported post-consumer textiles, estimates show that around two thirds are eventually reused (mostly in Sub-Saharan Africa) and roughly one third is recycled (FFact, 2020; Royal Haskoning DHV, 2021).

Figure 2.6

Post-consumer textiles (PCT) imported into and exported from the Netherlands, 2018

kilotonnes



Source: FFACT, CBS, Royal HaskoningDHV, Eurostat

The export of Dutch post-consumer textiles is steadily increasing, with Pakistan being the prime destination

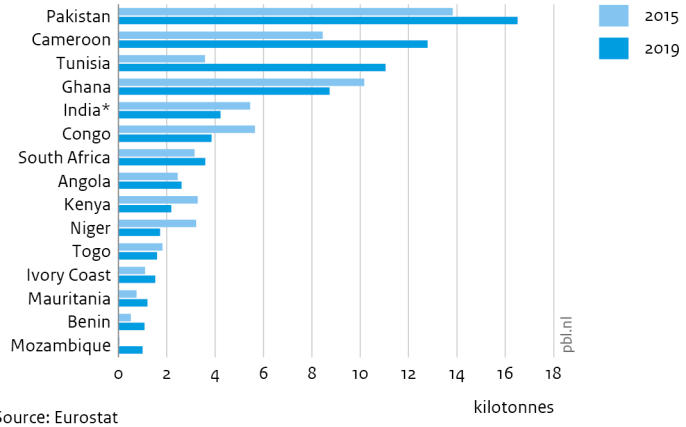
Dutch exports of post-consumer textiles increased from 136 kt in 2015 to 189 kt in 2019 (Eurostat, 2021a). The difference with the amount reported in Figure 2.6 is likely due to re-exports, as the Netherlands is an important collection hub of used textiles in North-Western Europe. In 2019, the Netherlands accounted for around 5% of globally exported post-consumer textiles volumes, thus being the 7th largest exporter ranked by quantity, and the 8th largest ranked by value (UN Comtrade, 2021). From the low- and middle-income countries that received these direct exports from the Netherlands, Pakistan received the largest share (around 9% in 2019), followed by Cameroon and Tunisia (Figure 2.7). These three countries also experienced a strong increase in imports from the Netherlands between 2015 and 2019.

Dutch exports to destinations outside Europe are almost exclusively classified as 'worn clothing', while rags and similar items are mostly exported to European countries (FFact, 2020). Although the latter may eventually be re-exported to destinations outside Europe, these flows cannot be traced. South Asian countries (i.e. India and Pakistan) are important trading partners for further sorting, fibre processing and yarn manufacturing. Textiles for reuse are mostly exported to Africa and Eastern Europe.

In intra-EU trade, Lithuania is an important recipient of post-consumer textile exported from the Netherlands, with an estimated 5% of exports in 2019. Lithuania, in turn, exports considerable volumes of used textiles, with key destinations in Eastern Europe (43%), Sub-Saharan Africa (33%), Pakistan (17%) and India (3%) (Eurostat, 2021).

Figure 2.7

Top 15 importers of Dutch post-consumer textiles in low- and middle-income countries



Source: Eurostat

* For India, values refer to 2015 and 2017, due to a lack of data on 2019

Of the non-European destinations of Dutch exports of PCT, the share of the UAE has increased by around 50%, since 2015, accounting for 5.5% of Dutch exports in 2019. While such indirect flows are difficult to quantify, it is likely that a sizable share was also re-exported to African countries. Imports from the Netherlands accounted for around 5% of total used textile volumes imported by the UAE. In turn, the UAE exported around 34 kt, or 12%, of total exports under the same trade code to African countries in 2019 (i.e. to Tanzania, DRC, Mozambique, Angola and Kenya) (Comtrade, 2021; Khamis, 2018). Exports to Australia, the United Kingdom, EU Member States and the United States likely consisted of processed materials such as industrial rags (Clarke, 2019).

3 Impacts of current trade flows

As concluded in Chapter 2, West African countries produce a significant share of the cotton for the Bangladeshi textile industry, which, in turn, is the largest supplier of clothing made from cotton for the Dutch market, while Pakistan is a major recipient of post-consumer textiles from the Netherlands. This chapter discusses the social, economic and environmental impacts of cotton cultivation in West Africa (focusing on Benin, Burkina Faso and Mali), as well as the impact of processing of post-consumer textiles in Pakistan. As the context of both processes is quite different, they are discussed separately.

3.1 Impacts of cotton production in West Africa

Given its share of the global fibre market — 23%, according to 2016 estimates (Krifa and Stevens, 2016) — cotton is arguably one of the pillars of the global textile industry. While West Africa accounts for only a small share of global production, for several countries, cotton is one of the most important export products and has brought opportunities to farmers in the region. At the same time, it has also contributed to or presented a range of sustainability challenges, including both social and environmental issues. This section discusses the positive and negative aspects of cotton cultivation in Benin, Burkina Faso and Mali.

Cotton production is linked to a range of environmental and socio-economic impacts

Cotton farming in West Africa is linked to negative environmental impacts, as well as to both positive and negative socio-economic impacts. Table 3.1 lists these issues alongside the Sustainable Development Goals they are most related to.

Environmental impacts are related to land and water use as well as the use of pesticides and fertilisers. Biodiversity loss, for example, is connected to pesticide use, excessive fertiliser use and land-use change. The severity of these issues depends on the region and local conditions under which cotton is grown.

The main socio-economic impacts in cotton farming are essentially connected to the ability of farmers and their families to make a living, including income, labour conditions and land rights. An overarching topical impact, here, is food security.

Table 3.1
Impacts and underlying issues of cotton cultivation related to SDGs

Topical impact	Underlying impact area	Related to SDG
Pollution and health	Pesticide use	Goal 3: Good health and well-being Goal 6: Clean water and sanitation Goal 15: Life on land
Water scarcity	Water use	Goal 6: Clean water and sanitation
Climate change	Land use	Goal 13: Climate action
Biodiversity loss	Pesticide use; fertiliser use; land and water use	Goal 15: Life on land
Land degradation	Land use	Goal 15: Life on land
Employment and economic growth	Labour conditions; income	Goal 8: Decent work and economic growth Goal 9: Industry, innovation and infrastructure
Position of women	Land rights; labour conditions; income	Goal 5: Gender equality Goal 8: Decent work and economic growth
Child labour	Labour conditions; income	Goal 8: Decent work and economic growth
Food security	Pesticide use; fertiliser use; land use; poverty	Goal 1: No poverty Goal 2: Zero hunger

Cotton cultivation is important for the livelihood of many West Africans

Under the current land-use regime, cotton cultivation is continuous and production practices have intensified, particularly input use (Soumaré et al., 2021; Williams and Marcini, 2015). These changes have rendered farming communities highly dependent on cotton cultivation. Most cotton farmers in Africa are smallholders, meaning that they farm fewer than 20 hectares of land.

In Benin, the dependency on the agricultural sector and focus on cotton as the dominant crop leads to substantial economic vulnerability as it makes farmers, businesses, and the country's trade balance vulnerable to external shocks. Agricultural commodity production is highly volatile due to the impact of cotton price fluctuations and influences of weather conditions, pests and diseases. Next to the exposure risk from a lack of diversification, cotton is also a controversial crop due to heavy pesticide use in its production. Benin's focus on conventional cotton production as a means of poverty alleviation and development of the economy, went along with an overreliance on pesticides as well as inorganic fertilisers and caused deforestation and the conversion of pastoral lands and displacement of semi-nomadic pastoralists (Westerberg, 2017). At the same time, as cotton is cultivated in rotation with food crops, this also implies that more area is under cultivation for food crops.

Likewise, the Burkina Faso agricultural sector is dominated by subsistence production systems with low productivity, little diversification, and a limited role for formal private businesses in agricultural value chains (IFC, 2019). Small-scale agriculture accounts for 34% of the country's GDP and agriculture accounts for about 60% of employment. An estimated one fifth of the population directly or indirectly rely on the production of cotton for their livelihoods (IFC, 2017).

Mali is amongst the world's most impoverished countries and has been dealing with a worsening security situation in recent years (BTI, 2020). Around 70% of Mali's population depends on agriculture as a source of income, with around 40% of the rural population, or four million people, dependent on cotton production. Despite of the country's fragile economic situation, cotton production continues to grow rapidly (BCI n.d.). Subsistence farming remains the dominant production method, with 68% of farmers cultivating fewer than 5 hectares of land, in 2018 (USAID and Crossboundary, 2018).

The West African cotton sector is characterised by high levels of government involvement

In recent years, the West African cotton industry has seen some limited privatisation of the sector and increased private sector involvement, though in most cases, the public cotton company retains a quasi-monopoly. This is the case in Burkina Faso, where the Société Nationale des Fibres et Textiles (SOFITEX) dominates the national cotton market and strictly controls cotton cultivation (Catalystas, 2019). In 2018, SOFITEX controlled around 80% of total ginning capacity. Similarly, in Benin, the Société pour le Développement du Coton (Sodeco) controls 81% of ginning capacity in 2018. As of 2012, the government had a 49% stake in Sodeco. Since 2016, the sector has successfully started to semi-privatise (Talon, 2018). Not only are prices fixed for cotton producers because of this structure, Sodeco also seeks to secure the cotton sector, support productivity and technical, social and economic conditions in cotton production (Talon, 2018). Finally, In Mali the cotton value chain is managed by the Compagnie Malienne pour le Développement du Textile (CMDT), a government-owned enterprise that controls 78% of the market. The CMDT handles the provision of inputs and credit to farmers, as well as the collection, ginning, and marketing of cotton. This also includes the processing in 17 cotton factories.

This public sector involvement is an inheritance from French colonial days, when the government-owned Compagnie Francaise de Développement des Textiles (French textile development company, CFDT) oversaw input supply, organising smallholders, buying cotton and a first processing (ginning) across West and Central Africa. Starting in the 1960s and 1970s, the CFDT was replaced by national cotton companies in which the government held a majority stake and the CFDT was a minority shareholder. These national cotton companies were — and in most cases still are — in charge of managing production, ginning, and marketing of cotton fibre. In addition, many of these national cotton corporations were assigned additional mandates to support rural development, such as the building of rural tracks and infrastructure to move cotton from production zones, increasing literacy amongst producers to facilitate producer associations, and supporting nutrition of farming households through promotion of animal and crop production for diverse diets (Soumaré et al., 2021).

Box 3.1: Water use in cotton cultivation in relation to water scarcity
Growing cotton requires fresh water, either in the form of natural rainfall, or by artificial irrigation for which groundwater or surface water is used. Water footprint analysis shows that about half of the global cotton production area in the 1990s was irrigated, accounting for almost three quarters of the global cotton production (Soth et al., 1999). Irrigation is therefore an important production factor, but at the same time, may cause depletion of water resources (Dağdelen et al., 2009). Sustainability of water use for cotton can be assessed by comparing regional water needs to water scarcity (i.e. water availability and the annual renewal rates of rainwater, groundwater and surface water (Mekonnen and Hoekstra, 2016)). Irrigation takes place in mostly warm climatic regions, where fresh water is already in short supply (e.g. in North Africa and parts of Asia, China and India; (Chapagain et al., 2006)).

Climatic conditions for cotton production are least attractive in Syria, Egypt, Turkmenistan, Uzbekistan and Turkey because water demands in these warm climates are high, whereas effective rainfall is low. This has led to large irrigated production areas, and yields varying from world average to very high. Climatic conditions for cotton are most favourable in the United States and Brazil, where water demand is low. Vast areas can do without irrigation, while yields are a little above world average. India and Mali have a particular position, with climatic conditions causing high water demand, and insufficient rainfall to meet this demand. The production area is only partially irrigated (between a quarter and a third of the harvesting area), resulting in relatively low overall yields (Chapagain et al., 2006).

Interviewees stated that, at present, there are no signs of water scarcity issues due to cotton production in the West African countries that are the focus of this study, as most of cotton production there is rain-fed (Sphera, 2021). However, at the same time, yields in West Africa are relatively low due to a limited availability of nutrients and water (Section 3.2.1). This means that efforts to increase both the quantity and quality of produced cotton will depend on fertilisation and irrigation. When increasing cotton production, risks of regional water scarcity should be avoided by learning from sustainable practices in other countries. Examples include using drought-resistant varieties and well-timed drip irrigation. Avoiding water stress especially during and after the flowering period is important to obtain a greater fibre length and higher quality cotton (Dağdelen et al., 2009).

3.1.1 Environmental impact areas

Cotton farming communities are exposed to dangerous pesticides
Cotton is susceptible to a wide variety of pathogens, more so under the climatic conditions in Sub-Saharan Africa. This results in serious problems with pests and subsequent cotton yield losses. In West Africa, it is estimated that between 25% and 35% of cotton yields are lost to pests (Amanet et al., 2019b). To counteract the pressure from these pathogens, cotton cultivation typically requires the use of large amounts of pesticides, with global cotton production representing up to 25% of global pesticide consumption (Kooistra et al., 2006). Nevertheless, it is important to note that the high costs of fertilisers and pesticides mean that smallholder farmers tend to use fewer such inputs than recommended. Interviewed experts stated that this, in turn, means that yields remain low and pathogens and pests can adapt to become resistant over time.

Pesticide use in West Africa also creates serious public health problems. In Benin, for example, up to 577 farmers were reported to have been poisoned by pesticides used on cotton, between 2000 and 2003 (Soumaré et al., 2021; Westerberg, 2017). The productivity losses and health care costs due to poisoning can be very high. UNEP has estimated the overall costs of health damage caused by pesticides in Sub-Saharan Africa between 2003 and 2020, to amount to roughly USD 90 billion (Westerberg, 2017). However, in some countries, such as Mali, pesticide use remains quite low compared to other regions (Soumaré et al., 2020), in part due to changes in parasite control methods (staggered targeted control, treatment threshold) and a lack of access to inputs (Michel et al., 2000).

Land-use change and pollution negatively impact biodiversity

Cotton cultivation in West Africa can contribute to biodiversity loss through the sub-optimal application of pesticides and insecticides. Cotton cultivation is further related to habitat destruction in the form of land clearing and forest fragmentation (Kouta and Ismaila, 2019).
According to the European Commission, Africa is the fastest growing market for neonicotinoid pesticides. While these pesticides are less toxic to humans than older classes of pesticides, they still pose particular problems for pollinators and aquatic organisms. It is estimated that over the long term, neonicotinoid use could have serious implications for biodiversity loss (EP/EXPO/DEVE/FWC, 2021). The impacts of cotton on water resources are considerable, with high levels of pesticide and fertiliser traces (CmiA n.d.), resulting in wildlife contamination and groundwater and surface water contamination. Pesticides not only negatively impact local wildlife biodiversity (both aquatic and terrestrial), livestock is similarly exposed and can consume pesticides through grazing and water sources (Radhakrishnan, 2017).

Older classes of pesticides are still widely used in Western Africa. In Benin, for example, large amounts of pesticide used on cotton has led to surface waters being contaminated with pesticides and insecticides such as endosulfan, heptachlor, DDT and metabolites. This has negatively affected the health of fish species living in local waterways (Agbohessi et al., 2015). Some of these compounds are slow to degrade and also accumulate in ecosystems, over time (CISL, 2016).

The impacts of cotton production on soil fertility are unclear

Research on the impacts of cotton production on soil fertility provides insights into effects in different situations. For example, in the cotton producing systems of western Burkina Faso, over 80% of soil substrate is depleted of its nutrients and there is a sharp decline in soil chemical content (Hauchart, 2005; Soumaré et al., 2021). In contrast, in the Koutiala region in Mali, studies show that there is little difference in soil nutrient content between cotton-farmed and fallow lands, suggesting that cotton production may not be damaging to soil quality (Benjaminsen et al., 2010). Often, research on cotton cultivation looks at crop impacts in isolation, instead of analysing the impacts within the context of developments within a broader agricultural system (Laris and Foltz, 2014). Recent studies exploring the types of differences mentioned above conclude that, while it is possible that soil fertility depletion or too rapid expansion of cotton areas played some role in the decline in cotton yields in some areas, evidence does not suggest a causal relationship between cotton cultivation and decreased soil fertility (Laris and Foltz, 2014). Instead, research in Mali suggests that, due to an attempt by farmers to maximise profits quickly, rapid expansion of the cropping area led to a decline in cotton yields in the early 2000s, as farmers faced labour bottlenecks. In addition, rapid expansion resulted in mismanagement or use of marginal lands (Laris and Foltz, 2014).

Cotton in West Africa is rain-fed and, thus, does not rely on groundwater or surface water extraction

While cotton farming is typically associated with pressures on water resources, this is less of a serious problem in West Africa than in some other regions, as most cotton farming is rain-fed (Kooistra et al., 2006). Cotton can be a challenging crop to grow because it is sensitive to pests and to both too little and too much moisture, in different stages of the growth cycle. Ideal conditions are warm and sunny, with enough rain during a specific, limited period. In the cotton-growing regions of Mali, Benin and Burkina Faso, conditions are favourable, given the sunny climate with seasonal rainy periods, without the additional irrigation required in other cotton-growing regions. While rain-fed cotton uses approximately 3,400 litres per kg of lint cotton, irrigated cotton farming relies on the extraction of groundwater and/or surface water, and for this purpose, water consumption can vary from 6,000 litres per kilogram, such as in China, to 22,500 litres per kilogram, such as in India (CmiA, 2014; Mekonnen and Hoekstra, 2011) (See Box 3.1).

Cotton cultivation contributes to climate change

Cotton production is both a contributor to and at risk of climate change. It is not straightforward to calculate the carbon footprint of cotton as this varies according to growing conditions, cultivation practices and production efficiency, which again differ widely per country or region (Ton, 2012). Most of the negative impacts on climate change due to cotton cultivation in West Africa concern nitrous oxide (N_2O) emissions from the use of mineral fertilisers, N_2O emissions from soil, and where animals are used in farming, methane (CH_4) emissions from draught animals and manure (CmiA, 2013). CH_4 and N_2O are potent greenhouse gases, with a respective global warming potential (GWP) of 25 and 298 times that of CO_2 (EPA n.d.).

In addition, land-use change is also associated with negative impacts on climate change, as it limits the ability of soils to absorb and store CO_2 emissions and releases CO_2 emissions previously sequestered in the soil. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) estimates that, at the global level, land degradation between 2000 and 2009 was responsible for annual global emissions of up to 4.4 billion tonnes of CO_2 (IPBES, 2018) Regarding the environmental impacts of cotton, research suggests that lower negative impacts are usually related to an overall lower input intensity, which then is aligned with lower yields and efficiency (Avadí et al., 2020). While organic cotton producers do contribute less to GHG emissions, the fact that they require more land results in environmental inefficiency compared to conventional farms (Bonou et al., 2019).

Environmental pressures of cotton cultivation in West Africa are linked to broader socio-economic developments

Environmental impacts as a result of cotton farming are part of broader societal changes in West Africa. Economic and political developments, as well as rapid population growth, affect how farmers cultivate crops. In turn, environmental impacts of cotton farming can be part of a vicious cycle, in which farming contributes to negative impacts that reduce yields, and adaptation to worsening conditions (using more pesticides, expanding onto marginal lands), again, exacerbates the negative impacts. However, while the pressure of growing populations and poverty are linked to the problems described above, they are not the only underlying drivers of land degradation in the Sahel (UNCCD, 2019).

The amount of pressure on degraded land is determined by how people react to economic opportunities. For instance, land degradation can lead to the abandonment of large areas and even to migration as well as to agricultural expansion on marginal land (UNCCD, 2019). Moreover, institutional factors such as local and national policies and markets pose further opportunities and limitations for new land uses, which also affect cotton farming. In West Africa — with its regional internal ECOWAS market — regional markets play an increasingly important role in linking local demand for and supply of local food. Global food market trends however influence food prices at local level. In this context, forces at a global level have become key determinants of land-use change, to the extent that they amplify or mitigate local factors (UNCCD, 2019).
The interplay between social, environmental and economic developments in the context of cotton farming, are discussed further in Chapter 4.

3.1.2 Socio-economic impact areas

In West Africa, many people depend on cotton farming for their livelihoods, despite the low income this provides

While cotton production has played a vital role in rural livelihoods in Benin, Burkina Faso and Mali, the level of income from cotton production in the region has been too low to boost economic growth (FAO, 2018). An important reason for this is that most of the raw cotton is directly exported, thereby missing the opportunity to create value-added from thread, clothing or apparel. A large proportion of agriculture's share of GDP is subsistence crops, which do not directly contribute to improved economic performance (Catalystas, 2019).

The structure of the industry in the region, with its parastatal control of ginning and exports, has not led to above global average prices for West African cotton producers. In Burkina Faso, for example, prices received by cotton producers from the national cotton companies have often been some of the lowest in the world (OECD, 2006). In Mali, incomes from cotton, despite their relative significance, are increasingly failing to meet the monetary requirements of some farming categories, which end up having to borrow at extortionate rates (up to 100% interest rates) (Soumaré et al., 2021).

In Benin, cotton enables the primary sector to represent approximately 20% of GDP and 40% of the inflow of foreign currency. It also ensures an income to more than a third of the population. Nonetheless, the evolution of cotton production has not been constant. Political decisions and climatic conditions have negatively affected production and therefore its economic benefits (INSAE, 2020).

As stated earlier, cotton is a volatile sector, and this has further contributed to its decline since the 2000s. Other factors have compounded this situation, including the fluctuations and downward trend on the international fibre markets; the economic collapse of the states and the withdrawal of agricultural subsidies; and limited entrepreneurial skills within cotton companies (Mbetid et al., 2010).

Cotton yields in Africa are much lower than those in other parts of the world

Cotton production in Benin, Burkina Faso, and Mali produces lower yields than that in other parts of the world, despite its crucial place in their economies. For instance, the average cotton yield in Benin, Burkina Faso, and Mali was 399 kg/ha compared to 992 kg/ha in the United States and 1,720 kg/ha in China in 2020–2021 (USDA, 2021a, c).

Low cotton productivity in West Africa is caused by a variety of factors. In the first place, despite its drought resistance, cotton yield is dependent on well-timed water supply, which is a limiting factor under the rain-fed cotton cultivation system of West Africa. This is further compounded by a changing climate with erratic precipitation patterns. Likewise, fertiliser use, which would normally greatly improve yields, especially under limited water regimes, is more often applied to food crops rather than cotton (despite this input is obtained through dedicated cotton cultivation schemes and extension services). In addition to that, between 25% and 35% of cotton yields are lost to pests (Amanet et al., 2019a).

Moreover, agricultural production still depends mostly on manual labour, with relatively little mechanisation (INSAE, 2020). Some of the reasons for the low level of mechanisation in West Africa include a large family labour force and lack of access to finance. Limited tenure rights with their risks and uncertainties also push farmers (especially older ones) not to opt for mechanisation (Saliou et al., 2020). Interviewees added that, in general, mechanisation is low because of a lack of access to inputs for food crops. Although, since the 2008 food price crisis, several countries (Burkina Faso, Mali) have set up input subsidy programmes for food crops.

Cotton cultivation involves high labour risks and low incomes

Workers in cotton cultivation in West Africa receive very low wages, often near or below the extreme poverty line and structurally below minimum wages. In addition, the work is dangerous, as workers are at risk of heat strokes, exhaustion, and extensive use of dangerous chemicals without PPE (Verité, 2018).

While providing employment to a significant part of the population, the cotton sector did not substantially contribute to poverty reduction and informality is prevalent, representing close to 85% of the non-farm workforce (World Bank, 2019). In Benin, for example, an estimated 30% of total employment is in the cotton sector. In Burkina Faso, 7% of the total workforce work in cotton production, while in Mali 17% of employment is in cotton production (Catalystas, 2019).
Cotton production in these countries (as well as in other cotton-producing countries in the region) is mostly limited to cultivation and ginning. Value addition (including, e.g., refining, processing) is done in other countries. This not only limits opportunities for increasing the proportion of skilled labour (and the social mobility potentials), but also limits the economic added value of the sector (Verité, 2018). In Mali, the value creation from by-products has improved, with an increasing processing of cotton seeds into oil (AFP, 2019).

Youths have few prospects in the West African cotton sector

The low wages and high labour risks are more severely felt amongst youths, while a combination of structural and circumstantial factors limits youth employment in the cotton sector. Firstly, because value addition of cotton is virtually non-existent, there is a lack efficient transformation units, which, in turn, reduces the number of jobs available. Furthermore, agriculture is perceived as unattractive and vocational training for agricultural work is discouraged. Instead, parents motivate their children to study for jobs that have an oversupply of labour, such as banking or insurance, creating a mismatch between skill profiles and sectoral capacity needs (Verité, 2018).

Young women face even fewer prospects than their male counterparts. Precarious land tenure rights particularly affect young women as land titles are predominantly passed on through male lineage, which means that women usually only have access to marginal land that they could lose again overnight. Likewise, young women are often pushed into early marriage and subsequently motherhood, which stops them from obtaining an education. In turn, illiteracy limits women's access to vocational training, which decreases their opportunities for employment in cotton, but also in other sectors (Catalystas, 2019).

West African cotton sector is male-dominated, with few opportunities for women

In 2018–2019, there were 201,805 cotton producers in Benin, of which 171,203 were men and only 20,602 were women (INSAE, 2020). In 2019, in Mali, 15% of organic cotton producers were women and between 0.3% and 6% of conventional producers were female (Westerberg et al., 2020). These figures do not include the unpaid work women do, such as fetching water, collecting firewood, and caring for children (Marphatia and Moussié, 2013).

The low level of women's participation in the sector is explained by a number of structural factors. Firstly, within the generally patrilineal descent system in West Africa, land is passed on only through male lineage, with the eldest son inheriting their father's land. More often than not, women are granted precarious tenure rights on land that does not belong to them (free of charge if the land belongs to their family, otherwise by paying rent, in money or part of the harvest), often available in marginal areas with poor soil quality (Catalystas, 2019; INSAE, 2020). Precarious tenure rights also negatively impact the productivity of women in the sector, as they lack the collateral to access inputs and credit (Soumaré et al., 2021).

These inequalities, in turn, cause lower agricultural productivity of up to 30% in households headed by women compared to households headed by men (World Bank, 2012; Backiny-Yetna and McGee, 2015). Where households are headed by men, women mostly participate in cotton cultivation as family labourers; therefore, often having no access to the cash earned because the incomes are often managed by the male head of the household. Women who do obtain employment in the sector do so mostly through informal, casual and seasonal agreements with low wages and little job security. Moreover, they face occupational segregation and reproductive health risks (due to pesticide exposure and a lack of voice within the household), harassment and sexual abuse (Verité, 2018).

Child labour is common in the West African cotton sector

As stated earlier, cotton in West Africa is cultivated under a labour-intensive production system. In this context, the minimal mechanisation of product together with the high share of smallholders in the sector mean a high prevalence of family labour, including children (Quak, 2018). In this context, the prevalence of child labour in cotton production in Benin, Burkina Faso, and Mali is high (with a respective 20.9%, 42.1%, and 49.2% of child labour). This also includes the most hazardous forms of labour, such as in the application of chemicals without PPE, as well as trafficking and forced labour (Verité, 2018).

In addition to engaging in family labour, children are also recruited to work on the fields in harvest seasons, often as migrant workers. Labour migration is often not voluntary and may involve coercion, particularly due to the presence of labour recruiters such as in Burkina Faso that promise high incomes and rewards to young boys for employment in cotton producing regions. Some farms do not pay the children until the end of the harvest season, which forces them to stay until the end of the harvest cycle even when they are mistreated. Wages are often lower than promised or even not paid at all (Verité, 2018).

3.1.3 Impacts on food security

Cotton cultivation has been having a mixed effect on food security

Despite the limited economic benefits and the many hazards related to cotton cultivation, one reason why farmers continued to grow cotton in the past, was to gain access to credit for technology and inputs that were also essential for their food production, and thereby for food security (Laris and Foltz, 2014).

The relationship between food security and cotton is however not straightforward and the effects of cotton production on food security in West Africa have been varied. In Burkina Faso, some research states that cotton cultivation has been conducted mostly at the expense of other food crops, which has played an important role in the country's recent food crisis (Catalystas, 2019). In Mali, by contrast, cotton production has led to the development of cereal crops, such as maize. Due to increased fertiliser use, maize production went from 60,000 to over 700,000 tonnes, between 1975 and 2018 (Soumaré et al., 2021).

Despite these differences, both published sources and the key informants interviewed for this study agree that cotton cultivation has overall had rather a positive outcome on food security in West Africa. Interviewees raised the point, however, that cotton farmers will always try to find a way to ensure their households' food security, either through cultivating enough food crops or ensuring enough revenues for buying food. The UN World Food Programme surveys in Burkina Faso and Mali show that many farm households also buy food and do not rely only on their own production (de Steenhuijsen Piters et al., 2021).

Diversification of crops for export could help improve food security in West Africa

Agricultural production and the rest of the local economy in cotton-growing regions remain highly dependent on cotton. Fluctuations in the price of cotton on the international market (98% of production is exported) and governance crises disrupt the entire cotton production system (Soumaré et al., 2020), which can have catastrophic consequences on food security. Government support for West African cotton farmers has been aimed at providing modern inputs such as improved seeds, fertilisers, insecticides, and draught animals such as cattle, as well as

credit, extension services, and a guaranteed pricing system intended to shield farmers from risk (OECD, 2006).

However, in the aftermath of the 2007–2008 food crisis, government support moved towards improving access to inputs for other crops beside cotton. This made it easier for cotton farmers to access fertilisers to use on food crops. While this increased support has contributed to improved food security, its potential to decouple cotton and food crop production can still be developed further according to the experts interviewed (IFAD/FAO, 2013).

The general risks of growing cotton raise questions about the option of cultivating other cash crops instead. Both in Benin and Mali, cotton and maize seem to compete, and farmers prefer maize as a cash crop given its lower labour requirements. Maize is also one of the staple foods in these countries (Benjaminsen et al., 2010). Burkina Faso has a comparative advantage that is not fully seized with respect to cereals, particularly rice and maize, but grows a variety of fruits and nuts, as well as oilseeds and livestock. While being one of the region's leading cotton producers, these significant opportunities will help diversify agricultural production and exports with the objective of improving value addition, and ultimately food security (World Bank, 2020).

Box 3.2 Preferred cotton and sustainability standards

In the textile industry, there is broad commitment to using what is called preferred types of fibres and materials (both plant- and animal-based). An array of sustainability standards exists, covering both social and environmental issues (labour, wages, water, land use, pesticides, pollution, animal welfare, deforestation). In 2018–2019, about 25% of globally produced cotton was preferred cotton, and this percentage has grown from about 5% in 2012–2013. Different labels and standards are used in different world regions. The 'Better Cotton Initiative' (BCI) represents the largest share, with a global coverage of 22% of total cotton production. For the African top 5 cotton-producing countries, the share of preferred cotton was much larger, covering about half of the production (51%). For Ivory Coast, Burkina Faso and Cameroon this share amounts almost 100% (see Figure 3.1). 'Cotton made in Africa' (CmiA) represents the largest share of labelled African cotton, certifying more than 30% of the total cotton production in Sub-Saharan Africa in 2018–2019 (Textile Exchange, 2020).

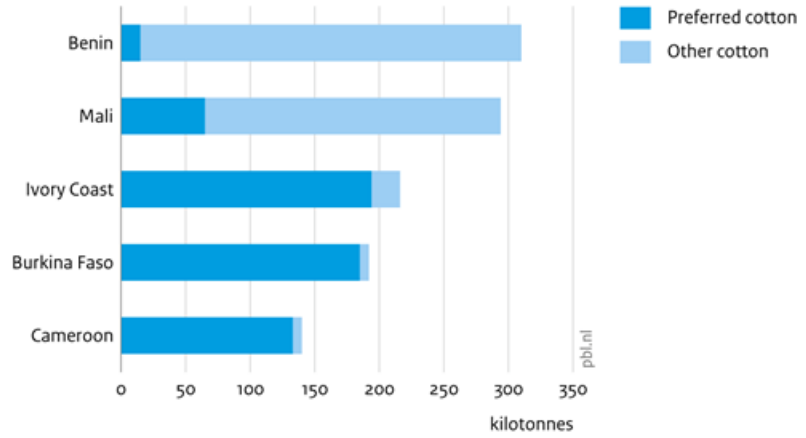
Standards contains several criteria to improve environmental protection and the living conditions of smallholders. For instance, genetically modified organisms are prohibited under CmiA criteria, just like certain pesticides and the worst forms of child labour. Farmers are trained in sustainable production methods as part of the CmiA programme, to attain higher yields and diversify crops. Support programmes are in place to improve the position of women (AbTF, 2021). LCA studies show that cotton production under CmiA criteria performs relatively better, compared to the world average for CO_2, nutrients and water use (all relative to the attained yields; Sphera, 2021). Impact assessment studies are also ongoing for farmers that work under BCI criteria.

Box 3.2 Preferred cotton and sustainability standards (continued)
According to interviewees, access to fertilisers is expensive for smallholders, due to interest rates charged by middlemen. Furthermore, genetically modified cotton is allowed under BCI, but creates a dependency as the investments by farmers in pesticide-resistant varieties is considerable, affecting their household income (IISD, 2020). These criticisms of practices in Asia deserve attention from BCI (2019). In general, the role of VSS seems positive, by activating all actors in textile supply chains to cooperate and improve on several issues (IISD, 2020). Interviewees also posed the question of quality in relation to preferred cotton: certified cotton is not seen as being of higher quality (e.g. fibre length) in comparison to other cotton. Experts pointed out that, if West African cotton was to improve in terms of quality, this would greatly improve its position on the global market.

The position of organic certified cotton for Africa is much discussed. Organic farming has shown to have a viable business case and provides good market opportunities as consumer demand is rising. This is mostly the effect of lower input costs outweighing the related lower yields. Sometimes, yield levels comparable to conventional farming are possible. However, the benefits of organic production depend on knowledge extension and sufficient local availability of organic fertiliser (livestock manure), which is not always the case (TextileExchange, 2020).

Figure 3.1

Production of preferred cotton in top 5 producing countries in Africa, 2019



Source: Textile Exchange – Market report 2020

3.2 Post-consumer textile processing

This section discusses the environmental and social impacts of the flows of post-consumer textiles (PCTs) to Pakistan, with a focus on recycling. Insights are gathered from interviews, an expert workshop and the literature. Pakistan was chosen because of the significant volumes of post-consumer textiles imported from the Netherlands and Europe, and its already existing recycling industry. So far, little has been published about what happens to these shipments.

Table 3.2
Impacts and underlying issues in post-consumer textile processing related to SDGs

Topical impacts	Underlying impact area	Related to SDG
Position of women	Labour conditions; income	Goal 5: Gender equality
Employment and economic growth	Labour conditions; income	Goal 8: Decent work and economic growth Goal 9: Industry, innovation and infrastructure
Resource efficiency	Demand for raw materials; waste production	Goal 12: Responsible consumption and production
Climate change	Energy use	Goal 13: Climate action
Pollution	Emissions to land, water, and air	Goal 15: Life on land Goal 6: Clean water and sanitation

Despite the fact that large amounts of post-consumer textiles from the Netherlands are also shipped to other EU Member States, this study focuses on low- and medium-income countries and therefore does not analyse impacts within the EU. In addition, while data show that a substantial share of post-consumer textiles from the Netherlands ends up in Africa, it is understood that most of these exports consist of second-hand clothing for recommerce. As the focus of this study is on recycling, detailed analysis of export streams for reuse in low-income regions of both Africa and elsewhere was not within the scope of this study.

Post-consumer textile processing in Pakistan is linked to a range of mostly socio-economic impacts

Research on the processing of post-consumer textiles in the Global South mainly looks at reuse and resale, pilot projects with a limited scope (RVO, 2021), or very specific regions where recycling is common, such as recycling in Panipat in India (Arisa/Sympany, 2020). Despite being one of the largest importers of discarded clothes, information on Pakistan's post-consumer textile sector remains scarce. Studies such as those done by Arisa in Panipat are not available for Pakistan. For this reason, it has proven to be a challenge to describe the specific environmental and socio-economic impacts associated with the influx of post-consumer textiles in the case of Pakistan.

To address the lack of data on the processing of post-consumer textiles in Pakistan, we examined the literature on post-consumer textile processing, in general, in other countries. and conducted interviews with various stakeholders and experts to gain a better understanding of the local context. While the interviews represent the views of a small selection of people with knowledge of the trade in second-hand clothing and used textiles, the insights gathered here do highlight certain issues and opportunities that require further, more thorough, research.

The information that we gathered during this study indicates that the main impacts of the export of post-consumer textiles to Pakistan are related to employment opportunities, labour rights, pollution and potential environmental gains through increased resource efficiency (see Table 3.2).

Imported post-consumer textiles are sorted and graded and subsequently resold or recycled

For exports of post-consumer textiles outside the EU, discarded clothing and other textiles have undergone some form of sorting and non-textile waste has been removed. Detailed sorting is typically conducted by experienced staff and it is, therefore, expected that the non-reusable or recyclable content in re-exported textiles is limited (Watson et al., 2016).

Imported textiles in Pakistan are sorted and graded, and subsequently resold or recycled (CSI Ltd., 2021, personal communication). Pakistan imports large shares of items with low value and uses them for the established local fibre recycling market, where they are recycled into rags, shoddy, or fleece. It is suspected that a share of these textiles is eventually recycled in India. Clothing or home textiles made from the recycled fibres are most likely sold locally or in low-income neighbouring countries such as Afghanistan. Second-hand items that still have retail value are sold in flea markets and thrift stores. Furthermore, part of the imported textiles is packed into smaller bales and re-exported to West and East Africa, where it is sorted, graded and sold for reuse. In addition, some higher value items are re-exported for resale in second-hand shops in Europe (CSI Ltd., 2021, personal communication; Expert interview, 2021). Pakistan also exports sorted materials to high-income regions for local recycling, with numbers cited of up to 36% of imports for one company importing post-consumer textiles from Scandinavia (Watson et al., 2016).

Basic textile recycling in Pakistan is not new, but faces technical challenges

Interviewees report that there is a relatively well-established industry in Pakistan of mechanical recycling of mostly cotton textiles, meaning shredding materials into fibres that can be combined with virgin fibres to make new textiles, or can be used as filling material, for example in furniture. There are roughly 52 companies in the business of recycling textiles in the Karachi Export Processing Zone (EPZA, 2021). In addition, a substantial amount of sorted material is re-exported for recycling in high-income countries or are slashed into smaller fragments for mechanical recycling in India. It is likely that these materials end up in recycling hubs such as Panipat (Watson et al., 2016).

Textiles of less than 89% cotton are not deemed suitable for recycling into new clothing and are instead used to make shoddy (Fibre2Fashion, 2016). Man-made fibres or blends of cotton and synthetic fibres are likewise not favoured for mechanical fibre-to-fibre recycling (ETC/WMGE, 2021). There are some technical challenges in processing textiles that have been dyed or treated, as it may not be clear what chemicals or processes were used to treat the textiles. These are some of the reasons why mostly white cotton textiles are selected for fibre-to-fibre recycling.

The trend of introducing recycled materials into clothing manufacturing has prompted a large amount of research and development in the broader textile industry, mainly to also process coloured fabrics in a way that makes them suitable for safe fibre-to-fibre recycling according to standards required for export. At present, fibre-to-fibre recycling is mostly limited to high quality items such as hotel bed linen and dress shirts. Instead, fibre-to-fibre recycling has usually included the addition of recycled PET, for example from bottles, to strengthen recycled cotton fibres to make new yarn. Interviewees also stated that in the past, polyester textiles would be incinerated as fuel, whereas now there is interest in incorporating recycled polyester into new yarn.

Growing interest in textile recycling is spurred on by international brands

As efforts to close loops in the clothing industry are developed, interviewees in Pakistan have stated that brands are increasingly starting to request a minimum recycled content to be incorporated into new clothing. In the last six to seven years, factories have increasingly started to repurpose used textiles. Interviewees stated that, every time the price of cotton goes up, or when buyers demand more sustainability, the interest in recycling grows. Overall, demand for recycled content in the manufacture of new clothing has caused a small shift towards creating recycled cotton fibre suitable for fibre-to-fibre recycling for the manufacturing of clothing for export. At present, most recycled yarn is made from pre-consumer textile waste, which is created during the manufacturing process.

In combination with the established clothing and home textile manufacturing industry in Pakistan, further developing the recycling industry could offer Pakistani companies an advantage to step into the circular economy for textiles. This trend is in line with the targets set by the Dutch Government, for the inclusion of a minimum percentage of recycled fibres in new clothing sold in the Netherlands (see Table 5).

While most recycling activities focus on cotton textiles, interviewees stated that there has also been attention from EU or US recyclers to buy polyester clothing from Pakistani sorters with 80% or higher polyester content, for recycling. This was viewed by interviewees as a positive development, as most polyester garments are sold to incineration plants in Pakistan as a fuel alternative.

Multiple uses of recycled textiles open possibilities for value addition

A feasibility study on post-consumer textile recycling in Pakistan concluded that there is potential for upscaling this incipient industry. In this context, exporting companies in the country find value in sorting and grading second-hand clothes and, in some cases, even ship them back to the country of origin (e.g. United States, Japan, European Union), while lower value items are either sold locally or recycled. Pakistan possesses a competitive advantage due to the relatively comprehensive textile infrastructure, from raw materials to clothes manufacturing. However, for the processing of used clothing and textiles, the local textile manufacturing industry may benefit from support to develop value-added processes and products as well as traceability solutions (RVO, 2021). Key informants agree that Pakistan's unique position as a promising partner for the EU's circular ambitions in the textile sector is enhanced by its well-established cotton supply chain and home textiles manufacturing, which are products of high suitability for recycling.

Against this background, recycled materials could be applied in many fields such as automotive, furnishing, sailing and/or insulation (e.g. geo fleece, carpet underlay, parcel shelves, stuffed toys, shoe insoles) (Leal Filho et al., 2019). However, as stated earlier, the price differential for recycled textiles is still not enough to discourage virgin use, which poses an obstacle to achieving the full value-addition potential of post-consumer textile recycling. In addition, interviewees emphasise that it is still necessary to further identify what type of infrastructure is in place for scaling up recycling, and what still needs to be developed.

Box 3.3 Post-consumer textiles from Nordic countries: a cascade in quality and value
Reuse and recycling of textiles can be regarded as a quality and value cascade that flows from high-income to low- and middle-income countries. Research based on Nordic textile collection shows that the top 10% of discarded textiles can be sold for domestic reuse, but the rest must be sold on lower income markets. Better quality textiles are still sold throughout Europe, mainly in the east, which includes Russia. Africa, the Middle East, and Central Asia. As economies evolve, final export destinations are always changing. Textiles of lower quality that may have been on offer for reuse in Poland 10 years ago are no longer in demand. Further afield, in Eastern Europe, the Middle East, and Asia, new markets have emerged. Reduced prices boost the market share of used textiles that are reused and recycled. Original buyers are required to find a market for each and every fraction their shipments contain in order to cover the costs of sorting. They can no longer make ends meet by selling only the highest quality items and the higher grades of reusable fabrics. Despite the low prices for these fractions, importers must sell second-grade textiles, rags for mechanical recycling, and plastic bags for plastic recycling. The full value of the exported used Nordic textiles is utilised, as much as possible. Since reuse yields a higher price than recycling, which, in turn, yields a higher price than other waste treatments, economic incentives also ensure that the waste hierarchy is followed. In other words, tight margins ensure that most environmental benefits are obtained from exported Nordic textiles.

Source: Watson et al. (2016)

Little goes to waste in Pakistani post-consumer textile processing

Importers of post-consumer textiles in Pakistan have to pay for waste disposal and so are incentivised to ensure that waste is sorted to separate saleable fractions as much as possible. This means that companies active in recycling textiles not only shred textiles to make yarn but also look for other ways to repurpose used goods. For example, second-hand bed linen can be dyed or printed to be resold as textiles for clothing manufacturing in low- and middle-income countries, adult clothing can be refurbished to make children's clothing, and white cotton dress shirts with stains can be bought in bulk and dyed a darker colour, to be sold on local markets.

A study on discarded textiles in Nordic countries concluded that, in Pakistan's KEPZ, 100% of the imported textiles are sold, in some form or other, and a total of about 57% is recycled: 36% is exported either as cut industrial wipes for the global market or slashed textiles exported to India for mechanical recycling, and 21% is mechanically recycled, domestically (Watson et al., 2016). While there are limits on the amount of reusable textile that enters Pakistan from the special economic zones, there are no limits on their import intended for recycling. The proximity of the Karachi Export Processing Zone (KEPZ) to potential users of recovered yarn from the recycling processes makes it more attractive economically to recycle or to sell to recyclers than to dispose of recovered textiles as waste (Watson et al., 2016).

Box 3.4: The Shoddy industry of Panipat

'Shoddy' refers to inferior quality yarn or fabrics made from the shredded fibre of textile waste cloth or clippings. The shoddy sector is part of the Indian informal economy engaged in the processing of the world's discarded textiles. It is perhaps one of the most effective, successful, and comparatively oldest industrial textile recycling practices in India, which recycles approximately 144 kt of post-consumer textiles every year, mostly discarded by high-income nations. The bulk of these post-consumer textiles is used as raw material to create low-quality products such as blankets, shawls and carpets. It is estimated that 3 tonnes of fabrics produce 1.5 tonnes of shoddy yarn. To achieve this output, garments are sorted and broken up into a fibrous mass on garneting machines. These fibres are then dyed, carbonised and converted into yarn from which blankets are made.

After a steady growth in the 2000s, the shoddy industry has been in decline and losing its profit due to its tough battle with polyester blankets which are cheaper, warmer, and light in weight, in addition to many other problems, such as economic slowdown and limited product range of shoddy yarn. Between 2012 and 2015, the industry shrank from 600 to 700 shoddy yarn and textile manufacturers in Panipat to 150 manufacturing units. Likewise, the production value also decreased drastically. Import of post-consumer textile containers also reduced from 800 containers/month to 300 containers/month (Jain and Gupta, 2016).

3.2.1 Environmental impact areas

Negative impacts of recycling are associated with energy use and pollution

There is limited research on the environmental impacts of post-consumer textile processing in Pakistan. Based on the more general studies available, as well as the few sources regarding Pakistan specifically, it can be concluded that most negative environmental impacts arise as a result of the energy used throughout the value chain (i.e. transport, sorting and recycling plants) and in waste processing. Benefits arise mostly from the offsetting of products and materials as a result of reuse and recycling.

With respect to pollution, research from Panipat, India, finds that the recycling industry contributes to local pollution of air, soil and water, for example by discarding chemicals (dye, bleach) into municipal drains (Arisa/Sympany, 2021). It is unsure whether this happens in Pakistan, too, but the Panipat research does point to a potentially negative impact on the environment in recycling centres if environmental standards are not enforced.

Reuse and recycling, generally, reduce environmental impacts of textile value chains

Textile reuse refers to various ways of prolonging the useful life of textile products, through renting, trading, swapping, borrowing, and inheriting (Fortuna and Diyamandoglu, 2017). Textile recycling refers to the reprocessing of pre- and post-consumer textile waste for use in new textile or non-textile products using a variety of methods, including chemical, mechanical, and thermal processes (Sandin and Peters, 2018). Textile reuse and recycling are both effective in reducing negative environmental impact, as compared to incineration and landfill, as fewer new products need to be produced. Textile reuse is more beneficial than recycling, except when such textiles are subsequently transported across long distances (Sandin and Peters, 2018). It matters to what extent a reused or recycled item offsets a new item (Ljungkvist et al., 2018; Watson et al., 2016).

Although the separated textiles require energy for transport, sorting and packing, every kilogram of virgin cotton replaced by a second-hand product saves around 65 kWh of energy (Woolridge et al., 2006). However, depending on the energy source and where and how cotton is produced, the environmental impact of recycling could be worse than cotton production, especially when recycling is powered by fossil fuel (Shen et al., 2012). Recycling is nonetheless still a better option than waste incineration, in terms of emissions and resource efficiency. In this regard, it also matters whether something is 'downcycled' (into lower value items such as padding, rags or filler) or recycled into a similar product through, for example, fibre-to-fibre recycling.

For the Nordic countries, it is estimated that the export for reuse, recycling and treatment of 75 kt of used textiles, annually, results in a net saving of 193 kt CO_2 eq in emissions and 72 million cubic metres of water (Watson et al., 2016). While these calculations cannot be applied to Dutch exports without the risk of inaccuracy, a simple calculation for the sake of estimation shows that, for the Dutch exports of 143 kt of textiles, a similar conversion would translate into a mean annual savings of 486 kt CO_2 eq in emissions and 181 million cubic metres of water. These values could increase further when the large volumes of textiles that are now being discarded in municipal waste streams are also collected and processed accordingly.

Recycling does hold a risk of problem-shifting between geographical regions. For example, increased recycling in the United Kingdom has been linked to reduced cotton cultivation and associated environmental impact in the United States, but also to increased energy use and associated environmental impact in the United Kingdom (Sandin and Peters, 2018). For this reason, the environmental impacts of textile reuse and recycling still need to be analysed consistently, from a life cycle perspective that considers collection and sorting processes and all relevant impact categories, as well as clearly describing key methodological choices and assumptions (Sandin and Peters, 2018).

3.2.2 Socio-economic impact areas

Information on textile recycling in Pakistan is scarce. For the discussion in this section, we therefore relied on the information that is available about textile recycling on the whole, lessons learned in pilot projects, information regarding the labour conditions of workers in the Pakistani clothing manufacturing industry in general, research done in Panipat, India, and what we learned from interviews with different stakeholders regarding textile recycling in Pakistan.

Informal employment prevails in the Pakistani textile sector in general

According to the International Labour Organization (ILO), around 73% of Pakistan's labour force of 61 million work informally. While there is no precise data on its share of informal employment, the country's textile sector provides employment to 40% of the total industrial workforce, from spinning and weaving to clothing and home textile manufacturing (ILO, 2016). Informal employment leaves workers more prone to labour and human rights violations, such as debt bondage and forced labour. Moreover, it exposes these workers to hazardous work and prevents them, and specially women and youth, from earning a living wage (ILO n.d.).

Against this background, a study by Human Rights Watch estimates that there are currently millions of workers in Pakistan's clothing industry who are routinely subjected to exploitation and abuse (HRW, 2019). Likewise, reports abound of worker grievances that include arbitrary dismissal of dozens of workers, unsanitary working conditions, extremely long working hours, and salaries below the statutory minimum wage. While the scope of Human Rights Watch's investigations of the Pakistani clothing sector is limited, there is undoubtedly a trend of widespread poor working conditions and a systematic failure of inspection mechanisms to enforce compliance with labour laws and regulations. In this context, women who are more likely to be employed informally, working from home, sewing garments that are destined for the domestic market, on a per-order or seasonal basis. An estimated 77% to 83% of women employed in Pakistan's informal economy are home-based workers.

Moreover, Pakistan's labour force lacks explicit protection against anti-union discrimination and suffers from a prohibition on forming and joining unions. There are many accounts of workplace harassment, including anti-union dismissals, physical violence, arbitrary imprisonments, and the presence of 'yellow' unions (i.e. worker organisation dominated or influenced by the employer) to undermine the trade union movement. In addition, social protection budgets (e.g. access to social security) have been drastically reduced because of structural adjustment programmes that have affected negatively the already weak social protection coverage in Pakistan (DTDA, 2018).

Textile recycling in low- and middle-income countries, such as India, has decent work deficits

Sorting of post-consumer textiles for recycling is still largely carried out in countries with lower labour costs. It is a labour-intensive process in which clothes are separated in up to 350 different categories (Piribauer and Bartl, 2019). Moreover, in post-consumer textile-importing countries, the labour force employed in this sector works mostly informally. As a consequence, employees work long hours for a meagre salary and are vulnerable to labour rights violations such as labour exploitation and inadequate occupational health and safety provisions, not to mention that they are left out of social security systems (ILO, 2019). Interviewees stated that, in Pakistan, there are differences in labour conditions between Economic Processing Zones and the rest of the country, with Zonal Authorities in EPZs typically enforcing strict rules regarding labour conditions (e.g. no child labour).

Box 3.5: post-consumer textile recycling is a labour-intensive process

In Panipat, India, post-consumer textile sorting in large spinning factories begins with the separation of mutilated clothes into: 1) sweaters (wool, acrylic, cotton); 2) wool (e.g. jackets, trousers, skirts); 3) denim (jeans and jackets) and 4) other textiles (i.e. items that remain after separation into the first three categories). After this first separation, buttons, labels and chains are removed and the clothes enter another round of sorting, this time based on colour. Subsequently, all dyeable material (as required for spinning) is sent for dyeing. Then all dyed and non-dyed material is passed through two different machines (a shredding machine then a willow machine), to open up the fibres. Once open, the fibres are fed into a carding machine and then spun into yarn. Lastly, the yarn is wound on to a frame and twisted. In smaller factories, the process described above is done by hand, including the spinning, storage space for sorted textiles is very limited, and there are separate bleaching and dying units (Arisa and Sympany, 2020).

Research indicates that the situation of formally employed workers in textile recycling outside the Export Processing Zones is not much better than that of their counterparts in informal employment. There is a body of evidence of the lagging corporate social responsibility in the textile industries in PCT-importing countries. Although these industries self-report on their compliance with labour laws, rules and regulations, problems such as child labour, no fixed working hours, limited freedom of association and poor working conditions prevail (Jain and Gupta, 2016). While there is no systematic documentation of the labour situation of workers in the post-consumer textile sector of Pakistan, the fact that the labour situation in the clothing sector is rather precarious (see the section on informal employment in the Pakistani clothing sector) suggests that post-consumer textile workers are also likely subject to labour rights violations.

It is not clear whether working conditions in Pakistan beyond the KEPZ are comparable with those in Panipat, India, which has a large recycling industry. Nevertheless, findings by Arisa and Sympany (2021) do show severe decent work deficits, ranging from widespread informal employment, low wages and exposure to hazardous substances (e.g. bleach and dyes), as well as child labour (Arisa and Sympany, 2021). Challenges such as these warrant caution in light of the lack of information available on the working conditions in the Pakistani recycling sector.

PCT sorting and grading in Pakistan could improve employment opportunities for women

Despite the overall rather negative outlook on labour conditions in the Pakistani clothing sector, and textile recycling in India, what little information there is on Pakistani textile recycling shows a more positive perspective.

Research on Nordic flows of post-consumer textiles to Pakistan finds that the import of post-consumer textiles creates employment opportunities for women as sorters and graders of used clothing and other textiles (Watson et al., 2016). According to the researchers, women are highly valued as skilled sorters of used textiles, sometimes into 300 or more different categories of product types, sizes, styles, and quality grades necessary for further sale. The report also states that, as it takes several months of training for sorters to be able to work quickly and accurately, once such training investments have been made, employers are keen to hold on to them. This could mean that sorters receive a higher wage than unskilled workers, but also that women are encouraged to continue to work once they are married and have children, as their work and skills are highly valued by the post-consumer textiles importing companies.

Nevertheless, Watson et al. also find that workers in the Karachi Export Processing Zone (KEZP) are prevented from participating in collective wage negotiations and do not enjoy the right to freedom of association. Trade unions are not permitted into the KEPZ and labour conditions are influenced by minimum standards set by partner organisations or companies in the EU. However, statements made by interviewees suggest that the Zonal Authority of the KEPZ do not tolerate certain labour rights violations, particularly child labour. Interviewees suggest that, in the textile industry in general, working conditions within the KEPZ are better than outside of it.

Box 3.6: Second-hand clothing in Africa

The value of the trade in second-hand clothing, shoes and home textiles has grown from USD 2.7 billion in 2009, to USD 4.5 billion in 2019, an increase of 67%. In parallel, the traded volume of second-hand clothing also shows a steep increase (ITC Trademap, 2021). Many of these garments are donated by consumers in the West and sold for profit in other parts of the world.

Sub-Saharan Africa is a major destination for second-hand clothes, including shoes and home textiles, intended for resale. While large volumes of second-hand clothing are first exported from the Global North to Eastern Europe and the UAE, or to countries such as Pakistan for sorting and grading, a significant share of the clothing with a resale value will end up in Africa. This is part of a trend that has developed since the 1990s.

Demand for second-hand clothes in African countries is high, with cited percentages of up to 80% or 90% of the population in certain countries buying imported second-hand clothing (Bahety and Mukiibi, 2017; Nørup et al., 2019). Research into consumer preferences in various African countries shows that consumers typically prefer second-hand over new clothing, for reasons of affordability, quality, and style (Wolff, 2020). Furthermore, the industry is a source of income for many people. The buying, selling, repairing and altering of imported second-hand clothing creates many jobs and provides a living for local people (Brady and Shen, 2018). In fact, in many countries, the second-hand clothing industry employs more people than the textile and clothing industry. For example, it is estimated that, in Kenya, the mitumba (meaning 'bundles' in Swahili) industry generates 121,000 direct and 27,000 indirect jobs (Wolff, 2020). Finally, tax revenues on imports of second-hand clothing is not negligible, with in Kenya, for example, USD 54 million in tariff revenues on 100 kt of imported second-hand clothing in 2013 (Bahety and Mukiibi, 2017).

Second-hand clothing from the Global North was not always abundantly available in Africa. From the 1960s to the 1980s, African countries produced and exported clothing and shoes made from locally produced fibres, in regional value chains (Bahety and Mukiibi, 2017). This manufacturing industry has diminished considerably since then, a trend that is often explained by the influx of cheap second-hand clothes. There are, however, different perspectives on this explanation. According to some researchers, the African clothing manufacturing industry declined within a context of trade liberalisation in the 1980s, leading to the influx of cheap East Asian clothing (Ljungkvist et al., 2018).

UN Comtrade data show that, between 2005 and 2017, China's new clothing exports to Sub-Saharan countries increased enormously, such as in Rwanda (up 6,926%), Kenya (up 3,573%), Tanzania (up 1,194%) and 471% for the SSA region as a whole (Lu, 2018). Others point to supply-side constraints undermining efficiency. Another possible explanation is the shift in consumer demand from traditional to more western fashion styles (Baden and Barber, 2005; Bahety and Mukiibi, 2017). It is possible that a combination of all these changes, including the influx of second-hand clothing, taking place more or less in parallel, has contributed to the demise of the local clothing production industry (Brooks and Simon, 2012; Norris, 2012).

Box 3.6: Second-hand clothing in Africa (continued)
In 2018, several East African countries took measures to curb the import of second-hand clothes, reportedly motivated by a wish to protect and stimulate African clothing manufacturing (AfricaNews, 2018). The East African Community (EAC) initially increased tariffs on second-hand clothing imports, but after protests from exporters in the United States, local consumers and traders in second-hand clothing, most countries reversed the tariffs back to pre-2016 levels. The only country not to do so was Rwanda, which was subsequently suspended from the African Growth and Opportunity Act (AGOA), thereby losing duty-free, quota-free access to the US textile market (Wolff, 2020).

Discussion around the future of the African textile industry continues, with questions addressing issues of affordability for low-income consumers and what to do with a growing mountain of discarded, low-quality imported clothing. Research projects in Ghana have shown that a substantial share of imported second-hand clothes is landfilled and or incinerated, causing major problems for local waste management, as well as environmental and public health risks (FashionRevolution, 2019). Beyond the potential value of good quality second-hand clothes for African consumers, the debate around countries' responsibility for their waste, thus, extends to the import of second-hand clothing from Western countries.

4 Impacts of circular economy strategies

Analysing the effects of future circular economy (CE) strategies in the Netherlands on low- and middle-income countries is not straightforward, especially given the various types of impacts such strategies may have. This chapter discusses the potential effects in the areas as presented in Chapter 3, focusing on three broad circularity strategies. How the CE strategies are used in the analysis is presented in Section 4.1. The impacts on cotton-producing countries in West Africa are discussed in Section 4.2 and on post-consumer textile processing in Pakistan in Section 4.3.

The impact analysis in Sections 4.2 and 4.3 is based on two general scenarios for each topic, to explore potential direct effects (i.e. trade implications) of these strategies, as well as indirect effects (i.e. on the various impact areas). Furthermore, the pros and cons of various options are discussed and the issues that require further attention are highlighted. The scenarios are not based on recent policy targets for circular textiles, but do address the relationship with these targets. The discussion is based on literature research, the interviews conducted with experts and an export workshop.

The Netherlands is an important trading partner for many countries, despite being a relatively small player at the global level. This study focuses on the impacts of Dutch circular economy strategies on low- and middle-income countries, while recognising that many national circular economy policies and ambitions will be aligned with circular economy ambitions at the EU level.

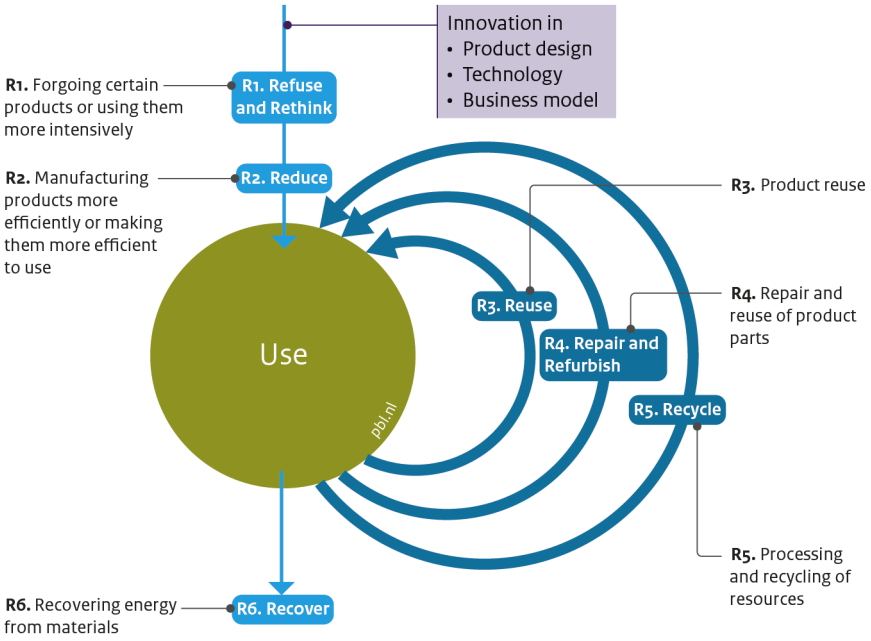
4.1 Structuring circular economy policies

In contrast to what happens in a linear economy, a circular economy makes optimal use of resources and minimises the creation of waste. This means that products are designed to be as efficient as possible while considering the entire life cycle, and that the materials used to make them continue to be applied in a way that generates the highest economic value and the least environmental damage.

Converting a linear economy into one that is circular involves system change, or transition towards a different way of thinking about material use. Where possible, material input is reduced or substituted with more environmentally friendly alternatives. Different approaches to consuming products appear, alongside new business models to suit this change. New approaches are also needed for design and production processes aimed at making products that last longer and can easily be repaired or refurbished. When something does finally become waste, recycling materials and recovering as much material or energy as possible are the last options, providing secondary materials and energy input for new production processes (Hanemaaijer et al., 2021b).

Figure 4.1

R-ladder of circularity strategies



Source: PBL

Circular economy actions and policies can be organised along a collection of so-called R-strategies (Figure 4.1), with different approaches to achieve more circular production and consumption: from refuse and rethink, to reduce, reuse, repair and refurbish, and finally recycle and recover. Furthermore, there are some cross-cutting approaches that have an impact at all levels, for example, innovation in product design, technology and business models. Circular design is for instance relevant for reducing material input (reduce), but also for extending the useful life of products (reuse, repair) and in facilitating easier recycling (recycle, recover) (Prins and Rood, 2020).

Circularity strategies in the context of textile value chains

This study uses a more simplified approach to labelling circular economy policy strategies in the Netherlands, and their potential effects on the transboundary flow of post-consumer textiles on the one hand, and the demand for raw cotton on the other. As several types of policies, in theory, have similar effects on how resources are used, the loops in the R-ladder can be clustered in measures that are aimed at reducing the amount of material input (narrowing loops), measures aimed at keeping products or materials in use longer (slowing loops), and measures that are aimed at recovering energy or recycling materials into new products and preventing losses (closing loops) (Table 4.1).

In the case of clothing, the following division can be made, based on type of strategy as well as the stage of the value chain:

- Strategies that narrow loops refer to reduce, rethink and refuse and relate to buying fewer clothes or sharing or renting them, but also to making clothes with a smaller environmental footprint. They have consequences for how many new garments are produced, what materials are used and how they are produced. In turn, they affect the amount and composition of discarded clothing that is traded abroad.

- Strategies that slow down loops include reselling garments and repairing or refurbishing items so they can have a second or third life. These strategies extend the lifetime of clothing. This, in turn, could lead to a lower demand for new clothing and related materials but could also change material use for new items, for durability reasons. Furthermore, they boost markets in second-hand clothing.
- Strategies that close loops include recycling and recovery of useful parts, secondary materials or energy from post-consumer textiles. These strategies are about optimal material use. They could change material use for new items for recyclability reasons and boost recycling markets.

Throughout these three CE strategies, there are also cross-cutting approaches, such as circular design. Design affects what new products are made of, and thereby how repairable they are, how long they can be used and if and how they can be recycled. Circular design is therefore an influential factor for all kinds of outcomes and subsequent measures in the value chain through various feedback loops.

Circular economy strategies have both direct effects (e.g. on trade) and indirect effects (e.g. on pollution in other countries). In our analysis, direct effects relate to changes in the composition and volumes of imported and exported clothing and indirect effects concern impacts on the environment, poverty and food security, resulting from the changing trade flows.

Next to different circular economy strategies, another dimension to consider is the extent to which low- and middle-income countries are part of the circular economy, for example, for reuse and recycling. A recycling approach with a scope beyond EU borders, will have different impacts on low- and middle-income countries, compared to an approach to close loops within the Netherlands or EU.

Table 4.1
R-ladder clustered in three strategies

CE strategy	Step on R-ladder	Examples of types of measures	Affecting
Narrowing loops	R1. Refuse and Rethink R2. Reduce	Reducing material use through the sharing of products, using alternative materials or foregoing certain items	New clothing
Slowing loops	R3. Reuse R4. Repair and Refurbish	Extending the use phase and lifespan of products, e.g., through repair or refurbishment, repair cafes, lowering VAT on repairs, buying second-hand	Second-hand clothing
Closing loops	R5. Recycle R6. Recover	Recycling product parts and recovering materials and energy for reuse	Textile waste

Ambition and targets for circular textiles in the Netherlands

In April 2020, the Netherlands formulated a Policy programme for circular textiles 2020–2025 to support the transition towards a fully circular textile industry by 2050. The policy programme includes a set of policy targets for 2025, 2030 and 2035, which provide minimum standards for clothing sold on the Dutch market, concerning what they are made of (sustainably produced and secondary resources), what happens to them after being discarded (collection, reuse and recycling) and for their environmental impact (footprint) (IenW, 2020; Figure 4.2 and Table 4.2). The first monitoring report on the policy programme concludes that much work needs to be done (Royal Haskoning DHV, 2021). For example, the share of recycled (post-consumer)/sustainable material in textile products needs to increase from 6% in 2018 to 25% by 2025.

Over half of the collected post-consumer textiles in the Netherlands are not intended for reuse or recycling, but directly end up in municipal waste streams and are subsequently incinerated. This is estimated to amount to roughly 192 kt of textiles every year. The targets set by the Dutch Government involve a significant increase in the amount of textiles available for sorting, reuse, or recycling, both domestically and abroad. Increased collection can also affect the need for raw materials, such as cotton, if more secondary materials become available from post-consumer textiles.

Both cotton production for Dutch clothing consumption and the processing of Dutch post-consumer textiles are influenced by these targets. For example, a minimum level of secondary material use requires a significant increase in recycling capacity. Furthermore, the way sustainably produced cotton is defined affects production processes in producing countries. Whether BCI or CmiA apply or not has implications for the many African smallholders that are currently part of these certification schemes. It also matters how the different targets are to be achieved. Different strategies have different implications. It is not our goal to specifically respond to the different targets. Instead, these targets are used to inform the circularity strategies examined in the following chapters.

Analysing impacts

With respect to international trade, a circular economy transition could affect trade in primary raw materials, secondary materials, recyclable waste, second-hand products and services (van der Ven, 2020). The discussion in the following sections on impacts focuses on trade in raw materials (cotton) and in recyclable waste (PCT). For both trade streams, the analyses look at the potential environmental, social and economic effects of both an increase and a decrease in trade flows. They discuss what circular economy strategies could drive these changes and examine different perspectives on potential effects, including complicating factors such as technological challenges. The analyses consider circular economy strategies in isolation from other developments or forces that may affect the future of the textile industry in different countries. While this simplified approach does not consider all relevant factors in detail, it allows us to explore what types of broad changes can be expected in line with specific strategies, and to illustrate examples of how policies could in practice have unforeseen impacts.

Figure 4.2
Targets of the 'Policy program for circular textiles 2020-2025' of the Netherlands

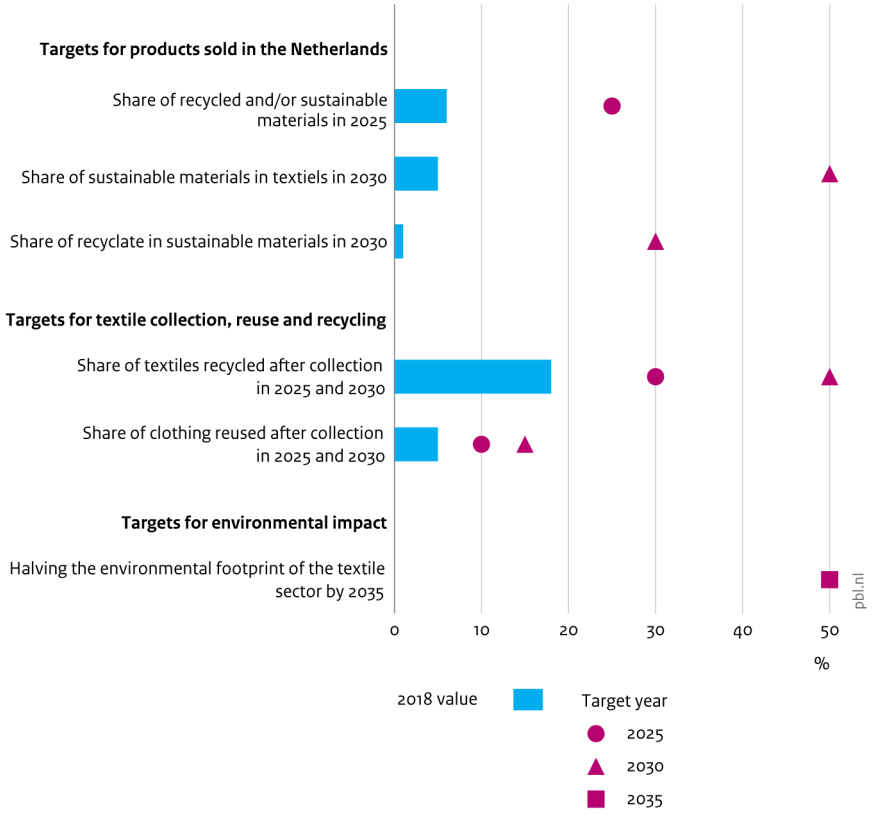


Table 4.2
Objectives for a circular textile sector in the Netherlands (IenW, 2020)

Target year	Objectives agreed on with the chain partners
2025	- The share of recycled (post-consumer)/sustainable material in textile products is 25%. - 30% of raw materials and products sold in the Netherlands are recycled after collection, if immediate reuse is no longer possible.
2030	- By 2030, we are halfway through the transition towards the circular economy, which means that: - All textile products sold in the Netherlands contain 50% of sustainable material. Of that 50%, at least 30% is recyclate and no more than 20% is sustainable material. - 50% of raw materials and products sold on the Dutch textile market are recycled after collection, if immediate reuse is no longer possible.
2035	- The aim is to half the ecological footprint of the textile sector with respect to emissions, water consumption, chemicals and microplastics.
2050	- Fully circular economy.

4.2 Impact of circular economy strategies on cotton cultivation in West Africa

This section discusses how changing demand is related to the three types of circular economy strategies (narrowing, slowing and closing loops), and how this affects people and the environment in Benin, Burkina Faso, and Mali. The cultivation of cotton in West Africa has consequences for several sustainability challenges, while also creating opportunities. As discussed in Chapter 3, food security is a key issue in the context of cotton farming in West Africa. Therefore, this section pays specific attention to how changes in demand for West African cotton could affect food security in the region.

4.2.1 Trade impacts of different circular economy strategies

Cotton is a raw material and as such, the three types of circular economy strategies contribute to either an increase or a decrease in demand for African cotton. In addition, the type of cotton demand could change. For example, as a result of specific sustainability standards or recyclate requirements as described in the Policy Programme for circular textile 2020–2025, demand for sustainably produced cotton or cotton of a certain quality can increase. This likely has impacts for producers, as higher quality cotton can fetch a better price and is often favoured in terms of durability and recyclability (Azzouz et al., 2008; Ütebay et al., 2019). Table 4.3 presents examples of measures and illustrates how each strategy could lead to either an increasing or decreasing demand for a specific type of cotton.

Table 4.3
Three strategies for cotton production and potential changes in demand

CE strategy	Examples of types of measures	Demand for cotton	Related policy target
Narrowing loops	Reducing material use through the renting of products, substituting cotton with materials such as hemp, or not buying certain items	Lower demand for cotton overall through, e.g., substitution; or higher demand for certified cotton/higher quality cotton	Minimum share of sustainably produced materials
Slowing loops	Extending use phase and lifespan of products through, e.g., repair or refurbishment, repair cafes, lowering VAT on repairs, buying second-hand	Lower overall demand for cotton due to lower material use; or higher demand for better quality cotton	Reuse target
Closing loops	Recycling products or parts, recovering materials for reuse, energy recovery through incineration	Lower demand for cotton due to recycling; or higher demand for better quality cotton	Minimum share of recyclate for use in new products

Strategies under *narrowing loops* refer to *reduce*, *rethink* and *refuse* and are aimed at lower overall material use. These strategies mainly affect the production of new items. In general, they will decrease the demand for raw materials, such as cotton. However, for sustainability reasons, some synthetic fibres could also be replaced by sustainably produced cotton.

Strategies under *slowing loops* refer to *reuse*, *repair* and *refurbish*. These approaches are about lifetime extension, through increasing durability, repair or simply using things longer before discarding them. If consumers use garments for longer and purchase fewer new items, this results in a lower demand for raw materials. However, depending on the quality of the cotton fibres, clothes made of cotton can be strong and relatively straightforward to repair. This durability aspect could work in favour of cotton, resulting in higher demand for cotton as a substitute to other materials that are more difficult to repair or become unappealing or damaged faster.

Strategies under *closing loops* refer to *recycling* or *recovering* materials and or energy. When clothing is incinerated to generate electricity, the demand for raw materials is not directly affected. However, for recycling, there are several factors that can affect whether demand increases or decreases. For example, if cotton is not well-suited to the dominant textile recycling practices, other materials could be favoured in clothing manufacturing, thereby decreasing demand for cotton. On the other hand, if cotton is especially suitable for recycling in some way, this would mean that demand increases, as clothing manufacturing and recycling technologies become more aligned.

The following sections discuss the potential impacts of changes in demand for cotton from West Africa.

4.2.2 Potential impacts of increased demand for cotton from West Africa

A higher demand for African cotton as a result of circular economy strategies is generally driven by an increased preference for a specific fibre or type of cotton, including 1) sustainability requirements (narrowing loops); 2) durability requirements (slowing loops); and 3) recycling requirements (closing loops).

Here, we briefly present the potential direct impacts of an increased demand for cotton from West Africa in terms of environmental issues, the effects on both poverty and food security. The subsequent sections discuss these impacts in more detail.

Overview of potential effects per impact area: increased demand for cotton

Environment: A direct effect of a higher demand for cotton could be an expansion of farmland and/or intensification. What the impacts of such an expansion or intensification would mean for climate change, biodiversity loss and land degradation, depends on several factors, such as transmission mechanisms in the cotton supply chain, access to inputs, whether farmers grow certified cotton, and farming techniques. If growing more cotton also means that more pesticides are applied, there could be serious negative impacts for public health and biodiversity.

Poverty: Cotton farming in West Africa is mostly small-scale, labour-intensive and input-reliant. To scale up production, improvements in, for example, efficiency and yields are necessary. Higher demand for cotton may not directly lead to much higher production levels, as labour is a limiting factor. With more and more youths choosing not to farm cotton but, instead, move to urban centres, manual labour is a bottleneck in rural areas. Herein does lay a serious risk regarding child labour. As cotton farming is very labour-intensive, farmers often work the land with their entire family, including their children. With older youths moving away, farmers may be more inclined to let smaller children work instead.

Food security: Cotton-growing regions in West Africa have been showing a higher degree of food security than other regions. Nevertheless, some interviewees considered a sharp increase in demand to present a risk of food shortages, as farmers could be motivated to use limited resources to grow cotton, thereby further depleting soils. Others view this as too simplistic a conclusion, emphasising that, as long as cotton farming happens on a small scale, scaling up would not be a problem for food security as farmers will always prioritise growing enough food for their families.

Certified West African cotton could be favoured over non-certified cotton

A preference for West African cotton could arise through sustainability initiatives or policies, for cotton certified in some way to offer improved environmental and social outcomes in the region. It is also possible that farmers are able to grow a certain quality and length of cotton, which makes for more durable and more easily recycled clothing. This could result in a better harvest price. These two possibilities can be combined. For example, cotton grown in Africa has relatively long fibres, which fall into the medium staple length category (about 28.5 mm). This fibre length is suitable for producing yarn that can be used in various applications and are processed worldwide as a resource for fashion and home textiles. In addition, CmiA states that the fact that African cotton is mostly grown by smallholders and is hand-picked, ensures its good quality (CmiA n.d.). Better quality cotton may also be more suited to recycling processes and lifetime extension, adding another dimension to the demand for a specific type of cotton.

Sustainably produced cotton, and higher quality cotton for stronger, more easily recycled clothing, is in line with targets set by the Dutch Government for circular textiles. However, whether demand for African cotton increases depends on how 'sustainable' material is defined. it is of course possible that these targets may lead to other materials being favoured over cotton, thereby potentially contributing to a decline in demand for the fibre. In addition, currently, most West African cotton is mixed with the large bulk of cotton processed in Asia. Distinguishing and tracking supply according to region of origin remains a challenge.

Certification schemes can support sustainable intensification of cotton production

If growing more cotton also means that more pesticides are applied, there could be serious negative impacts for public health and biodiversity. While some certification schemes could offer benefits, interviewees mentioned several potential downsides to, for example, organic cotton. The yields tend to be lower, it requires more land, there is more uncertainty involved due to pests, and farmers are dependent on external support to transform their entire farm to an organic model, with consequences for food crops. For the ginning phase, organic cotton production similarly requires extra investment to meet certification standards.

Organic farming is however not the only option. Some sources argue that developing other types of cotton-blend systems can help conserve resources and biodiversity (Soumaré et al., 2021). These approaches should, amongst other things, focus on a sustainable land management that uses ecological intensification processes for crop and production systems. Equally important is the management of soil organic matter, which affects water retention, erosion and nutrient availability; agro-ecological management of pests and diseases; and selecting early varieties, which are compact and resistant to the effects of environmental disturbance (Bachelier et al., 2018). Likewise, irrigation and large-scale water storage harbour the potential for increasing agricultural productivity under a changing climate (Sylla et al., 2018), but these aspects would not be without risk.

Some interviewees mentioned that ensuring that farmers and wage labourers receive a higher income, for example by way of a premium for certified content, could give them the opportunity to invest in draught animals, thus also increasing their access to manure and improving soil fertility. Alternatively, more direct trade relationships between the EU and West African cotton producers could also facilitate higher incomes.

Higher cotton production levels not necessarily have a direct impact on food security

Cotton-growing regions in West Africa have shown higher levels of food security. This can be explained in a few ways, such as by better access to fertiliser for cotton improving soil nutrient levels, which benefit the yields of cereal crops planted in rotation. In this sense, greater demand could amplify food production. Furthermore, if demand is high for cotton labelled by certain certification programmes, this could also offer additional long-term benefits such as capacity building, supporting women to become more economically independent, and encouraging agriculturally sustainable practices (CmiA n.d.). Interviewees emphasised that such support programmes should target the farming or cropping system as a whole, and not only focus on cotton.

In this regard, some of the informants interviewed for this study pointed out that food crops cultivated in rotation with cotton, such as soya, cowpeas and maize, benefit from increased productivity as the application of fertiliser increases yields for up to three years after application. This view is reflected in research conducted in Mali over a 25-year period, between 1965 and 1990, with results indicating that cotton was an important entry point of nutrients via fertilisation in West Africa. The study indicates that through fertiliser use, cotton has a positive impact on the productivity of other crops in the rotation (Ripoche et al., 2015).

Nevertheless, increased demand for cotton from West Africa also may have negative impacts. Some interviewees considered a sharp increase in demand to present a risk of food shortages, as farmers would be motivated to use limited resources to grow cotton. Others viewed this as too simplistic a conclusion. As long as cotton farming remains a small-scale effort, scaling up would not be a problem for food security as farmers will always prioritise growing enough food for their families.

Improved gender equality in cotton farming can provide productivity and food security benefits

Improved participation of women in cotton cultivation could hold potential to achieve a sustainable transition for the sector. Conventional cotton production is also culturally considered 'the business of men' and women usually do not take part in it due to the health risks for themselves and their children associated with the use of fertilisers and pesticides. Likewise, as organic cotton depends only on natural inputs, which are mostly free, there is no need for credit required for purchasing chemicals, which is a crucial reason for women to join organic cotton schemes. Against this background, organic cotton cultivation allows women to have an independent income that they can allocate without seeking permission from their husbands (Kloos and Renaud, 2014).

Likewise, gender equality could have a positive effect on productivity. Because they face a greater workload in subsistence farming and domestic care work, female cotton producers are significantly more inclined towards motorisation than men to decrease their workload (Saliou et al., 2020). Moreover, overcoming gender inequalities has potential to increase food security as well. In this context, providing women with equal landownership rights and access to credit can help them achieve their full productivity potential (FAO, 2011). This would spread to other household activities, which can result in increased calorie availability and dietary diversity within households; better household investment decisions related to food, child education, and health and household livelihood diversification (Dam Lam et al., 2017).

West African cotton farmers are particularly vulnerable to climate change

Cotton in West Africa is cultivated in semi-arid regions, where livelihoods are heavily reliant on agriculture and where external shocks, such as changes in foreign demand for agricultural products such as cotton, can have a strong impact. Most cotton is grown in the Sahelian region, which has seen increased land degradation over the past 50 years, aggravated by climate change and increased food production due to exponential population growth. The semi-arid regions in the Sahel have ecosystems that are very sensitive to climate change and variability, while populations are acutely dependent on them (UNCCD, 2019).

Climate change is set to have detrimental effects on land productivity in Africa. Temperatures are expected to rise faster than the global average, especially in more arid regions such as the Sahel. As a result of raising land temperatures and changing precipitation, water stress will increase, thereby likely causing a reduction in cereal crop productivity (UNCCD, 2019). This, combined with the increasing pressures of pests and disease on livestock and crops, is projected to negatively affect food security (Niang et al., 2014).

The effects of these land-use challenges are expected to be disproportionally felt in rural areas and present a higher risk to populations already living in poverty (UNCCD, 2019). Amongst these populations, female-headed households, people with limited access to land, modern agricultural inputs, education and infrastructure will be more severely affected.

4.2.3 Potential impact of reduced demand for cotton from West Africa

Certain circular economy strategies can lead to a decline in global demand for cotton, in general. More reuse and recycling, with less incineration, would result in large volumes of secondary material becoming available.

Furthermore, cotton could see a diminished popularity due to its large environmental footprint in many cotton-growing areas, in terms of water use in some regions, or its susceptibility to pests. In addition, if repair or recycling technologies favour other materials such as polyester or other natural materials, such as hemp or linen, cotton could see a drop in demand.

Overview of potential effects per impact area: decreased demand for cotton

Environment: A lower demand for cotton could result in farmers turning to other crops, instead. Changing from cotton to other crops can mean that they have less access to pesticides, which in turn may lead to lower pressures on biodiversity. Less access to fertiliser would mean soil fertility could suffer and degrade faster.

Poverty: The importance of cotton for the livelihoods of many people in West Africa means that sudden shocks can have a direct impact on farmers. On the other hand, farmers can choose to grow other crops, if they have access to sufficient inputs. Income levels will in part depend on their access to markets.

Food security: If farmers no longer have a financial incentive to produce cotton, they may transition towards cereal or vegetable crops. This could mean that food security is strengthened, if more food is grown on land previously used for cotton. However, if farmers can no longer access inputs, yields will be lower and soils will degrade, potentially affecting farmers' ability to produce sufficient amounts of food.

The impacts of a lower cotton production depend on the alternatives and how those are produced

The longer-term consequences of a drop in demand for cotton will depend on the alternative crops grown in the place of cotton. Some plants are well-suited to the climatic conditions in West Africa, and others less so. Likewise, the choice of alternative crop will determine the impact on rate of nutrient depletion, susceptibility to pests or drought, or certainty of income from harvest.
In addition, the environmental challenges associated with projected climate change and land degradation form obstacles for many other crops beside cotton. Although some crops may, for example, require fewer inputs or have less of a nutrient depleting influence, changing weather patterns and already degraded lands still need to be addressed.

On top of that, as is the case with cotton, other cash crops such as cacao and coffee have no local outlets; they are export products and marketing channels are very limited for farmers. However, in recent years, local food crops have increasingly become cash crops, meaning that farmers are no longer limited to export products for cash.

Farmers can adapt to a drop in cotton demand but may still need support

The impacts of lower cotton demand on food security and the environment depend on several factors. While some interviewees view lower demand as a positive trend, others highlight its potential risks. For example, if farmers no longer produce cotton under a certification programme, they will not have access to the additional benefits associated with certain certification programmes, such as capacity building, fertiliser or manure.

Nevertheless, in relation to food security, several interviewees pointed out that smallholders always ensure that they grow enough food for their families. If the price of cotton is low, farmers will grow something else to sell. In West Africa, demand for food on regional market means that crops can always be sold. A growing population in addition to increasing urbanisation has led to a higher demand for grains, legumes and root vegetables. As farmers are less dependent on cotton for their access to fertilisers, through national subsidy programmes targeting fertilisers for food crops, more and more cotton farmers are earning a living producing food for the regional market.

If, however, switching to food crops from cotton means that farmers have less access to inputs such as fertilisers, this would lead to further nutrient depletion of the soil, which, in turn, could result in lower yields. In a possible solution to this issue, some experts point out that, since 2008, national programmes in countries such as Mali and Burkina Faso aimed at subsidising synthetic fertilisers, have led to improved access to fertilisers for any crop. While they emphasise that there is a long way yet to go, in this way, access to inputs has been decoupled from cotton production and have given farmers more room to choose what to grow.

Some interviewees stated that women also have a more promising outlook in food crop sectors. For example, when household income from cotton decreased in Mali, men asked women to contribute more to the household. This gave women a stronger economic position.

For some farm households, there may not be a future in farming as the main income generating activity. New opportunities could arise in the growing West African food processing sector or other off-farm activities related to the food economy, such as transport and retail, all of which have seen an increase in jobs, in recent years (Allen et al., 2018).

4.2.4 Contextualising impacts: challenges and complicating factors

The circular economy could drive more sustainable production of cotton in West Africa

If the transition towards a circular textile value chain is to lead to an increased demand for sustainably produced cotton from West Africa, certain issues will need to be monitored and addressed. This study shows that cotton cultivation in West Africa is connected to several sustainability challenges, from concerns over biodiversity to food security.

These relationships need to be made much clearer, in addition to a better understanding of how sustainability challenges could be influenced by an increased demand for cotton or for better quality cotton. More thorough research can also help to identify the conditions under which sustainable increases in production are possible. A better grasp of these conditions can inform what is needed to monitor potential changes, to prevent contributing to negative social and environmental impacts.

The analysis indicates that a socially responsible and environmentally sustainable increase in cotton production will need to be combined with more sustainable farming practices. Adoption of sustainable practices depends on policies, markets and local conditions (Woittiez et al., 2015). As discussed above, many challenges in West African farming systems are, for example, connected to the management of degraded land and soil fertility, against a backdrop of worsening impacts from climate change.

The relationship between increased cotton demand and food security likewise requires closer scrutiny and monitoring. From this analysis, it is not clear whether more cotton production could potentially threaten or improve food security.

In a similar vein, the role of women in cotton farming should be considered in future analysis of the prospective to scale up sustainable production, with potential co-benefits for gender equality and food security.

Finally, monitoring and tracking the flows of African cotton to clothing manufacturers and into eventually onto the Dutch market will need to be improved.

A smooth transition from cotton to other crops requires careful monitoring

More information and insight are needed to understand whether and through what mechanisms different strategies for a circular textile value chain could lead to a lower demand for cotton from West Africa.

Similar to the possible impacts of increased demand, the consequences of lower demand for and production of cotton in West Africa are also not well understood. This study does show that many people in West Africa depend on the cotton industry for their livelihood and could therefore be affected in one way or another.

If a decline in cotton production is to happen without far-reaching negative impacts, this brief analysis indicates that attention is needed for the alternatives available to cotton farmers. From access to farming inputs, support for sustainable land management, and a possibly different role for women in farming, there are several issues to consider and monitor. Attention for the issues described in the analysis above could help to identify where co-benefits could be achieved, and also where special precautions are necessary to prevent negative impacts.

In addition, other trends also play a role regarding farming in West Africa and need to be viewed alongside circular economy strategies. For example, as mentioned by several interviewees, population growth in West Africa is seen as an important factor to consider in relation to the production of food.

4.3 Impact of circular economy strategies on post-consumer textile processing in Pakistan

This section discusses how export of post-consumer textiles is related to the three circular economy strategies, and how this affects people and the environment in Pakistan. As little information is available about the processing of post-consumer textiles in Pakistan (see also Chapter 3), we supplemented the exploration of potential impacts with knowledge about the Pakistani textile industry, in general. In addition, the insights gathered from interviews and discussions during our expert workshop are used to further develop the scenarios. As discussed in Chapter 3, resource efficiency is a key issue in the context of post-consumer textile processing. Therefore, this section pays specific attention to how the different circular economy strategies and post-consumer textile processing in Pakistan could affect resource efficiency in the clothing value chain.

4.3.1 Trade impacts of the circular economy strategies

Similar to cotton demand, circular economy strategies could either increase or decrease the supply of post-consumer textiles to Pakistan. Furthermore, the type, composition or quality of post-consumer textile export can be affected. These changes in export depend on the circular economy strategy chosen, but also on if and how the Pakistani textile industry is incorporated into the circular economy loops of the Netherlands. Table 6 presents a few examples of measures and illustrates how each strategy could lead to either an increase or decrease in the export of post-consumer textiles to Pakistan.

Strategies under *narrowing loops* refer to *reduce*, *rethink*, and *refuse* and should result in less overall material use. These strategies can affect the demand for new clothing and textiles, how new textiles are made and what they consist of. All other things remaining equal, less materials used leads to lower volumes of textiles in circulation. These strategies do not directly affect post-consumer textile flows, as they mainly target the first phases of product life cycles (e.g. retail, renting, sharing). In the longer term, however, these strategies will reduce export volumes of post-consumer textiles.

Strategies under *slowing loops* include *reusing* products, *repairing* damaged items, or *refurbishing* garments so they can have a second or third life. These strategies extend the lifetime of products. This, in turn, could go together with a lower demand for new clothing. Dependent on whether reuse, repair or refurbishment is done within or outside the EU, export of post-consumer textiles could either decrease or increase.

Strategies under *closing loops* include *recycling* and *recovery* of useful materials or energy from end-of-life products labelled as waste. These strategies are about optimal material use, and here, too, the increase or decrease in the export of these materials also depends on whether the recycling and recovery takes place within or outside the EU.

Table 4.4
Circular economy strategies for post-consumer textiles

CE strategy	Examples of types of measures	Affecting	Policy measures
Narrowing loops	Reducing material use through the renting of products, using alternative materials or not buying certain items	New clothing	Minimum share of sustainably produced materials
Slowing loops	Extending use phase and lifespan of products through, e.g., repair or refurbishment, repair cafés, tax incentivising repairs, buying second-hand	Second-hand clothing	Reuse target
Closing loops	Recycling product parts and recovering materials and energy for reuse	Textile waste	Minimum share of recyclate for use in new products

The following sections discuss the potential impacts of changes in demand for post-consumer textile processing in Pakistan.

4.3.2 Potential impacts of increased export of post-consumer textiles to Pakistan

An increased demand for processing services for post-consumer textiles in, and thus export to, Pakistan could be driven by strategies aimed at more recycled content in textiles.
Below, a brief overview is presented of the potential direct impacts of an increased demand for processing services for post-consumer textiles in Pakistan, in terms of environmental issues and labour rights and working conditions. In the following sections, these impacts are discussed in more detail.

Overview of potential effects per impact area: increased export of post-consumer textiles

Environment: Fibre-to-fibre recycling may save energy. More recycled content in clothing can lead to reduced resource use, compared to the use of virgin materials. Local environmental impacts of recycling depend on whether or not there are measures implemented to prevent water and air pollution.

Employment: Scaling up processing of post-consumer textiles in Pakistan could lead to job creation. Most sorting and grading is done manually, requiring workers who are trained to be accurate and fast. Sorting for recycling can be automated, sorting for reuse cannot.

Labour rights and working conditions: Little is known about working conditions in post-consumer textile processing in Pakistan. The Pakistani textile industry, in general, has decent work deficits. Scaling up post-consumer textile processing in Pakistan while implementing sustainability standards can offer decent work opportunities.

Environmental impacts of recycling in Pakistan depend on local practices

As discussed in Section 3.2.1., the impacts of recycling are generally positive and can result in substantial resource efficiency savings compared to raw material production. Nevertheless, the nature of local impacts depends on several factors and the specific impacts in Pakistan are not clear. Research on the Indian recycling hub in Panipat (Arisa, 2020) shows that local pollution can be a problem, with hazardous substances disposed of improperly in drains and workers exposed, for example, to bleach, without protective equipment. While there is a lack of data on this topic for Pakistan, the implementation of standards regarding environmentally sound waste management and restrictions on the use of certain hazardous substances should be monitored.

Textile recycling can take on many forms, including downcycling. Overall, recycling textiles into new fibres is most beneficial from an environmental perspective, compared to for example making rags or stuffing. The technical aspects of fibre-to-fibre recycling, however, are rather challenging.

Increased exports of post-consumer textiles can create jobs in sorting, grading and recycling in Pakistan

Based on the available information and expert interviews, the most relevant socio-economic impacts of increased demand for recycling in Pakistan seem related to labour rights and working conditions. Although it is difficult to estimate, based on the available sources, a larger demand for sorting and recycling could translate into local job creation. From interviews and the few studies available on this industry can be derived that Pakistan has a large workforce trained in sorting and grading, and well-established trade relationships for the import of post-consumer textiles from Europe. In addition, most of the different phases of the textile and clothing supply chain are present in Pakistan; from cotton cultivation to spinning and clothing and home textile manufacturing. This means that knowledge and expertise is at hand regarding a wide variety of materials and processes to treat textiles.

The study by Watson et al. (2016) estimates that, for every 100 tonnes of post-consumer textiles imported each year, two people were employed full-time in sorting in Pakistan. In addition, it is estimated that for every sorting job, six jobs are created in the sale of imported textiles on second-hand markets. All in all, the report estimates that a further 600 people could be employed to process the imports of post-consumer textiles from Nordic countries alone. The study further points out that a sorting plant employs roughly 20 to 30 people in administrative or economic positions on a total of 729 employees. These estimates do not consider jobs in recycling or how many jobs could be created if volumes of exported post-consumer textiles were to increase, substantially.

In this context, more research is required to estimate how many and what types of jobs could be created with the volumes of Dutch post-consumer textiles to be recycled.

Impacts of scaling up recycling in Pakistan depend on brand requirements

The impacts of scaling up and further developing sorting, grading and recycling of post-consumer textiles in Pakistan depend on several factors. One key issue is whether sustainability requirements or standards are set that recycling companies must adhere to.

On the one hand, if the circularity strategy is part of an attempt to increase overall sustainability in textile value chains and conscious choices are made to incorporate recycling services in Pakistan, it stands to reason that minimum standards would be set regarding labour conditions and

environmental impacts. On the other hand, if further developing post-consumer textile recycling in Pakistan is an indirect result of changes in policy affecting the new clothing manufacturing industry, increased recycling would not necessarily happen in line with sustainability standards.

While clothing brands are encouraged to require the manufacturers to source materials according to minimum standards, including the recycled content, the recyclers would be subject to the same reporting and transparency demands as other contractors and subcontractors. Achieving transparency at this level is desirable but has proved a challenge in the past, and may form a barrier to smaller businesses wanting to enter the textile recycling market (UNESC, 2021).

Concerns about transparency and informality were echoed in the expert interviews, as informality in textile value chains typically increases further away from first-tier companies. Interviewees stated that improving working conditions depends on first understanding the value chain. A key recommendation from the experts, in this regard, is to encourage companies to request more transparency from suppliers and sub-suppliers. This involves social dialogue, aimed at improving working conditions and not punishing companies outright for working with informal labour.

Improving labour conditions is main opportunity for post-consumer textile processing in Pakistan

There are several challenges in relation to the improvement of labour conditions in the clothing and textile industry in Pakistan. Research has shown that textile workers are often subjected to exploitation with regard to wages, working hours, and other labour rights (HRW, 2019). Another concern voiced by labour rights advocates relates to potential shifts from formal manufacturing jobs to informal recycling jobs. A key challenge related to this possibility is to transform jobs without losing social protections where they already have been achieved.

Nevertheless, interviewees were optimistic about good working conditions in the post-consumer textile processing industry, arguing that the business of sorting, grading, and recycling requires skilled labour. This was stated to be the case especially for high-quality recycling, focused on value addition. To achieve fibre-to-fibre recycling rather than downcycling, continuous work processes are required. In this context, there is no room for child labour or unqualified personnel. Some interviewees, therefore, expected that, if the emphasis would be on high-end recycling, workers would not be treated badly. Opportunities for decent work are therefore related to a demand for qualified personnel.

If standards regarding labour rights were to be enforced, the export of post-consumer textiles from the Netherlands could help contribute to decent work opportunities. Research by Watson et al. (2016) finds that local Pakistani companies dealing with European charity organisations are often required to follow certain Corporate Social Responsibility standards or Codes of Conduct. How well this is implemented is not known, although experts interviewed for this study indicated that working conditions had improved and, on average, were better at companies producing for EU, Australian and North American markets, compared to, for example, local or African markets (Watson et al., 2016). Identifying decent work deficits in existing value chains is the first step, which is also in line with recommendations by interviewees advocating for labour rights. In a subsequent step, stakeholders could then collaborate to promote decent work in a targeted manner.

Scaling up export of post-consumer textiles to Pakistan calls for careful monitoring and implementation of sustainability standards

There is currently too little information available on the impacts of existing post-consumer textile processing in Pakistan to make detailed projections about scaling up export as part of Dutch circular economy strategies. This is especially problematic given the large volumes of post-consumer textiles exported from the Netherlands to Pakistan, every year. A better understanding of the situation as it is now, is therefore necessary.

Despite data shortcomings, the available research does indicate that there is substantial potential for environmental gains in diverting post-consumer textiles away from waste incineration and towards sorting, grading and recycling. Estimations of the job creation potential, however, will require more data.

In terms of labour rights and working conditions in post-consumer textile processing, this analysis indicates that scaling up export of post-consumer textile processing alongside concentrated efforts to set and monitor implementation of sustainability standards, could help to improve labour rights and working conditions. In this sense, transparency and reporting are essential to guarantee exporting post-consumer textiles for processing does not result in negative externalities in Pakistan.

4.3.3 Potential impacts of reduced exports of post-consumer textiles to Pakistan

If circular economy strategies in the Netherlands are aimed at regional reuse and/or recycling of textiles (within the EU or even the Netherlands), the export of post-consumer textiles to Pakistan would decrease. Another reason for reduced export could be a significant reduction in clothing consumption in the Netherlands due to successful narrowing of loops strategies.

Overview of potential effects per impact area: decreased export of post-consumer textiles

Environment: depending on whether or not a decreased export of post-consumer textiles means that less material is being recycled or repurposed, overall resource efficiency could be lowered. A decrease in the availability of post-consumer textiles could mean that material demand is being met by 'new' materials, with the footprint of producing or extracting those raw materials.

Labour rights and working conditions: lower exports for the post-consumer textile industry in Pakistan could constitute a missed opportunity to promote decent work. If volumes from other regions remain high, no significant change is to be expected.

Employment: If overall volumes decrease, workers may be forced to find other means of employment.

Impact of restricting post-consumer textile exports to Pakistan depends on the scale of restrictions

Because of the limited understanding of the current impacts of post-consumer textile exports, it is hard to say what will happen if circular economy strategies in the Netherlands or EU would lead to lower exports of post-consumer textiles to Pakistan. It could be argued that, given the large volumes of post-consumer textiles imported by Pakistan every year, a change in flows from the Netherlands alone would not have a major impact.

Although exports from other high-income regions are likely to continue, such as from North America and Australia, a decrease in exports from the EU could nevertheless be significant. It would also mean that less material is available for the sorting, grading, and recycling industry as well as for global second-hand markets. While data limitations in this study mean that it is not possible to calculate what the consequences of an EU export stop would be for the global trade in discarded textiles, several interviewees stated that it would lead to overall lower resource efficiency. This, in turn, depends on whether the post-consumer textiles that are no longer exported will be reused and recycled elsewhere or are incinerated. Incineration or recycling of textiles that are still fit for reuse for example, constitutes a loss of value.

The global trade in second-hand and post-consumer textiles is efficient at maximising the value of textiles for resale, repair or, finally, recycling and recovery. Many interviewees repeated that only very little of the amount of exported post-consumer textiles goes to waste in Pakistan. This is also reflected in the findings of the case study by Watson et al. (2016). Achieving similar levels of value retention on a smaller, regional, scale may be challenging. Meanwhile, consumer demand in low- and middle-income countries for affordable, decent quality textiles will remain or may even increase.

4.3.4 Contextualising impacts: challenges and complicating factors

High sustainability standards can form a hurdle for local businesses

During interviews and in the expert workshop, the concern was raised that if standards for Pakistani sorting, grading, and recycling companies become too high or costly to achieve, companies may shift their focus to other markets with lower standards. Unintended trade barriers, due to high standards and requirements of clothing manufacturers for recycled content in new clothing, could thus lead to lower overall sustainability in the Pakistani textile industry.

In combination with the possible end of Pakistan's GSP+ status looming in 2023, it begs the question of whether the EU will still be an attractive export destination when tariffs are re-imposed on goods exported to the EU. Interviewees also mentioned that after tariffs were reduced under the GSP scheme, Pakistan did not export more, but shifted export from China to the EU. Increased tariffs, in combination with the growing requirements by EU companies regarding sustainability and transparency in supply chains, mean that Pakistani companies, when faced with major hurdles, may choose to focus on other regions.

Not all textiles can easily be recycled at present

One of the main challenges for recyclers is caused by the material make-up of clothing and textiles. This issue was also raised by interviewees with insight into local recycling practices in Pakistan. Most fibre-to-fibre recycling activities are currently aimed at high cotton content items, preferably white or light coloured to avoid the need for bleaching and to facilitate dyeing recycled fibres. Recycling of blended or synthetic textiles usually involves lower value downcycling into industrial rags, insulation materials and upholstery fillings (ETC/WMGE, 2021). In recent years, however, garments are increasingly made of material blends with lower cotton content. Poly-cotton blended garments are popular and affordable for many consumers, but form a technological challenge for the recycling and recovery of materials. Furthermore, recycling companies often do not know the types of dyes or treatments that were used on such garments, information which is usually lacking for coloured fabrics. A lack of information forms a further problem for recyclers regarding safety and environmental criteria set by clients. It is difficult to determine the content of recycled yarn, without knowing what was used to make the original product.

Strategies aimed at increasing the sustainably produced material content in new textiles, or the recycled content, therefore would need to consider the technological challenges involved. On the other hand, it is possible that these issues could spur the reversal of the trend to blend synthetic and natural fibres in clothing manufacturing, with subsequent consequences for the sourcing of raw materials. In addition, increased demand for recycling could go hand in hand with improved labelling of garments, to facilitate accurate sorting, grading, and recycling.

Understanding the trends in consumer demand for clothing is important for circular economy policy

Market analysts project that the global apparel market will continue to grow, in the near future. This is in part related to increasing disposable incomes for middle-class consumers, globally, and especially in emerging economies. Previous forecasts for the period between 2020 and 2025 indicated a 4.8% growth, up to USD 2,000 billion (Fibre2Fashion, 2020). According to analysts, other important factors driving the growth of the global apparel market include population growth in Sub-Saharan Africa and South Asia, rapid urbanisation, and a shift in the global economic power base (Fibre2Fashion, 2020). The Covid-19 pandemic, however has caused significant shocks in the global textile industry, and it remains to be seen what the pandemic will mean for consumer demand in the long term (McKinsey and Company, 2021), and how this could affect workers in global textile value chains (ILO, 2020).

In addition, consumer demand in high-income countries is changing, too. As some experts stated, there are currently several, and sometimes competing, issues in eco-fashion. Consumers want different and incompatible things, such as biodegradable clothing; recycled content, as well as high durability. Finding a balance is key, in this regard, as striving for the perfect solution may prove futile.

For these reasons, understanding the influence of trends in consumer demand for new clothing in global markets is important for discussions on how circular economy trends in European countries could affect manufacturing countries. For example, if demand for fast fashion continues to grow, it will have consequences for the quality of clothing put on the market and thus its suitability for recycling. Research and analysis are required to understand how different, sometimes contrasting, trends could affect demand for consumer products such as new clothing, second-hand clothing, or recycled content.

Design and mislabelling may limit the development of textile recycling

A large share of post-consumer textiles is unsuitable for multiple use and recirculation. Recycling is not always feasible due to difficulties in separating the mix made of various types of fibres with differing mechanical and technological properties. Moreover, the widespread production of lower-grade products (downcycling) from recycled textiles also plays a role (Leal Filho et al., 2019), and garments undergo changes to their material content through repeated wearing and washing. Another barrier to textile recycling is the mislabelling of clothing. Around 60% of Dutch garments composed of multiple fibres are labelled inaccurately (Wilting and van Duijn, 2019). While it is possible that the inaccuracy is unintentional due to the complex textile production chain, financially motivated deliberate inaccuracy cannot be ruled out. And even if most producers say they do not rely on labels for recycling, mislabelling is an indication of a lack of transparency in the industry that has an impact on creating a level playing field for businesses (Wilting and van Duijn, 2019).

5 The way forward

The ambitions of the Netherlands for a transition to a circular textile industry can affect both the production of cotton, as well as the processing of post-consumer textiles abroad. Chapter 4 examines the potential outcomes of different circularity strategies for textiles and linked them to the targets set in the Policy programme for circular textile 2020–2025 of the Netherlands.

From the analysis, it can be concluded that the social, economic and environmental impacts of the circular economy transition in the Netherlands on countries in the Global South will depend on 1) the chosen type of circular economy strategy; 2) the role of low- and middle-income countries in the Dutch circular economy; 3) and policies and practices that apply in the countries in question.

While there are risks and challenges, there are also opportunities for both cotton production in West Africa and post-consumer textile processing in Pakistan, which align with both the circular textile strategies of the Netherlands and the UN Sustainable Development Goals. Grasping these opportunities will require a sound understanding of the existing situation and challenges, as well as a clear perspective on what is necessary to prevent unwanted negative consequences. These conditions are discussed in this chapter.

5.1 Achieving circularity in textiles requires interventions at every level of the value chain

To achieve a more circular textile value chain, a coordinated approach is needed where the whole value chain is addressed, and not only one part or one group of stakeholders. This calls for interventions on every level of the value chain, from the clothing design board, to the cotton field, the consumer and, finally, the recycling plant. Strategies are needed at each level of narrowing loops (e.g. reduce impact of material use), slowing (e.g. reuse clothing) and closing loops (e.g. recovery and recycling of fibres), and need to be interwoven with the cross-cutting strategy of circular design to support them.

Designing clothing with optimal value cascading in mind has multiple benefits

Throughout the post-consumer clothing trade, low-quality clothing offers very few options for circularity other than downcycling. Other clothing items may be sturdy, such as protective clothing, but are currently almost impossible to recycle. It is essential to incorporate sustainability strategies like extending the lifetime of garments or improving clothing's recyclability in the design phase of new products. Ideally, this would mean that a garment could have different values for different actors, throughout its life cycle, and feed into the creation of new products. Designing clothing with a cascade of value in mind, can offer optimal value retention throughout the lifespan of a product. By being sturdy, clothing will last longer, by being repairable it can be adjusted and refurbished, and finally by being recyclable, designers can prevent waste creation.

To this end, two key recommendations stand out. First, accurate labelling of products to facilitate recycling, is essential. Second, the sale of products that cannot be recycled easily and are destined to either be dumped or incinerated, should be discouraged. This is in line with the discussions around planned obsolescence for other products, where single-use or short-lived products could be taxed at a higher rate, or simply banned.

Supporting West African cotton farmers can be part of the Dutch circular economy

A main target of circular strategies is to reduce the use of primary resources. In the case of cotton, this will have positive impacts on the environment in cotton producing countries (e.g. avoiding agricultural expansion, halting natural habitat loss, reducing pesticide pollution, and decreasing water scarcity), but it can also negatively affect the income and living conditions of smallholder cotton producers. Therefore, when designing and implementing circular strategies for the Dutch clothing sector, supporting cotton farmers in low- and middle-income countries could also be considered.

There are several options available to serve both targets for the Dutch economy and economies elsewhere. If the demand for raw cotton stabilises or even decreases, opportunities to attain a decent farm income can be found in increasing the quality of raw cotton. The recyclability of cotton clothing partly depends on longer cotton fibres, and this quality aspect is a way to raise the price of cotton at the farm gate, thus generating a better income. This can be done by improved farming practices, for which capacity building and outreach of knowledge is required, and access to agricultural inputs is made possible at low costs. Improving cotton farming may also lead to co-benefits for other crops in the rotation system, through improved soil fertility, thereby supporting local food security and crop diversification.

Another option is to stimulate farmers to produce according to sustainability standards, where the socio-economic conditions for farmers are an important part of the intended results. Care should be taken that these options do not increase the costs for farmers too much. More insight into the various socio-economic business cases for farming, such as producing high-quality, certified and/or organic cotton (TextileExchange, 2020; Tovignan et al., 2018) provides a basis for choosing appropriate Dutch circular strategies, and implementing the right farmer support programmes.

More research on consumer behaviour can support effective policy-making

Consumer demand for clothing in high-income countries is changing, for example, regarding price, quality and sustainability criteria. Different consumers also want different and at times incompatible things from clothing brands, such as: low prices, sustainably sourced materials (e.g. Fairtrade, organic, vegan), biodegradable clothing, recycled content, as well as high durability. Consumers have also become accustomed to the availability of new styles over short periods of time. Not only does this complicated set of preferences constitute a challenge for brands that need to adhere to various sustainability requirements, while also ensuring prices are attractive to customers, trends in consumer demand also can have implications for the circular economy. For example, different developments can be expected if circularity strategies are aimed at increasing reuse and, thus, the demand for second-hand clothing, or if strategies are mainly aimed at increasing recycling. In addition, consumers can also choose to substitute their old shopping habits or supplement them with more sustainable choices. Buying second-hand, recycled, or otherwise circular clothing instead of fast-fashion items, will lead to different outcomes compared to also buying circular clothing next to fast fashion.

At present there is not much systematic research available about how consumers handle their clothing: how much clothing do people have, how long do they keep items, wear them, share clothing or sell items online? On top of that, why consumers make certain choices is also not clear. Understanding what these dynamics mean for the circular economy transition will require research on consumer behaviour, preferences and willingness to adjust to a changing system.

Recycling is improving but still needs to be scaled up and aligned with circular design

Textile recycling routes are typically classified as being either mechanical, chemical or, less frequently, thermal and it is often assumed that there is a type of recycling method for each type of fibre. In reality, the process is more complicated, as recycling routes often consist of a mix of mechanical, chemical and thermal processes. In fact, discarded multi-material textiles form a big challenge as they are very difficult to recycle. The use of chemical recycling methods can be considered, but the use of excessive non-recoverable chemicals, high temperatures and undesirable side reactions with the secondary fibre material can make these processes potentially hazardous to the health of workers, in addition to having a detrimental environmental impact (Sandin and Peters, 2018).

An exception, here, would be the emerging biochemical recycling processes, which are highly material selective and work on lower temperatures, enabling a more economic and environmentally friendly recycling process. There are already some efforts to tackle the problem of multi-material textiles with the use of biochemical processes (Piribauer and Bartl, 2019). For example, viscose fibres can be produced from decolourised cotton using the decolourisation approach of Swedish manufacturer Renewcell, which consists of dissolving used cotton and other cellulose fibres and transforms them into a new, biodegradable raw material called Circulose. The decolourisation approach harbours potential to remove reactive dyes and wrinkle-free agents. However, adaption of the process to remove colouring from cotton substrates should be the focus of future research and development, in addition to different processes for cotton textile that has been treated with dirt and water repellents (Wedin et al., 2018). Coloured and or treated cotton can be very challenging to recycle safely.

Recycling innovation and design should, ideally, go hand in hand, as a large share of post-consumer textiles is unsuitable for multiple use and recirculation. This is partly due to the composition of many textiles, for which there are not yet suitable recycling technologies. As a result, recycling is not always feasible due to difficulties in separating the mix made of various types of polymers with different mechanical and technological properties (Leal Filho et al., 2019).

5.2 Improved monitoring of trade flows and inclusive dialogue is essential for a sustainable and just transition

Reliable and detailed data are essential to achieve a circular textile industry. To implement effective policies, more information is needed to understand the existing textile trade and also to monitor how it changes in the transition to a circular economy. To ensure that the transition is inclusive, it is likewise vital to engage in dialogue with all relevant stakeholders.

Monitoring of the trade in second-hand clothing and used textiles is currently inadequate

Current reporting systems are insufficient for monitoring and analysis of trade flows of discarded textiles or second-hand clothes, for several reasons. The lack of reliable data and therefore insight into trade flows forms a serious challenge for the design and implementation of effective policies to improve sustainability in the textile industry. Data availability and reporting can be improved on several fronts.

First, international trade statistics provide trade codes for textile waste and second-hand clothing and used textiles. These are useful for determining the export of textiles from domestic stocks. However, statistical data on worn textiles do not provide details on the status of the goods. For example, the codes do not cover the export of technical textiles, such as carpets, as they do not have specific product codes. The total volumes also do not allow to distinguish between rewearable textiles and those meant for recycling and the trade codes for used clothing contain several other types of products. In addition, CBS finds that some second-hand goods are probably counted along with new or other goods (Tunn and Delahaye, 2020). This means that the real content of shipments is difficult to know.

Another limitation is the fact that there is a financial threshold under which companies trading from and to EU Member States do not have to register shipments with customs authorities. As of 1 January 2020, this threshold is set at EUR 800,000 for import, and EUR 1 million for export to other EU Member States. For shipments of second-hand clothes, the value is often below the threshold. The threshold does not apply to trade with non-EU countries. An added difficulty relates to the units in which shipments need to be registered. It is not required to do so in kilograms, it is, for example, also possible to use cubic metres or number of items. Calculating what these units translate to in terms of kilograms forms a challenge. For second-hand clothing and used textiles the threshold of EUR 1 million is equivalent to roughly 1,000 tonnes (at a trading price of EUR 0.92 per kg in 2018), or around 68 truckloads of clothing (Tunn and Delahaye, 2020). What exactly is in these shipments is unclear. This means that not only is it likely that the export and import of second-hand clothing and used textiles is underreported in trade reports, detailed information about contents is also not available.

Finally, around 60% of Dutch garments composed of multiple fibres are labelled inaccurately (Wilting and van Duijn, 2019). While it is possible that such inaccuracy is not intentional, but due to the complex textile production chain, deliberate inaccuracy with a financial motive cannot be ruled out. And even if most producers would state not to rely on labels for recycling, mislabelling is an indication of a lack of transparency in the industry that has an impact on creating a level playing field for SMEs (Wilting and van Duijn, 2019).

Insight into international trade, including South–South trade and related benefits and risks, is necessary for sustainable and fairer outcomes

In the debate around textile and clothing value chains, it is often stated that supply chains have become very complicated and opaque. While the topic has received more attention in recent years, the global networks of second-hand products in which a lot of our clothes end up, are similarly complex. The role of global sorting, grading, and re-exporting hubs is not well understood, and research suggests that black markets also have a significant place in many countries.
The global market in second-hand items involves a range of different actors, often in the Global South, who seek to extract value from discarded textiles from high-income regions. As Norris (2012) writes, these actors are good at identifying value in cast-offs, separating items into a wide range of categories that each have their own target consumer groups, across social, cultural, economic and legal borders.

Understanding the potential environmental and socio-economic benefits and risks of the trade in second-hand clothing and used textiles requires much more information than what is currently available. First of all, reliable and detailed data are needed to paint a clear picture of import and export flows between countries. Second, identifying the benefits and risks of these trade flows can

guide future policy interventions. For example, the extent to which large markets for reuse of clothing contribute to resource efficiency improvements, or to local job creation, are important aspects of the circular economy. Similarly, if second-hand markets in the Global South do function well in terms of value retention and other social and environmental outcomes, it stands to reason that circular economy strategies in high-income countries seek to complement these markets. On the other hand, if second-hand markets are found to have poor environmental or social outcomes, circular economy strategies should at least not worsen negative impacts in the Global South and, if possible, improve the situation.

A just transition requires inclusive dialogue between all relevant stakeholders

In line with the previous recommendation, further research is warranted to examine potential alignment between Dutch circular economy strategies, existing networks of circularity in the rest of the world, and broader Dutch development strategies. Opportunities for co-benefits will depend on a sound understanding of the existing situation, such as the working conditions in post-consumer textile sorting, grading and recycling, and the environmental risks of recycling.

Central to achieving such insights is by way of inclusive dialogue between relevant stakeholders and/or their representatives. If scaling up recycling of post-consumer textiles in low- and middle-income countries is to be considered, it is for example necessary to ensure that new jobs meet decent work standards and that the hard-fought gains in clothing manufacturing jobs are not lost. Inclusive dialogue between stakeholders can help identify risks, provide opportunities for successful implementation and prevent negative externalities.

In addition, dialogue between stakeholders in the Global South is necessary to understand what motivates the importers of second-hand clothing and post-consumer textiles. Viewing post-consumer textile trade only from the perspective of exporters would obscure the fact that such shipments are actively imported, meaning they are paid for in advance by someone in the importing country. To achieve a circular textile value chain, it is necessary to consider the reasons why this happens and include local stakeholders in the discussion about whether the trade benefits them or not, and how it may need to change.

5.3 A government-wide approach to the circular economy calls for alignment with development ambitions

Dutch circular economy policy constitutes a government-wide effort. The necessity of this is made clear in this study, in which international textile value chains are connected to issues such as pollution, public health, biodiversity loss, economic development opportunities, and labour rights. The Dutch Government has ambitions and responsibilities regarding all of these issues, both nationally and internationally. As such, there is a clear opportunity to connect the circular economy transition with foreign policy and development cooperation.

A cross-border perspective can strengthen coherence between circular economy policies and development cooperation

Unlike the fight to halt climate challenge — with the reduction in greenhouse gas emissions as the main goal — there is no single overarching or generic target to select for steering towards a more

circular economy (Kishna and Hanemaaijer, 2019). Promoting a circular economy requires a set of targets that focus on the input, use and loss of raw materials, as well as their related impact. It is useful to make a distinction between targets aimed at more efficient use of raw materials (i.e. circularity targets) and targets aimed at reducing the environmental and socio-economic effects of raw materials use (i.e. effect targets) (Hanemaaijer et al., 2021a).

The Policy programme for circular textile 2020–2025 includes circularity targets (e.g. increased use of secondary materials and more reuse and recycling) and effect targets (e.g. increased use of sustainably produced materials and halving of the sector's environmental footprint). Achieving these targets requires cross-border activity, as resource production and manufacturing is mostly located in low- and middle-income countries. The same holds for recycling, with large shares of second-hand clothing and used textiles finding their way to Pakistan, which has a strong position in post-consumer textile processing (sorting, grading, recycling) as well as clothing and home textile manufacturing.

Besides value retention and sustainably produced materials, there are other issues that are closely linked to the textile value chain that require attention. For cotton production in Africa this includes food security, while for textile processing in Pakistan this includes working conditions. Although these issues are not directly priorities of the Dutch circular economy, they are part of the UN Sustainable Development Goals and key priorities for the Dutch Ministry of Foreign Affairs. It is therefore worthwhile to include improving food security and working conditions as a precondition and provide monitoring of these issues. Due diligence measures (i.e. appropriate care) should therefore be implemented for both upstream and downstream value chain partners.

Alignment between circularity targets and effect targets is important for achieving the overarching goals of the circular economy transition

How circular economy targets are defined in terms of impacts and in terms of circularity, has consequences for environmental and social issues in low- and middle-income countries. It is therefore important to be clear about what the targets aim to achieve in the longer term, so circularity strategies are aligned with the overarching goals of the circular economy transition (i.e. decrease and limit environmental pressures while addressing potential security of supply risks for critical materials). For example, for achieving a reuse target, strategies can focus on increased collection and sale of second-hand clothing. However, as the overall goal is to reduce the environmental footprint, replacement rates also need to be addressed. This could mean that additional incentives are needed to discourage consumption of new clothing. Similarly, minimum requirements for secondary material content in new clothing can boost recycling, but these requirements need to be supplemented with environmental and labour standards and quality criteria.

With the right preconditions, the circular economy transition can contribute to achieving Sustainable Development Goals abroad

A circular textiles transition links to a range of sustainability challenges, including food security, sustainable agriculture, decent jobs, gender equality, human health and environmental issues like pollution, climate change and biodiversity loss. For almost all these issues, the Dutch Government has set both national and international policy targets or ambitions, including on climate under the Paris Agreement, and biodiversity targets in the upcoming new biodiversity framework, as well as a broad range of targets within the UN Sustainable Development Goals (SDGs). Although the Policy programme for circular textile 2020–2025 aims to address several of these issues, other issues

might worsen while many remain unaddressed. Furthering all targets requires linking national circular economy policies with international climate and biodiversity policies and those on development cooperation.

Reducing environmental footprints can be combined with socio-economic benefits in low- and middle-income countries. For example, applying alternative farming techniques can reduce the need for pesticides, with related biodiversity and health benefits, while safer recycling methods also have dual benefits for people and the environment. Furthermore, increased recycling could go hand-in-hand with the creation of more decent jobs. An important prerequisite is the setting of standards and quality requirements, including specific certification schemes for cotton used in clothing, and requirements for decent jobs in post-consumer textile processing. While research on the latter is limited, there are indications that explicit sustainability standards and transparency requirements have positive outcomes, whereas an indirect increase in recycling activity through a target for secondary material use for manufacturers could exacerbate poor labour conditions.

With the right preconditions, the circular economy can thus drive positive change and thereby contribute to the achievement of global commitment, including the SDGs, both in the Netherlands and abroad. For example, the circular economy can make use of already existing sustainability standards and potentially cost-effective circular infrastructure, providing opportunities to positively influence issues, such as food security (SDG 2), gender equality (SDG 5) and decent work (SDG 8). Achieving a circular economy without negative spillovers on low- and middle-income countries requires government-wide efforts and policy coherence across policy agendas, including a cross-border approach with specific attention for policy coherence regarding sustainable development (PCSD), as is called for in the SDGs.

6 References

AbTF (2021). Annual Report 2020. Aid by Trade Foundation, Hamburg.

AFP (2019). Mali hopes to cotton on to added value. www.france24.com/en/20190421-mali-hopes-cotton-added-value, March 2021.

AfricaNews (2018). Global business of secondhand clothes thrive in Africa. www.agoa.info/news/article/15417-global-business-of-secondhand-clothes-thrive-in-africa.html, May 2021.

Agbohessi PT, Imorou Toko I, Ouédraogo A, Jauniaux T, Mandiki SNM and Kestemont P. (2015). Assessment of the health status of wild fish inhabiting a cotton basin heavily impacted by pesticides in Benin (West Africa). Science of The Total Environment 506–507: pp. 567–584.

Allen T, Heinrigs P and Heo I. (2018). Agriculture, Food and Jobs in West Africa.

Amanet K, Chiamaka EO, Quansah GW, Mubeen M, Farid HU, Akram R and Nasim W. (2019a). Cotton Production in Africa. In: (eds.) Cotton Production. pp. 359–369.

Amanet K, Emmanuel O, Quansah G, Mubeen M, Farid H, Akram R and Jatoi W. (2019b). Cotton Production in Africa. In: (eds.). pp. 359–369.

Arisa and Sympany (2020). Textile recycling unravelled - Exploring post- and pre-consumer textile recycling value chains in Panipat, India. Arisa and Sympany, Utrecht.

Avadí A, Marcin M, Biard Y, Renou A, Gourlot JP, Basset-Mens C. (2020). Life cycle assessment of organic and conventional non-Bt cotton products from Mali. International Journal of Life Cycle Assessment, 25:678–697.

Azzouz, B, Ben Hassen, M and Faouzi S. (2008). Adjustment of Cotton Fiber Length by the Statistical Normal Distribution: Application to Binary Blends. Journal of Engineered Fibers and Fabrics 3.

Bachelier B, Balarabe O, Boulakia S, Demenois J, Gerardeaux E, Goebel F-R and Loison R. (2018). Which ways forward for sustainable cotton production in Africa in the context of climate change?

Baden S and Barber C. (2005). The impact of the second-hand clothing trade on developing countries.

Bahety S and Mukiibi J. (2017). WTO Fisheries Subsidies Negotiations: Main Issues and Interests of Least Developed Countries. CUTS International Geneva, Geneva.

BCI (n.d.). Mali. www.bettercotton.org/where-is-better-cotton-grown/mali/, April 2021.

Benjaminsen TA, Aune JB and Sidibé D. (2010). A critical political ecology of cotton and soil fertility in Mali. Geoforum 41: pp. 647–656.

Bonou z, Allali and Aziz F. (2019). Environmental Efficiency of Organic and Conventional Cotton in Benin. Sustainability 11: pp. 3044.

Brooks A and Simon D. (2012). Unravelling the Relationships between Used-Clothing Imports and the Decline of African Clothing Industries. Development and Change 43: pp. 1265–1290.

BTI (2020). Mali Country Report 2020. www.bti-project.org/en/reports/country-report-MLI-2020.html, May 2021.

Catalystas (2019). Report on Youth Employment in Agricultural Value-Chain: Burkina Faso. Netherlands Enterprise Agency, The Hague.

Grain Central (2020). World cotton stocks on high. www.graincentral.com/markets/world-cotton-stocks-on-high/, March 2021.

Chapagain A, Hoekstra A, Savenije H and Gautam R. (2006). The Water Footprint of Cotton Consumption: An Assessment of the Impact of Worldwide Consumption of Cotton Products on the Water Resources in the Cotton Producing Countries. Ecological Economics 60: pp. 186-203.

Circle Economy (2020). Exploring the global environmental and socio-economic effects of pursuing a circular economy: case study on jeans and mobile phones. Circle Economy, Amsterdam.

CISL (2016). Threading natural capital into cotton: Doing business with nature. University of Cambridge Institute for Sustainability Leadership (CISL), Cambridge.

CmiA (2014). Lifecycle Assessment (LCA) of Cotton made in Africa (CmiA). Cotton made in Africa.

CmiA (n.d.). African Cotton. www.cottonmadeinafrica.org/en/african-cotton/, April 2021.

COFACE (2021). Benin. www.coface.com/Economic-Studies-and-Country-Risks/Benin, February 2021.

Comtrade (2021). Trade statistics – 6309 – Textiles; worn clothing and other worn articles. https://comtrade.un.org/data/, March 2021.

CSI Ltd. (2021). Feasibility Study Textile Recycling. Consulting Service International Ltd., Hong Kong.

Dağdelen N, Basal H, Yilmaz E, Gürbüz T and Akçay S. (2009). Different drip irrigation regimes affect cotton yield, water use efficiency and fiber quality in Western Turkey. Agricultural Water Management 96: pp. 111–120.

Dam Lam R, Boafo Y, Geleto S and Saito O. (2017). Assessing the food security outcomes of industrial crop expansion in smallholder settings: insights from cotton production in Northern Ghana and sugarcane production in Central Ethiopia. Sustainability Science 12: pp. 1–17.

De Ridder M (2017). Internationale effecten circulaire economie vragen om moreel en strategisch leiderschap. Internationale Spectator.

De Steenhuijsen Piters D, Nelen J, Wennink B, Ingram V, Tondel F, Kruijssen F and Aker J.

(2021). West African food system resilience. Wageningen, Wageningen Economic Research, Report 2021-006.

DTDA (2018). Labour Market profile 2018 - Pakistan. the Danish Trade Union Development Agency, Denmark.

EP/EXPO/DEVE/FWC (2021). The use of pesticides in developing countries and their impact on health and the right to food. Policy Department for External Relations Directorate General for External Policies of the Union.

EPA (n.d.). Overview of Greenhouse Gases. www.epa.gov/ghgemissions/overview-greenhouse-gases, July 2021.

EPZA (2021). Investors Directory. www.epza.gov.pk/investors-directory/, May 2021.

ETC/WMGE (2021). Plastic in textiles: potentials for circularity and reduced environmental and climate impacts. European Topic Centre on Waste and Materials in a Green Economy, Mol.

Eurostat (2021a). EU trade since 1988 by HS2,4,6 and CN8.

Eurostat (2021b). EU trade since 1988 by HS2,4,6 and CN8. https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do, March 2021.

Eurostat (2021c). Combined Nomenclature, 2021. XI Section XI – Textiles and textile articles. Chapter 63 - Other made-up textile articles; sets; worn clothing and worn textile articles; rags.

https://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=DSP_NOM_DTL_VIEW&StrNom=CN_2021&StrLanguageCode=EN&IntPcKey=47844598&IntKey=47848258&StrLayoutCode=HIERARCHIC&IntCurrentPage=1; and: https://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=DSP_NOM_DTL_VIEW&StrNom=CN_2021&StrLanguageCode=EN&IntPcKey=47848288&IntKey=47848288&StrLayoutCode=HIERARCHIC&IntCurrentPage=1, March 2021.

FAO (2011). Closing the gender gap in agriculture. www.fao.org/news/story/en/item/52011/icode/, May 2021.

FAO (2018). Economic importance of cotton in Burkina Faso. Food and Agriculture Organization of the United Nations (FAO), Rome.

FashionRevolution (2019). Dead White Man's Clothes. www.fashionrevolution.org/dead-white-mans-clothes/?fbclid=IwAR1ISve8Xfen-aF3gXJXjKh5LysYAF2SRYGjtB1dcSMvkYHiaVLi5_SynIo%20and%20https://www.textilemountainfilm.com/contact, May 2021.

FFact (2020). Massabalans Textiel 2018. Rijkswaterstaat. Utrecht.

Fibre2Fashion (2016). So, what do you do with shoddy yarn? www.fibre2fashion.com/industry-article/7791/so-what-do-you-do-with-shoddy-yarn, May 2021.

Fibre2Fashion (2020). Global apparel market outlook: an overview. www.fibre2fashion.com/industry-article/8698/global-apparel-market-outlook-an-overview, May 2021.

Fortuna LM and Diyamandoglu V. (2017). Optimization of greenhouse gas emissions in second-hand consumer product recovery through reuse platforms. Waste Management 66: pp. 178–189.

Gakpo JO. (2019). Burkina Faso cotton production plummets after phasing out GMO. www.allianceforscience.cornell.edu/blog/2019/04/burkina-faso-cotton-production-plummets-phasing-gmo-crop/, February 2021.

GBA (2017). Pulse of the industry. www.globalfashionagenda.com/publications-and-policy/pulse-of-the-industry/, March 2021.

Hanemaaijer A, Kishna M, Koch J and Wilting H. (2021a). Mogelijke doelen voor een circulaire economie. PBL Netherlands Environmental Assessment Agency, The Hague.

Hanemaaijer A, Kishna M, Kooke M, Brink H, Koch J, Prins AG and Rood T. (2021b). Integrale Circulaire Economie Rapportage 2021. PBL Netherlands Environmental Assessment Agency, The Hague.

Hauchart V. (2005). Culture du coton et dégradation des sols dans le Mouhoun (Burkina Faso).

Hortmeyer E. (2020). Top 10 cotton producing countries in the world. www.dnfi.org/cotton/top-10-cotton-producing-countries-in-the-world_4785/, March 2021.

HRW (2019). No room to bargain: unfair and abusive labor practices in Pakistan. Human Rights Watch, United States.

IEEP (2019). EU circular economy and trade: Improving policy coherence for sustainable development.

IenW (2020). Policy programme for circular textile 2020–2025. Dutch Ministry of Infrastructure and Water Management, The Hague.

IFAD (n.d.). Benin. www.ifad.org/en/web/operations/country/id/benin, February 2021.

IFAD/FAO (2013). Rebuilding West Africa's food potential: Policies and market incentives for smallholder-inclusive food value chains.

IFC (2017). Sowing Seeds of a Bright Future For Burkinabe Cotton Farmers.

IFC (2019). Creating markets in Burkina Faso - Growing Burkina Faso's private sector and harnassing it to bolster economic resilience - Country Private Sector Diagnostic. International Finance Corporation, Washington D.C.

IISD (2020). Global Market Report: Cotton. The International Institute for Sustainable Development, Manitou.

ILO (2016). The Islamic Republic of Pakistan Decent Work Programme (2016-2020). International Labour Organization.

ILO (2019). The future of work in textiles, clothing, leather and footwear International Labour Organization, Geneva.

ILO (2020). Research brief — The supply chain ripple effect: How COVID-19 is affecting garment workers and factories in Asia and the Pacific. International Labour Organization, Geneva.

ILO (n.d.). Informal economy: a hazardous activity. www.ilo.org/safework/areasofwork/hazardous-work/WCMS_110305/lang--en/index.htm, May 2021.

IMF (2019). Burkina Faso, IMF Country Report No. 19/393.

INSAE (2020). Monographie de la Filiere Coton au Benin. Institut National de la Statistique et de l'Analyse Economique, Cotonou.

IPBES (2018). The IPBES assessment report on land degradation and restoration. Montanarella, L., Scholes, R., and Brainich, A. (eds.). Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn.

ITC (2013). Improving Africa's Cotton Value Chain for Asian Markets. International Trade Centre, Geneva.

ITC Trademap (2021), 'List of exporters for the selected product', online: www.trademap.org/, viewed in February 2021.

Jain P and Gupta C. (2016). Textile recycling practices in India: a review. International Journal of Textile and Fashion Technology 6: pp. 21–36.

Khamis J. (2018) Recycling clothes in the UAE. https://gulfnews.com/going-out/society/recycling-clothes-in-the-uae-1.2197303, March 2021.

Kishna M and Hanemaaijer A. (2019). Doelstelling circulaire economie 2030 - Operationalisering, concretisering en reflectie. PBL Netherlands Environmental Assessment Agency, The Hague.

Kloos J and Renaud FG. (2014). Organic Cotton Production as an Adaptation Option in North-West Benin. Outlook on Agriculture 43: pp. 91–100.

Kooistra K, Termorshuizen A and Pyburn R. (2006). The sustainability of cotton: consequences for man and environment.

Kouta S and Ismaila T. (2019). Forest landscape dynamics in the cotton basin of North Benin. International Journal of Forest, Animal and Fisheries Research 3: pp. 195–202.

Krifa M and Stevens S. (2016). Cotton Utilization in Conventional and Non-Conventional Textiles—A Statistical Review. Agricultural Sciences 07: pp. 747–758.

Laris P and Foltz JD. (2014). Cotton as Catalyst? The Role of Shifting Fertilizer in Mali's Silent Maize Revolution. Human Ecology 42: pp. 857–872.

Leal Filho W, Ellams D, Han S, Tyler D, Boiten VJ, Paço A, Moora H and Balogun A-L. (2019). A review of the socio-economic advantages of textile recycling. Journal of Cleaner Production 218: pp. 10–20.

Ljungkvist H, Watson D and Elander M. (2018). Developments in global markets for used textiles and implications for reuse and recycling. IVL Swedish Environmental Research Institute, Stockholm.

Lu S. (2018). Why is the used clothing trade such a hot-button issue? www.shenglufashion.com/2018/11/15/why-is-the-used-clothing-trade-such-a-hot-button-issue/, May 2021.

Lucas P, Kram T and Hanemaaijer A. (2016). Potential effects of circular economy policies in the EU and the Netherlands on developing countries. PBL Netherlands Environmental Assessment Agency, The Hague.

Maldini I, Duncker L, Bregman L, Duscha L, Piltz G, Grevinga T, Cunningham G, Tap R, Balgooi F and Vooges M. (2017). Measuring the Dutch clothing mountain: Data for sustainability-oriented studies and actions in the apparel sector.

Marphatia AA and Moussié R. (2013). A question of gender justice: Exploring the linkages between women's unpaid care work, education, and gender equality. International Journal of Educational Development 33: pp. 585–594.

Mbetid E, Havard M, Kadekoy-Tigague D and Djondang K. (2010). Impacts des changements de politique dans un contexte de crise mondialisée sur les acteurs des filières cotonnières d'Afrique Centrale. Cahiers Agricultures 19: pp. 21–27.

Mekonnen MM and Hoekstra AY. (2011). The green, blue and grey water footprint of crops and derived crop products. Hydrol. Earth Syst. Sci. 15: pp. 1577–1600.

Mekonnen MM and Hoekstra AY. (2016). Four billion people facing severe water scarcity. Science Advances 2: e1500323.

Michel B, Togola M, Téréta I and Traoré NN. (2000). La lutte contre les ravageurs du cotonnier au Mali : problématique et évolution récente. Cahiers Agricultures 9: pp. 109–115.

Minter A. (2018). No one wants your used clothes anymore. Bloomberg Opinion.

Mirdha RU. (2019). Bangladesh now depends less on India for cotton. The Daily Star.

Mirdha RU. (2020). Textile millers moving away from Indian cotton. The Daily Star.

Mirza J. (2019). EPZA bans business of used, worn clothing. www.thenews.com.pk/print/452998-epza-bans-business-of-used-worn-clothing,

Niang I, Ruppel OC, Abdrabo MA, Essel A, Lennard C, Padgham J and Urquhart P. [eds.] (2014). Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects, pp 1199–1265. Cambridge University Press Cambridge and New York.

Norris L. (2012). Trade and Transformations of Secondhand Clothing: Introduction. TEXTILE 10: pp. 128–143.

Nørup N, Pihl K, Damgaard A and Scheutz C. (2019). Replacement rates for second-hand clothing and household textiles – A survey study from Malawi, Mozambique and Angola. Journal of Cleaner Production 235: pp. 1026–1036.

OECD-FAO (2020). Agricultural Outlook 2020-2029 – Cotton. www.oecd-ilibrary.org/sites/630a9f76-en/index.html?itemId=/content/component/630a9f76-en, March 2021.

OECD (2006). Cotton West Africa in the International Market. OECD; ECOWAS-SWAC.

Partzsch L, Zander M and Robinson H. (2019). Cotton certification in Sub-Saharan Africa: Promotion of environmental sustainability or greenwashing? Global Environmental Change 57: 101924.

Piribauer B and Bartl A. (2019). Textile recycling processes, state of the art and current developments: A mini review. Waste Manag Res 37: pp. 112–119.

Prins AG and Rood T. (2020). Op weg naar een robuuste monitoring van de circulaire economie Resultaten-2019 van het Werkprogramma Monitoring en Sturing Circulaire Economie. PBL Netherlands Environmental Assessment Agency, The Hague.

Quak E. (2018). Drivers, Challenges and Opportunities for Job Creation in the Sahel. Institute of Development Studies, Brighton.

Rademaker M. (2017). De Europese circulaire economie en ontwikkelingslanden.

Radhakrishnan S. (2017). Chapter 2 - Sustainable cotton production. In: SS Muthu (eds.) Sustainable Fibres and Textiles. Woodhead Publishing, pp. 21–67.

Reliefweb (2021). Burkina Faso: Situation Report — 1 Feb 2021. https://reliefweb.int/report/burkina-faso/burkina-faso-situation-report-1-feb-2021, February 2021.

Rijksoverheid (2021). 'Internationaal Maatschappelijk Verantwoord Ondernemen', online: www.rijksoverheid.nl/onderwerpen/internationaal-maatschappelijk-verantwoord-ondernemen-imvo/bevorderen-internationaal-maatschappelijk-verantwoord-ondernemen, accessed September 2021.

Ripoche A, Crétenet M, Corbeels M, Affholder F, Naudin K, Sissoko F, Douzet JM and Tittonell P. (2015). Cotton as an entry point for soil fertility maintenance and food crop productivity in savannah agroecosystems–Evidence from a long-term experiment in southern Mali. Field Crops Research 177: pp. 37–48.

Saliou IO, Zannou A, Aoudji AKN and Honlonkou AN. (2020). Drivers of Mechanization in Cotton Production in Benin, West Africa. Agriculture 10: pp. 1-13.

Sandin G and Peters GM. (2018). Environmental impact of textile reuse and recycling – A review. Journal of Cleaner Production 184: pp. 353–365.

Shen L, Worrell E and Patel MK. (2012). Comparing life cycle energy and GHG emissions of bio-based PET, recycled PET, PLA, and man-made cellulosics. Biofuels, Bioproducts and Biorefining 6: pp. 625–639.

Shirvanimoghaddam K, Motamed B, Ramakrishna S and Naebe M. (2020). Death by waste: Fashion and textile circular economy case. Sci Total Environ 718: p. 1-10.

Soth J, Grasser C and Salerno R. (1999). The Impact of Cotton on Fresh Water Resources and Ecosystems: A Preliminary Analysis. WWF, Gland.

Soumaré M, Traore S and Havard M. (2020). Croissance démographique, sécurité alimentaire et accès à la santé et à l'éducation en zone cotonnière du Mali.

Soumaré M, Havard M and Bachelier B. (2021). Cotton in West and Central Africa: from the agricultural revolution to the agro-ecological transition. Cahiers Agricultures 30.

Sphera (2021). Life cycle assessment of Cotton made in Africa. A report for the Aid by Trade Foundation. Sphera Solutions. Chigaco.

Sylla F. (2020). Cotton and Products Update. USDA.

Sylla MB, Pal JS, Faye A, Dimobe K and Kunstmann H (2018). Climate change to severely impact West African basin scale irrigation in 2 °C and 1.5 °C global warming scenarios. Scientific Reports 8: pp. 14395.

Talon JC (2018). Renaissance de la Filière Coton au Bénin – Raison du Succès et Défis à Relever, Cotonou, Sodeco.

TextileExchange (2020). Preferred Fiber & Materials Market Report 2020.

Ton P. (2011). Cotton and climate change: impacts and options to mitigate and adapt. International Trade Centre, pp. 1–17.

Tovignan DS, Epiphane S, Laurent CG, Hinvi J, Bonou-zin Dossi Clarisse R, Koussahoué S and Gian N. (2018). Analyzing the determinants of profitability of organic and conventional cotton in Benin. International Journal of Innovation and Scientific Research 39: pp. 79–90.

Townsend T. (2020). 40 million households produce natural fibres. https://dnfi.org/abaca/40-million-households-produce-natural-fibres_22590/, March 2021.

Tunn V and Delahaye R. (2020). Uitvoer van voorraden – haalbaarheidsstudie. Statistics Netherlands (CBS), The Hague.

UN (2015). Transforming our world: The 2030 Agenda for Sustainable Development. United Nations, New York.

UNCCD (2019). The Global Land Outlook West Africa Thematic Report. UNCCD, Bonn.

UNESC (2021). Recommendation No. 46: Enhancing Traceability and Transparency of Sustainable Value Chains in the Garment and Footwear Sector (ed UNEaS Council), Geneva, Economic Commission for Europe.

USDA (2018). Cotton: World Markets and Trade. USDA Foreign Agriculture Service.

USDA (2021a). Cotton: World Markets and Trade April 2021. United States Department of Agriculture.

USDA (2021b). Production, supply and distribution. www.apps.fas.usda.gov/psdonline/app/index.html#/app/advQuery, April 2021.

USDA (2021c). Production, supply and distribution - cotton. March 2021.

Ütebay B, Celik P and Cay A. (2019). Effects of cotton textile waste properties on recycled fibre quality. Journal of Cleaner Production 222.

Van der Ven C. (2020). The Circular Economy, Trade, and Development: Addressing spillovers and leveraging opportunities. Tulip consulting, Geneva.

Verité (2018). Summary of Key Trafficking in Persons Risk Factors in Cotton Production. Verité, Amhurst.

Vitale J. (2018). Economic importance of cotton in Burkina Faso. Food and Agriculture Organisation, Rome.

Voora V, Larrea C and Bermudez S. (2020). Global Market Report: Cotton. International Institute for Sustainable Development, Winnipeg.

Watson D, Palm D, Brix L, Amstrup M, Syversen F and Nielsen R. (2016). Exports of Nordic used textiles: fate, benefits and impacts. Nordic Council of Ministers.

Wedin H, Källman B, Rúna A, Kristinsdottir, Niit E, Mansoor ZA, Lindgren C and Rammsy H. (2018). Evaluation of dyeing and finishing components in recycling and regeneration of coloured textiles prototypes. RISE Research Institute of Göteborg.

Westerberg V. (2017). The Economics of conventional and organic cotton production. A case study from the municipality of Banikoara, Benin. The Economics of Land Degradation Initiative.

Westerberg V, Diarra A, Diallo H, Diallo S, Kone B, Domergues M, Keita O, Doku A and Di Falco S. (2020). The economics of cotton production in Mali and the challenges of land degradation. Case study in Koutiala and Bougouni. The Economics of Land Degradation Initiative.

Williams A and Marcini F. (2015). Measuring Sustainability in Cotton Farming Systems. Towards a Guidance Framework. Food and Agriculture Organization of the United Nations International Cotton Advisory Committee, Rome.

Wilting J and van Duijn H. (2019). Labels: Accurate or not? Circle Economy, Amsterdam.

Woittiez L, Descheemaeker K and Giller K. (2015). Adoptability of sustainable intensification technologies in dryland smallholder farming systems of West Africa. ICRISAT.

Woolridge A, Ward GD, Phillips P, Collins M and Gandy S. (2006). Life cycle assessment for reuse/recycling of donated waste textiles compared to use of virgin material: An UK energy saving perspective. Resources Conservation and Recycling 46: pp. 94–103.

Zohoun J. (2020). Bénin, 1er producteur du coton grâce aux réformes du government. www.24haubenin.info/?Benin-1er-producteur-du-coton-grace-aux-reformes-du-gouvernement, February 2021.

Appendix: List of experts consulted

Table 1
List of experts consulted

	Name	Organisation	Field of expertise
1	Abdoul Aziz Yanogo	Better Cotton Initiative BCI	Cotton cultivation
2	Bruno Bachelier	CIRAD	Cotton cultivation
3	Tina Stridde	Cotton Made in Africa CmiA	Cotton cultivation
4	Issouf Sanou	African Food Sovereignty Alliance AFSA	Cotton cultivation
5	Bart de Steenhuijsen Piters	WUR	Cotton cultivation
6	Haki Pamuk	WUR	Cotton cultivation
7	Sander Zwart	CGIAR/IWMI	Water use in agriculture
8	Susanne Tempel	Arisa	Post-consumer textiles
9	Gine Zwart	Arisa	Cotton cultivation
10	Amy Ching	IDH	Cotton cultivation
11	Lis Suarez Visbal	Utrecht University Copernicus Institute	Post-consumer textiles
12	Paul Overgoor	RVO Netherlands Enterprise Agency	Post-consumer textiles
13	Winnie van der Wal	Netherlands Embassy in Islamabad	Post-consumer textiles
14	Bertus Wennink	Royal Tropical Institute KIT	Cotton cultivation
15	Asif Raza	A-one Graders Pakistan	Post-consumer textiles
16	Romina Kochius	GIZ	Post-consumer textiles
17	Karl Borgschulze	CSI Ltd.	Post-consumer textiles
18	Lucy Norris	University College London	Post-consumer textiles
19	Muhammad Ubaid	GIZ	Post-consumer textiles
20	Muhammad Kamran Kashif	GIZ	Post-consumer textiles
21	Margherita Licata	ILO	Post-consumer textiles
22	Maria Beatriz Mello da Cunha	ILO	Post-consumer textiles
23	Michiel Scheffer	WUR	Post-consumer textiles; cotton cultivation
24	Steven Bethell	Bank en Vogue	Post-consumer textiles
25	Shirley Rijnsdorp-Schijvens	Schijvens	Post-consumer textiles
26	Emile Bruls	RWS	Post-consumer textiles
27	Vivian Tunn	CBS	Post-consumer textiles