



Cleaner, greener cotton

Summary report



Cotton is a water-intensive crop that is usually grown in dry regions so as not to damage the eventual quality of fibre. Add to that the heavy use of pesticides, inconsistent subsidies between rich and poor countries, and labour issues from the farm to the retail shop, and cotton becomes a product with considerable social and environmental impacts.

Not just cotton, synthetic fibres such as polyester, rayon and viscose use much energy and chemicals to produce, often up to five times as much. Synthetic fibres are popular but for many reasons – practical, historical, and economic – cotton is a mainstay. Fortunately there are ways to make cotton more sustainable which help keep the environment it depends on healthy as well.

Cotton Supply Chain





Economic mainstay

Cotton accounts for 85% of all natural fibres followed by wool, linen, and hemp, with cultivation occurring in around 100 countries. The main producers are India (8.6 million ha), United States (5.3 million ha), China (4 million ha), Pakistan (3.1 million ha) and Uzbekistan (1.4 million ha). Around 25 million tonnes of cotton are produced annually of which nearly 40% is traded internationally.

In a good year a smallholder farmer in Mali would expect to earn US\$1,000 per year but with depressed world prices many of these farmers operate at a loss and accumulate debt. More than 90% of cotton farmers live in developing countries on farms of less than 2 hectares; cotton employs 7% of the total labour force in developing countries.

Typical Value Chain

(per kilo of product)

\$25.00+

selling price



\$3.80

finished product



\$1.32

yarn



\$0.76

fibre



\$0.32

seed cotton

Source: BBC World Service

Cotton's many sides

From socks to scarves, most of us wear several items of cotton every day. In the fields, hard at work, and at the spinning and manufacturing factories, the reality is cotton often entails the use of hazardous chemicals, polluted or dwindling water supplies and can result in habitat loss, degraded soil and unfair working conditions. A few figures make the point:

- 8506 litres of water (irrigation and rainfall) are needed on average to grow 1 kg of cotton lint (or roughly a pair of jeans) and the textile industry is estimated to use 378 billion litres of water annually, using up to 200 litres of water to process, dye and finish each kilo of textiles.
- In the 1990s, estimated cases of pesticide poisoning a year in agriculture were up to several million, resulting in between 20,000 and 40,000 deaths some of which relate to cotton growing.
- The surface area of the Aral Sea has decreased by 85% due to irrigated cotton cultivation in Uzbekistan and Turkmenistan over the last 40 years. Twenty of the 24 native fish species there are now extinct including the sturgeon that produced world-renowned caviar, and many more fish and bird species are close to extinction.

- Although cotton cultivation in Central America has now declined to low levels, only 2% of the hardwood forest in the original cotton-growing areas remains intact and coastal savannas and mangrove forests have also been destroyed.

- It is estimated that more than 50% of topsoil from all farmland was lost in the last century, representing an enormous economic loss. As cotton is grown in hot arid regions, the soil is often of poor quality, with organic content less than 1%. This makes the soils fragile and vulnerable to erosion by wind and water, and to salinisation due to poor irrigation and drainage.

- Child labour, and “debt” or “bonded” labour in which farm workers or their families are forced to work to pay off debts to other farmers or seed and chemical suppliers, long hours and inadequate pay are among the poor social conditions to be rectified in the making of cotton.





Blending solutions

As part of its Global Conservation Programme, WWF aims to help make cotton cultivation part of a sustainable industry and to reduce impacts on priority ecosystems. WWF is working with partners to develop and promote 'Better Management Practices' (BMPs) which are healthier for people, safeguard water and vital habitats and deliver economic benefits to farmers and others involved in the long cotton chain.



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Involving the private sector

Many companies are already making business decisions and public commitments to purchase larger quantities of cotton products that meet various ethical standards, notably certified Organic or Fair Trade. To complement this process, WWF and other partners initiated the Better Cotton Initiative (BCI) which aims to define a new type of commodity that is grown with measurably reduced social and environmental impacts. The BCI is a collaborative global process, involving a wide range of stakeholders along the cotton chain from farmers to retailers. Currently, representatives from Adidas, Gap Inc., H&M, ICCO, IKEA, Organic Exchange, United Nations Environment Programme, PAN UK, and WWF, make up the BCI Steering Committee.

Demonstrating better farm practices

Many better ways to farm come from farmers themselves or from local research centres. WWF is working with these groups, local NGOs and government agricultural support ("extension") services to identify and test better management practices (BMPs), and to develop education materials, manuals, and training tools. The BMPs aim primarily to improve soil quality, pesticide and water use in growing cotton. However attention is also given to helping farmers work together in cooperatives or organisations so that they gain access to credit facilities and reduce costs through bulk purchasing of seed, fertilisers and machinery.



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Making supportive policies

National or state policies including the enforcement of regulations about the use of different agro-chemicals or cotton seed is another avenue for change. Equitable allocation of reliable water supply for farmers is also critical in many cotton-growing countries. WWF is encouraging local policy-makers to consider sustainable solutions to the growing water crisis such as traditional water-harvesting, defining environmental flows for rivers, and encouraging the facilitation of BMP approaches by state governments.



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Small-holder farmers – Indus Basin, Pakistan and Godavari Basin, India

In Pakistan and India cotton is grown by large numbers of small-holder farmers who typically own less than 2.5 hectares of land. Cotton is an important cash crop in both countries with cotton and textiles accounting for 55% of foreign exchange earnings in Pakistan and 45% of all exports from India to the EU. WWF is working on cotton projects in both countries with funding from the European Commission and in partnership with the private sector.

Field activities in villages of the Punjab Province, Pakistan and the state of Andhra Pradesh, India demonstrate “models” of good practice that can be replicated elsewhere. Providing Farmer Field School training in the Pakistan projects has led to at least a 50% reduction in pesticide use which means natural predators, insects and birds return to the fields, keeping at bay would-be pests. In India Non-Pesticide Management (NPM) is being tested on some farms to see the effect of using only natural biocides. In both cases farmers are trained to distinguish ‘pest’ insects from ‘pest predator’ insects in the field, and to make their own decisions regarding tillage operations, or the application of water and fertilisers. Similarly, education about pesticide-handling and labelling and disposal of bottles is helping to reduce the incidence of pesticide-related illness.

Policy advocacy, support to agriculture extension departments, and the development of sustainable cotton sourcing with the private sector helps to ensure these models of good practice are recognised and replicated.



Large-scale farmers – Murray-Darling Basin, Australia

Large privately-owned farms predominate in Australia, Brazil and the US; this makes improved farm planning feasible on a large scale. Most farmers belong to an association or producer group which helps in the development and provision of information about better cotton cultivation systems and practices to farmers. The economic and legislative climate may also be more conducive to investment in BMPs such as drip and sprinkler irrigation systems.

Australian cotton farmers have already made substantial progress, as growers have had to become more efficient to stay in business due to water shortages and legislative pressures. For example, the Murray-Darling Basin Integrated Catchment Management Policy (adopted in 2001) aims for healthy rivers and ecosystems and innovative, competitive and ecologically sustainable industries.

The cotton industry has developed a manual of Best Management Practices that outlines safe pesticide handling; integrated pest management; farm design, and land and water management. By the end of 2006, 46% of the Australian cotton crop was being audited according to the best practice guidelines, and application of pesticides had dropped from 7.8 kg of active ingredients per hectare in 1997/98 to 2.8 kg in 2005/06 on average.

WWF’s action in Australia aims to help the implementation of the Best Management Practice guidelines, encourage industry-wide measurement and reporting of environmental performance, and to ensure that some of the water use reductions becomes water saved for rivers and wetlands.





A bird's eye view of better management practices in the field

Reducing pesticide use

Integrated Pest Management (IPM) uses several manual, biological and chemical methods to address pest problems rather than relying solely on pesticide spraying. The Pesticides Trust reports up to 68% reduction in pesticide use on IPM farms with 70% of sites achieving greater yields; preliminary analysis showed that the IPM plots achieved an average of 1500 kg/ha compared to 700 kg/ha in current practice. Seed that is genetically modified e.g. "Bt cotton", is being combined with these IPM practices in several countries. Other systems such as Organic or Non Pesticide Management (used in India), only allow natural biocides, meaning a total elimination of artificial pesticides.



Improving water use

Irrigating better: Flooding the fields is a common practice in many countries which causes substantial water losses through evaporation and overflow at the other end of the field. The cotton crop can also suffer if the roots stand in water for too long. Alternate furrow irrigation, where every other furrow is irrigated reduces the wet soil surface by 50% and thus reduces loss from evaporation. Sprinkler or drip irrigation can result in water savings of 70% or more, allowing water to get slowly to the roots of plants through a system of valves and tubing. A wide range of drip irrigation equipment is available from fully automated systems that cost millions of (US) dollars to install and run on a farm to simple bucket and hose systems which cost a few dollars.

Water "harvesting": Enabling rainwater to be stored for future use or recycling water that runs off irrigated fields can dramatically improve water efficiency and address some of the problems of water irregularity and scarcity faced by farmers. Rainwater harvesting is an old tradition in India and other Asian countries, both on farms and at community level; the latter using shallow mud-walled reservoirs ("tanks") to collect the rainwater during the monsoon season, allowing underground aquifers to slowly recharge.

Increasing soil fertility

"No-till" farming where soils are not ploughed is an important practice that helps conserve soil quality. Similarly the use of organic manures, silt from "tanks", or composts can help increase soil health and hence cotton production while making use of other farm by-products. Integrated Nutrient Management (INM) is a systematic approach that seeks to regain and maintain the nutrient status of soil using organic manures and the judicious use of artificial fertilizers.

Addressing child labour

Child labour on cotton farms and in the textile industry is a key issue for many stakeholders. Rather than boycotting poor cotton farmers whose children work on farms, it is necessary to address the issues of rural poverty - so that child labour is not required - and to build an understanding that children should spend most time at school and at play. In India, social mobilisation, the use of production contracts citing the Prohibition of Child Labour Act, and regular field inspections during the growing season, can help to ensure these conditions are met. Child Rights Protection Forums have been established in the villages of several districts. Some companies offer a reward system to these Forums for compliance and the Forums act as watchdogs, helping to create a 'black list' of villages where requirements are not adhered to.



Genetically Modified (GM) cotton:

At present there are many claims and counter-claims made about the benefits and risks or lack of both in GM cotton. There is already a lot of GM cotton grown – about 30% of all cotton – and this is increasing rapidly in key growing countries such as India. If there are no immediate benefits for farmers – real or perceived – then they will stop using the technology as long as other alternatives are available.

Organic cultivation: Certified organic cotton growing accounts for about 0.2% of world cotton production. Organic cultivation does not allow the use of any synthetic fertilisers, pesticides or GM seeds, and requires other BMPs that increase soil fertility such as manuring and crop rotation. Although average productivity per hectare is generally lower than for conventional cotton – in the USA it is about 30% lower – part of this difference is probably due to production losses during the conversion from conventional farming which takes around three years. Nevertheless organic cultivation may still be a more viable approach for many small-scale farmers as it requires less expenditure on inputs, eliminates health risks associated with pesticides, and farmers also receive a premium payment of about 10-20% above the standard cotton price.

The water crisis and the chance to act now

Estimates are that by 2025, 40% of the world population will face water shortages; agriculture accounts for 70% of water withdrawals on average. WWF works from local to global scale with farmers, traders, manufacturers and retailers, finding solutions together so that “thirsty crops” such as cotton, sugarcane and rice use less water and ultimately help conserve vital ecosystems. In doing so, WWF promotes better social and economic conditions in the cultivation of these crops. Complementing its work on agriculture, WWF has also been active in the conservation of more than 80 million hectares of wetlands since 1999, and in ensuring healthy rivers flowing from source to sea.



Further Information

www.panda.org/agriculture
[click cotton]

www.bettercotton.org
[Better Cotton Initiative]

www.icac.org
[International Cotton Advisory Committee]



The mission of WWF is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by

- conserving the world's biological diversity
- ensuring that the use of renewable natural resources is sustainable
- reducing pollution and wasteful consumption

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