Cotton-Human Relations in Contexts of Production, Consumption, and Sustainable Community

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Introduction

Cotton represents a central staple crop, the world's most important fiber crop, and ostensibly the second most important oilseed crop. As such, it is highly regarded as an essential yet little-known specific commodity that has long proved to be related to food and shelter—labelled the basis of human life—in addition to the textile industry and clothing [Orsena 2006; Foshee et al. 1999]. Over decades, however, cotton, as the one of humankind's greatest achievements, has also been assessed in the emerging critical ethno-historical literature as the central element that weaved together the industrial revolution and modern capitalism [for further details, see Riello 2013; Beckert 2014]. Considering these intriguing factors, however, it is somewhat surprising that the subject of cotton has often been overlooked in many fields of study (especially historiography and anthropology), regardless of its many facets and contours, and the challenges and opportunities it poses to humans today. In some public settings/spheres, moreover, it is noted that cotton has even been conceptualized with often simplistic understandings, thereby leaving the very crucial question of cotton production and consumption substantially unaltered. It is therefore of signal importance that research is conducted to examine that the nature and role of cotton and its implications for humans' economic activities and physical environments.

This piece of research sets out to modestly contribute to this inquiry by empirically providing a short account of cotton's journey from a local, artisanal product to a global, mass-produced commodity. Particularly intriguing is the question of determining precisely how human communities confront cotton cultivation and consumption. Some sections of this essay deliberately re-elaborate and develop part of the contents of Munsi and Shimazaki's book [2023], initially designed to highlight, through a staggering spatial and chronological scope, some salient aspects of the strong relationship between cotton and humans from auto-ethnographic narrative and socio-cultural anthropological perspectives. In particular, the discussion is enlarged herein to encapsulate the objective of my research: to determine how cotton activities can threaten both human dignity and the protection or preservation of the natural environment, while assuring sustainable development of local communities.

The synthesis includes information gleaned mainly from secondary sources, field and career narratives, and auto-biographical memory [Collins and Gallinat 2010]. The data from the field survey

is primarily based on the experiences, opinions, and interpretations of the researcher and informants. The substantive concern from both parties was thus to grasp the undeniable reality of the fusion of cotton and people at the local, national, and global community levels. Data collection was conducted in a flexible manner, within a multi-method approach, in order to access different types of data to provide an account of the "big picture" of overall cotton cultivation and consumption. The body of empirical data is supplemented by a few historical sources. The evaluation was developed out of a concern for the cotton issues causing conflict in human civilization. Beckert's [2014] valuable discussion, therefore, represented a definitive or archetypal evaluation model that allowed me to further comprehend the history of cotton and its impact on the aforementioned Industrial Revolution and modern capitalism.

The remainder of this article is divided into three integrated and interrelated sections, mirroring the essay's three-pronged emphasis on cotton—history, experience/memory, and records. This actually entails three integrated and interrelated themes, including, where it is necessary, examples that can be read individually or as a set. Read as a set, the selected examples bring to light the range of issues that form the substance of the essay. Following a brief-description of the very concept (and label) of cotton as one of the world's leading agricultural crops, the first prong takes a historical perspective, illustrating and reflecting on a number of cotton cultivation and consumption threats to humans since the period of slavery.[1] Here, I demonstrate that cotton, as a fluffy white fiber, is cultivated and picked in cotton fields, used in spinning and dyeing mills to produce yarn and fabrics, or in sewing factories to manufacture products, and even in retail outlets to sell cotton products. The essay's second prong then highlights and details narratives deemed important to the issues facing cotton cultivation and consumption in today's globalized world. Interspersed in this discussion is an exploration of what constitutes the effects of cotton on local community sustainability. From this perspective, it is important to analyze the relationship of cotton production and fair trade as well as with the deplorable implications of a growing amount of child labor in India, Bangladesh, Uzbekistan, and Mali. An important note is made on the concepts of organic conventional cotton and organic cotton in relation to the Sustainable Development Goals (SDGs).

The article's third and final prong explores the ethnographic data to demonstrate the growing importance of cotton and its socio-environmental implications. The overall discussion, therefore, brings the main threads of this essay together into a reflexive analysis. From a balanced perspective, I argue that cotton and humans continue to be inextricably linked. Such an understanding must be based not only on historical memory, but above all on written evidence. This ultimately reflects the acknowledgement that cotton, as a natural fiber [Berland, Oosterhuis, and Tugwell 1992], has long remained an "unchanging and important" part of people's lifestyles [Orsena 2006, 2012]; it thus plays a central role within contemporary society, producing an impact upon humans' everyday lives, their sense of fashion and business, and the ways in which they (explicitly or implicitly, consciously or

[1] Beckert [2014: xvi] cogently observed that "industrial capitalism remained tightly linked to slavery and expropriated lands, but as its institutions—everything from wage labor to property rights—gained strength, they enabled a new and different form of integration of the labor, raw materials, markets, and capital in huge swaths of the world."

unconsciously) interact with it daily. It is precisely in this context, I further suggest, that cotton, as a single, seemingly inconsequential item, has always been with humans and been close to them, and its production has had an incredible impact on the development of economic systems.

Defining the Concept of Cotton in Context

From the very beginning of scientific interest on the subject of cotton, scholars have been debating its nature, meanings, definitions, and categories. The aspects of the term "cotton" indeed need to be discussed and contextualized. Of course, what follows here are not the only well-known approaches to the subject. Many authors have, for instance, proposed more conflictual interpretative models, suggesting that cotton, as a fluffy white fiber, can be defined and categorized differently. In the Japanese context especially, the English term "cotton" has a variety of meanings in Kanji or Chinese characters. Some of the more consistent evidence is that the Chinese characters for cotton are *wata* or *men*, 綿, *momen* 木綿, and *menka* 棉花. It transpires that they are often used alternatively by companies, scholars, and many other people, depending on the place, contexts, and circumstances. However, it is sufficient to note at the outset that all terminologies designate the same thing in English: *cotton wool*.

As such, cotton handlers often speak or write *wata or men* 綿 as a generic term. This allows me to underline two aspects: while cotton 棉花 *menka* in the woody part specifically refers to cotton grown or picked on farms, cotton *menka* 棉花 in the yarn part essentially denotes cotton after the seeds have been removed or processed in a spinning mill. A possible explanation for this might be that ancient people in Kanji regions thought that each of these terminologies could essentially denote, from the Kanji characters themselves, the very notion of whether cotton at hand was still plants, or the already processed product. This is just a small detail, but it is important if one reasons in terms of cotton. Strictly speaking, however, the very concept (and label) of cotton *wata* or *men* 綿, specifically refers to the soft, white fluff peeled off from the seeds of the cotton plant and hence is called "cotton wadding" *momenwata* もめんわた or *kiwata* 生綿, "raw cotton."

The possibility of understanding cotton in this specific context is further generated by the terms *mawata* 真綿 and *momen* 木綿 (silk). Both, even if in a very different degree, carry a semantic, and more important, theoretical halo that in the long run risks invalidating their application in specific contexts. However, what becomes evident in the comparison of field experiences and secondary sources is the very fact that cotton known as *mawata* 真綿 is, rather, a fiber made from silkworm cocoons (*mawa*). Unlike *menka* 棉花, the vegetable fiber of cotton, *mawata* 真綿 is simply considered as an animal fiber. This fine observation, not new in the scholarly and public discussion as Munsi and Shimazaki [forthcoming 2023] point out, therefore, makes cotton *menka* 棉花 and *mawata* 真綿 completely different. Every one of these terms has its own history and inevitably, being less or more frequently used by scholars, companies, and farmers, it carries a semantic halo. Despite these implicit or explicit differences, however, experience has shown that it perhaps does not matter much which of the concepts one chooses. Readers may infer that this declaration of flexibility is somewhat

disingenuous and needs to be questioned. This task, however, is beyond the scope of this essay.

Taken together, it seems likely that all these selected overlapping definitions not only illustrate the multifocal dimensions of cotton and the voluntary aspects of choices, but they also imply the relevance of this plant fiber to humans in their various sectors of life. In this foregoing discussion, however, and in order to avoid misunderstanding and confusion, I will use the widely-used yarn-biased term "cotton"(*menka* 棉花) as a single term that seems more philologically accurate, describing a longstanding socioeconomic and developmental phenomenon. After all, cotton is the fine seed of plants of the mallow family; the fiber serves probably to accumulate moisture for germination of the seed [Cook 2001]. However, more simply, one realizes today that many species are grown commercially and can be conveniently divided into three types according to staple hair length: Type 1 entails long-fiber cotton, measuring 28 mm or longer; Type 2 suggests medium-fiber cotton, measuring 21 to 28 mm, and Type 3 refers to short-fiber cotton, measuring 21 mm or shorter [Thomas 1995].

It is important to state immediately that cotton growing and manufacturing has a long history all over the world. There is, therefore, a need to focus on it as a fluffy white fiber and its very concrete and often brutal development. One needs to trace how it was grown, transported, financed, manufactured, sold, and consumed. This approach allows us to see connections between cotton and humans, people and places, and determine the effects of cotton in the various dimensions of human lives. Indeed, as Beckert [2014: xviii] rightly pointed it out:

> One reason it is hard to see cotton's importance [in our midst] is because it has often been overshadowed in our collective memory by images of coal mines, [diamond, cobalt, and coltan], railroads, and giant steelworks—Industrial Capitalism's more tangible, more massive manifestations [...] Capitalism was in many way a liberating force, the foundation of much of contemporary life; we are invested it in it, not just economically but emotionally and ideologically. Uncomfortable truths are sometimes easier to ignore.

This insight into cotton is a tool that can help unfold the facets, extent, and contours of cotton in the field. This reconceptualization of cotton, therefore, leads me to consider its historical perspective in order to introduce a more theoretical and practical argument about cotton production and consumption, and determine the possible ecosystem risks at stake.

Historical Background of Cotton

At the outset it is important to state that for more than 6,000 years cotton has increasingly been used by humans, beginning with peoples in Asia, America, and Africa who independently discovered cotton and its perfect suitability for cloth making. In contrast, synthetic fibers like polyester were not created until after World War I. Indeed, Eli Whitney's insights and his invention of the cotton gin in 1794 are often studied in history classes. It is important to note, however, that rarely does one

think closely about the science behind cotton itself. Although the origins of cotton cultivation and utilization are to date not entirely clear, it is nevertheless probable (if past evidence is any guide) that it dates back to prehistoric times. According to different documents and web sources, cotton was probably found between 3,500 and 8,000 years ago, more or less the same as wool and hemp. More precisely, cotton seemingly originated in both Central and South America and in India. It is thus more productive to note that cultivation—farming it and trying to improve the crop yield and properties—started at least 3,000 years ago.

Another body of ethno-historical data reveals that cotton was already being cultivated and used in Mexico 8,000 years ago, Peru 3,500 years ago, and India 5,500 to 7,000 years ago. It is possible to get an idea of the beginnings of cotton activities in the world from data contained in the seminal work by Moulherat et al. [2002]. Other research results, however, indicate that the earliest examples of cotton textiles presumably date back to 4500 BCE. In a Neolithic tomb in Mirgarh, Pakistan, for instance, archaeologists found cotton threads preserved in copper beads. Equally important, a striking net made of cotton yarn dating to 2,500 BCE has been found at the Calal site in Peru. Mention of cotton was also found in the Indian scriptures (Rig Veda) reaching back to around 1500 BCE, and in the writings of Herodotus (a Greek) in 445 BCE. Lying entirely in the northern and eastern hemispheres, India was especially known as a cotton-producing country from BCE. Thereafter, cotton cultivation increasingly spread to Southeast Asia, Arabia, and Africa.

One comment is in order regarding the particular case of Africa:

> Cotton was probably first cultivated by Nubians in what is today eastern Sudan. Some claim that the fiber was cultivated, spun, and woven there as early as 500 BCE, though archeological finds that Moroë, a former city on the east bank of the Nile, confirm the presence of cotton textiles only for years between 500BCE and 300BCE. From Soudan, cotton spread north to Egypt. After 800 CE, the spread of cotton and its attendant production, accelerated further on the wings of Islam. Knowledge about how to grow and process cotton then traveled to western Africa. How exactly cotton came there is still unclear; it is possible that itinerant weavers and merchants brought it from East Africa, sometime around the beginning of the Common Era [...] Literary sources and archeological finds testify to cotton spinning and weaving in West Africa in the eleventh century, by which time it had spread as far south as present-day Togo. By the early sixteenth century, Leo Africanus reported on the "great abundance" of cotton in the "Kingdome of Melli" and wealth of cotton merchants in the "Kingdome of Tombuto," meaning the great West African empires of Mali and Timbuktu [Beckert 2014: 10].

Around the 1st century, then, the first cotton economy was born when products made from Indian yarn and fabric were reportedly exported to the West. Meanwhile, it is surmised that the Arabs developed cotton cultivation in Africa through conquest. In southern Europe especially, Arab traders simultaneously introduced cotton textiles and cotton cultivation methods to Italy and Spain. However, in recent years, ethnographic and historical narratives revealed that it was probably difficult to grow cotton in Europe, where the climate was cooler than in tropical regions.

With high probability, however, cotton, as a raw material and fluffy white fiber, began to enter Europe from the Mediterranean in the 14th century, while cotton spinning and weaving began in Italy

and France. However, it seems likely that woolen fabrics were still the main clothing textile in Europe, and it was not until the 18th century that cotton became a major industry. In spite of this, however, it is probable that cotton was already widely grown in Latin America and the West Indies before the arrival of Columbus in the 15th century. Suffice it to emphasize here in passing that cotton seeds grown in Panama were only later brought to the U.S. (around 1740), shortly before the Revolutionary War. They were cultivated in the Virginia region, of course not without consequences to the social dimensions of life there. Notable here are picking cotton and upland cotton (see illustrations in Figures 1.1 and 1.2). Focusing particularly on upland cotton, which today accounts for more than 90% of all cotton grown in the world, it is important to state that it was created at this time in the U.S. by breeding wild species from Central America. This is unsurprising, perhaps simply because it is an easy to grow variety with good fiber quality and high adaptability to the land [for further details on

Figure 1.1 Illustration of Picking Cotton
Source: William Aiken Walker (American, 1838–1921)
https://artvee.com/Accessed on06/12/2022
See also Munsi and Shimazaki [2023: v]

Figure 1.2 Illustration of Upland Cotton (1879–1895)
Source: Winslow Homer American, 1836–1910)
https://artvee.com/Accessed on 06/12/2022
See also Munsi and Shimazaki [2023: v]

upland cotton, see Read, Reddy, and Jenkins 2006].

One matter is certain in these developments:

> The history of clothing is difficult to reconstruct because most cloth has not survived the ravages of time [...] "Evidence of cotton's essential role in early societies can be found in the foundational myths and sacred texts of many peoples. In Hindu scripture, cotton appears frequently and prominently [...] People across West Africa attributed their spinning skills to Ananse, a spider deity. In North America, a Hopi spider goddess was believed to spin and weave cotton. The Navajo believed that Begochiddy, one of the four sons of Ray of Sunlight and Daylight, had created and planted cotton after making the mountains and insects [Beckert 2014: 5–6].

It is further recognized that cotton products were brought to China from India in the 1st century AD. More precisely,

> [c]otton became a major presence in the Chinese countryside during the Yuan dynasty (1271–1368). During those years, it effectively replaced ramie, which, with silk, had traditionally served the Chinese as a fiber for making cloth. By 1433, Chinese subjects could pay taxes in cotton, which enabled the state to cloth its soldiers and officials [...] During the expansionary Mining dynasty (1368–1644), cotton production spread throughout China's new conquests [Beckert 2014: 11, 14].

Thereafter, especially with the encouragement of the government of the time, cotton cloth increasingly spread throughout China, replacing the previous linen cloth and becoming a popular daily garment. Interestingly, however, due to climatic and other reasons, cotton cultivation did not take root in Japan. Instead, it was reintroduced from China in the 16th century and spread mainly in western Japan, including Kyushu. This process culminated in the 19th and 20th centuries with the advent of new technologies introduced to the country. With this caveat in mind, I can turn now to a review of some salient aspects of cotton.

Reviewing Some Distinctive Aspects of Cotton as a Fiber Plant

As I have attempted to examine cotton and its impact dispassionately, especially from the standpoint of my own long involvement in anthropology, I have improved my understanding of the fact that cottonwood is originally a plant related to hibiscus, a common horticultural species and a natural fiber [for useful discussion of the subject, see Hake-Johnson and Kirby 1996; Taylor and Gardner 1983; Constable 1991; Jones and Well 1997; Jost and Whitaker et al. 2006; Seegul 2001]. For the moment I propose to simply make one crucial field observation: when the seed is planted in the spring, the plant grows into a green shrub about one meter tall. It then produces pink or cream-colored flowers, which, when pollinated, fall off and produce a fruit called "a cotton ball." Inside this fruit are cotton seeds and white fibers. In the fall, when the leaves fall and the cotton balls break open to reveal the fibers, the

cotton can be picked.

In Australia, for example, cotton is harvested by large mechanical harvesters and packaged in large, round modules. These modules are then processed in a cotton gin (cotton ginning machine). During the ginning process, the lint (fibers attached to the seeds) is separated from the seeds and compressed into rectangular bales, each bale weighing 227 kg. In further processing, cotton is spun, dyed, knitted, and woven into clothing and household products [Cotton Australia 2021]. Reading my field notes I can see cotton not only as it first appeared to me as a central staple crop related to food and shelter, but also in retrospect the trajectory my observations of its production and consumption have taken. This allowed me to approach the usual aspect of any anthropological research: "objects" standing in front of observers and observed as objects of reflective inquiries. Interspersed in this discussion is an exploration of what constitutes cotton, showing the many facets it exhibits as well as its contemporary challenges in terms of production and consumption.

One further matter is certain: To meet humans' desperate need for fiber, cotton is currently grown in 80 to 100 countries, providing income to hundreds of millions of farmers around the world. Despite this, however, a different story appears when one looks at how todays' globalized society interacts with cotton. Two important perspectives emerge here. One is that cotton was among several plants grown during the colonial period. Particularly in the U.S., as briefly discussed below, cotton culture was a major part of slavery, the Industrial Revolution, and Capitalism. This is the central thesis of Hopkinson (2006) and Beckert (2014), and the issues have more recently been presented in all their importance by Munsi and Shimazaki [2023]. Unfortunately, the same scenario is still being repeated in Uzbekistan in Central Asia (EJF 2005). In addition, biotechnologists report that "regular cottonseed may be harmful to humans and many animals because it contains high levels of the toxic substance gossypol" [Shand 2019: 10].

Another interesting point is that cotton, as a "white gold," is ultimately related to human wants and needs. For example, cotton forms an inseparable part of people's daily lives, as the fibers taken from the plant are often used to make fabrics, clothing, bed linen, hospital operating gowns, and even paper money. But cottonseed is also provided as feed for animals that have more than one stomach, such as cattle and sheep. Here, the description offered by the American biotechnologist Rasor is characteristic: "Cottonseed is consumed in many ways. Its dregs are often used in tortillas, breads and baked goods because of their high protein content. And the seed kernels (whole seeds) can be roasted and eaten as a snack" [Shand 2019: 15].

> Fashioned by African, American, and Asian peasants, spinners, weavers, and merchants over at least five millennia, this cotton world was vibrant and expanding. Despite its diversity across three continents, the centers of this huge manufacturing industry had many things in common. Most important, cotton growing and manufacturing almost always remained small-scale and focused on households [Beckert 2014: 14].

From this perspective, for instance, cotton is analogically taken as product of the center/periphery relationship in ordering the socio-economic process, a human-cotton relationship that is inherently

intrinsic and reciprocal. Furthermore, this interaction between cotton and humans is not merely the constant pressure of the center (states seeking their national interests through cotton projects or established cotton companies) toward the periphery (local community seeking sustainability through cotton projects or cotton farming sectors—especially in tropical regions) but also a much more complex interplay, when the periphery can talk back and advocate human dignity, human health and security, and ecosystem protection briefly discussed in the subsequent sections.

Another important element regarding the specifics of cotton is its genetic modification [Stone 2007], which is scientifically considered to have no effect on the fibers of clothing fabrics. Here, the observed correlation between cotton and humans might be explained in this way: in recent years, as many people partly depend on cotton for their livelihoods, several companies and national institutions have made efforts to make cotton more sustainable. Detailed surveys have shown that most growers are smallholder farmers and that growers in developing countries have fewer than two hectares of land. In addition, there is probably a significant percentage of cotton products in every household's closet, either plain or dyed in various colors and mixed with other fibers (blended cotton). Similarly, processed cotton is also used in building materials. In this sense, as mentioned above, cotton is deeply related to human beings. Not surprisingly, there is today a growing awareness that cotton is not only a part of how humans live and work, but it is also involved in all areas of their lives. It is therefore of great importance to understand the distinctive aspects of cotton in its connection to people's lived experience.

It is arguable, being a general and generic level of specific practice rather than an abstraction, that the more one interacts with the cotton itself as an object, the more one touches it and feels it, the more one considers its meaning and, hence, develops a keen interest in its existence and impacts on humans. Salfino (2015: 2), reviewed in *Sourcing Journal* by Cotton Incorporated Lifestyle Monitor Research (Consumer Trends Survey), went further to demonstrate that today's advertising of cotton is helping to solidify the ties that consumers have ostensibly had to cotton products and household goods. Furthermore, many consumers have stated that they would prefer to be oriented toward cotton or cotton blends when choosing apparel products. It is thus more productive to note that cotton products never go out of style and their possible influence on human life cannot be ruled out. More precisely, cotton products only, in a sense, change in color and pattern. From this perspective, one matter, therefore, remains certain: "Cotton's genetic history is full of surprises. From transoceanic travels to inter-species cross-breedings, cotton's story is one of plant and seed survival, adaptation, and human cultivation. What started as a naturally tough, unspinnable fiber has been transformed into something most folks adore for its soft, comforting feel" [Crop Science Society of America 2016: 2].

Even in this participatory situation, many agencies and companies occupy important roles in influencing the structural level of cotton production and consumption, and vice versa. This seems to reference the subtle idea of a game: the mirroring game between structures and agencies in terms of cotton activities is endless. In fact, recent research has deliberately enhanced the belief that black slavery and the British Industrial Revolution are undeniable truths and inescapable aspects of modern human history. From this spectrum, I can subsequently consider the relationship of cotton with the issues of slavery, forced labor, child labor, and environmental destruction. Thus, I analyze a few

examples in order to illustrate the complexity of the cotton issues in human civilization, which I try to vividly underscore in this essay.

The Cotton Industry and Slavery

The cotton industry can be largely divided into the agricultural sector (cotton cultivation), and the industrial sector, including production of cotton yarn and cloth (Foshee et al. 1999). Slavery was inseparable from cotton cultivation in the 17th and 18th centuries. Furthermore, it was considered as an essential part of cotton cultivation, which in turn contributed greatly to the development of the Industrial Revolution in England in the 18th century. In this regard, Beckert's rich, fascinating, and consequential book, *Empire of Cotton* [2014] complements Riello's [2013] book C*otton*. Beckert compels a reevaluation of core concepts, going back to the Industrial Revolution in England and following cotton production through to World War II, describing the incredible impact that cotton production has had on the development of economic systems. All of these are intertwined with European colonial policies beginning with the Age of Discovery. From this account, it is clear that slavery, the Industrial Revolution, and colonialism were closely linked to the development and growth of the cotton industry. The movement was also globalized, spanning Europe, Africa, the Americas, and the Indian subcontinent. Many narratives illustrate that Black African slaves were being used for agricultural labor in Latin America at the end of the 15th century. In this context, it is important to specify that they were frequently used in North America to grow tobacco in the British Virginia colony in the early 17th century and later to grow and harvest cotton.

By the early 18th century, then, cotton plantations were established through slavery and ultimately became the economic basis for the American Revolution of 1775 as so clearly delineated by Beckert [2014] and Engerman [2010]. Simultaneously, the Industrial Revolution in England was burgeoning and consequently led to the mass production of cotton yarn, which increased the demand for the raw material, cotton fiber. An implication of this is the possibility that this necessitated an increase in the production of cotton plantations in the southern United States, and as a result, many more black slaves were brought into the country. The population of black slaves reportedly numbered approximately 900,000 individuals in 1800 and then over 4 million in 1830 (some other sources even state that the number exceeded 6 million). Retrospective, detailed statistics revealed that the United States produced nearly 70% of the world's cotton between 1790 and 1805, and then a tremendous 80% (850,000 tons) in 1860.

Subsequently, the Civil War brought U.S. exports to a halt. As a result, Europe was hit by a severe cotton crisis, and by September 1862, nearly 250,000 British workers were said to have lost their jobs due to factory closures and other factors. The British thus sought alternative countries to replace the dwindling supply of cotton caused by the Civil War. Subsequently, India and Egypt replaced the U.S. in supplying large quantities of cotton to the West. This was also a crucial factor in both countries later coming under British rule. This process, it should be reiterated, was at the same time centrifugal and directly connected with the hitherto increasing economic and social conditions. Fortunately,

slavery in the U.S. was then abolished with the Emancipation Proclamation of 1863. However, even with the passage of the Civil Rights Act of 1964, the repercussions of slavery have not been resolved and continues to be a unique social problem in the United States. In this respect, cotton, the root of slavery, is widely regarded as a "sinful plant" in American society.

African slavery and the Atlantic economy in relation to the facets and contours of cotton have received much attention in the reviews of Beckert's [2014] book, *The Empire of Cotton*, labelled as a nonfiction account that explores the history of cotton and its impact on modern capitalism. Here, one further realizes the extent to which Beckert, with penetrating insight, demolishes the myth of capitalism as it has been traditionally understood. More specifically, he counters the notion that Europeans controlled the cotton industry as a result of scientific innovation, arguing that, "Europeans became important to the worlds of cotton not because of new inventions or superior technologies, but because of their ability to reshape and then dominate global cotton networks" [Beckert 2014: 30]. Against the backdrop of this growing understanding, Beckert, a social, political and economic historian, peels back cherished notions to reveal that "industrial capitalism" evokes the more discreet ways in which states intervened to protect the interests of global capitalists through more diplomatic channels, preserving the initial gains made through "war capitalism." Neither concept is exclusive, with "war capitalism" and "industrial capitalism" continually interacting with one another and overlapping chronologically, as Beckert [2014: 174] underscores: "industrial capitalism's institutional innovations facilitated war capitalism's death due to its own contradictions, as strong states, which could spread to more regions of the world, would enable labor mobilization in the global countryside after the end of slavery." Through the discussion of these two concepts, Beckert significantly underlines the importance of forced labor, with an emphasis on slavery in particular, in the development of global capitalism. Finally, Beckert [2014: 114] cogently claims that "the flow of cotton from the United States to Europe and of capital in the opposite direction" was at the core of developing international trade networks.

Cotton, the British Industrial Revolution, and the Colonization of India

In the late 18th century, improvements in cotton spinning machinery in England led to the mass production of cotton yarn, and the demand for the raw material, cotton, increased dramatically. This led to the establishment of the British cotton industry, which in turn began to import raw cotton, rather than cotton products, from India. Furthermore, cotton cultivation spread rapidly in the West Indies and the United States. In the U.S. especially, when Whitney invented the cotton reeling machine at the end of the 18th century, cotton production by black slaves on cotton plantations in the South greatly increased. In India, on the other hand, cotton cloth had long been produced by cottage industry and exported to England through the East India Company. Literature merely suggests that the quality was reputedly excellent, and it was so popular in England that it became a boom. However, it could be stated that the Industrial Revolution enabled the British to produce large quantities of inexpensive cotton cloth, and conversely, they began to export it to India. As a result, the cotton textile

cottage industry was destroyed in India, and the country was forced to specialize in cotton production and export. In addition, it is important to emphasize the historical fact that the already impoverished country, known as the Indian Empire, later became a British colony in 1877 and cotton was cultivated as a major commodity crop along with tea and opium. To better understand this phenomenon of cotton it is necessary to reconsider and analyze the present-day (contemporary) human scenario of its cultivation and consumption.

Reconsidering Cotton Cultivation Today

As an agricultural product, cotton cultivated today has increasingly been improved through repeated crossbreeding to increase yield and make it easier to pick. Without continued breeding and improvement (sustainable development), the trees will revert to 3 to 5 meter tall in 5 to 10 years. Dominant breeding is, therefore, important: otherwise, the yield will decrease and the quality will deteriorate. There is a further consideration: both cotton and rice require a warm climate [Duggan et al. 2009], abundant water [Karam et al. 2006], and plenty of sunlight. Practically, it takes four to five months from sowing to harvest for rice, and five to six months for cotton, i.e. one to two months extra for cotton. This means that cotton needs a little more sunlight than rice. Therefore, in order to receive more sunlight, cotton fields are often located in the Northern Hemisphere, as opposed to rice fields that are often located in the Southern Hemisphere. Details on fiber development and maturation can be found in Seegul's [2001] valuable work, while Roberts et al.'s [1996] synthetic review enhances one's understanding of the process of defoliation, harvest, and ginning.

Moreover, it can be assumed that cotton has very little to be discarded. The husks of cotton plants are rich in cellulose, which is used to feed cattle and other animals, the fiber is used for clothing and materials, the seeds are used to make cottonseed oil for tempura and other dishes, and the fiber remaining in the seeds is called cotton linter, which is used to make dynamite, plastic enhancers for glasses and other products, cosmetics such as lipstick, and raw materials for synthetic fibers such as *cupra*. It is suggested that cottonseed oil pomace and harvested cotton stalks are also used as fuel. Yet, it is important to emphasize here, for security's sake, that cotton is highly flammable because of its oil content. Once a fire starts, it smolders inside and cannot be extinguished. Experience has indeed shown that a fire that encounters assembled cotton can run 20 to 30 meters in one second. However, it should be noted in passing that the cotton products one wears and uses are processed and safe in this regard.

In addition to cotton fibers, the picked cotton (seed cotton) contains dead leaves, bits of stalks, and other debris. The process of separating the fibers, seeds, and other foreign matter (trash), and then preparing the fibers is called ginning. The yield varies slightly depending on whether the cotton is picked by machine or by hand, but generally the yield is 50% seeds, 40% fibers (*men* 綿 , cotton), and 10% waste for every 100% cotton. The fiber is called "Ginned Cotton/Lint" and the seed is called "Cotton Seed", or "Cotton Boll," as it grows in the field, although the term "Cotton Ball" itself is used for round cotton for either medical or cosmetic purposes. Cotton is reportedly the world's largest non-food crop.

Robertson, Espinoza, and Weatherford (2002) deftly discuss the foliar fertilization of cotton.[2]

More facts need to be mentioned here. First, good cotton is usually thin, long, strong, mature, elongated, and uniform. It yields fine, strong yarns and fabrics with a variety of functions. Second, cotton is highly absorbent, functional, easy to dye, and pleasant to the touch. It is ideal for towels, shirts, and bedspreads. The third consideration is that cotton is grown in more than 100 countries around the world, and by 2020, production was estimated at about 26 million tons, equivalent to 180 billion T-shirts or 53 billion pairs of jeans (depending on the weight of the batting). Furthermore, cotton is an important strategic commodity, just like grain and crude oil. Major economically powerful countries, such as the U.S., China, and Russia still prohibit exports of items that greatly affect the clothing, food, and shelter of their own citizens whenever their harvests decrease for their own convenience. Supak and others [2001] provide us with the best substantive synthesis of the evolution of cotton harvest management.

Many people's disdain for cotton cultivation, however, is related to its "dark sides." During the Vietnam War, for instance, a defoliant was reportedly developed and used to wipe out the jungle so that the guerrillas would have no place to hide. However, this was a major factor in the destruction of the environment, and it is because of the invention and use of large quantities of defoliant by the U.S. that organic cotton is attracting so much attention. This defoliant caused enormous damage not only to the environment but also to the human body. It contained high concentrations of dioxin, which affected the fetuses of those who inhaled it before becoming pregnant, causing serious damage not only to the Vietnamese but also to U.S. Vietnam veterans. This leads me to briefly consider the concept (and label) of organic cotton.

Important Note on Organic Cotton

Recently, the SDGs (Sustainable Development Goals) and sustainability have become trending words in the media and are being discussed with much fanfare in various places, such as schools, homes, and offices. In this context, organic cotton is also a hot topic with high recognition, as is organic food today [Textile Exchange 2021a, 2021b]. However, consumers' detailed understanding of it is less explored and developed. It is often misunderstood that textile products made from organic cotton have nothing to do with being "good for you" or "gentle on your skin." From this perspective, for instance, they are tested in comparison to regular cotton, but there are no results showing such a difference. In this respect, it is clear that they differ from "food ingredients." This misunderstanding is often an aspect of a lack of understanding about the raw materials by some marketing companies and others.

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[2] This actually entails the application of Nitrogen (N). Field experience has shown that feed grade urea is the most reliable, economical, and proven folial N. material. The standard recommendation is to apply 4.6 Ibs of nitrogen/acre as ura in at least 5 gallons or more of water per acre (gal/acre assumes aerial application 10 to the gallons of water is performed for ground application).

Despite the high level of awareness, empirical research informs us that the scale of organic cotton production is very small, accounting for less than 1% of total cotton production, and the ratio has remained stagnant for more than 10 years with no significant change. The production output shows that it is a highly scarce raw material. Production increased temporarily around 2010, but has since then been on a somewhat downward trend. The purpose of the world's encouragement of organic cotton is to live in harmony with nature as much as possible and to leave our descendants a healthy, safe, and abundant environment. Of course, it is also a reflection on the U.S. cotton farming practices of the 1960s. In the U.S. especially, in order to supply plenty of water to the vast, warm lands for cotton cultivation, many irrigation systems were installed and the latest agricultural machinery was used. In addition, and in order to increase farmers' production efficiency, American chemical companies worked to develop pesticides and fertilizers, and farmers sprayed large quantities of the resulting chemicals on their fields. Furthermore, through the power of biotechnology, they developed seeds that increased yields and were resistant to pathogens. As a result, U.S. cotton production and efficiency improved dramatically. However, this exhausted the soil and depleted groundwater. This bears upon another concern, also expressed by critical observers: the spraying of pesticides and insecticides by airplanes and other means has unfortunately caused many problems, including hazard to the health of local residents.

Perhaps the worst example to date is the application of large amounts of chemical fertilizers to the exhausted and unproductive land in an attempt to increase revenues. This has obviously led to the land becoming increasingly degraded and the nearby agricultural water supply being contaminated. The same problems were seen with other crops. In 1990, the U.S. enacted the Organic Foods Production Act, which established a number of regulations. For example, the initial key issue regarding the arrangements for organic cotton cultivation was the limitation of the use of chemical fertilizers and pesticides. Then, the non-use of genetically modified organism (GMO) seeds, and third-party inspection and certification were added. Overall, it is evidenced that cotton is largely divided into *conventional cotton*, which accounts for about 70% of production, and *sustainable cotton*, which accounts for about 30%, depending on the cultivation method [Textile Exchange 2021a: 13; see also Mullins and Burmester 1991]. Of this sustainable cotton, about 3% is organic cotton (see Figures 2.1 and 2.2).

As far as sustainability is concerned, more precise information is nevertheless necessary in order to clarify the terms conventional cotton, sustainable cotton, and organic cotton. Experiential knowledge has increasingly demonstrated how they are similar but not overlap, as once thought. How may such differences be explained?

> Organic cotton refers to cotton produced by certified organic standards only, such as *GOTS*, *OCS*, *NATURTEXTIL MN* and other standards in the *IFOAM Family of Standards*; these standards include cotton grown from non-GMO seeds and without the use of synthetic pesticides and fertilizers. However, organic certification does not cover the additional issues of cultivation and farming practices which impact the environment and population, such as emissions, biodiversity and employee working conditions.
>
> Sustainable cotton refers to cotton production which takes these numerous impacts into consideration,

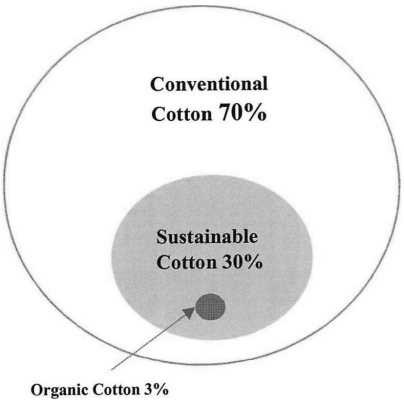


Figure 1.1 Differences in Cotton Cultivation Methods
Source: Author's schematic representation, 20/04/2022. Data extracted from Munsi and Shimazaki [2023: 83]

Figure 1.2 Conventional Cotton
Photo by a cotton flower cultivation farmer, 2015.
Source: Data extracted from Munsi and Shimazaki [2023: 83]

with the aim of reducing negative impacts and supporting positive outcomes in an ideally holistic manner; this includes the entire cotton lifecycle such as the sustainable use of recycled cotton. Needless to say, sustainable cotton is inclusive of organically produced cotton due to the beneficial requirements in organic cultivation practices [Textile Exchange Report 2020: 8–25].

After all, when one compares conventional and organic cotton, the following can be discerned and understood:

> With the focus on sustainability, consumers have a variety of opinions about the different types of cotton and what "organic cotton" means. In general, therefore, it seems likely that consumers have a high opinion of all cotton-rich apparel products. However, it seems evident that the majority of cotton products sold in retail stores are made from conventional cotton, with organic cotton being used for a very small percentage. In this context, what is important to observe is the very fact that when looking for natural and sustainable fibers to meet the market need for organic cotton, many brands and retailers compare it to conventional cotton. Such a misconception disappears, especially when one realizes that the distinction between organic and conventional cotton is often misunderstood or misrepresented in sustainability discussions and marketing materials [This is so even today, as I know from a personal experience in Sub-Saharan African contexts.] [Salfino 2018: 1–4, 13, translation from the original French and bracketed text by the author].

Figuring World Cotton Production and Consumption

Looking back to the past, the world cotton production in 1924 was 6 million tons. The United States was the main producer, accounting for about 60%, followed by India, China, and Egypt, with these four

countries accounting for 90% of the world's production. After World War II, however, cotton-producing countries diversified. Africa, especially West African countries, greatly increased its production and became the world's second largest export region around 1980. In addition, it is interesting to note that production in Asia, especially India, China, and Pakistan, also grew significantly. Over the course of about a century, production has more than quadrupled (at least superficially).

Through a brief analysis of cotton farming, however, many empirical studies [Kerby and Hake 1996; Landivar and Benedict 1996; Layton and Reed 1998; Kerby et al. 1996; Oosterhuis 1990, to name but a few] have demonstrated how todays' globalized world produces about 26 million tons of cotton, mostly in India, China, the United States, Brazil, Pakistan, Turkey, and African countries, in areas with vast tracts of land and abundant water and sunlight. It is possible that Australia's crop yields could vary greatly depending on the amount of rainfall caused by the El Niño phenomenon. On the other hand, it is important to acknowledge that China, India, Pakistan, Turkey, Bangladesh, and Vietnam have abundant and inexpensive labor. The top five countries (United States, Brazil, India, Greece, and Benin) account for approximately 75% of the total. As discussed below, it is important to acknowledge that the history of cotton production, consumption, and spinning is striking by its considerable contribution to the development of globalization through international marketing and the Industrial Revolution. Self-ascription in this case, however, is clearly built into critics' assertiona that the Industrial Revolution also had its dark side, with slavery and child labor, and was the beginning of a serious social crisis in many countries around the world, a point that remains unchanged today.

> Since 1960, world production of cotton fiber has doubled from 10.2 to 20.3 [currently 26] million tons, representing a moderate average annual growth of 1.7%. Although, there are numerous cotton producing countries, global production is largely dominated by China (28%), followed by the USA (17%), and India (12%). These three countries alone accounted for nearly 60% of the world's cotton fiber in 2004 and 2005, compared to 47% thirty years earlier. In this global picture, West Africa occupies a modest place: the region ranks fifth and contributes only 5% of international production. However, it is following a remarkable trajectory since its production has increased tenfold since 1960 to reach more than one million tons of fiber in the last four years.
>
> The world demand for cotton fiber has increased at the same rate as the population, i.e. 1.8% per year between 1960 and 2000. During this period, world consumption of man-made fibers increased by 4.7% per year, marking the relative decline of cotton compared to synthetics. Cotton accounted for 68% of total fiber use in 1960; this proportion declined steadily to 38% in 2000 [Atlas de l'Intégration Régionale en Afrique de l'Ouest/CEDEAO-CSAO/OCDE 2006: 1; translation from the original French text by the author].

These data and projections appear to illustrate how humans cannot distance themselves from cotton. Instead, to a large degree in human lived experience, they are explicitly or implicitly linked to cotton through its production and consumption, especially in the textile, skill and construction sectors. In this context, moreover, empirical evidence shows that "new factors in cotton cultivation allow production to respond more effectively to the expansion of demand, while enhancing the economic visibility of cotton production [...] The increase use of other existing technologies and crop management techniques has also contributed to contain the cost of production and to increase world

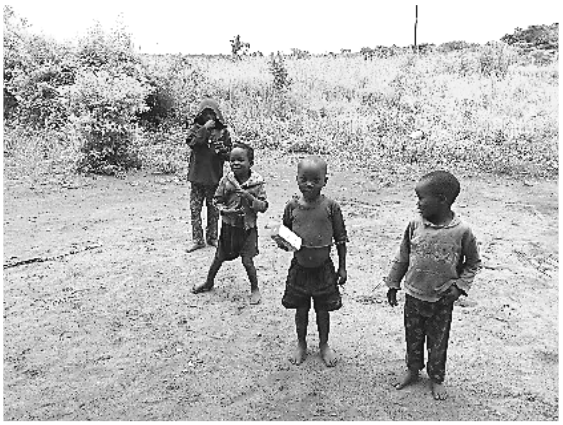
cotton production" [Becerra 2004: 6].

Hand-picking cotton fields, Human Dignity and Child Labor

It has been proposed that the center of gravity of philosophical anthropology is human dignity in modern society. What is at stake here are particularly "two bans: a ban on the instrumentalization [or reification, banalization, with slavery as a paradigm] and a ban on degrading treatments or humiliations [with torture as a paradigm]" of human persons, with the former being readily "the most voiced of the two bans" [Baertschi 2014: 206]. Crucially, this conception of the ontological dignity of human beings, translates into a formidable protestation against any dehumanization. In this sense, an anthropology of human dignity calls people to engage in ordinary life (objective world) in order to definitively allow a survival of the reign of humanization, that is to say, a world of human dignity (fraternal world or subjective world). This concern shows parallels with the cotton issues conflicting human civilization explicitly and implicitly underscored in his essay. Some case studies are in order here.

In sub-Saharan Africa, notably in Mali, Benin, and the Ivory Coast, as well as in many other developing countries, the combination of findings in the large part of this study provides some support for the conceptual premise that cotton is still planted and picked by hand. Hand-picking cotton is a demanding job (see Figures 2.1 and 2.2). The experience from the field is quite telling: when picking, one wants to pick only the fibers inside the husk, but one's hands inevitably touch the husk, which has sharp thorns that quickly turn one's hands bloody. This is true even for the most experienced pickers. In addition, they have to pick for long hours under the scorching sun. This is naturally a job that everyone hates: low wages, long hours in the heat, and blood everywhere. As such, it is a fact of history that many black slaves were brought to the United States for this work. In this respect, and

Figures 2.1 Government of Mali inspection team
Photo by Toyoshima employees, 2015
Data extracted from Munsi and Shimazaki [2023: iii]



Figures 2.2 Picker's children in Mali
Photo by Toyoshima employees, 2015. Data extracted from Munsi and Shimazaki [2023: iii]

a far as unrelenting assaults on human dignity are concerned, history repels many stories and fond memories of it.

Next, I would like to briefly refer here to the case studies outlined in my more recent work [Munsi 2022: 341–347] to further illustrate the core argument of this essay. The figures I propose to use in the subsequent lines have been taken from projects in which matters of human dignity and humanity have been observed over the past decades. This terrain is, to use Sunderland and Denny's [2007: 211] terms, "an illustrative one because of its highly charged saturation with political, professional, and performance elements as well as the epistemological differences and cross purposes we encounter as anthropologists." The important part here is to consider the empirical studies that indicate that approximately 70% of the world population today is found in agriculture (including cotton cultivation) and fisheries, and approximately 20% of the population is found in the service industry. On the surface, there is accruing evidence that child labor has been and continues to be a major issue of human dignity in all parts of the world.[3] Recent statistics have shown that the majority of child laborers work in mines and plantations such as coffee, rubber, tobacco, and cotton fields. In addition, they are found both in street hawking and in sewing factories.

These accounts and many others can help to explain the child labor issue as being a health hazard for children and interfering with their schooling. It is estimated that more than 300 million children between the ages of 5 and 14 work full-time worldwide. As matters stand today, the worst cases of child labor, to my knowledge, are in the sewing factories in Bangladesh (briefly sketched out in the following discussion) and the seafood processing factories in Thailand.

Zenca's [2011] finding gleaned from the peasant Kolkhozniks and Amir Temur Kolkhoz of Uzbekistan is notable because it is a moving portrayal of how today's young men with little education or training express their feelings and opinions regarding concerns about human dignity violations. It transpires that they resolutely consider that they will "do almost anything except pick cotton, because picking is seen as demeaning and even unmanly" [Zenca 2011: 163]. Moreover, in terms of health hazards, it has been argued that the quantity of pesticides used in cotton cultivation is estimated to be approximately 1,000 times higher than the amount used in other crops. This case illustrates some general issues. One factor is the inhalation of insecticides or their contact with the skin, which can cause headaches, nausea, breathing difficulties, and sometimes death. Developing countries use approximately 30% of the world's insecticides. It is also suggested in this respect that most of the fatalities due to pesticide use occur in developing countries and are caused by farmers' lack of knowledge about pesticides and lack of protective clothing when spraying. Secondly, the working environment is another case in point.

[3] Child labor is distinguished from general paid work and part-time work. Essentially, it pertains mainly to the following concerns: (i). children who are engaged in work unsuitable for their capacities as children or in work that may jeopardize their health, education or moral development and whose age is below 14 years; (ii) children who practice and engage in economic activities, on a part or full-time basis. The practice deprives children of their childhood and is harmful to their physical and mental development; and (iii) child laborers, constituting a group of working children who are either too young to work or who are engaged in hazardous activities—that is, work that is potentially harmful to their physical, social, psychological or educational development [UNICEF 2013, reviewed by Lal 2019: 2199].

Case Study 1. Child Labor in India

Perhaps a prime example of child labor is found in India. This unrelenting assault on human dignity refers to treating a person as an instrument or as a means to achieve some other goals. Lal's [2019] seminal work greatly improves one's understanding of various concepts and studies associated with child labor, its socio-economic issues, and world and Indian scenarios of child labor. As I have noted previously, cotton is produced in almost 100 countries, with a total production of 26 million tons. Both cotton cultivation and trade, it has been argued, represent a major part of modern society. In India especially, cotton picking is done under the blazing sun in the daytime for long hours. Here, it is reported that artificial pollination is used in the production of high-breed cotton. There is no doubt that this type of work is done before the sun rises and is very precise and meticulous. This is very delicate and fine-grained work, which is done by children, not by adults. As a result, there are few opportunities for children to go to school. I suggest that many smallholder farmers have much debt to pay off in order to obtain seeds and pesticides. In order to pay off the debts, many smallholder farmers hire their children out on long-term contracts, and, hence, children do not have time to go to school (see Figures 3.1, 3.2, and 2.3). Moreover, they are paid very little and are almost treated as slaves.

Desk research by Butterflies [Roy 2015: 97] indicates that "while poverty and unavailability of good schools explain the child labor supply side, growth of low paying informal economy rather than higher paying formal economy—called organized economy in India—is amongst the causes of the demand side." Thus, one of the remedies for this completely poverty driven issue of child labor threatening human dignity, according to Lal [2019: 2205], consists of "investing in the institutions of work to ensure a future of work with freedom, dignity, economic security, and equality." I speculate

Figure 3.1 A Girl picking cotton (Indian cotton field)
Photo by the NPO ACE, 2022. Used with permission.
See also Munsi and Shimazaki [2023: v]

Figure 3.2 Girls working in the strong sunlight (Indian cotton field)
Photo by the NPO ACE, 2022. Used with permission.
See also Munsi and Shimazaki [2023: vi]

that one of the reasons why many cotton farmers in India are still unable to make a profit may be due to the country's history and the caste system unique to India. From a historical perspective, intensive cotton production in India began in earnest with the Industrial Revolution in England. Originally, India produced not only cotton but also cotton textiles. However, when the British became able to mass-produce cotton fabrics, imports from the UK were cheaper than domestic cotton fabrics, so only those fabrics were sold. From there, India became a monoculture that only exported cotton, the raw material, to England. This is when cotton cultivation in India began to spread widely.

Case Study 2. Child Labor, Forced Labor, and Environmental Problems in Central Asia

In Central Asia, more precisely in Uzbekistan, Turkmenistan, and Tajikistan, cotton farming activities are still major sources of national income, a state-sponsored activity, making these countries the world's leading exporters of cotton. Each region has its own production quota. This forced labor is not only done by ordinary laborers and farmers, but also by in-school children during the harvest. In some areas alone, for instance, more than 200,000 people are forced to work, and the total number in the entire country is immeasurable. Unfortunately, there are also cases of children being forced to stay out of school for 3 months at a time to harvest. In addition, the purchase of cotton is done by a state-owned company, and the purchase price from farmers is one-third of the international trading price.

In Uzbekistan especially, one notices that not only child and forced labor, but also fair trade have become a major problem [Zenca 2011]. An even greater problem is that the nearby Aral Sea has dried up due to the heavy use of water for cotton irrigation. It is stated to be the largest environmental disaster of the 20th century. This inland lake used to be the fourth largest in the world. In the 1950s, the former Soviet Union began to focus on its agricultural policy, especially cotton cultivation, and used the water flowing into the Aral Sea for irrigating farmland. As a result, the water flowing into this sea was drastically reduced. In the past 50 years, the area of the Aral Sea has been reduced to approximately 20% of its former size, and the lower end of the lake has become a desert. It is well recognized that cotton cultivation uses a large amount of water. More importantly, however, is the observation that the people living in the region, especially the fishermen, are in a life-or-death situation. Recently, and thanks to the cooperation of the United Nations and other organizations, the area has been gradually recovering. However, it will still take approximately 100 years for the situation to return to normal. As such, this country has been blamed not only for child labor but also for environmental problems, and it has also been a target of the fair trade initiative I mentioned earlier.

Case Study 3. Exploitation of Minority Uyghurs in China

Recently, newspapers and television media have been reporting that Uyghurs (570,000 individuals)—a minority group of Turkic origin—have been forced to work at picking cotton by hand

in the Xinjiang Autonomous Region, where the Tian Shan mountain range separates the northern and southern regions of the country. This forced labor, and other prohibitions that "undermine Turkic-Uyghur and Islamic identities" [Fathil 2019: 355], inherently translates into a factual case of human dignity violations. Indeed, the suspicion of forced labor in the Chinese cotton fields has attracted attention, and Swedish fashion brand H & M (Hennes and Mauritz) and the USA's Patagonia have stopped procuring Xinjiang cotton.[4] It transpired in narratives that the Japanese clothing and lifestyle brand MUJI has, however, broken its code of conduct on contract farms in Xinjiang, and Uniqlo has avoided stating whether or not it uses Xinjiang cotton. Nowadays, however, there is a lack of information disclosure. Currently, China's total production output is approximately 6 million tons. Of this, 5.2 million tons are produced in Xinjiang Province, where cotton, as "white gold," has increasingly become the unutterable woe of human slavery, to an extent similar to the deplorable cotton field-exploitation of African Americans between the 18th and 20th centuries mentioned previously.

The most recent statistics have estimated Xinjiang Province's cotton production at approximately 5.2 million tons per year, while China's total demand has reached 7.9 million tons. It imports approximately 2 million tons per year from Brazil and India. Xinjiang's cotton is grown in desert areas with little rainfall, similar to the San Joaquin Basin in the United States and the banks of the Nile River in Egypt. Notably, in Xinjiang, when water is needed, snowmelt from the Tian Shan Mountains can be used for irrigation. There is an abundance of sunlight. In addition, it is a desert region with little rainfall, making it ideal for cotton cultivation. There is considerable evidence that quality of the Xinjiang cotton is the highest in the world, and there are many requests for it from all over the globe; it is not surprising that famous apparel manufacturers want to buy the cotton.

Too often the rationale seems to be that the most labor-intensive and demanding part of cotton cultivation is the picking of cotton. In Xinjiang especially, machine picking is as high as in the United States and Australia, accounting for approximately 70% of the total. Still, by some counts, approximately 60% of the crop in Xinjiang today is harvested by machine, less than 40% is harvested by hand, and the minority Uyghurs are the victims in the region. For example, research has revealed that an estimated 570,000 workers from three Uighur regions were, according to a review of the BBC and the German newspaper Süddeutsche Zeitung, reportedly "mobilized to cotton picking operations in 2018. The transfers took place under the Chinese government's *coercive* labor training scheme that involves military-style management" [Banerjee and Stockman 2020: 3; see also Zenz 2020: 3. Italics, ***my emphasis***].

Every year, during the cotton-picking season, from August to November each year, many migrant workers came to Xinjiang from Gansu, Narusi, Henan, Sichuan, Shandong and other provinces. In 1998, when the number was at its highest, it reached more than one million. All expenses such as food, accommodation, and transportation were paid by the cotton farms. In addition, they were paid on a piece-rate basis for picking cotton, which left a record of high income. However, the work was reportedly very difficult for the minority Uyghurs to handle by hand. In more recent contributions,

[4] It may help to understand that Xinjiang's cotton is one of the three most expensive forms of cotton in the world, along with that found in Giza in Egypt, and Supima, in the United States.

for instance, their exploitation in China has been criticized as "modern day slavery" [Banerjee and Stockman 2020; Zenz 2020]. Crucial in this respect, however, activists have claimed that major Western fashion brands are complicit in the abuse which has violated the human dignity and humanity of Uyghur Muslims.

Evidently, the advantage of machine picking is that it is possible to pick large quantities in a short time, and there is less chance of contamination by foreign substances. In some cases, however, a national strategy was set in motion to provide work for many workers and it is stated that the introduction of machinery was intentionally delayed. With the advent of mechanized cotton-picking work, however, the number of migrant workers was reportedly reduced to less than 200,000 by 2015 as a result of mechanization. Indeed, there are already enough mechanical pickers in operation and mechanization is expected to continue in the future. Under these circumstances, however, it is surprising to note that there are reports revealing how hundreds of thousands of ethnic minority workers (Uyghurs) in Xinjiang are being again forced into labor under the rationale of a labor shortage.

Mechanical pickers and automatic cotton winnowing machines in the U.S. and Australia

There is today considerable data to show that cotton picking is still done by hand, except in the United States, Brazil, Australia, and Xinjiang Province of China, where cotton is picked by machines (see Figures 4.1 and 4.2). Note in passing that this labor of women and children (child labor) for cotton picking has become a major problem worldwide, as this has had negative consequences for health of those involved. However, high-speed pickers developed in the U.S. 60 to 70 years ago are 7 to 8 meters high and have a capacity equivalent to 300 to 500 people or more on a single machine. Since large warehouses are needed to store this picked seed cotton for a period of time, it is nowadays

Figure 4.1 Cotton picker
Photo by Toyoshima Employee, 2016.
See also Munsi and Shimazaki [2023: iv]

Figure 4.2 Ginning (automatic cotton ginning machine)
Photo by Toyoshima Employee, 2016
See also Munsi and Shimazaki [2023: iv]

compressed and stored in the fields.

Cotton has often been criticized in this context and elsewhere as being particularly fluffy and bulky, requiring many warehouses for storage. However, in recent years, the introduction of this compacting machine has ostensibly made it possible to speed up the harvesting process and prevent the quality of the cotton from deteriorating due to rain. Cotton reapers remove seeds and debris from the cotton, align the fibers, and compress and pack the cotton. Samples cut from it are inspected and then transported to spinning mills around the world according to their quality. It should be noted that in some parts of China, machine picking of actual cotton is deliberately not done. This is understood as a national strategy to provide jobs for many people.

Discussion: Facing the Challenges of Cotton-Human Relations in a Globalized Society

I have tried to demonstrate how the relationship between cotton and humans has played a very important role in the history of the world, especially in terms of textiles. It would be surprising if this had not been the case. Looking back, one recalls how it is difficult to find anything else in human life over the centuries as important as food and clothing, fully represented by cotton. Today, perhaps more than ever before, people want to know more about the environment in which their food and clothing are produced. In this respect, they are especially interested in the impact of the production of cotton, as a typical fiber [Hake-Johnson, Hake, and Kerby 1998], on human society and the global environment. It is also easy to see that social scientists and humanists (including myself) have begun to seek such disclosure, or to make such aspects of past and present societies visible. It is precisely in this specific context that readers can, therefore, locate the main threads of this essay within the larger part of this study [Munsi and Shimazaki, 2023], one that cherishes the proven tools of historical sources, interviews, field experiences, and auto-biographical memory to address the cotton issues in human civilization.

What particularly emerged from this reflexive narrative analysis is the diversity of the relationship between cotton and people. To put it bluntly, cotton is well known for its versatility, functionality, and natural comfort. This entails a fundamental understanding of cotton as both a fiber crop and a food, or so to say, “a source of rare necessities” [*The Economic Times*, Panache 2018]. Specifically, it is a raw material for clothing (e.g. T-shirts, underwear, and socks), household items (e.g. tarpaulins, tents, sheets, coffee filters), and industrial products (e.g. building materials, fishing nets). Cotton seeds can also be used as fertilizer and livestock feed. Readers know that cotton is also used in Japanese futons. Cotton can be woven and knitted into fabrics such as velvet, corduroy, chambray, velour, jersey, and flannel. In addition, cotton can be blended with other natural fibers (such as wool) and chemical fibers (such as polyester) to make dozens of fabrics for a variety of uses. Cotton linters are the very short fibers that remain in cotton seeds after ginning. Usually such linters are used in manufactured goods such as bandages, cotton swabs, banknotes, x-ray film, and plastic enhancers. Less well known is that it is also used as a raw material for cupra fabric and dynamite.

A recent detailed study on the uses of cotton revealed that from one bale (227 kg) of cotton,

approximately 215 pairs of denim jeans, 250 bed sheets, 750 shirts, 1,200 T-shirts, 3,000 diapers, 4,300 pairs of socks, 680,000 cotton swabs, and 2,100 boxer shorts can be produced. Naturally, however, the amount of product produced depends mainly on the weight of the cotton being picked. Cottonseed, which accounts for about half of the weight of the picked cotton, is often used to feed cattle or crushed into oil; from 1 ton of cottonseed, about 200 kg of oil, 500 kg of cottonseed meal, and 300 kg of husks can be obtained.

Cottonseed oil is generally considered as being good for longevity partly because it contains no cholesterol and is high in polyunsaturated fatty acids and antioxidants (Vitamin E). This cottonseed oil is thus used not only for cooking, but also in products, such as soap, margarine, emulsifiers, cosmetics, pharmaceuticals, rubber, and plastics. Another byproduct of oil extraction to be considered here is cottonseed meal, which is high in protein and often used as livestock feed. Furthermore, cottonseed hulls are also a valuable source of feed for livestock. Thus, it is stated that a global cottonseed production can provide the protein needed by hundreds of millions of people and animals. In light of these startling statements, readers can infer the importance of cotton to humans and how it is intrinsically connected to their lives. In fact, the core assertions of this article precisely intends to provide readers with such a perception. It is hoped to enhance their understanding of the positive and negative impacts of cotton production on humans and their environment [Gwathmey et al. 2001; Sadras, Bange, and Milroy 1997; Kosmas et al. 2006; Pace et al. 1999].

Here, I turn my discussion inward to emphasize the relevance to various sectors of human life. It is recognized that humans first produced cotton to ensure the sustainability of individual and local populations. In the process, however, cotton has also been linked to humans at the local, national, and international levels. The first half of this essay highlighted how cotton was the most important defining element of 19th century American history. Indeed, cotton prolonged slavery and other kinds of coerced labor, imperial conquests, and very unequal distributions of income or political power. However, the cotton produced by the slaves led to the American Civil War, the bloodiest conflict of all, which nearly destroyed the United States. The following is a brief introduction to some of the remarkable statements made on the subject of "Cotton and Race in the Making of America: Global Economic Power, Human Costs and Current Relevance".

> When cotton production exploded to satiate the 19th century textile industry's economic appetite, it became the first truly complex global business and thereby a major driving force in U.S. territorial expansion and sectorial economic integration. Both before and after the Civil War, blacks were assigned the cotton fields while a pervasive racial animosity and fear of a black migratory invasion caused white Northerners to contain blacks in the South [Dattel 2012: 1, author's translation].

Gene Dattel conducted extensive research on the role of cotton from 1787 to the 1930s. His findings revealed that "King Cotton" (the economic and political importance of cotton production) was indeed an empire builder (imperial colonialism and expansionism) in itself. His study, therefore, provides valuable insights into the problems facing today's changing world. Over the past decades, cotton companies have increasingly become more involved in cotton production activities. In the

process, it is reported that cotton in its various stages, including actual cotton (raw cotton) and cotton ginning, has affected the energy, financial, and project sectors in a variety of situations. In rural southern Mali (West Africa), for example, cotton has long been a major driver or "principal engine of economic development," benefiting "farmers, rural communities, private traders, cotton companies, and the national government" [Settle and Soumaré et al. 2014: 2]. Not only the farmers who participated in cotton projects and activities, but also partner companies benefited in many ways. I suggest that companies assisted first in the increased security of supply of actual cotton. This (dynamic) situation not only improved yields and productivity, but it also increased farmers' trust in the partner companies. In addition, partner companies have been able to understand what the farmers really needed. In a sense, both parties have had long-term benefits and equally contributed to making project implementation sustainable.

However, as a more practical matter, it is clear from the large part of this study and other recent developments that human cotton production is ultimately based on the importance of its material aspects. This material aspect is evident in the consumers' perception of the human-cotton relationship. Although not often discussed, the relationship between cotton production and food security certainly exists. My sense from the field is that good agricultural practices in cotton production (e.g., reliable crop, soil, and water management) have remarkably contributed to the recovery of growers and farmland. It is also directly related to the food security challenges one faces today. By working together with farmers and businesses to increase the sustainability of cotton production, resilience can, I suggest, contribute not only to cotton production, but also to improving food security now and in the future.

Within the ambit of its diplomacy policies/strategies from the colonial period to the present, France has actively encouraged and supported cotton cultivation in Western African countries, especially Mali, where "the cotton sector has historically been managed by vertically integrated, state-supported cotton companies" [Settle and Soumaré et al 2014: 4]. At its best, France has effectively occupied a major position in the world in terms of quantity and quality of cotton exports. A close reading of figures released by recent studies showed that, in addition to the demand for food, the demand for textiles, including cotton, is increasing in these regions. In Mali alone, for example, case studies have shown that production has increased, with approximately 4 million farmers earning a living from cotton cultivation. This single factor also accounts fie between "50% and 75% of the total export earnings for the country" [Settle and Soumaré et al 2014: 2]. Here, it should be emphasized in passing that there is a link between cotton and food security in both African and South Asian cotton production. However, the challenges related to their future have naturally a direct impact on each country. Despite the overall increase in synthetic fibers, it is readily apparent that cotton remains the main raw material for the textile industry as it accounts for approximately 32% of all fibers used. One matter is certain: almost two-third of all cotton produced worldwide is used by the textile industry for clothing manufacture [USDA 2008]. Currently, there is accruing evidence that cotton is grown on approximately 33 million hectares of land worldwide, accounting for approximately 2.5% of the world's arable land. Expanding the area under cotton cultivation is not an easy task in the face of the competition for land due to increasing demand for food.

While it has been evident in the field that cotton production ensures the benefit of sustainability for local communities [Barder, Sumner and Culpepper 2001; Bednarz, Bridges and Brown 2000], I have also tried, in this essay, to identify its negative aspects. Some important clues can be discerned here, based on the findings gleaned from secondary sources such as Blecourt, Lahr and Brink and fieldwork research as well as a web platform (December 2020) jointly launched by the organic cotton community around the world. Readers can infer that the environmental impact of cotton production (including salinity, desertification, environmental pollution, and, of course, human health) is gauged as an increasingly important issue of the foregoing discussion.

There is considerable evidence that cotton, as a central staple crop, is intensively grown and requires large amounts of water for irrigation [UNESCO-IHE Institute for Water Education 2009; Witten, Jost and Cothren 1999]. This consequently causes soil salinization and a decrease in soil fertility, especially in dry areas. On the Niger river, for instance, the local populations is facing the challenge of regulation of ancient inland waterways and the re-imaging of their ecological, social, and cultural functions in the surrounding contemporary contexts. Perversely, the global outpouring of condemnation and grief over this socio-environmental phenomenon of environmental destruction in places such as Mali, Niger, Pakistan, Uzbekistan, and India (to name but a few) is evidence of an understanding that cotton production, when it is not well managed, often leads to threats to the land. Its physical loss is irreversible. Its emotional toll may be irreparable. However, a possible reconstruction would need to be accompanied by interpretation that acknowledges this, especially from the perspective of transdisciplinary river/waterways management and regeneration.

Equally important, in Central Asia, because of cotton production, the diversion of rivers into huge irrigation canals has dried up Lake Aral, one of the largest inland waters in the world. By the same token, it is estimated that approximately 60% of irrigation water in Central and South Asia is lost on the way before it reaches cotton fields, due to weak infrastructure [see Pesticide Action Network UK 2006]. Cotton "was, until recently, the dominant crop in the Uzbek agricultural economy. The area of modern Uzbekistan was already considered an important cotton growing region even in Russian imperial times. Irrigated lands account for the vast majority of all cotton, as well as wheat, production" [Abdullaev et al. 2005: 4]. Sadly, cotton production also can be the venue for coercive labor, environmental destruction, and even conflict or violence. In addition, cotton production is also a contributing factor to climate change. For example, industrial fertilizers often used by the entire agricultural industry, including cotton, are produced using large amounts of finite energy sources (1.5% of the world's annual energy consumption) and, hence, release a lot of carbon dioxide. It is suggested, furthermore, that when nitrate is applied in excess to agricultural land, nitrate is converted to nitrous oxide. This nitrous oxide is a greenhouse gas that is approximately 300 times more destructive than CO_2 in terms of global warming. Soil degradation significantly reduces its ability to absorb carbon, thereby adding to the greenhouse effect.

A final, but not the least negative aspect of cotton production actually entails social risks. Experience in various countries, particularly in Uzbekistan [Zanca 2011]—representing today the largest agricultural sector of the 5 Central Asian countries of the former Soviet Union—has shown that conventional cotton production has a series of social and economic risks for small farmers in

developing countries. Importantly, many small farmers in southern Asia have fallen ill or lost their lives due to lack of proper equipment and knowledge of how to handle pesticides. A corollary to this is that medical expenses and inability to work are serious economic burdens for the affected families. In addition, monoculture, with its heavy use of chemical fertilizers and pesticides, degrades the soil, reducing its ability to retain nutrients and moisture. As a result, farmers often face reduced yields and must increase production inputs of fertilizers. In addition, resistance of some pests to pesticides and the development of secondary pests are also issues to be addressed.

Evidence from case studies on crops conducted in West Africa and other areas, moreover, reveals that "risks to human health and the environment are inherent in the current use of certain hazardous pesticides by small farmers, presenting a challenge to food security, human health and livelihoods" [Settle and Soumaré et al. 2014: 2]. Additionally, it is reported that poor small farmers in Mali and elsewhere find themselves today in a situation where they must borrow from banks and cotton buyers to pay for increasing agricultural input costs. However, yields and market prices are sometimes low, and farmers' income from cotton harvests is often less than their input costs. Thus, more and more farmers are being forced into debt. Because cotton is essentially a cash crop, cotton farmers are heavily dependent on an unstable world market. Growing cotton only can also reduce a family's food security, especially in areas with unstable climatic conditions, as they do not have enough money to buy food in bad harvest years.

As far as cotton-human relations are concerned, much research is still needed in this area of the study to enhance one's insights into historiographical inquiry. For example, one can point to the issue of "combining cotton production with other crops," a challenge that has been addressed in the past. In addition to being underrepresented in the regional literature, cotton production on the African continent appears to suffer from inadequate management (as it has been defined by external actors). Fortunately, it is interesting to note in these critical times of political unrest in the region that much effort has over the past decades been made in Mali to reduce the risks to farmers by establishing field schools for cotton farmers. However, a closer look reveals that more efforts are still needed in this area of cotton production to solve this crucial issue [for further details, see Settle and Soumaré et al 2014].

I particularly draw attention to this most frequently overlooked case of Sub-Saharan Africa because of my acute awareness of the stakes of cotton production in this region. Recent statistical figures have shown that the overall population of sub-Saharan Africa, "856 million in 2010, is [today] projected to exceed 2 billion by 2050. Close to 218 million people, roughly one in four, are [nevertheless] currently undernourished. Concomitantly, African governments reportedly spend only 5% to 10% of their budgets on agriculture, far less than the average of 20% that Asian governments spent on agriculture during the Green Revolution." [Settle and Soumaré et al. 2014; 2]. It is surmised that successive appointed African governments (or some part of a provincial or national government) themselves have pledged to devote approximately 10% of their budgets to agriculture in order to achieve key goals related to sustainable development and food and nutrition security. Despite this, however, a case study from cotton systems in Mali has amply demonstrated that very few have achieved this goal [Settle and Soumaré et al. 2014]. As a result, many residents in Sub-Saharan Africa are poor and, hence, do

not have the economic wherewithal to solve their cotton issues. That is perhaps the reason why the concept (and label) of cotton as "being of benefit to humans" is not shared by everyone.

These findings and many others outlined previously may help us to understand how the meaning of cotton production and consumption is vividly defined by their past in addition to their context in the present. In this regard, how can communities be recognized as sustainable from the cotton production and consumption around them? Perhaps one of the most contentious issues with the management of cotton production in Africa especially has been the need to reconcile the development-oriented cotton cultivation projects with socioeconomic development around resource exploitation. From this perspective, Settle and Soumaré et al. [2014: 1], based on a case study from the cotton sector in Mali, vividly remind us of one important matter: "Progress towards sustainable solutions requires effective research and extension systems to be able to connect and work with often highly decentralized, isolated and semi-literate populations." Further studies, which take these variables into account, will need to be undertaken.

I would further posit that more research is needed in this area from a bottom-up approach. Embracing a more anthropological perspective, one should expand this task to definitively consider ethnography, a key tool of effective site management, for it must engage local communities (and not just experts). Concomitantly, in terms of sustainability (or sustainable management), particular emphasis has recently been put upon engaging the local communities and cotton companies or project managers in a dialogue and meaningful communication, with anthropologists interposed. This is deemed noteworthy so that the community understands right from the beginning what may happen if the site is explored for cotton production and ensure the survival of both the environment and future generations. In direct terms, they need to understand what development opportunities are offered by cotton production and consumption, but also that the implementation of cotton cultivation projects may impose limits on them, such as impeding other economic development, or even imposing some restrictions on altering the appearance of homes or engaging in certain activities in their least restricted locations. Naturally, the point, as Douglas Comer pointed out in the interview conducted with by Helaine Silverman, is that project initiators should become more aware of the fundamental understanding that "[one] cannot have sustainable management without the support of the local community, and if planning reveals community opposition that cannot be resolved, then a nomination should not proceed" [Silverman 2017: 123; for further details on this concern for involving farmers and local stakeholders at the project development stages, see Settle and Soumaré et al. 2014: 4].

In a sense, the considerations put forward in his essay on the deterrent effects of cotton production parallel well the causes of environmental damage experienced and suffered by the Kumals (Nepal) and the Malagasy (Madagascar) described by Kattel [2022]. In Nepal, for example, it is reported that after the establishment of the Tumlingtar airport, many immigrants migrated to the area, and the land of the Kumals was acquired in large quantities and many facilities were established and successfully urbanized. As a result, the Kumals lost, in this process of urban development, approximately 70% of their land and many of their traditional crafts and natural resources. Hitherto, the Kumals were rich in natural resources and clay mines, produced pottery and depended solely on agriculture, including livestock and crops. The situation of the Kumals in the Arun Valley of Eastern Nepal is similar to that

of communities found in Da Lat in southern Vietnam.

Da Lat in the 1980s used to be a city of flowers and honeymooners with fresh air, beautiful waterfalls, stunning lakes, and pine forests, and the weather all year round was cold with fog. There were sparse houses, sporadic traffic, and few commuters and because of this Da Lat's landscape was peaceful and pristine. As matters stand today, however, da Lat has completely changed as the pine forests were cut down to make golf courses and the temperature can now reach 30° Celsius at noon. Da Lat has become hotter and consequently people have to use fans and air conditioners. Seen in this light, one can more readily appreciate how the city without air conditioning was the pride of the Da Lat people, but now it is gone [Lu Y Nhi 2021, considerations translated and reviewed with commentary commensurate to their significance from the original Vietnamese text by the author, February 11, 2023].

Another stunning example of adverse environmental effects is that of Madagascar, which has reportedly lost 40% of its forests in the last 60 years, causing various environmental damage. It cannot be denied that the Malagasy today continue to face issues of deforestation and habitat loss or destruction, agricultural fires, erosion, and soil degradation, therefore putting their ecosystem at great risk. Perhaps that is the reason why the Malagasy one day ironically (as well as intelligibly) addressed project managers in these terms: "the next time you come to Madagascar, there will be no more Malagasy. All the people will have starved to death and a lemur [the rare endemic species living there] will have to meet you at the airport" [Kottak 1997, reviewed by Kattel 2022: 259, bracketed text by the author]. According to Kattel, the Malagasy wanted to emphasize how funders are often more concerned over the lemur, plants and the environment than about the human population. Thus, it bears observing that environmental injustice will occur and will be disregarded as a difficult issue if measures are not taken to address it in a locally appropriate manner. Narratives like these are widespread and they always carry on one hand the feeling of the environment irremediably lost, and on the other hand an awareness of economic prosperity, with dramatic consequences concerning the unaffordable cost of living for the local community.

I highlight these three cases simply because the reality of all these communities exemplifies what I have put forward in this analysis as points and situations of cotton production in which no room is created to promote the existential values of humans. On a different scale of the consequences of sustainable development, I would definitely agree with [Kattel 2022: 273] that the very concept (and label) of

> sustainability gives the meaning of fulfillment of maximum needs of human beings at present as well as for [the] future without disturbing the environment. A similar balance between human population and their environment is often portrayed in anthropological studies of adaptation [...] we should not be concerned in only one aspect i.e. environmental/ecological sustainability. To keep a better balance between population and resources, socio-cultural, economic, and political aspects of society should also be concerned.

Consistent with the literature, I would comprehend sustainability as that which specifically refers

to a long-term equilibrium between the human population, their demands, and the environment. Definitively, for this very practical reason, any cotton production projects, I suggest, should carefully consider these aspects.

As I ponder this intersection of cotton and humans, I wonder if one should not also consider how much of the everyday challenges people deal with are linked to the undeniable reality of the cotton value chain being linked to approximately 350 million jobs worldwide. Importantly, this ultimately includes farmers in more than 100 countries, many of whom are small-scale farmers whose main source of income is from the crops they produce. Ironically, as well as interestingly, literature suggests that the cotton industry is also linked to food and nutrition security. In response, many have combined cotton production with the production of food crops such as maize, beans, sesame, sunflower, sorghum, rice, wheat, and sugarcane. This also reduces the use of pesticides and other chemical fertilizers. Analogically, however, my sense from the field is that any approach of combining cotton with other food crops or rotating cotton still poses both possibilities and challenges. In this age of plant-based synthetic and cloned meat, it should come as no surprise that cotton, with its seeds that can be eaten by humans, has long been developed in many sectors of life. Of course, cattle already eat cottonseed. Cottonseed oil, genetically modified or not, is eaten by people. In addition, the oil cake that remains after the oil is pressed from the seeds, is rich in protein and is often used as feed for cattle. Therefore, it is not far-fetched to state that cotton seeds can be used as human food. By simply manipulating certain genes, it has been possible to stop the production of chemicals in the cotton that are harmful to humans.

Perhaps the next logical step would be to genetically modify cotton to increase its fiber content and strength, and to use the cottonwood itself for wood. Then all three of humanity's basic needs, food, clothing, and shelter, could be obtained from cotton. Efficient use of resources would also help combat climate change [*The Economic Times*, Panache 2018]. From Pizza's [2022: 4–10] valuable discussion of the "cotton-human relationship," one can further find the following clues: cotton has long been recognized as one of the most common textiles. The observed correlation between cotton and humans might be explained in this way. The aspects of cotton and its related historical, sociological, economic, and sustainability dynamics outlined in this essay allow me to argue that it is both a natural fiber and ubiquitous material. Indeed, compared, for example, to polyester, nylon, and rayon, cotton seems likely to be a more ecological choice for humans. It is important to augment this idea with one field observation: while many people naturally and simply assume that cotton itself is sustainable, this may nevertheless not always be the case. This is partly because cotton is a natural material and, above all, does not necessarily require a lot of chemical processing. In some instances, however, the subtle question still remains: is it really sustainable? One could perhaps conclude that every effort to discern the answer is made in achieving sustainability.

Concluding Remarks

The foregoing discussion calls for a particular focus on disclosing cotton as a central staple crop

produced in subtropical and tropical regions where water and sunlight are abundant, as well as in lands with abundant and inexpensive electricity. Thus it is more heuristically productive to conclude from the analysis of many accounts that India, China, the United States, Brazil, and Mali typically represent the main producing countries, despite the fact that they vary in size, economic power, demographic makeup, and distribution of income. This essay has labored to demonstrate that this dynamism often finds expression in the active responses of local communities to the shifting opportunities and constraints of the social and physical environments. However, it might be quite interesting to read the whole set of cotton issues with each particular state in mind, taking those variations into account while also contemplating them without taking those variations into consideration—contemplating their policies toward history, time, culture, peoplehood, and even "nation-ness."

The present results, however, are significant in at least two major respects. First, cotton itself, as a natural fiber, has, historically, a profound relationship to slavery and colonialism, the Industrial Revolution and capitalism, development and sustainable communities, and a significance for human life—to mention only the most obvious reasons and connections. It was clear from the main findings of this study (and many more) that the approximately 26.1 million tons of cotton produced annually is enough to produce 170 billion T-shirts. This very peculiar economic aspect and other issues and angles from which one might explore the matter of cotton cultivation and consumption highlighted how important cotton has long been to human life. Despite this undeniable reality, however, cotton appears to be hardly environmentally friendly. This is simply because regular cotton production requires significant toxic chemicals and large amounts of water, especially in warm regions. India especially, for a combination of reasons, distinguishes itself with approximatively 20,000 liters of water needed to produce 1 kg of cotton. This finding broadly supports the work of other studies in this area linking cotton with humans.

The second striking issue that runs through this essay is the use of genetically modified organisms (GMOs) deemed noteworthy in cotton production. In this respect, I referred explicitly to approximately 90% of cotton that is grown today using chemical fertilizers and GMO seeds. This is evident in the field, though the use of genetically modified organisms (GMOs) continues to be a subject of debate. Globally, however, cotton uses approximately 10% of the world's pesticides and 25% of its insecticides. It became clear from a review by the Worldwide Fund for Nature (WWF) that the use of chemical fertilizers and pesticides generally has a negative impact on the environment. This is precisely because they can cause soil degradation and lead to pollution and water contamination, including reduced biodiversity. A specific account of this issue should, surely, be possible, and should be a matter of specific research about the four pillars of sustainability: human, societal, economic, and environmental.

In recent years, attention has focused on sustainable cotton, especially organic cotton, which institutionalizes environmental aspects. It is critical to note that organic cotton, produced without the use of hazardous pesticides, is not genetically modified, and has been inspected by a third-party organization. It seems worthwhile that cotton is grown in large quantities and harvested by machines in large areas such as the United States, but in other major cotton-growing countries such as India, it is often rather grown by individual farmers on smaller plots of land. These individual farmers thus

earn little money from cotton cultivation alone, forcing them to engage in child labor and reducing children's opportunities to go to school. In many places, however, to counter such challenges (at least as I see them), the propagation of sustainable cotton and Corporate Social Responsibility (CSR) activities by companies are currently underway [for a brief literature review on the subject, see Martinuzzi et al. 2011].

Finally, and in light of the green environment campaign, the present study underscores that attention should be paid to the cotton products that are discarded. Although cotton is generally biodegradable, this does not mean that cotton products can be dumped in landfills. This finding was unexpected and suggests that when cotton clothing and hygiene products are buried, anaerobic biodegradation occurs, producing methane, a toxic greenhouse gas. As a preliminary conclusion, it is self-evident from the field of ecology and from the analytical descriptions and considerations underlying this essay in this arena that without adequate human attention, cotton will have a negative impact on the environment from its production to its disposal, contributing to global warming. It is unfortunate, however, to note in this respect that participants at COP 26 in 2021 in Scotland overlooked the crucial issues pertaining to cotton cultivation and consumption when discussing climate change and global warming.

Taken as a whole, the present historiographical and ethnographic narrative analysis thus reinforces the significance of a frequently cited paradox according to which cotton itself is, on the one hand, environmentally friendly and, on the other hand, is considerably damaging to the natural and physical environment and to human life, at several stages from cotton cultivation to merchandise production. I focused on this last point by highlighting the very fact that capacity-building programs for sustainable community through cotton cultivation projects (and not government projects) have not led to any significant improvement in either in the sustainability of the community or in the management and ecosystem conversation. Instead, as evidenced by this discussion, issues around cotton production in the name of sustainable development in West Africa and Central Asia have undoubtedly presented more impediments to the implementation of the SDGs in the respective regions. In general, therefore, this study, within its relatively limited scope, has provided a refined interpretative tool for demonstrating how the link between cotton and people is irreversible. This facet of the study mirrors the intriguing realization that many cotton-growing communities and countries are today facing concomitant and/or interrelated sustainability, environmental, and ecological issues. This would be a fruitful area for further work.

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Cotton-Human Relations in Contexts of Production, Consumption, and Sustainable Community

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Abstract

This study focuses particularly on the little-explored social phenomenon of the relationship between cotton and humans that is observed in different contexts, sectors, and conditions of lived-experiences, business, and economic development, and exists around us. It then explains, along with case studies and actual events, why cotton is so important to humans and why the two are inevitably inseparable. The connection between the two may sound metaphorical, but it is, rather, an unmistakable reality. I argue that this relationship will continue as long as human beings live their social, economic, and material lives. Here, cotton represents one of the world's leading agricultural crops and appears in many situations as an important textile raw material in clothing. For example, it is cultivated and picked in cotton fields, used in spinning and dyeing mills to produce yarn and fabrics, in sewing factories to manufacture products, and in retail outlets to sell cotton products. In all of these stages, cotton and humans continue to be inextricably linked. The analysis thus reinforces the assumption that the maintenance of natural ecology and human ecology should be reconsidered today as being equally crucial in the process of cotton production and consumption. On the whole, these finding, though preliminary, have important implications for developing our understanding of the many facets and contours of cotton, with regional studies being crucial to such understanding.

Keywords: Cotton, humans, production and consumption, economic development, human dignity, sustainable community