Cleaner, greener cotton

Impacts and better management practices

Cotton: woven in our lives

World-wide 115 million bales of cotton (25 million tonnes) are produced each year which are used to make 45-50% of all clothes, household goods and other commercial products. Cotton accounts for 85% of all natural fibres followed by wool, linen, and hemp. Most other textile products are made with synthetic fibres, of which polyester is the most common; made from oil, polyester uses 3-5 times more energy to produce. Rayon or viscose are made from wood instead of oil, but also consume considerable amounts of energy and chemicals.

Despite its natural origins, and long history of cultivation, action is needed to improve the sustainability of cotton farming. WWF is working to address the key environmental and social issues – making cotton cleaner and greener.

Economically vital

According to an FAO report, based on average export unit values, the value of world cotton output in 2000 was estimated at about US$26.6 billion. Nearly everywhere it is grown, cotton represents an important cash crop for farmers and an economically valuable part of the total economy. In some countries in Central Asia or West Africa, cotton exports represent more than half the value of total exports – in Pakistan cotton and textile products account for 70% of export revenues. In other major cotton producing countries, such as India or China, textile products have traditionally formed a substantial part of export earnings, although the relative importance of textiles is changing rapidly. The value of cotton increases step by step from farm to shop as illustrated in the value chain below.

Trade in cotton and textiles has become less constrained by international rules.
But there are still significant national subsidy programmes for cotton farmers which skew the market and undermine the economies of other countries.

Cotton and subsidies

Cotton has been the subject of several cases at the World Trade Organization due to subsidies paid to farmers in the USA. Some 25,000 cotton farmers in the US receive around US$4 billion per year in subsidies (US$105 per hectare), so while its production costs are US$1.70 per kg, US cotton is sold on the world market at US$1.18. In the European Union, Greece and Spain produce only 2% of world cotton but account for 16% of the world's subsidies. China also provides subsidies to its cotton farmers at US$0.23 per kg.

Since the mid-1990s, world prices for cotton have fallen by 50%. The International Cotton Advisory Committee (ICAC) estimates that the withdrawal of American cotton subsidies would raise world cotton prices by up to 26%. Oxfam reports that subsidies such as those in the USA have pushed the cotton sector of many countries such as Brazil, Mali, and India into a deep crisis by reducing income to millions of small-holder farms.

- 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.
- Overall, African farmers have lost an estimated US$300 million due to depressed commodity prices.

Cotton: some production figures

Nearly **35** million hectares are under cotton cultivation around the world representing about **2.5%** of the world's arable land.

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.

About **25** million tonnes of cotton lint is produced each year of which nearly **40%** is traded internationally.

Cotton is grown in around **100** countries, but 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); the top **10** countries grow about **85%** of all cotton.

The main consuming countries for raw cotton are China, followed by India and Pakistan, making up more than **60%**. Finished products go to every country in the world.

Global production averages **1,670** kg of seed cotton per hectare and **584** kg of lint (raw cotton) per hectare, with the most efficient producers being Israel, attaining **3,827** kg of seed cotton per hectare.

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 Supply Chain

retail shops

cut, sew and finish → clothes and other items

textile producer → cloth (colours)

spinner → yarn

gin (extraction) → fibre

trader

cotton farm → seed cotton

From field to fashion

In most cases it is not possible to trace an item of clothing bought in a shop back to the cotton field where the cotton was grown. This is because cotton fibre from several regions or even countries is blended to achieve consistent yarn quality and there are separate companies, often in different countries, involved at each stage in the supply chain.

The exception to this are products made of 100% certified organic cotton which have a traceable and separated supply chain, but which as a consequence increases the cost of the finished article. Although it has increased more than fivefold since 2001 to 31,000 tonnes in May 2006, certified organic cotton represents only about 0.2% of world cotton production of which about two-thirds is grown in Turkey and India. Products which use certified Fair Trade cotton have also started to enter the market.

Impacts of cotton

Cotton cultivation accounts for about 7% of the total labour force in developing countries and contributes strongly to economic and social development. As a key cash crop it helps provide jobs as well social services, such as primary schools and clinics in many poor areas.

There are various negative social and environmental impacts associated with cotton cultivation worldwide that undermine its sustainability. Cotton is one of agriculture's water-intensive and pest-sensitive crops, mostly grown in semi-arid, water-scarce areas. Its cultivation takes up about 2.5% of global arable land, involves about 20 million farmers, and has been estimated to consume 8-10% of the world's pesticides.

Recently, increased attention has been paid to the social and environmental impacts of clothing, especially with regard to worker conditions in factories and to a certain extent on energy use and waste reduction in textile production.

Attention is also needed at the farm level where the most serious impacts on people and the environment occur, relating to:

- Hazardous chemicals
- Water scarcity
- Habitat loss
- Soil degradation
- Poor working conditions

Hazardous chemicals

Farmers use pesticides because cotton is a plant that is vulnerable to a wide variety of damaging pests that substantially lower crop yields and hence farm income. This has led to the development of an agro-chemical industry around cotton. Although grown on only 2.5% of crop land, cotton cultivation accounts for about 8-10% of global pesticide use. In developing countries around 50% of all pesticides used are for cotton cultivation. Several agro-chemical companies also produce and sell cotton seeds.

In the 1990s, The World Health Organization (WHO) and the International Labour Organization (ILO) suggested that there were several million cases of pesticide poisoning a year in agriculture, resulting in between 20,000 and 40,000 deaths, the vast majority of cases being in developing countries and some of which relate to cotton growing. There are also many reports of groundwater contamination – the main source of drinking water for most rural populations in developing countries. These cases are often worst among poor, illiterate farmers who do not fully understand the risks involved and how to use pesticides in a safe manner. Since all family members are usually involved in some stage of cotton farming in developing countries, this affects men, women and young and old alike.

Cotton: some environmental impacts

About half of global cotton fields are irrigated and account for around three-quarters of global cotton production

8506 litres of water (irrigation and rainfall) are needed on average to grow **1** kg of cotton lint, with a range from **4710** lt/kg (China) to **20217** lt/kg (India).

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.

US$2-3 billion is spent annually on pesticides in cotton cultivation accounting for about **10%** of production costs

Globally cotton accounts for **8-10%** of pesticides and up to **50%** of all pesticides used in developing countries

Countries such as Sudan, India, Brazil and Pakistan still routinely use chemicals that are listed as “highly” or “extremely” hazardous by the WHO and are not recommended for developing countries. These include organophosphates which affect the nervous system, but which are cheaper than newer chemicals and so continue to be used.

• Widespread negative effects from pesticide use have been observed amongst cotton farming communities in Pakistan with repeated cases of poisoning and deaths occurring due to handling of these chemicals. A study by the National Agriculture Research Centre in Pakistan found that one third of groundwater samples in the Punjab Province exceed maximum allowed pesticide residue levels. Around 50% of cotton farmers report pesticide-related sickness in their families.

• In Nicaragua the area under cotton cultivation reached its peak at 220,000 hectares in 1977, but the over-use of pesticides led to the elimination of the natural enemies and pest resistance. By the late 1980s, chemicals accounted for half of farmer’s production costs, making cotton production no longer economically viable and cotton farming now stands at 2,000 hectares. A United Nations study estimated that the social and environmental costs of pesticide over-use in Nicaragua during the cotton boom approached US$200 million per year.

• In 1995, endosulfan-contaminated runoff from cotton farms in Alabama, USA, resulted in the death of more than 240,000 fish along a 25 kilometre stretch of river.

• A study in Andhra Pradesh, India, undertaken as part of the FAO IPM programme in 2003, identified 383 occurrences of pesticide poisoning in three villages, with symptoms of headaches, burning eyes, excessive sweating and vomiting. Severe neurological disorder was reported in 10% of cases such as seizure, staggering gait, tremors and loss of consciousness.

• Pesticide Action Network (PAN) UK reported that more than 50% of cotton workers in Egypt in the 1990s suffered symptoms of chronic pesticide poisoning, including neurological and vision disorders; and that in a 2003-4 survey of 27 cotton farming villages in Senegal 162 people were reported as accidentally poisoned.

• Throughout the Aral Sea Basin in Central Asia, the abundance of pesticides and fertilisers used for cotton farming have accumulated on the now exposed sea-bed. The NGO Médecins Sans Frontières (Doctors without borders) reports that an estimated 43 million metric tonnes of salt and pesticide laden dust is blown into the air each year affecting four million people that live in downstream areas. The high incidence of miscarriages, deformities and massive fish mortality in the Aral Sea area has been linked to pesticide pollution in the rivers and air.

Water scarcity

The water crisis is growing and it is estimated that by 2025 about 40% of the world’s people will face a chronic water shortage. Agriculture is by far the biggest water user accounting for 70% of global water withdrawals on average, with the highest withdrawals occurring in many developing countries. In river basins such as the Indus in Pakistan, the Murray-Darling in Australia and the Amudaria in Central Asia, agriculture accounts for up to 95% of the water taken from rivers for human use of which cotton takes a substantial share.

Water for cotton processing and textile production is also water-intensive using an estimated 378 billion litres of water annually - up to 200 litres of water to process, dye and finish each kilo of textiles (US Environmental Protection Agency). 1 kg of cotton lint, about enough for a pair of jeans, requires about 8500 litres of water on average. This means that to grow the cotton for a pair of jeans needs on average enough water for about 40 baths.

Reduced water flow in rivers and streams affects freshwater ecosystems and the functions and services these ecosystems provide for people and nature:

The reduction in water flow in Indus River over the last 60 years, due mostly to agriculture, has led to a dramatic decline in fish numbers which used to contribute towards the livelihoods of many. Reduced flow and damming of the river has also compromised the existence of the endangered Indus River Dolphin which was found throughout the Indus and its tributaries 100 years ago but now exists in just five isolated sub-populations.

• 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 are now extinct including the sturgeon that produced world-renowned caviar, and many more fish and bird species are close to extinction.

• In 2001, 22 of 23 districts in Andhra Pradesh were declared under drought, affecting nearly two million hectares of cotton farmland and putting tremendous stress on farmers. A New Scientist article reports that two-thirds of India’s crops are now irrigated with groundwater. In Gujarat, water could be tapped at a depth of 10 metres in the 1950s; in contrast, boreholes now drilled as deep as 400 metres may run dry.

• The establishment of environmental flows and water extraction caps in Australia, reduced the water taken from rivers, but increased groundwater abstraction. Australia’s Commonwealth Scientific and Research Organisation (CSIRO), reports that certain groundwater resources were over-exploited in 2001, including aquifers in the Murray-Darling Basin where cotton is grown.

• Spain has been suffering severe water shortages with 2004-05 being the driest in 125 years. Compounding the problem are the half a million illegal boreholes which are used to irrigate agricultural crops, making it difficult for water to be used wisely.

Habitat loss

Much of the land used to cultivate cotton has been in production for generations but other areas have been converted from natural habitats more recently.

• Over 80% of the Tugai Forest in the Amudaria Basin has been destroyed to make way for cotton cultivation. This forest provides an important oasis of shade and moisture in a landscape of Central Asian desert and is vital for many species of wildlife including over 150 bird species which use the forest as a stopover during migration.

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

• Cotton is currently expanding in Brazil's Cerrado, where it is grown in rotation with soy and corn, to the extent that Brazil is expected to become the 2nd largest producer (from 6th) and the world's largest exporter of cotton in the coming decade. As well as impacting the Cerrado ecology, this also displaces other crops and livestock to other regions, such as the Amazon Basin.

• River delta ecosystems typically rely on regular flooding to flush out salt accumulated in the soil. The construction of upstream dams and irrigation systems – for crops including cotton - not only reduces water flow, but also prevents natural flooding events. As well as impacting aquatic species, such as river dolphins, farmers living close to such deltas experience salt water intrusion onto their land rendering the soils useless for cultivation.

Soil degradation

It is estimated that more than 50% of topsoil from all farmland was lost in the last century. This represents an enormous economic loss as well as leads to siltation and pollution downstream. Cotton is grown in hot arid regions and the soil is often of poor quality with organic content less than 1%. This makes the soil fragile and vulnerable to erosion by wind and water. It also encourages farmers to apply high quantities of artificial fertilizers. Unsuitable irrigation or lack of adequate drainage can exacerbate these tendencies and lead to high salt levels in soil which renders them useless for agriculture.

• Poor irrigation techniques such as flooding of the fields leads to salt deposition on fields and over-abstraction of groundwater makes the soil saltier. Half the cultivated land in Uzbekistan has lost productivity due to the salinisation of soil.

• Large areas of farmland in the Murray Darling Basin in Australia are threatened by salt levels which are naturally high but have been made worse by decades of inappropriate farming.

• The remaining extent of the Tugai Forest in Central Asia is threatened by high salt conditions due to cotton irrigation.

Poor working conditions

Long hours, low pay and unsafe labour practices are recognized issues in textile "sweatshops". While some progress has been made in improving labour conditions in certain textile factories, complementary action is needed on farms.

One priority is children working inappropriately for their age group - undertaking hazardous activities involving pesticides or working hours that prevent them from going to school. Similarly there are unsafe working conditions for adult farmers and workers, especially involving pesticides too. There are also problems in several countries with "debt" or "bonded" labour in which farm workers or their families are forced to work to pay off debts to other farmers or to seed/chemical suppliers. Finally there is the late or non payment of farm workers.

• According to a report commissioned for the India Committee of the Netherlands, nearly 450,000 children between six and 14 were employed in cotton fields in India during 2003-04, of which 248,000 were from Andhra Pradesh. Of this 90% were girls and 90% were under debt bondage. Migrant children typically put in 11-13 hours of work per day while local children work for 9-10 hours.

Better Management Practices: solutions for social, environmental and economic sustainability

Significant improvement is required in the way cotton is grown to support development and farmer livelihoods, ensure freshwater for future generations, reduce pollution and illness and reduce impacts on biodiversity. 'Better Management Practices' (BMPs) are locally-adapted farming methods that generally help farmers to improve their profitability while reducing key impacts. The use of 'Better Management Practices' in cotton cultivation help achieve measurable reductions in key environmental impacts while improving social and economic benefits for cotton farmers worldwide.

Reducing pesticide use

Integrated Pest Management

Integrated Pest Management (IPM) uses several manual, biological and chemical methods to address pest problems rather than relying solely on pesticide spraying. Pests are physically picked off the plants or caught using pheromone traps, practices which discourage pests and encourage insect predators, and crop rotations are carefully planned. Pesticides are only sprayed when absolutely necessary, such as in the event of a severe pest attack or at appropriate times during the crop cycle. Many governments and international organisations, such as the UN's Food and Agriculture Organisation, have been promoting IPM with considerable success over recent years.

• The use of IPM techniques relating to cotton in India has resulted in a 60-80% reduction in pesticide use and increased yields translating to cost savings and additional income generation of about US$250 per hectare. An indirect benefit is that women are saved hours of hauling water from up to 3km away for repeated applications of "knapsack" pesticide spraying.

• In Pakistan's Punjab province, cotton farmers have observed a 50% decrease in pest attacks after pesticide sprays were reduced and have seen the return of birds to the fields, picking off insects from the cotton leaves, thus acting as natural pest controls.

• 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.

There are also a variety of other practices that are being used in cotton cultivation that are either steps on the way towards IPM, or which use it in combination with other practices.

• Integrated Nutrient Management (INM) seeks to regain and maintain the nutritional status of soil using organic manures and the judicious use of artificial fertilizers.

• Non-Pesticide Management (NPM), which is being tested by small-scale farmers in Andhra Pradesh, India, uses biological pest control and organic fertilisation.

• There is debate whether LEC ("Lutte Étagé Ciblée") and LS ("Lutte sur Seuil"), which are approaches used in Mali, and Bukina Faso to make chemical spraying more systematic, represent steps towards IPM.

Genetically Modified (GM) cotton

GM cotton seed is used by farmers with the aim of higher yields; GM seed is increasingly used in combination with BMPs such as IPM (above). There are two main ways in which genetic modifications are used in cotton farming: using the Bt gene within cotton seed to provide resistance to bollworm infestation and therefore reduce pesticide applications (Bt-cotton) and manipulation of cotton seed so that the plant is herbicide-resistant (HR-cotton) enabling weed control with specific herbicides. HR-cotton is mostly used in large-scale, mechanised, farming, whereas Bt-cotton is used both on large farms as well as on small farms in many developing countries.

At present there are many claims and counter-claims made about the benefits and risks or lack of both in GM cotton; this is compounded by unlicensed GM seeds being sold on the black market or which are not the seeds that they claim to be. This makes is extremely difficult to find reliable data on GM cotton in many countries however two things are clear:

• 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.

It should also be noted that organic cultivation bans the use of GM seed.

Although there are potential environmental benefits from using GM technologies – combining Bt seed with IPM practices for example - there are also uncertain ecological risks, and higher seed costs for farmers, against which these have to be weighed. In countries where GM seeds are licensed, there is a need for effective ecological monitoring programmes to check whether there are any unforeseen impacts. If these occur, over time or due to cumulative or synergistic effects, regulatory agencies should withdraw licenses for these seeds immediately.

Over the past decade the use in Australia of Ingard and later Bollgard II, popular GM seeds used in conjunction with improved chemical application practices, has helped to reduce the average quantity of active ingredient sprayed per hectare from around 7.8kg to close to 2.7 kg today; for Bollgard II application rates of less than 1 kg are reported.

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. Some organic cotton results:

- Experienced farmers in India, Paraguay, East Africa and Peru report yields which are broadly equivalent to conventional cotton growing.
- In Zimbabwe observed yields were lower in organic systems than conventional, but the profits were higher even for the poorest farmers due to reduced input costs.
- Turkey reports up to 30% lower yields due to problems with defoliation; some Israeli farmers have similar experiences.
- Farmers in Senegal found that a drop in yield with organic cotton was compensated by reduction in input costs and a 30% price premium for the seed cotton.

However, while many environmental problems can be addressed by switching to organic, there are mixed opinions about the future success of organic cotton due to the challenges of growing such a pest-sensitive crop without chemical control. After several years of stable organic cotton production in the US, yields began to decline. Keeping organic cotton separated during processing is also costly unless there is a substantial volume of organic production.

At present organic cotton production is increasing at more than 20% annually due to growing demand from multinational retailers and brands. Whether this trend continues is likely to depend on the longevity of good yields, consumer demand for organic cotton products, the commitment of large companies to organic cotton, and the level of premium payments offered to farmers.

Improving water use

Irrigation efficiency and field preparation

Substantial water savings can be made through improving irrigation efficiency. In many countries only 30-35% of the water withdrawn for irrigation actually reaches the crop and the rest is lost from irrigation channels and fields. Flooding the fields is a common practice in many countries, which causes substantial water losses through evaporation and overflow off the other end of the field. In addition, the cotton crop can suffer if the roots stand in water for too long.

Creating ridges for planting and applying water along the furrows dramatically reduces water use and improves the growth of the plant. Alternate furrow irrigation, where every other furrow is irrigated reduces the wet soil surface by 50% and thus reduces losses from evaporation; this also reduces weeding. Such practices require additional field preparation and seeding efforts which require more investment by a farmer in terms of equipment, fuel and labour. To be economically viable, however, the benefits of increased crop output have to out-weigh these additional costs; this is not always the case where the cost of water for farming is low.

- In Pakistan the use of bed and furrow practices and water "scouting" techniques (to check for water stressed plants or dry soil), to decide whether to irrigate or not, has been demonstrated to save two to four irrigations per farm in each growing season.
- Dramatic water savings of 70% or more can be made with sprinkler or drip irrigation whereby water goes slowly to the roots of plants through a system of valves and tubing, getting precisely to where it is needed. 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. Drip irrigation systems can also be used in combination with land preparation methods such as furrows. To date, drip irrigation still only accounts for less than 1% of irrigated farmland, but this is increasing rapidly as water scarcity increases.
- Israeli farmers using drip irrigation for cotton cultivation achieve the highest yields in the world and use far less water than the most advanced furrow irrigation techniques.

Water storing and recycling

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. The majority of cotton in the Murray-Darling Basin uses tail drains and ditches to capture water which drains off the field to direct the water back into storage for re-use.

Rainwater harvesting is an old tradition on farms and at community level in India and other parts of Asia. Shallow mud-walled reservoirs ("tanks") at the bottom of valleys would be constructed to collect the rainwater during the monsoon season, allowing underground aquifers to slowly recharge. During the dry season the silt collected in the bottom of these "tanks" could be collected, providing nutrient-rich fertiliser for the farms. Even the large city of Bangalore is managing to recharge groundwater aquifers through rehabilitating ancient tanks. On farms similar techniques can be used to hold back and store rainwater water by creating small ponds.

Similarly there are projects in India that are trialling groundwater management schemes among groups of villages that share common aquifers in order to optimise crops planted according to the total water availability.

Cotton: some better management practices

The use of IPM techniques relating to cotton in India has resulted in a **60%-80%** reduction in pesticide use and increased yields translating to cost savings and additional income generation of about **US$250** per hectare.

Alternate furrow irrigation, where every furrow is irrigated, reduces water use by **50%** and also reduces the need for weeding.

Water savings of **70%** or more can be made with sprinkler or drip irrigation whereby water goes slowly to the roots of plants through a system of valves and tubing.

Rainwater harvesting can be used to hold back and store water by creating small ponds.

Better seed varieties often produce greater yields: the 'okra leaf' variety grown under rainfed conditions in Australia regularly generates around **10%** more cotton lint per millimetre of rainfall.

Improved seed varieties

The use of seed varieties - whether traditional, hybrid or GM varieties - with growing periods shorter that the usual 180-210 days will reduce the water requirement of the crop. Similarly varieties can be used that are more water efficient, such as the 'okra leaf' cotton variety which under rainfed conditions in Australia regularly generates around 10% more cotton lint per millimetre of rainfall. However the cost of producing improved seed varieties can be expensive meaning that such seeds may remain beyond the reach of many small-holders.

Integrated Crop Management

Integrated Crop Management (ICM) brings together several of the BMPs outlined above to define a strategy for improved production. ICM looks at energy efficiency, crop rotation, waste and pollution management, monitoring, integrated pest, nutrient and land and water management. ICM typically looks at environmental and agronomic issues, but can also be broadened to include site management and thus incorporate issues such as labour terms and conditions.

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 be at school and be able to 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.


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How WWF is working

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 other involved in the long cotton chain.

Involving the private sector

Cotton is a versatile fibre used in a wide range of end-products world-wide. Even though it has lost some of its market share to synthetic fibres, there will continue to be major consumer demand for cotton in the future. Sensing the growing public and shareholder unease about the impacts of cotton, 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 cotton commodity that is grown with measurably reduced social and environmental impacts.

The BCI is a collaborative global process, involving a wide range of stakeholders from farmers and their representatives along the cotton value chain to brands, and retailers. Local technical working groups will help define what Better Cotton is and how local cotton farmers could grow Better Cotton successfully. BCI will also collaborate with regional and global partners to provide a global perspective and collective tools and identify appropriate international norms.

Once a global Better Cotton system has been defined, it will be tested through regional pilot studies to ensure it is practical, achievable, and has the desired effect of improving the environmental, social, and economic sustainability of cotton farming. BCI is an open initiative and welcomes the involvement of all interested parties. 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 BMPs that are suitable and economically viable in each situation, to help develop education materials, manuals, and training tools, and to spread their use more widely.

Helping farmers to work together in cooperatives or farmer organisations can also mean that farmers gain access to credit facilities and reduce costs through bulk purchasing of seed, fertilisers and machinery. In this way WWF's field projects also help improve the livelihoods of farming families in some of the poorest regions of the world.

The majority of cotton farmers live in developing countries and do not have access to information or training about BMPs. Most also do not currently have the skills, knowledge, confidence or finances to explore new methodologies without support. Supporting farmers is an important strand of WWF's field work, which largely focuses on community-based training programmes such as Farmer Field Schools. This approach ensures that the techniques and skills are developed by the communities themselves. This approach is one that WWF advocates that governments, business and NGO extension services actively encourage.

Making supportive policies

National or state-level policies and regulations can act as an accelerator for cotton BMP adoption or as a constraint. The effective enforcement of regulations regarding which agro-chemicals or cotton seeds may be used is important in this respect.

The policies and plans for increasing the reliability and equitable allocation of water supply for farmers are also critical in many cotton growing countries. WWF is encouraging local policy-makers to consider alternative and sustainable solutions to the growing water crisis, such as traditional water harvesting structures and encouraging the facilitation of BMP approaches by state governments. Ensuring policy solutions are linked to realistic application in the field is critical as is the integration of healthy environmental flows in rivers and social water needs into state-level water policy so that water saved from better practices goes in part to sustaining freshwater ecosystems and resources.

Where WWF is working

WWF is working in several regions where cotton is an important crop in terms of export earnings and livelihood provision and where cotton is also severely threatening valuable ecosystems. Our project approaches are locally adapted to take into account the income and education levels of farmers and other stakeholders, the policy environment and the level of industry support for BMPs.

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 in partnership with the private sector and with funding from the European Commission.

Field activities are taking place in villages of the Punjab Province, Pakistan and the state of Andhra Pradesh, India to demonstrate "models" of good practice that can be replicated elsewhere. Providing Farmer Field School training in the Pakistan projects have led to at least a 50% reduction in pesticide use which mean 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, through Women's Open Schools, has successfully reduced the incidence of pesticide-related illness and created a sense of empowerment among women. There is greater understanding that they and their children should not work in the fields during and after crop spraying and that it is not safe to use empty pesticide bottles for storage of foodstuffs, such as rice and sugar.

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


WWF
STEEL TAPE

Large-scale farmers – Murray-Darling Basin, Australia

Large privately-owned farms up to hundreds or thousands of hectares predominate in Australia, Brazil and the USA; 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. However, even in these countries, the cost of water can still be so cheap that farmers are unwilling to spend money on becoming more sustainable.

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 Ha 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.

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.

www.panda.org/freshwater

Further information

Web

www.panda.org/agriculture [click cotton]

www.bettercotton.org [Better Cotton Initiative]

www.icac.org [International Cotton Advisory Committee]

www.organicexchange.org [Organic Cotton]

www.fao.org/ag/AGP/AGPP/IPM [United Nations Food and Agriculture Organisation – IPM programme]

www.pan-international.org [Pesticides Action Network]

Reports

World Agriculture and the Environment: A Commodity by Commodity Guide to Impacts and Practices.
(Jason Clay, April 2004)

Better Management Practices and Agribusiness Commodities, Phase Two: Commodity Guides.
(Research Report for IFC Corporate Citizenship Facility and WWF-US, March 2004)

Agriculture Water Use and River Basin Conservation.
(WWF, 2003)

'Thirsty Crops' – our food and clothes: eating up nature and wearing out the environment.
(WWF, 2003)

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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