



REPORT

IND

2012

THIS PUBLICATION  
HAS BEEN PUBLISHED  
IN PARTNERSHIP WITH:



# COTTON MARKET AND SUSTAINABILITY IN INDIA

The publication is a part of the European Union funded project 'Reducing the Impact of Water – Intensive & Polluting Crops: Sustainable Sources of Freshwater to Support the Livelihoods of Poor Communities in the Godavari Basin, India' and is supported by WWF-UK.

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The authors express their grateful thanks to Mr. Mahesh Ramakrishnan, Arvind Limited, Mr. Ravi Singh and Dr. Sejal Worah, WWF-India for their comments and feedback, and Mr. Lovekesh Wadhwala, Mr. Vamshi Krishna, Mr. Sudhir Patil and Mr. Sushil Pal from WWF-India for their constant support to the programme.

Printed by: Galaxy Offset India Pvt. Ltd.

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# COTTON MARKET AND SUSTAINABILITY IN INDIA



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APMC	Agriculture Produce Marketing Committee
BCI	Better Cotton Initiative
BCM	Billion Cubic Meter
BMPs	Better Management Practices
CAGR	Compound Annual Growth Rate
CCI	Cotton Corporation of India
ELS	Extra Long Staple
EU	European Union
GDP	Gross Domestic Product
GHG	Green House Gas
GoI	Government of India
GUJ	Gujarat
Ha:	Hectares
ICA	International Cotton Association
ICAC	International Cotton Advisory Committee
INM	Integrated Nutrient Management
IPM	Integrated Pest Management
IWM	Integrated Water Management
IWR	Irrigation Water Requirement
Kg:	Kilogram
MAH	Maharashtra
mha:	Million Hectares
MoWR	Ministry of Water Resources
MT	Metric Tons
N:	Nitrogen
NPM	Non-Pesticide Management
NRC	National Research Council
OGL	Open General License
TMC	Technology Mission on Cotton
TUFS	Technology Upgradation Fund Scheme
UNCTAD	United Nations Conference on Trade & Development
USDA	United States Department of Agriculture
WF	Water Footprint
WWF	World Wide Fund for Nature

# FOREWORD

Cotton is an important agricultural commodity, traded all over the world. India has progressed substantially in improving both production and productivity of cotton over the last five years, transforming from a net importer of cotton, to becoming one of the largest exporters, shipping 5.5 million bales in 2010-11, second only to the USA.

Cotton cultivation is a very important part of the Indian agrarian landscape and provides sustainable livelihood to a sizeable population in India. Cotton is cultivated in about 10.31 million hectares in the country, which accounts for 30% of the global cotton area and contributes to 22% of the global cotton produce. It is estimated that more than 5.8 million farmers cultivate cotton in India and about 40-50 million people are employed directly or indirectly by the cotton industry. Government initiatives like the Technology Mission on Cotton and Technology Upgradation Fund Scheme have improved the marketability of the farm produce and helped in modernizing and upgrading the ginning and pressing factories. These initiatives have led to appreciable improvement in the quality of cotton bales, which in turn have proven beneficial for the textile industry. Furthermore, growing disposable incomes have also accelerated domestic consumption, increasing demand within the country as well.

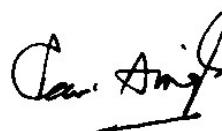
However, the value chain of cotton right from the farmer level till the end-user level is beset by problems of inefficiency, wastage, contamination in the form of trash content, as well as unsustainable use of inputs, such as water, pesticides and fertilisers.

To meet the current demand as well as address the demand growth in the future, the value chain of cotton has to be improved. This is possible through appropriate input management, improved supply chain management, backward linkages, standardisation of trade practices and achieving economies of scale by incorporating sustainable agricultural practices.

Paramount in this endeavor is the need to incorporate such sustainable practices in cotton production, so as to ensure social, economic and environmental benefit to all stakeholders in the value chain. Agriculture accounts for over 80 % of total water usage and cotton is a water intensive crop that has implications on the hydrological balance of some areas. About 45 % of pesticides in India are used for cotton alone. In order to achieve sustainable growth, there is a need to balance both the economic and ecological factors influencing cotton cultivation.

This report "Cotton Market and Sustainability in India", jointly developed by Worldwide Fund for Nature – India (WWF – India) and YES BANK, outlines the cotton market scenarios and, environmental effects of current agricultural practices.

It also identifies specific tasks, which could build a foundation for sustainable cotton development. The rationale for this Report is to generate awareness on the issue of sustainability in cotton production among the policy makers, industry leaders and other stakeholders, to take substantial steps in promoting sustainable cotton production.



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SG & CEO  
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Founder, MD & CEO  
YES BANK

# EXECUTIVE SUMMARY

Cotton is an important agricultural commodity, both globally as well as domestically. In many developing and underdeveloped countries, cotton exports are not only a source of vital foreign exchange earnings, but also account for a substantial proportion of their GDP and tax income, leading to significant economic and social development.

About 70% of the global cotton production comes from 4 countries, which include China (27%), India (22%), USA (13%) and Pakistan (8%). In the current year 2011-12, world cotton production is expected to rise by 7% to 26.7 million MT over last year (being the largest crop since 2004/05). The production increase will be driven primarily by China, followed by India and Pakistan. According to the USDA estimates, China's production is expected to rise by 8% to 7.2 million MT, India's by 6% to 5.9 million MT and Pakistan's by 17% to 2.2 million MT in 2011-2012<sup>1</sup>.

India is a major producer of cotton and is also the 2nd largest exporter after the USA. It accounts for around 59% share in the raw material consumption basket of the Indian textile industry. Thus, cotton plays a major role in sustaining the livelihood of an estimated 5.8 million cotton farmers and about 40-50 million people engaged in related activities, such as cotton processing and trade. India has the largest cotton cultivated area, which constitutes about 30% of the global cotton area. India's cotton production has increased at a CAGR of 8.5% from 2003 to 2010. In 2001, India was a net importer of cotton. Within 7 years, five million Indian cotton farmers have made India the world's second largest producer and second largest exporter of cotton (ahead of USA, behind China), by doubling India's cotton production.

Globally, demand for cotton has led to more than threefold increase in its production since 1950s. However, this increase in production has been achieved through intense input application, use of which has most often overlooked environmental impacts. Some of these unsustainable production practices include indiscriminate use of pesticides and fertilisers, inefficient use of irrigated water, with no regard to water quality or water use. Agriculture accounts for 83% of total water usage. While cotton is a water intensive crop, it's the quality of the water that is most affected by its cultivation, due to leaching and run off chemicals in ground and surface water. These environmental impacts associated with cotton production are increasingly coming into focus and reiterating the need for sustainable production systems.

Today about 90% of cotton in India is BT cotton<sup>2</sup>. We recognize the complexity of the issue related to genetically modified seeds and the deep divide between different stakeholders on this issue. However, in the case of this report we have kept the seed debate outside of the scope of this study, as we believe that it requires a comprehensive report unto itself. Instead, the focus of this study is to highlight unsustainable practices related to inputs such as water, pesticides and fertilisers and their environmental and health impacts. The report also focuses on the rational for Better Management Practices , such as Non-Pesticide Management, Integrated Pest Management, Integrated Nutrient Management, and Integrated Water Management that essentially lessen the burden of inputs and environmental impacts, while increasing productivity.

Over the years, WWF- India has been working with farmers to produce more sustainable cotton, by offering farmers to understand these Better Management Practices (BMPs) that equip them to produce quality cotton, sustainably. These BMPs have fed into global initiatives, such as the Better Cotton Initiative. BCI is a global voluntary initiative, supported by a range of stakeholders, such as producers, global retailers, traders, and financial institutions. The purpose of BCI is to promote measurable improvements in the key environmental and social impacts of cotton cultivation by mainstreaming sustainable production practices.

The purpose of this report is to provide an overview of the cotton market and the need for sustainable agricultural practices that would balance economic, social and environmental factors.

<sup>1</sup> International Cotton Advisory Committee (ICAC) and FAS-USDA

<sup>2</sup> Genetically modified cotton seed

# INTRODUCTION

Cotton, a warm climate crop, is essentially produced for its fibre, which is a raw material for producing cotton yarn in textile industry.

Cotton is a member of the order Malvales, family Malvaceae, genus *Gossypium* consists of 50 wild and cultivated species, out of which only four are grown on a commercial scale in the world. *G. hirsutum* and *G. barbadense* account for about 95% and 3% of world production respectively, while *G. arboreum* and *G. herbaceum* account for about 2% of world production. Extra long staple cotton -Egyptian, Pima (American Egyptian) and Sea Island- belong to the species *G. barbadense*. Roughly about 90% of world cotton production is accounted in the Northern hemisphere with more than 100 countries growing cotton.

Cotton is an important agricultural commodity, heavily traded in more than 150 countries. In many developing and underdeveloped countries, cotton exports are not only a vital source for generating foreign exchange earnings, but also account for a significant proportion of their GDP and tax income, leading to significant economic and social development. Today, 37 of the 53 African countries produce cotton and 30 of them are exporters.

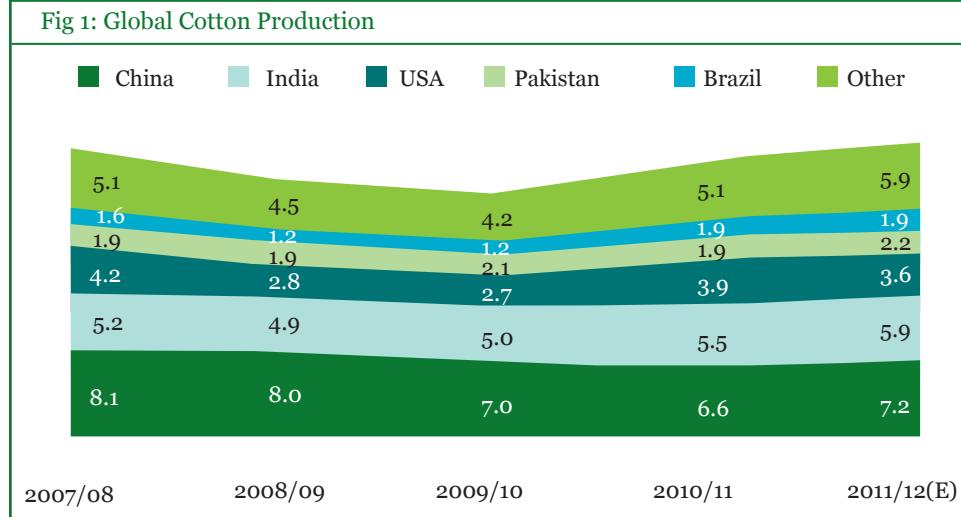


# 1. GLOBAL COTTON PRODUCTION

Prior to 2008, the world cotton industry had been experiencing robust demand growth and rising yields. Over the last 60 years, cotton production once almost quadrupled, from 7 million tons in 1950/51 to 27 million tons in 2006/07, but declined thereafter to 22 million in 2009/10. The introduction and adoption of new technologies and expansion of the area under cotton has resulted in significant production gains in the world.

About 70% of the global cotton production comes from 4 countries, which include China (27%), India (22%), USA (13%) and Pakistan (8%). In the current year 2011-12, world cotton production is expected to rise by 7% to 26.7 million MT over last year (being the largest crop since 2004/05). The production increase will be driven primarily by China, followed by India and Pakistan. According to the USDA estimated, China's production is expected to rise by 8% to 7.2 million MT, India's by 6% to 5.9 million MT and Pakistan's by 17% to 2.2 million MT in 2011-2012.<sup>3</sup>

Fig 1: Global Cotton Production



Source: ICAC, USDA  
Source: ICAC, USDA

# 2. GLOBAL COTTON TRADE FLOW

China is the largest cotton producer, consumer and importer. As seen in the table below, the top consuming countries after China are India, Pakistan, Brazil, USA and Bangladesh. To meet its cotton consumption demand of 10 million MT, China imported 2.6 million MT in 2010-2011, which contributed to about 34% of world imports.

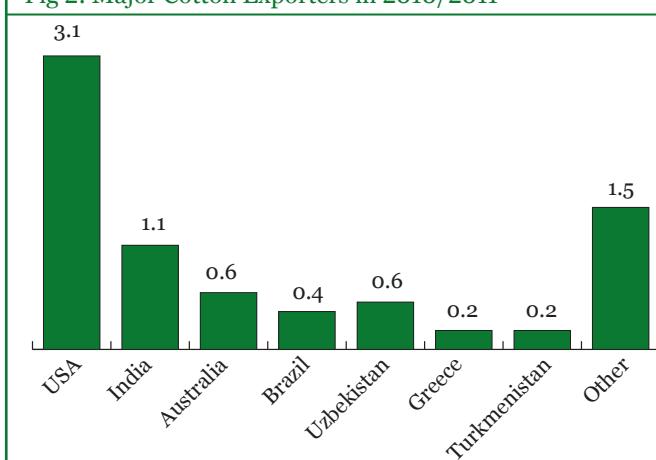
Top cotton importing nations apart from China include Bangladesh (0.76 million MT), Turkey (0.74 million MT), Indonesia (0.39 million MT), Thailand (0.38 million MT), Vietnam (0.36 million MT) and South Korea (0.23 million MT).

Table 1: Cotton Consumption Ranking

Countries	Cotton Consumption 2010-11 (million MT)	World Cotton Consumption share (%)
China	10	40%
India	4.4	18%
Pakistan	2.2	9%
Turkey	1.3	5%
Brazil	1.0	4%
USA	0.8	3%
Bangladesh	0.8	3%
Other	4.4	18%
<b>TOTAL</b>	<b>24.8</b>	<b>100%</b>

Source: USDA and YES BANK Research

Fig 2: Major Cotton Exporters in 2010/2011



Source: USDA

The major cotton exporting nations were USA (ranked 1st with 3.1 million MT cotton exported in 2010-11), contributing about 41% of world's total exports followed by India (1.1 million MT- 14% of total export), Australia (0.6 million MT),

<sup>3</sup> International Cotton Advisory Committee (ICAC) and FAS-USDA

Brazil (0.4 million MT), Uzbekistan (0.6 million MT), Greece (0.2 million MT), Turkmenistan (0.2 million MT), as illustrated in the graph above.

**Table 2: Major Cotton Export Destinations**

Exporting country	Destinations
USA	About 79% of US cotton production is exported majorly to Asian countries: China, Turkey, Indonesia, Thailand, Pakistan and the rest to Mexico
West Africa	80% of exports are sent to Asia - China, Indonesia and Thailand
Uzbekistan	China, Bangladesh, Russian Federation and EU
Australia	Cotton export on a rise, main destinations: Indonesia, China and Thailand
Egypt	<p>Egyptian exports are well distributed among country groups (developing/ developed). This fact is mainly explained by the specificity of Egyptian cotton fibers.</p> <ul style="list-style-type: none"> <li>Developing countries: 98% of Egyptian cotton fibers are exported to Asia mainly to India (34%), Pakistan (18%), China and Turkey (9% each) and Thailand (7%) in the lead.</li> <li>Developed countries: The EU is the main market for Egyptian cotton and accounts for 56% to developed countries.</li> </ul>

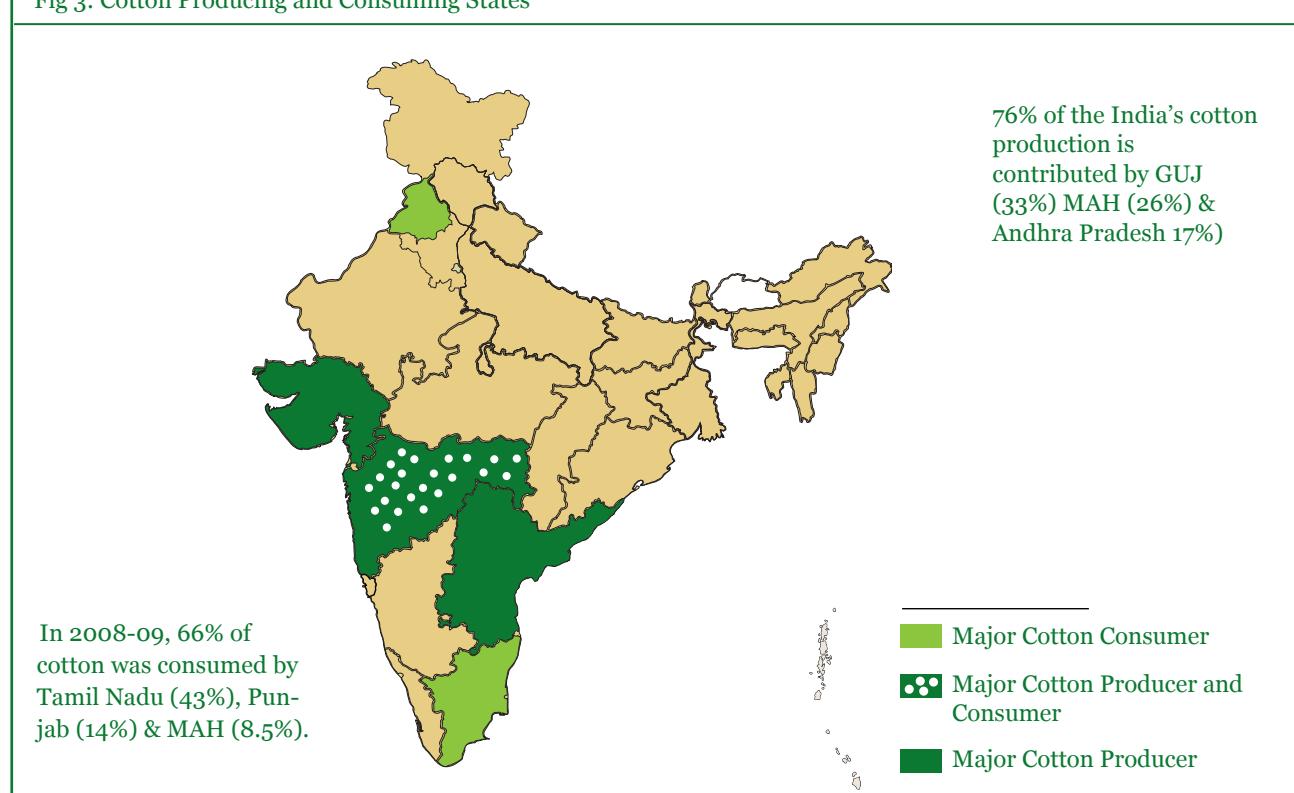
Source: UNCTAD and YES BANK Research

### 3. INDIAN COTTON SCENARIO

Cotton has around 59% share in the raw material consumption basket of the Indian textile industry. It plays a major role in sustaining the livelihood of an estimated 5.8 million cotton farmers and about 40-50 million people engaged in related activities, such as cotton processing and trade<sup>4</sup>. India has the largest cotton cultivated area which constitutes about 30% of the global cotton area.

The planting period in India takes place from March to September, while harvesting takes place from October to February. Cotton is produced in 3 zones, the Northern zone, comprising the states of Punjab, Haryana and Rajasthan, the Central zone, comprising Maharashtra, Madhya Pradesh and Gujarat and the Southern zone, comprising Andhra Pradesh, Karnataka and Tamil Nadu.

**Fig 3: Cotton Producing and Consuming States**



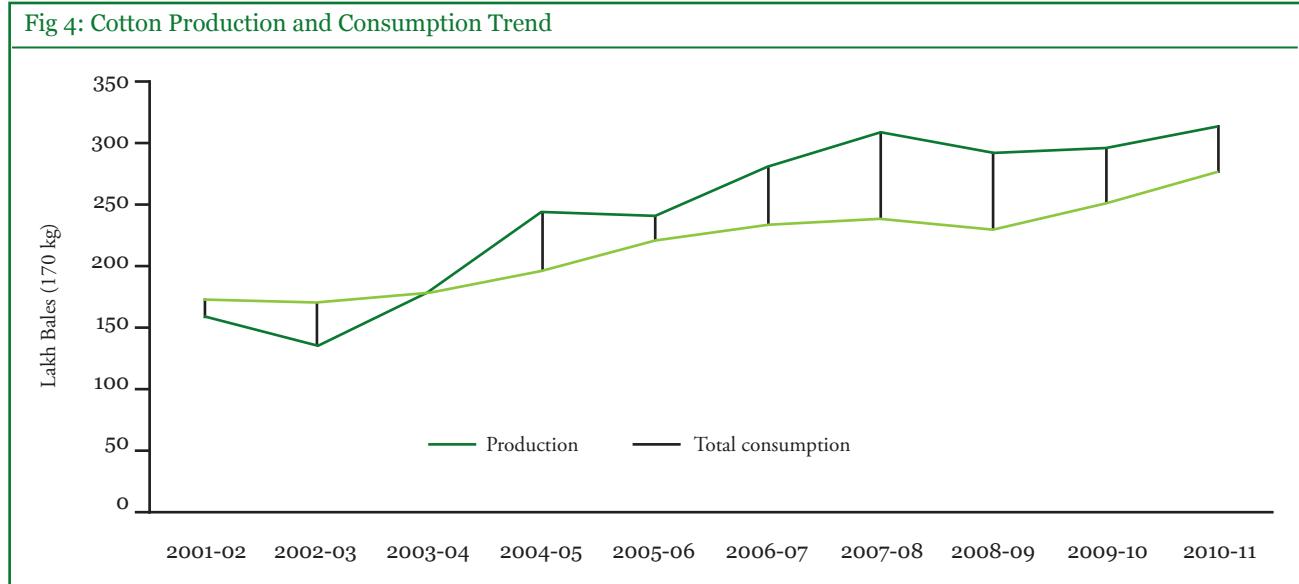
Source: YES BANK Research

<sup>4</sup> Ministry of Textiles report on Cotton fibre

### 3.1 Indian Cotton Production

Over the past 10 years, Indian cotton production grew with a CAGR of 7% to reach 31.2 million bales in 2010-11. In 2001, India was a net importer of cotton and as a result of a range of initiatives, such as better technology, seeds, nutrient management, irrigation and governmental initiatives, five million Indian cotton farmers have made India the world's second largest producer and second largest exporter of cotton (ahead of USA, behind China) by doubling India's cotton production.

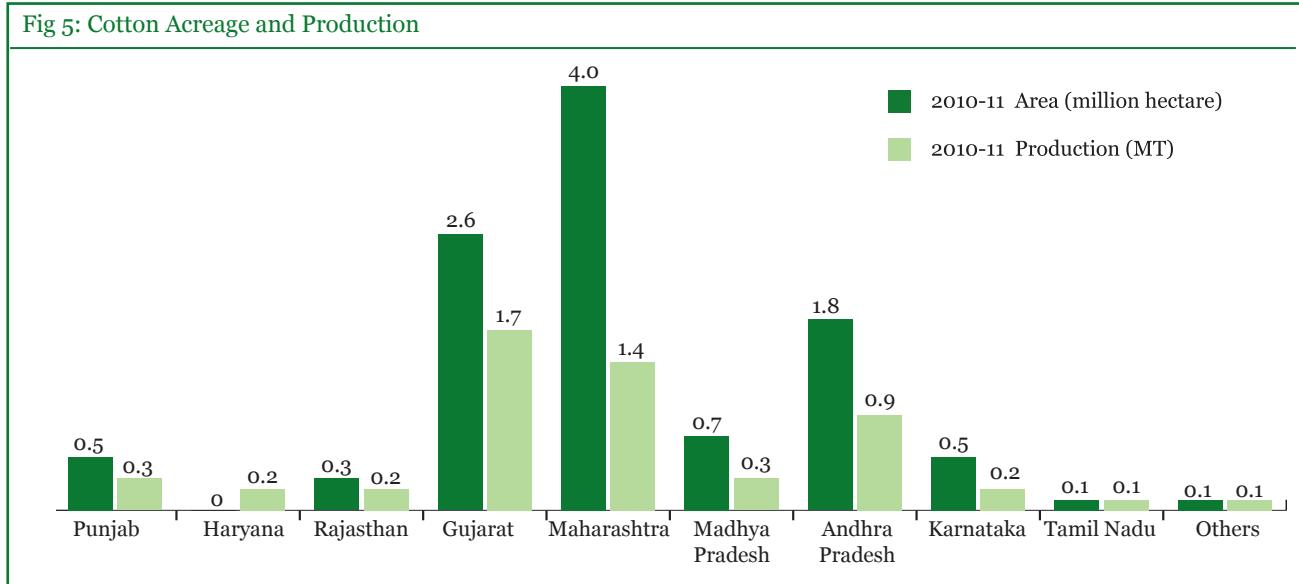
Fig 4: Cotton Production and Consumption Trend



Source: Central Institute for Cotton Research, Ministry of Textiles, Government of India

About 76% of total cotton production is contributed by 3 states: Gujarat (33%), Maharashtra (26%) and Andhra Pradesh (17%), whereas 70% of cotton is consumed by spinning mills located in Tamil Nadu (43%), Maharashtra (17.5%) and Punjab (8.5%).

Fig 5: Cotton Acreage and Production



Source: Central Institute for Cotton Research, Ministry of Textiles, Government of India

Approximately 65% of India's cotton is produced on rain-fed areas. India is the only country to grow all four species of cultivated cotton: *Gossypium arboreum* and *G.herbaceum* (Asian cotton), *G.barbadense* (Egyptian cotton) and *G.hirsutum* (American Upland cotton). *Gossypium hirsutum* represents 90% of the hybrid cotton production in India.

However, based on fibre parameters such as length, uniformity, micronaire, strength, short fibre content, neps and seed-coat fragments, various varieties are valued differently. India produces a large number of cotton varieties and hybrids.

**Table 3: Zone-wise cotton cultivation and production**

Zones	North Zone	Central Zone	South Zone
States	Punjab, Haryana, Rajasthan	Maharashtra, Madhya Pradesh, Gujarat, Orissa	Andhra Pradesh, Karnataka, Tamil Nadu
Area	1.36 Million hectares	7.26 Million hectares	2.44 Million hectares
Production (170kg bale)	3.9 Million bales	20.1 Million bales	6.8 Million bales
Productivity	484 kg/ha	483 kg/ha	493 kg/ha
Conditions	100% irrigated	Irrigated and rainfed	Irrigated and rainfed
Nature of Genotype	Hybrids and varieties	Hybrids and varieties	Hybrids and varieties
Species	G. hirsutum, G. arboreum	G. hirsutum, G. arboreum, Intra hirsutum, G. Herbaceum	G. hirsutum, G. arboreum, G. herbaceum, G. barbadense, Interspecific tetraploids (HB)
Major Insect/Pest	Heliothis, Whitefly, Jassids, Pink bollworm, Mealy bug	Heliothis, Whitefly, Jassids, Aphids, Pink bollworm, Mealy bug	Heliothis, Whitefly, Jassids, Aphids, Pink bollworm
Diseases	Leaf curl virus, Wilt	Wilt	Wilt, Foliar disease
Sowing Method	Drill Sown	Hand dibbling	Hand dibbling
Time of Sowing	April-June	June-July	July-August

Source: Cotton Corporation of India

The major ones are illustrated in table 4.

The quality of cotton fibre in the bale depends on many factors including variety, weather conditions, cultural practices, harvesting and storage practices, moisture and trash content, ginning processes, and post-baling storage and handling practices. Enormous differences exist around the world in terms of cotton production, harvesting and ginning practices. About 70% of the over 100 million bales of cotton produced globally are harvested by hand. Although 40 countries harvest some cotton by machine, only three (USA, Australia and Israel) harvest 100% by machine.

**Table 4: Cotton Varieties (Including Hybrids)**

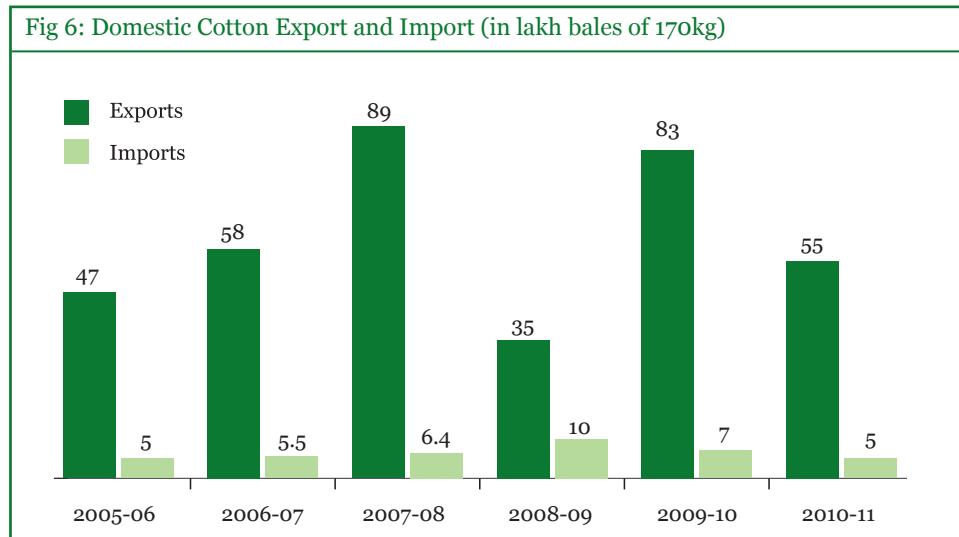
Sr.	Variety	Staple Length (2.5% span length)	Micronaire	MSP (INR/Q/L)
<b>Short Staple (20 mm &amp; below)</b>				
1	Assam Comilla	<20mm	7.8-8.0	2000
2	Bengal Desi	<20mm	6.8-7.2	2000
<b>Medium Staple (20.5 mm to 24.5 mm)</b>				
3	V-797	21.5-23.5	4.2-6.0	2300
4	Jayadhar	21.5-22.5	4.8-5.8	2250
5	G. Cot 12/13	21.5-23.5	4.2-6.0	2300
6	AK/Y-1	23.5-24.5	3.0-5.5	2350
7	PCO-2 (AP & Karnataka)	23.5-24.5	3.4-5.5	2350
<b>Medium long staple (25.0mm to 27.0mm)</b>				
8	F-414/H-777/J-34 Raj	24.5-25.5	4.3-5.1	2500
9	F-414/H-777/J-34 Hy Raj	26.5-27.0	3.4-4.9	2750
10	F414/H-777/J-34 Hy (Har)	26.5-27.0	3.8-4.8	2750
11	LRA-5166	26.0-26.5	3.4-4.9	2600
<b>Long Staple (27.5 to 32.0mm)</b>				
11	F414/H-777/J-34 Hy (PJ)	27.5-28.5	4.0-4.8	2800
12	JKHY-1/MECH	27.5-28.5	3.5-4.7	
13	H-4/H-6	27.5-28.5	3.5-4.7	2850
14	SANKAR 6/10(SAU)	27.5-29.0	-	-

Table 4: Zone-wise cotton cultivation and production (Continued)				
Sr.	Variety	Staple Length (2.5% span length)	Micronaire	MSP (INR/Q/L)
<b>Long Staple (27.5 to 32.0mm)</b>				
20	SANKAR 6/10(Guj)	27.5-29.0	3.6-4.8	2850
21	Bunny Brahma	29.5-30.5	3.5-4.3	—
22	Brahma	29.5-30.5	—	3000
23	Bunny	29.5-30.5	—	3000
<b>Extra Long staple (32.5mm &amp; above)</b>				
24	MCU-5	32.5-33.5	3.2-4.3	3200
25	DCH-32(MP)	34.0-36.0	3.0-3.5	3400
26	DCH-32(South)	34.0-36.0	3.0-3.5	3400
27	Suvin	37.0-39.0	3.2-3.6	4200
28	RCH-2	30.00mm	—	2850

Source: Office of the Textile Commissioner, Mumbai

### 3.2 Indian Cotton Export and Import Trade Flow

Cotton consumption has witnessed a sustained increase since 2003-04 onwards due to growing demand for Indian textiles and subsequently, there has been considerable expansion and modernisation of the textile mills. Even though the Indian cotton consumption has increased at a rapid pace in the last few years, it has not kept pace with the growth in domestic cotton production, which has led to a surplus of production since 2003-2004. As a result, India has emerged as one of the top exporters of raw cotton in the world. Currently, India is the second-largest exporter of cotton after the USA and mainly catering to markets in Bangladesh, China and Pakistan.



Source: Cotton Advisory Board

Table 5: Cotton Export and Imports (Volume)				
Cotton Year	Quantity (lakh bales of 170 kgs)	Est. Value (INR in Crores)	Quantity (lakh bales of 170 kgs)	Est. Value (INR in Crores)
2005-06	47	3951	5	696
2006-07	58	5267	5.5	752
2007-08	89	8366	6.4	986
2008-09	35	3837	10	1378
2009-10	83	10270	7	1196
2010-11	55	NA	5	NA

Source: Cotton Advisory Board

## 4. COTTON SUPPLY CHAIN IN INDIA

The Indian cotton value chain, which begins with fibre production, post procurement of raw cotton, culminates in textile and garment products, is very complex in structure with a profusion of numerous small-scale, decentralised and fragmented units along with some large-sized integrated enterprises, also known as composite mills. The small-scale sector is largely unorganised and labour-intensive, whereas large-scale enterprises are mostly organised and capital-intensive. In the last few years, the industry has witnessed considerable expansion, integration and technological upgradation with several integrated players in the industry, who manufacture two or more products.

The Agriculture Produce Marketing Committee (APMC) is the primary market infrastructure in the country through which cotton is marketed. The main functions of these markets or mandis is to regulate market practices such as weighing, process of sale, method of grading, payment process, etc. APMCs also provide facilities for storage, boarding and lodging for buyers, sellers, etc. This committee charges 1% of the goods value as fees from the buyers. The marketing committee, which runs the market, consists of both buyers and sellers who have the responsibility of maintaining and developing the market yard for its users. In India, currently there are around 7,062 mandis that are functional.

The three marketing agencies engaged in cotton trade are:

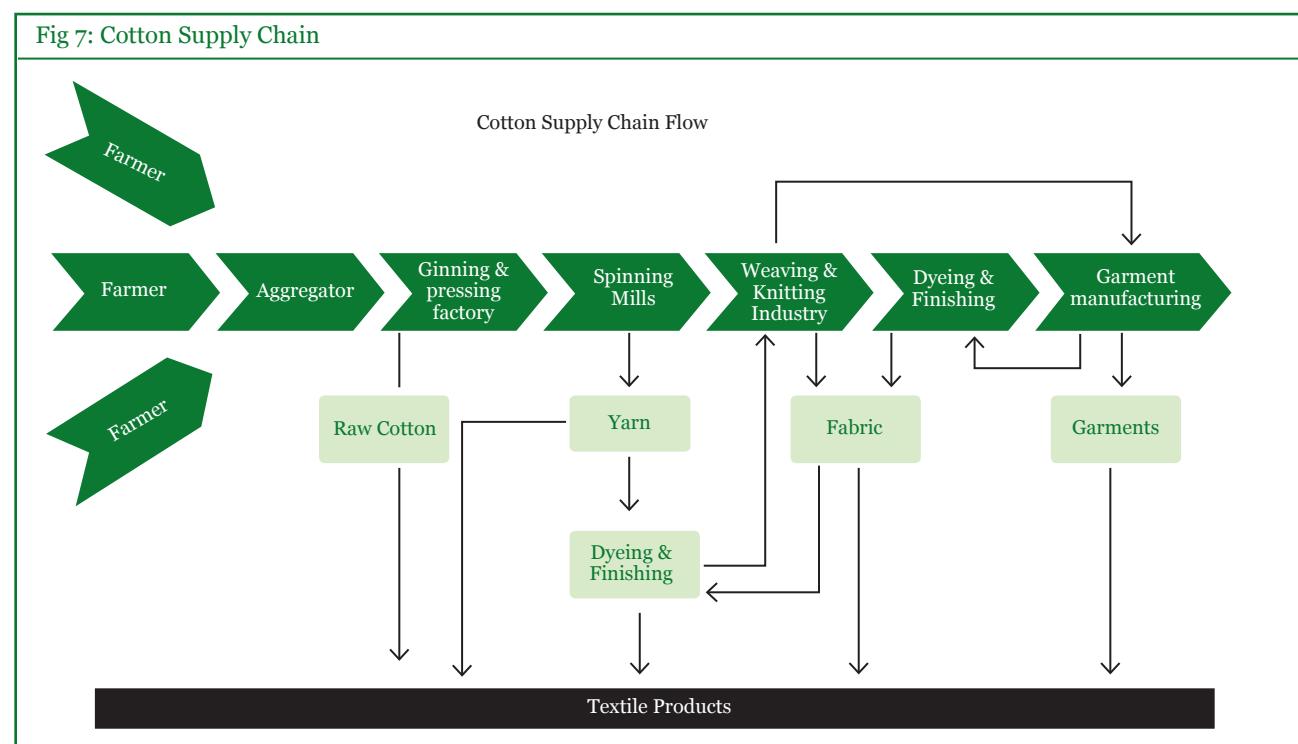
1. Private sector comprising traders, owners of ginneries operating as individual business proprietors, partnership firms and private limited companies
2. Public sector agencies like the Cotton Corporation of India (CCI)
3. Co-operative sector

It has been estimated that approximately 80% of the marketed surplus of kapas and lint is handled by the private marketing channels and the remaining 20% by the institutional marketing channels including co-operatives and Cotton Corporation of India (CCI).

In private setup, farmers sell cotton directly to ginners, primarily in the form of kapas (raw cotton or seed cotton). Recently, aggregators have started to play a major role in collecting raw cotton from farm gate of 10-15 farmers and in selling the consolidated produce to ginners in a radius of 100-150 km. Sometimes if the prices are attractive the consolidated cotton is dispatched to over 200 km from Maharashtra to Gujarat.

### Fibre to Fabric supply chain:

- Cotton from farms is processed to extract fibre from the seed in a ginning unit and the lint is packed in 170 kg bales.



- These bales are loaded and transported to spinning mills to manufacture yarn.
- Yarn is a raw material used by weaving units to manufacture grey fabric.
- Grey fabric is dyed and finished for providing color and property to the cloth in process houses.
- Finally, the dyed and finished cloth is used in the garment manufacturing unit to stitch various clothes.

## 5. GOVERNMENT INITIATIVES

The Government of India (GoI) has endeavored to promote domestic cotton production, processing as well as consumption.

Some of the key policy initiatives are summarized as below:

### 5.1 National Textile Policy (NTP) 2000:

In 2000, GoI announced the National Textile Policy – 2000, which replaced the previous Textile Policy of 1985. One of the main objectives of the new policy is to enable the textile industry to attain and sustain a pre-eminent global standing in manufacture and export of clothing.

For development of cotton sector the policy endeavoured to:

- Increase cotton productivity and upgrade its quality to international standards, through effective implementation of the Technology Mission on Cotton
- Reduce the ratio between cotton to non-cotton fibres in line with international trends
- Encourage full fibre flexibility between cotton and man-made fibres

Table 6: National Textile Policy, 2000—A snapshot

Objectives	Measures introduced	Impact/progress
Increasing output	De-reservation of garments and knitting from Small Scale Industries	Growth in hosiery segment
Technological Up-gradation	Implementation of TUFS, covering all manufacturing segments of the industry	Slow progress initially, but picked up pace in recent times—major capacity expansions underway
Productivity enhancement	Implementation of Technology Mission on Cotton and Technology Mission on Jute	Strengthening of raw material base for the industry
Quality improvement Strengthening raw material base	Reviving textile research associations (TRAs) to focus research on industry needs	Substantial increase in cotton production, though no major progress in jute production
Infrastructure development	Encouraging private sector to set up world-class, environment-friendly, integrated textile complexes and textile processing units	40 textiles park projects have been approved by the Ministry of Textiles.
Product diversification	Strengthen and encourage the handloom industry to produce value-added items	No major progress in terms of product diversification
Export expansion	Marketing assistance to the industry to forge joint ventures to secure global markets	Increased interaction between Indian textile industry and foreign counterparts through participation in foreign exhibitions and delegate visits
Employment generation	Setting up a venture capital fund for tapping knowledge-based entrepreneurs of the industry Re-design and revamp schemes and programmes initiated in the handloom, sericulture, handicrafts, and jute sectors to ensure better returns for those from the disadvantaged categories	
Human resource development	Strengthening HRD institutions, including NIFT, on innovative lines	Development of skilled labour in the industry

Source: Ministry of Textiles, Government of India

- Encourage modernisation of the spinning sector
- Liberalise and encourage export of cotton yarn

The objectives and measures introduced by the government in National Textile Policy and their impacts are summarized below.

## 5.2 Technology Upgradation Fund Scheme (TUFS):

The TUFS was launched in April 1999, by the GoI, in order to modernize the textile industry as well as increase its competitiveness. Under the scheme, textile firms across segments could avail of loans for technological upgradation at lower interest rates. The scheme has been so popular that the industry asked for an extension of the scheme, which was originally set to expire by March 2007. The government has now extended this scheme for another 5 years, i.e. until FY12. Some of the incentives provided under this scheme included:

- a. Interest reimbursement at the rate of 5% of the normal interest rate charged by the lending agency or rupee term loan, or
- b. Coverage of 5% exchange fluctuation (interest and repayment) from the base rate on foreign currency loan, or
- c. Credit-linked capital subsidy of 15% for SSI textile and jute sector, or
- d. Credit-linked capital subsidy of 20% for the powerloom sector, or
- e. Interest reimbursement at the rate of 5% plus 10% capital subsidy for specified processing machinery.

## 5.3 Technology Mission on Cotton (TMC) 2000

TMC was launched in February 2000 with the primary objective of improving production, productivity and quality of cotton in India. The TMC was structured into four mini missions, which were implemented by different nodal agencies. The following table describes the Technology Mission on Cotton (TMC) in brief.

**Table 7: Technology Mission on Cotton – A snapshot**

Technology Mission on Cotton (TMC)		
Mission	Focus	Output
Mini Mission I	Research	Development of new genotypes to improve quality of cotton and cotton yarn in the country
Mini Mission II	Technology dissemination programs for farmers	Extension services and distribution of improved seed varieties
Mini Mission III	Improvements in market infrastructure	161 Market yards (out of sanctioned 250 market yards) were modernised to avoid cotton contamination
Mini Mission IV	Modernisation of the ginning and pressing sector	829 ginning and pressing factories (out of targeted 993 projects) were modernised

*Source: Ministry of Textiles, Government of India*

## 5.4 Duty Structure

GoI, as part of its policy initiative, to encourage foreign trade in Cotton, has substantially streamlined the duty structure on Cotton. The Government had increased customs duty on cotton fibre exports from 5% in FY02 to 10% in FY03. But in FY09, the Government removed the customs duty on cotton. The customs duty on cotton yarn also has gradually

**Table 8: Customs duty on Cotton textile**

Items	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10
Cotton	5	10	10	10	10	10	10	Nil	Nil
Cotton Yarn	20	20	20	20	15	12.5	10	10	10
Cotton Fabrics	**30/35*	**30	**20	**20	**15	**12.5	**10	**10	**10

*\*Attracts advalorem rate or specific rate whichever is higher basis*

*Source: Ministry of Textiles, Government of India*

decreased from 20% in FY05 to 15% in FY06 and further to 10% in FY08. The duty on cotton fabric has also decreased substantially over the years. In addition, the Government allowed 5% export incentive for raw cottons. These measures have provided an incentive as well as impetus for generating greater volumes in cotton trade.

Cotton production does not attract excise duty. However, excise duty is applicable on cotton yarn and cotton fabric, which have been reduced substantially.

The three major advalorem rates of CENVAT-14%, 12% and 8%, applicable to non-petroleum products have been reduced by 4% each, i.e., to 10%, 8% and 4%, respectively and CENVAT on cotton textiles and textile articles has been reduced from 4% to Nil, as a measure to stimulate the economy in the context of global economic recession, by Government of India, on 7th December 2008. However, in Budget 2009-10, the optional CENVAT on Pure cotton textiles restored to 4% and for other textile excluding Man-made filament yarns and fibres at 8%

Table 9: Excise duty on Cotton textile									
Excise duty on different categories of cotton textiles (% advalorem)									
Items	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10
Cotton	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Cotton Yarn	9.2	9.2	9.2	*4.08	*4.08	*4.08	*4.12	#*4.12/Nil	#*4.12/Nil
Cotton Fabrics	16	12	10	*4.08	*4.08	*4.08	*4.12	#*4.12/Nil	#*4.12/Nil

\*Zero duty without CENVAT facility

Source: Ministry of Textiles, Government of India

## 6. CHALLENGES FACED

Although the Government has taken steps towards sustained development of the cotton industry in the declared Fibre Policy, there are few key issues, which require stronger efforts:

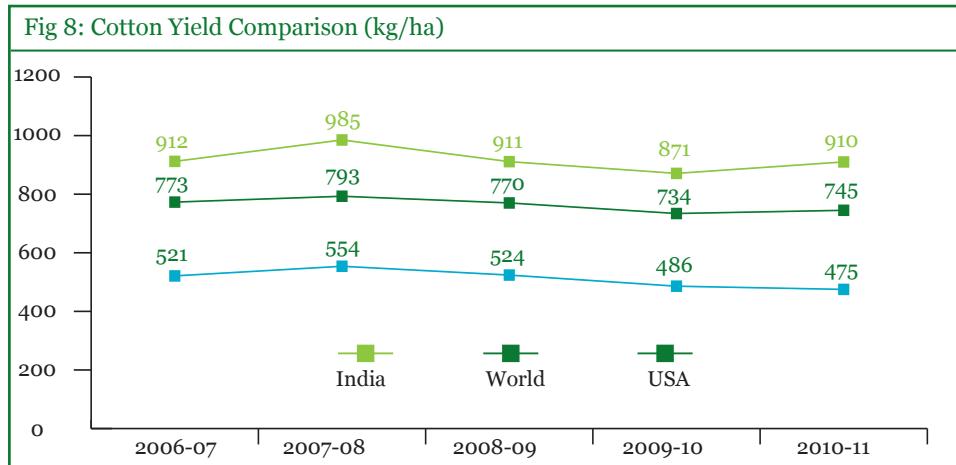
- **Lack of irrigation facilities:** Predominance of rain-fed area has been one of the major hindrances to cotton cultivation in India. Almost 65% of the area under cotton cultivation is rain-fed and only 35% of it is irrigated, thus, exposing the cotton productivity to the vagaries of monsoon.
- **Increase cotton yield:** Although yields of cotton have increased over a decade, however they are well below world average<sup>5</sup> and less than half of cotton yield in USA as evident in the graph below:

Joint efforts and collaborative research involving private as well as public sector research institutes would help in finding a quick solution for yield development.

- **Cotton contamination:** Contamination in Indian cotton has reduced significantly as a result of upgradation of ginning and pressing factories under the Technology Mission on Cotton.

However, this area still requires contin-

ued focus and measures for reduction of contamination at farm level, under the Policy. In the latest (2007) survey by the International Federation of Textile Manufacturers, the six most contaminated cottons tested were from India. Likely sources of contamination are handpicking, where foreign matter (such as polypropylene strands from picking bags) may be accidentally introduced, and ginning, where seed coats may not be adequately removed, and wire or metal can break off machinery and remain embedded within the fibres.



Source: Cotton Advisory Board

<sup>5</sup> ICAC USDA

- **Lack of infrastructure:** The transport infrastructure is poor in India and the cost of transporting cotton fibre from one state to another is substantial.
- **Problem of admixtures:** There are inconsistencies in the strength, length, micronaire, colour and reflectance of cotton as different varieties of cotton fibre with different physical properties are mixed together. Admixture also makes the grading and testing of cotton difficult. Quality-conscious mills, particularly the export-oriented ones, are compelled to engage themselves in expensive bale management exercises to maintain yarn quality.
- **Government Cotton Policy Interventions:** Restrictions on exports and frequent changes in the policy have hurt cotton trade and resulted in the country being sidelined in the international market because of risks associated with vacillating policies and unsteady supplies.
- **Competition from other fibres:** Cotton fibre is increasingly facing competition from artificial fibres, notably polyester. This is attributed mainly due to rising price volatility in cotton trade and variations in fibre characteristics, because of genetic, environmental, harvesting and ginning factors.
- **Branding initiatives:** The proposal to implement measures envisaged under the draft policy for improving the marketing and branding of cotton are extremely beneficial. Such measures should also include boosting the production and promoting the consumption of cotton in the country.
- **Need for stronger Indian arbitration for imported cotton:** The Indian textile mills importing cotton have to encounter onerous problems, because foreign buyers invariably stipulate arbitration by International Cotton Association (ICA), Liverpool, in the sale contracts. India has been a regular importer of cotton and imports will continue in future.

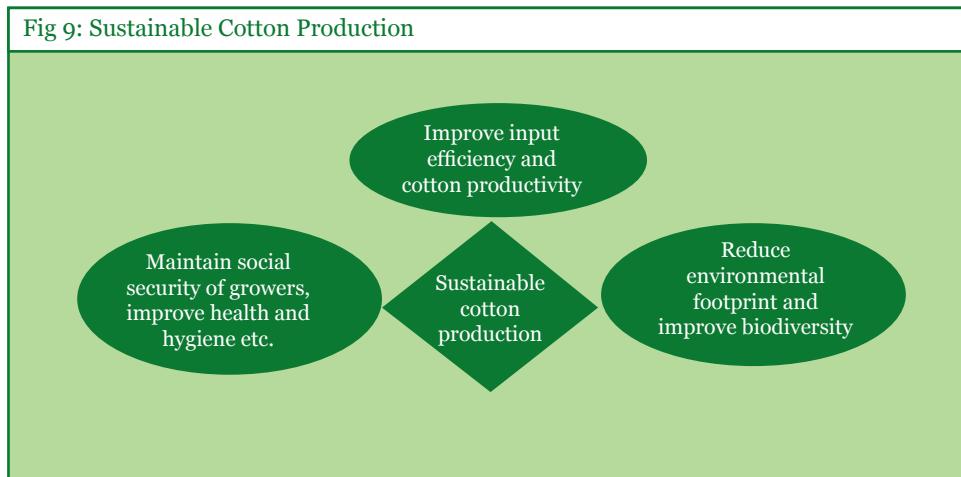
## 7. COTTON SUSTAINABILITY

Accelerated demand for cotton, globally, has led to more than threefold increase in its production since 1950s. This increase in production has been achieved through intense input application, use of which has most often overlooked environmental impacts. Some of these unsustainable production practices include indiscriminate use of pesticides and fertilisers, extensive use of irrigated water, with no regard to water quantity and quality, use of applications that contribute to soil erosion, and an unbalanced (quantity, time of use) use of resources in some areas.

The environmental impacts associated with cotton production, such as soil and water pollution, are increasingly coming into focus and reiterating the need for sustainable production systems. The United Nations defines ‘Sustainable development’ as development that meets the needs of the present, without compromising the ability of future generations to meet their own needs<sup>26</sup>. The basic premises of this definition are supported by three pillars of sustainable development – economic sustainability, environmental protection, and social security.

In the subsequent section, the report focuses on sustainability issues linked to agricultural practices, in cotton cultivation. The report also gives an overview on various existing sustainable initiatives such as; the initiatives associated with enforcement of standards related to sustainable cotton production; the involvement of global retailers in enforcement of sustainable practices; and existing governmental policies/schemes to promote sustainable management practices.

Fig 9: Sustainable Cotton Production



<sup>26</sup> World Commission on Environment and Development; Our Common Future: Towards Sustainable Development, Chapter 2, available at <http://www.un-documents.net/ocf-02.htm>

## 8. ENVIRONMENTAL IMPACT OF AGRICULTURAL PRACTICES

Between  
1950/51

and 2010/11 the area under irrigation has increased by almost 6.7 times<sup>7</sup> and the productivity enhancement<sup>8</sup> has only been fivefold. The increase in production is attributed to a range of factors, including use of high-yielding varieties of seeds, intensive input application, increased area under cotton cultivation, and better infrastructure.

Cotton production clearly contributes to economic growth, however, until externalities born out of social and environmental impacts are not reflected in the economic value of cotton, the value will continue to be inflated in real terms and not lead to sustainable growth. Some such social and environmental impacts that are critical to be internalized in the real economic value of cotton, include the cost of water treatment that has been polluted due to the use of pesticides; the decrease in net available water due to water pollution, and the health hazards and cost of treatment that affect the farmers and others due to the use of pesticides.

Some of the key environmental issues related to cotton production are covered in the following sections:

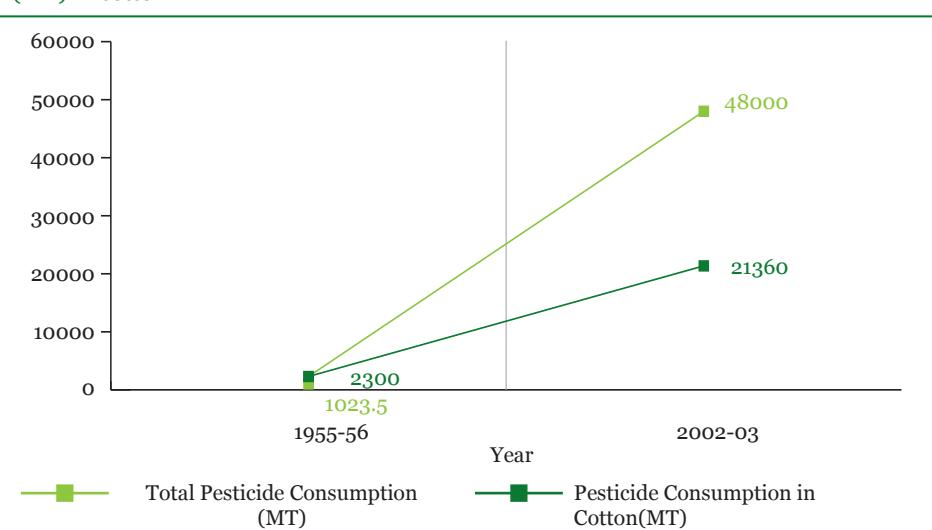
### 8.1 Pesticides

Cotton consumes 44.5% of the total pesticides used in the country<sup>9</sup>. The major constraint to productivity enhancement of cotton is insect and pest infestation and diseases, such as leaf reddening. The indiscriminate use of pesticides, however, has adverse effects on the natural predators and parasites of bollworms. Use of pesticides also leads to environmental pollution (of soil and water), increase in the cost of cultivation, and sometimes, development of resistance in insects against insecticides.

Pesticide production in India was 5000 million tonnes (MT) in the late 1950s and has now substantially increased to 85,000 MT (Gupta 2004<sup>10</sup>). Similarly, the consumption of chemical pesticides in agriculture fields peaked up to 48,000 MT in 2002/03 from merely 2300 MT in 1955/56<sup>11</sup>. The per hectare pesticide consumption for cotton amounts to 2.7 kg/ha, which is much higher than national average of 0.8 kg/ha<sup>12</sup>. Interestingly, it is estimated that only 0.1% of these chemicals used reach the targeted pests, with 99.9% dispersing into the soil, water, and air (Myers, 1999).

Indian cotton production is heavily associated with the intensive use of hazardous pesticides, and is responsible for over half of all agricultural pesticides applied nationally. Within this figure, Indian cotton is associated with some of the most hazardous pesticides used. Characterized by a near total lack of safety measures, low quality equipment, and protective clothing often unavailable or prohibitively expensive, Indian cotton production represents a highly unsafe environment within which to work<sup>13</sup>. Observational studies reveal a heavy toll exerted on the health of those who work with cotton pesticides and chemical analysis has revealed traces of pesticide residues in blood samples taken from Indian cotton labourers.

Fig 10: Changes in total pesticide consumption vis-à-vis total pesticide consumption (MT) in cotton



Source: PK Gupta (2004), Toxicology 2004

<sup>7</sup> Derived from data of MoWR and CCI

<sup>8</sup> Productivity enhancement is defined as mass of cotton produced per hectare as oppose to cotton production, which is net mass of total cotton produced.

<sup>9</sup> Agrolook 2001

<sup>10</sup> PK Gupta (2004), Toxicology 2004 May 20,198(1-3):83-90

<sup>11</sup> DPPQandS, Faridabad

<sup>12</sup> Chari et al

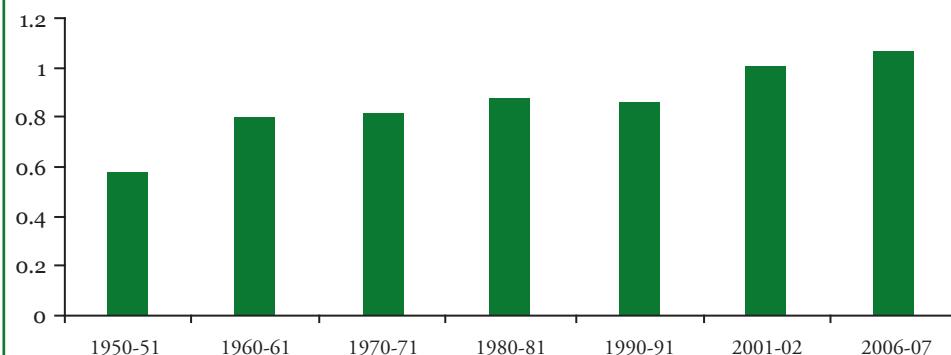
<sup>13</sup> USDA Foreign Agricultural Service, Production Supply and Distribution, United States Department of Agriculture

## 8.2 Fertilisers

Cotton accounts for about 6% of the total fertiliser consumption in India<sup>14</sup>. The fertiliser consumption in cotton has increased manifold over the last five decades.

The indiscriminate use of fertilisers results in nutrient [nitrogen (N) and phosphorous (P)] loading in surface and ground waters. The major concern, however, is nitrification in the surface and ground waters from N-based fertiliser application. The major problem with nitrification is the contamination of ground water and other freshwater bodies. Nitrification can reduce alkalinity, pH, dissolved oxygen and promote bacterial growth in water<sup>16</sup>. The reduction is associated with various potential health impacts. Nitrification can lead to methemoglobinemia in infants (“Blue Baby”)<sup>17</sup> and nitrate poisoning in animals<sup>18</sup> (NRC 1972). The contamination leads to eutrophication, growth of biomass and reducing biodiversity. The excessive increase in biomass production creates anoxic conditions and a decrease in water quality<sup>19</sup>. It is estimated that almost 10% of the N-based fertilisers applied on soil leaches to the surface or ground waters, thereby causing severe water pollution.

Fig 11: Fertiliser consumption (MT) in cotton<sup>15</sup>

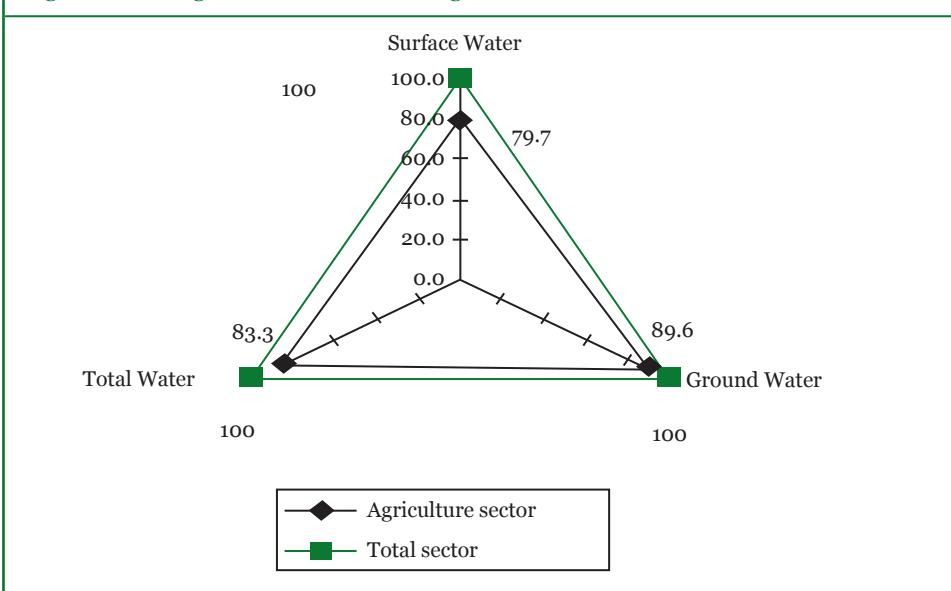


Source: [www.indistat.com](http://www.indistat.com)

## 8.3 Water

Agriculture accounts for 83% of total water usage (79.7% in surface water and 89.6% in ground water). Globally, cotton production is associated with large amount of water withdrawal. About 53% of the global cotton area is under irrigation (WWF 1999). In India however, most of the cotton growing regions come under rain-fed (69%) and few areas (31%) are irrigated. According to estimates, the share of cotton water use from rainfall to irrigation is 405:133.<sup>20</sup> However, it's the quality of the water that is affected most in cotton

Fig 12: Percentage of total water use in agriculture



Source: Ministry of Water Resource and WWF Analysis

<sup>14</sup> FAO 2003/04

<sup>15</sup> The fertiliser consumption is calculated for both rainfed and irrigated cotton farming.

<sup>16</sup> Wilczak, Andrzej, Joseph G. Jacangelo, Joseph P. Marcinko, Lee H. Odell, Gregory J. Kirmeyer, and Roy L. Wolfe. 1996. Occurrence of nitrification in chloraminated distribution systems. Jour. AWWA, 88(7):74-85.

<sup>17</sup> Shuval, H. I., and Gruener, N. 1972. Epidemiological and toxicological aspects of nitrates and nitrites in the environment. Am. J. Publ. Health 62: 1045-1052.

<sup>18</sup> NRC (National Research Council). 1972. Accumulation of Nitrate. Natl. Acad. Sci. Washington, D.C.

<sup>19</sup> Vitousek, P. M., Aber, J., Howarth, R. W., Likens, G. E., Matson, P. A., Schindler, D. W., Schlesinger, W. H., and Tilman, D. G. 1997. Human alteration of the global nitrogen cycle: Sources and consequences. Ecol. Appl. 7: 737-750.

<sup>20</sup> UNESCO – IHE, Institute of water education 2005

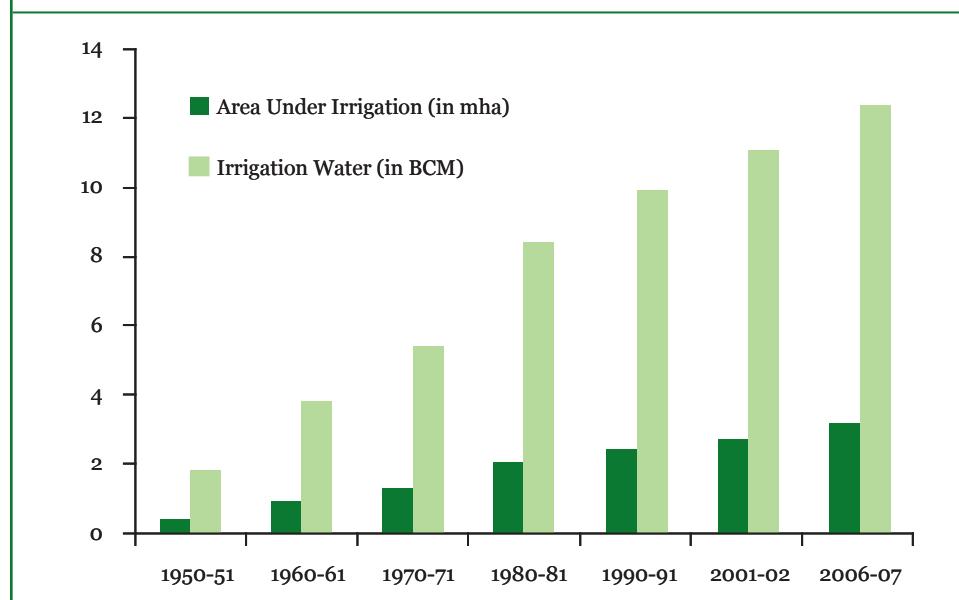
cultivation due to leaching and run off chemicals in ground and surface water. This also affects the net available water used for other activities.

#### 8.4 Environmental Impact of Irrigation Systems

As stated earlier, the total area under irrigated cotton has increased 6.7 times between 1950/51 (0.47 mha) and 2006/07 (3.1 mha). The average irrigation water requirement (IWR) for cotton in India is 405 mm<sup>21</sup> and the water withdrawal<sup>22</sup>, for cotton, has increased from 1.86 billion cubic metres (BCM) to 12.42 BCM between 1950/51 to 2006/07.

Worldwide about 73% of cotton is produced in irrigated fields and only 27% under rain-fed conditions (WWF 1999). While enhanced irrigation is critical for increase in production of cotton, it also leads to the extraction of significant amounts of surface and ground waters. As reflected in the table above, over the years an increasing amount of surface water has been withdrawn and diverted for the production of cotton. In India, wherever irrigation is being provided to cotton, the irrigation system in general uses traditional technique of flood irrigation, which is low in efficiency. Moreover, the irrigation schedule does not depend on the actual crop water demand, but rather on the availability of water supply. Hence, inefficient irrigation system and unsustainable water use, particularly in the northern region of India, where cotton is grown under irrigated condition, has several environmental implications. Rivers are being diverted and dammed for large-scale irrigation projects. This has significant downstream effects, including water shortages with adverse impacts on wildlife and water availability for human consumption.<sup>23</sup> Therefore, it is essential to integrate sustainable and efficient utilization of water in cotton production.

**Fig 13: Area under irrigation and amount of water withdrawal in cotton cultivation in India**



Source: [www.indistat.com](http://www.indistat.com)

#### 8.5 Increased Soil Salinity

The use of irrigation water and excessive chemical fertilisers in cotton production has led to soil salinisation<sup>24</sup> in many parts of the cotton-growing regions in the world. Salinity may arise because of excessive use of irrigation and fertilisers. Soil salinity is the accumulation of excessive salts at the soil surface and result in degradation of soil and vegetation. Besides, due to excessive amount of salt in soil, it is difficult for plants to absorb soil moisture and this has a detrimental effect on plant growth and yield. It also results in permanent soil fertility loss.

In India, 27%–60% of the irrigated land under cotton suffers from some degree of salinisation.<sup>25</sup> One-third of the irrigated land in the country is affected by salinity or is expected to become affected by salinity in the near future. This share is quite likely to be higher for cotton, as it tends to be cultivated through inefficient irrigation systems. Due to increasing

<sup>21</sup> FAO 1999

<sup>22</sup> Water withdrawal has been considered from the IWR and cotton area under irrigation

<sup>23</sup> Kooistra, K.J.; Pyburn, R.; and Termorshuizen, A.J. 2006. The sustainability of cotton: Consequences for man and environment, Science Shop Wageningen University and Research Centre, Report 223' ISBN: 90-6754-90-8585-000-2.

<sup>24</sup> Kooistra, K.J.; Pyburn, R.; Termorshuizen, A.J. 2006. The sustainability of cotton: Consequences for man and environment, Science Shop Wageningen University and Research Centre. Report 223. ISBN: 90-6754-90-8585-000-2.

<sup>25</sup> Stockle, C.O. 2001. Environmental impact of irrigation: The State of Washington Water Research Center (SWWRC); Newsletter September 2001

soil salinisation area under cotton production is being limited, which is leading to cotton cultivation in soil that is not fit for its growth. In addition, the quality of water is also being affected by the chemicals leaching from cotton fields. This is also limiting the net available water for other ecosystem functions.

## 8.6 Water Footprint

The water footprint (WF) is an indicator for assessing the volume of water required for producing cotton fibre throughout its various stages of production, ranging from production to processing. The water footprint (WF), which is a measure of green<sup>26</sup>, blue<sup>27</sup>, and grey<sup>28</sup> water, is highest in India, when associated with the production of cotton fibre, among all the other cotton growing countries. About 8,663 litres and 20,217 litres of water are required to produce one kilogram of seed and lint cotton, respectively, which is highest in the world. The global average is 3,544 l/kg and 8,506/kg<sup>29</sup>.

## 8.7 Biodiversity

Biodiversity plays a crucial role in enhancing the environmental resource base upon which cotton production depends. As stated earlier, this report does not cover genetically modified seeds and their impact on biodiversity. In the case of this report, we have kept the seed debate outside of the scope of this study, as we believe that it requires a comprehensive report unto itself. Instead, the focus of this study is to highlight unsustainable practices related to inputs such as water, pesticides and fertilisers and their environmental and health impacts.

The cotton production system is found to be a thriving ground for several flora and fauna. WWF-India (2011) recorded 335 species of flora and 332 species of fauna in the cotton area of the Warangal district of Andhra Pradesh, in addition to discovering a new scorpion species.

The application of pesticides and chemicals for crop protection, without understanding the Economic Threshold Values<sup>30</sup>, results in negative impact on essential organisms for the ecosystem. This leads to the loss of beneficial insects, which are required for crop development.

Improved practices in cotton production, which address soil erosion and water loss, and maintain the organic matter of top soil, result in improved habitat conditions for birds, small mammals, and many soil organisms. The introduction of improved practices like Integrated Pest Management (IPM) in cotton production has had a positive impact. It results in environmental gains, measured as Environmental Impact Quotient<sup>31</sup>, through significant reduction in the volumes of insecticides applied in the fields.

## 8.8 Carbon Emissions

Each year, agriculture emits an estimated 10 to 12 percent of total greenhouse gas gases (GHG) emissions, which amount to approximately 5.1 to 6.1 Gt CO<sub>2</sub> per year.<sup>32</sup> In India, agriculture contributes 375 million metric ton of CO<sub>2</sub> or 20% of the overall GHG emissions.<sup>33</sup>

It has been observed that most of these GHG emissions in cotton are associated with crop management (fertiliser management, crop residue management, cotton production). Cotton is dependent upon the use of nitrogenous fertilisers and soil water storage to maintain high levels of production. Losses of nitrogen to the atmosphere and nitrate leaching have high global warming potential.

Cotton production requires energy for ploughing, applying agrochemicals (fertilisers, herbicides, insecticides, fungicides, and plant growth regulators), planting, watering, crop cultivation, harvesting, slashing, stalk pulling, and transport. Crop

26 Volume of water taken up by plants from the soil, in so far it concerns soil water originating from infiltrated rainwater

27 Water taken up by plants from the soil, insofar it concerns infiltrated irrigation water

28 Water use by translating the volumes of emitted chemicals (pesticides and fertilisers) into the dilution volume necessary to assimilate the pollution

29 UNESCO-IHE Institute for Water Education, Water Footprint of Cotton Consumption 2005

30 Economic threshold is an important parameter, defined as the density at which control measures should be applied to prevent an increasing pest population from reaching the economic injury level

31 Measure of environmental impact assessment caused due to pesticide application. The EIQ values can be used to compare the environmental impact of different pesticides and pest management programs. Factors such as toxicity (dermal, bird, chronic, bee, fish, beneficial arthropod), soil half-life, systemicity, leaching potential, plant surface half-life, surface loss potential, and farm worker, consumer, and ecological effects are all considered when calculating an EIQ for a particular pesticide

32 FAO 2009

33 WRI 2009

intensification, mechanization, and modernisation have also never been GHG-emission-free, as they require more fuel, farm machinery, and agrochemicals. In addition, production, transportation, and application of agrochemicals for cotton production require significant energy resources, resulting in even higher GHG emissions.

In order to reduce GHG emissions from cotton production and to reduce other adverse environmental impacts, WWF-India has been advocating Better Management Practices (BMPs). According to preliminary studies, BMPs have the potential to reduce 40-50% of GHG emissions, as compared to conventional farming.

The next section will give an overview on these Better Management Practices.

## 9. BETTER MANAGEMENT PRACTICES: A PRECURSOR FOR SUSTAINABILITY

It has been established that indiscriminate use of inputs, such as water and chemicals in cotton production, is the cause for some of the key environmental issues associated with cotton production. Sustainable cotton cultivation, therefore, requires an integrated approach at the crop management level, with improved practices. Better crop management practices, such as Non-Pesticide Management (NPM), IPM, Integrated Nutrient Management (INM), Integrated Water Management (IWM), are essentially meant to lessen the burden of inputs, while increasing productivity to reduce environmental impacts. WWF-India has helped develop Better Management Practices (BMP) based on the above parameters that balance crop productivity with agri-inputs. These practices can be broadly categorised into the following five areas.

### ■ Soil Fertility Management

BMPs on soil fertility management include Soil Test Based fertiliser application. Based on the nutrient status of the soil, fertilisers are recommended for application in soil. Apart from this, BMPs also includes Integrated Nutrient Management that requires the use of organic inputs (like tank silt application, crop residues, vermicompost, farm yard manure, etc.) practices in conjunction with inorganic fertilisers. The particular management practices restrict the overuse of mineral fertilisers and thus prevent loss of nutrients.

### ■ Pest and Disease Management

BMPs on pest and disease management advocate proper pest monitoring through sticky, pheromone and yellow trap, encouraging cultural, mechanical and judicious chemical practices to control pest and diseases in cotton. These can effectively reduce the hazards of using excess of chemical pesticides and insecticides.

### ■ Water Management

BMPs on water management have been developed to improve water use efficiency in cotton irrigation. The water BMP includes adoption of water conservation techniques like drip irrigation and other innovative techniques, such as watering plant rows in pairs. In the micro irrigation system, water use efficiency varies from 70 to 95 percent, compared with 35 to 40 percent in traditional irrigation techniques i.e. flood irrigation due to significant seepage, evaporation, distribution, conveyance losses, etc.

### ■ Clean Picking

BMPs encourage safe use of pesticides with proper disposal of containers by the users. Emphasis is also given to clean cotton picking practices that reduce the likelihood of contamination. The BMPs encourage the use of cloth bags, which are used to collect cotton during picking and for cotton storage. Separate, ergonomically designed, aprons are provided to the women labourers for reducing the contamination of hair and threads from polypropylene bags.

## 10. POLICY AND BMPs

Cotton is a priority commodity for the Government of India. With regard to the policies for promoting BMPs in cotton—the precursor to sustainability—the existing agriculture policies at the national level focus on the popularisation of IWM, IPM, and INM practices. While the INM and IPM practices are promoted by the agriculture department of the state governments, IWM is promoted by the water resource/irrigation department, supported by the agriculture department. Crop-specific allocations and inter-

ventions are usually not designed at the state level. Therefore, at the field level, the focus on crop-specific interventions is quite limited. The thrust of the practices varies across states. For example, Gujarat focuses on promoting soil health and micro-irrigation, Madhya Pradesh focuses on organic production, Maharashtra focuses on pest surveillance, and Andhra Pradesh focuses on micro-irrigation (linked to IWM) and NPM.

In the context of cotton, the Directorate of Cotton of the Ministry of Agriculture, Government of India, has been implementing the Technology Mission on Cotton. Under this, Mini Mission I focuses on research, while Mini Mission II focuses on enhancing productivity. Mini Mission II, therefore, is the policy initiative of the central government for the promotion of BMPs in cotton production in India. The schemes under mini mission have the scope to incentivise micro irrigation technics. It also focuses on plant protection, which includes seed treatment, distribution of pheromone traps, supply of bioagents/bio pesticides, and surveillance of diseases and pests. Mini Mission II, therefore, is the singular policy initiative of the central government for the promotion of BMPs in cotton production in India.

## 11. WWF-INDIA CASE STUDIES

WWF-India's Sustainable Cotton Project is working towards developing improved sustainable cotton production systems, in which farmers, by adopting BMPs, are equipped to produce quality cotton by using environment-friendly organic fertilisers produced from locally available resources. The project started in 2007 with a few farmers in Warangal and now has presence in different agro-climatic cotton-growing regions of the country—Andhra Pradesh, Maharashtra, and Punjab. What started with a few farmers is now aimed at reaching one-tenth million of cotton growers.

Better management practices that were mentioned in the previous section form an integral part of this project. The thrust of the project is to discourage the use of chemical pesticides, which are not only expensive, but also damage the crop and environment, and lead to long-term illnesses for the farmers and their families.

Conservation, as well as productive use of water and sustainable use of natural resources by cotton farmers is also promoted under the BMPs. Emphasis is also given to clean cotton picking and reduction of cotton contamination for the mutual benefit of the farmers and the industry.

The Project uses an integrated approach: by developing water and nutrient management practices for cotton and cotton-based cropping systems; and IPM technology, has thereby created a ripple effect among farmers in the Warangal district of Andhra Pradesh, as well as the Jalna and Aurangabad districts of Maharashtra.

On adoption of the BMPs, farmers have managed to reduce their water and chemical use. In 2010, the project involved almost 8,800 farmers. By using BMPs, these farmers managed to reduce their water application by 30%–51%, pesticide application by 38%–80%, chemical and fertiliser use by 32%–53% and GHG emissions by 57% on an average, as compared to the farmers who were engaged in conventional farming and did not use BMPs that year.

The cotton produced under WWF-India's BMPs is procured by the local suppliers of the global brands and retailers, such as IKEA and Marks and Spencer. Thus, a supply chain is ensured, focusing on production and uptake of sustainable raw materials. WWF-India is creating a network of reputed national textile brands and retailers to create awareness about sustainable raw material supply.

At this juncture, when the cotton apparel and textile market is shifting towards building a better supply chain, with an emphasis on improved environmental and social standards, WWF-India's BMPs have contributed towards producing environmentally sustainable cotton within an enabling environmental framework. This effort has also contributed to Better Cotton Initiative's standards development.

**Table 10: Results from BMP fields**

30%–51% water reduction in BMP fields
38%–80% lessening of chemical pesticides in BMP field
32%–53% reduction in chemical fertiliser
40%–50% reduction in GHG emission
31% improvement in gross margin of BMP farmers

*Source: WWF India: Data of 2010*

## 12. GLOBAL SUSTAINABLE INITIATIVES

Various global initiatives have been developed for increasing 'sustainable' cotton production.

These initiatives work on the principle of enforcing standards (environmental, social, and labour standards) in the production system as well as the supply chain. There has been a significant integration of 'sustainability' in common farming practices in India in the recent years, however sustainable cotton farming is yet to be considered mainstream. Therefore, few initiatives are designed to support mainstream adoption of sustainability in cotton production through the existing trade and sourcing channels. Some of the global initiatives are mentioned in the table below:

Table 11: Global initiatives towards sustainability in cotton production		
Initiatives	Standards	Highlights
Better Cotton Initiative (BCI)	Environmental and Decent Work Conditions	Formation of learning groups, self assessment, creation of chain of custody in supply chain, no premium for the produce
Fair Trade (FT)	Labour, Development, and Environmental	Product certification system, social premium for doing social/ community development activity.
Organic	Environmental	Product certification system, premium for the produce exists however not guaranteed
Cotton Made in Africa (CmiA)	Social and environmental	Work on principle of social business; small holder cotton farmers of Africa are grouped into companies; verification done for the companies; no premium for the produce

### 12.1 Organic Cotton <sup>34</sup>

Organic initiatives were introduced to cotton in the 1990s. Organic cotton certification focuses on the farming system and environmental sustainability. Organic cotton has a market share of little less than 0.2% today and the area under organic cotton cultivation is close to 0.76% of the total cotton production. In 2008/09, 175,000 tonnes of organic cotton were produced, as against the total cotton production of 23.4 million tonnes. India is one of the leading producers of organic cotton in the world.

The main differences between conventional cotton and organic cotton relate to the methods of cultivation. During the cultivation of organic cotton, the use of synthetic pesticides and fertilisers is not allowed, neither is the use of biotech cotton seeds. The cotton seeds should be organic. The objective of these rules is to maintain a healthy environment. These growing methods aim to minimise negative influences on biodiversity and, at the same time, maintain the good quality of the farmland, lakes, and rivers. Crop rotation and the use of animal or vegetable fertilisers are also requested in organic cotton production. Useful insects, as well as biological pest and weed controls, such as pheromone traps, are used, in addition to weeding by hand. Organic cotton can be picked by hand or by machine.

One of the challenges faced by organic cotton farmers is to go through a 2 to 3 year period of transition. During this period, although the producer is already required to apply the organic standards, which are more labour intensive than in conventional cultivation, transitional cotton is not allowed to be sold as certified organic.

There is a premium associated with organic cotton. As per cotton analyst Mr. A. Ramani (2010): Five years ago (2005), OC was selling 20-25 cents per pound more than regular cotton. The organic price premium has since declined, and the price differences between organic and conventional cotton are now not very large.

### 12.2 Better Cotton Initiative<sup>35</sup>

Better Cotton Initiative (BCI) is a voluntary programme, with a vision to enable millions of farmers around the world to grow cotton in a way that is healthier for the farming communities and the environment, and is more economical.

The standards developed by BCI tend to take a moderate approach towards sustainable cotton. The purpose of the standard is to transform the market by bridging the gap between unsustainable cotton and organic cotton. The production process is manageable by the farmers, and not governed by stringent protocols. It is meant to exclude unacceptable and reduce the gap between the best and conventional practices, in order to achieve faster market transformation instead of proceeding incrementally.

<sup>34</sup> Elke Hortmeyer, Bremen Cotton Exchange

<sup>35</sup> www.bettercotton.org

The demand for Better Cotton was created by retailers like IKEA, Marks & Spencer, Levi's, Adidas, and H& M. Later, several partners of the global retailers joined in the process.

Some of the features of the BCI are listed below:

- The Minimum Production Principle set by the BCI in order to produce Better Cotton is uniform worldwide. The production principle describes the broad criteria that need to be addressed by the farmers for the production of Better Cotton. The criteria under Production Principle are based on crop protection, water, soil, habitat, fibre quality and decent work conditions.
- The entire system of achieving the production principle of the BCI operates in a learning and knowledge-sharing mode, where the growers are grouped into a learning Group.
- The Production Principles are based on agronomic aspects and maintaining decent work environment in cotton fields
- Unlike Fair Trade and Organic Cotton, Better Cotton is not labelled.
- The BCI does not guarantee a higher cotton price paid to producers, but aims to improve farm management practices and increase productivity.
- By 2012, BCI aims to create 1.3% of the global cotton production as Better Cotton.

## 13. ROLE OF GLOBAL BRANDS AND RETAILERS IN ENFORCING SUSTAINABILITY IN THE SUPPLY CHAIN

Increasing level of awareness about depleting natural resources and their impact on the eco-system are influencing a switch in consumer lifestyle choices and consumption pattern. As a result, there is greater support for sustainable cotton production. This increased consciousness for sustainability is opening up

Table 12: Snapshot of some Global Commitments to BCI

Company	Commitments
Abhishek Industries Ltd.	AIL has made a commitment towards ethical business. AIL has partnered with BCI to promote measurable improvements in cotton cultivation to make it more economically, environmentally, and socially sustainable
Adidas	The Adidas Group's goal is to secure more sustainable cotton sources, and therefore they closely follow the Better Cotton Initiative, a project they co-funded.
Arvind Limited	Arvind initiated the first BCI approved project in India and is a newly elected member of BCI council. Arvind's project covers over 30,000 acres of farmlands and involves working closely with nearly 3,800 farmers. The project size is set to double within the next financial year.
H&M	H&M has been involved with the BCI since its inception in 2004, and is an elected member of the organisation's council.
IKEA	Founding member of BCI. IKEA and WWF started working with farmers in India and Pakistan in 2005 with the aim of making conventional cotton production more sustainable. As of now, 13.4% of their total cotton use is sustainable cotton
Levis	Is a founding member of BCI. Levis has created alliances with other big cotton consumers to support more sustainably produced cotton that uses less water and pesticides.
Marks & Spencer	M&S aims to be the world's most sustainable major retailer by 2015. As a part of this mission, M&S seeks to source 25 per cent of its cotton from sustainable sources by 2015. M&S is also a founder member of BCI.
Nike	Nike became a member of the Better Cotton Fast Track Program in October 2011, as a part of its long term strategy to improve the environmental and social impact of global cotton production. The programme is a pilot approach supporting BCI's efforts to reach farmers and support them in developing sustainable business practices.
Sainsbury's	Have committed to source all of their key raw materials and commodities, including cotton, sustainably, by 2020. They became member of BCI in 2009 and will be introducing BCI Cotton in their supply chain in the coming year.

a new market for global brands and retailers. There is a major industry effort, led by key international brands and retailers, to raise the standard of cotton production and its environmental and social impact, by promoting better-produced and better-managed cotton into mainstream products. Besides, implementing sustainability standards also contributes to a stable and long-term availability of strategic raw material for the industries.

### 13.1 IKEA and Sustainable Cotton

Textile business in IKEA has a turnover of €2.4 billion, with a share of 12.1% of the total business of the company. Its annual requirement of lint cotton is 225,000 MT. Cotton is one of the most important raw materials for IKEA, and accounts for 80% of the textile business. Sustainability is the keyword for IKEA's business. Hence, the company works actively to increase the availability of more sustainable cotton by encouraging cotton farmers to introduce more sustainable farming practices. IKEA has set out to create lasting and large-scale improvements in conventional cotton cultivation. In the 2010 financial year, 13.4% of the total cotton used in IKEA products came from the cotton produced in a more environment-friendly way. The company wants all the cotton used for IKEA products to be produced in accordance to the social and environmental criteria developed by the Better Cotton Initiative (BCI) by the end of Financial Year 2015.

IKEA funds various partners to implement activities in the field. IKEA and WWF formed a global partnership in 2005 to work on reducing the environmental and social impacts of cotton cultivation in India and Pakistan. WWF's collaboration with IKEA grew out of a water conservation project in Bahawalpur, Punjab. It involved over 42,000 farmers in 2010/11, producing an expected 62,000 tonnes of seed cotton. In India, the first joint project started in 2006 in the Warangal district of Andhra Pradesh. It established plots to test and demonstrate water usage, soil fertility, and pesticide management, using 'farmer field schools' to train farmers.

The second phase of the joint IKEA and WWF partnership works in the Aurangabad and Jalna districts of Maharashtra. About 5,000 farmers are engaged in the project.

IKEA has also entered into partnerships with non-governmental organisations like Action for Food Production, Development Support Centres, and suppliers like S Raja and Abhishek Industries to work closely with cotton farmers. On an average, the participating farmers in all these projects have halved their water consumption and chemical pesticide use, while the use of chemical fertilisers has been cut by 30%.

*Source: IKEA Sustainability Report 2010, Making Sustainability Work by Kavita Joshi*

## 14. ROADMAP FOR SUSTAINABLE COTTON DEVELOPMENT

Government policies and initiatives have been providing the requisite boost to domestic cotton production, processing as well as consumption. The National Textile Policy (2000) is aimed at building a strong and vibrant textile industry, capable of producing quality cloth at an acceptable price, increasingly contributing to employment provision and economic growth, and competing for an increased share of global market. The policy endeavoured to increase cotton productivity and upgrade its quality to international standards through effective implementation of the Technology Mission on Cotton.

Cotton production largely depends on the area under cotton production and productivity. Issues such as food security and land pressures have led to the area under cotton production to remain largely constant. Thus, future production is expected to be driven by improvement in cotton yield. Yield is assumed to grow at alternate rates of 4.0% and 4.7%. Additionally, the Directorate of Cotton Development, Mumbai, has also made projections for cotton fibre production. The estimates made by the directorate are based on an assumption of 4.7% increase in yield, per hectare, till the terminal year, 2020. The projections for consumption of cotton fibre have been arrived at through projections for cotton fabric consumption and through use of conversion ratios. The final scenario for 2020 is encapsulated in the table on the right.

Table 13: Investment Requirement in Textile Sector

Investment requirement till 2020 (Rs cr)	
Spinning	63,525
Weaving	38,485
Knitting	12,499
Processing	26,695
Garmenting	35,305
Grand total	176,510

*Source: Ministry of Textile, GoI*

Table 14: Yield Growth

Yield growth assumed at 4.7% (lakh bales 170 Kgs each)

Year	Production	Consumption	Surplus
2019-20	483	413	70

*Source: Ministry of Textile, GoI*

Given that the production of cotton fibre, as well as MMF fibre and filament yarn are expected to witness a substantial increase in the next 10 years; CITI and Ministry of Textile jointly estimated that an investment worth Rs 176,510 crore would be required during FY10-FY20 for creating the required capacity along the textile value chain on the basis of estimate of the increased fibre production.

To meet the current demand as well as address the demand growth in the future, the value chain of cotton has to be improved. This is possible through appropriate input management, improved supply chain management, backward linkages, standardisation of trade practices and achieving economies of scale by incorporating sustainable agricultural practices. In order to achieve sustainable growth, there is a need to balance both the economic and ecological factors influencing cotton production.

The report has highlighted the significant contribution made by cotton and the textile industry to the Indian economy. However, it has also underscored the negative environmental and social impacts of the existing unsustainable agricultural practices in cotton production. Therefore, there is a need to integrate the environmental and social impacts into the economic value of cotton; else cotton productivity will deteriorate in the long run. There is a need to adopt a holistic approach to transformation of the cotton market towards sustainability. It is crucial that BMPs that include IWM, IPM and INM, at the very least are integrated in India's overall cotton production. As an integral part of cotton cultivation in India, these practices will encourage conservation of natural resources, enhance soil fertility, encourage water management, discourage the use of pesticides and other harmful chemicals, and reduce the overall water and carbon footprint of cotton. On the other hand, there needs to be a pull from the consumption side to scale up the consumption of sustainable cotton. Voluntary (farmer, industry and civil society) standard and certification initiatives and governmental policies will further provide the right impetus for a transformational change.

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# WHO WE ARE

## About WWF-India

WWF-India is one of India's largest conservation organizations. Established as a Charitable Trust in 1969, it has an experience of over four decades in the field. Its mission is to stop the degradation of the planet's natural environment, which it addresses through its work in biodiversity conservation and reduction of humanity's ecological footprint.

A challenging, constructive, science-based organisation WWF addresses issues like the survival of species and habitats, climate change & energy, sustainable forest management, water resources/river basin management, sustainable agriculture and marine and freshwater Conservation. These programmes work across sectors and regions in various parts of the country.

In addition to conservation of biodiversity through field programmes, WWF India also aims to transform the policies and practices of key industrial sectors to reduce their ecological footprint and develop innovative sustainable solutions.

## About YES BANK

YES BANK, India's new age private sector Bank, is the outcome of the professional & entrepreneurial commitment of its Founder, Dr. Rana Kapoor and its top management team, to establish a high quality, customer centric, service driven, private Indian Bank catering to the Future Businesses of India. YES BANK has adopted international best practices, the highest standards of service quality and operational excellence, and offers comprehensive banking and financial solutions to all its valued customers.

YES BANK has a knowledge driven approach to banking, and a superior customer experience for its Branch Banking (Individuals and SMEs) and Corporate clients. As a part of this knowledge driven approach, YES BANK focuses on key growth sectors like Infrastructure, Food & Agribusiness, Telecommunications, Information Technology, Lifesciences, Infrastructure, Renewable Energy, Media & Entertainment, Manufacturing and Textiles, among others.

YES BANK's differentiated approach to banking provides industry specific financial solutions which facilitate superior structuring and tailored financial solutions. YES BANK is steadily evolving as the Professionals Bank of India with the long term mission of "Building the Best Quality Bank of the World in India".

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