

THE EFFECT OF WOOL ON CENTRAL ASIAN ECONOMY AND ENVIRONMENT

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Abstract: In this research paper, the effects of wool on Central Asian countries are discussed. Future trends are analyzed and potential benefits of wool are presented, as well as some ways to effectively take advantage of the abundant byproduct of wool.

Keywords: Central Asia, ecosystem, economics, agriculture, Aral Sea, water management.

Introduction

In Central Asia, cotton plays a big role in both the economy and environment of the region. This commodity is produced in large amounts and both locally processed and exported to other countries as well. However, this poses one huge problem: overreliance on cotton. To produce cotton, large amounts of water is used, and as the temperatures rise, water sources are becoming scarce. Therefore, using other sources as a viable option instead of cotton is important where wool is a viable option for the region.

Current economic and environmental trends

Central Asia is one of the biggest cotton producers in the world, producing 3.5 – 4 million metric tons (MT) of raw cotton annually, and Uzbekistan dominates 60–70% of output[9]. While this provides many benefits, it has 1 huge environmental side effect: water use. Cotton requires a large amount of water, to be exact, 10,000 - 12,000 liters of water just to produce a kilo of cotton. Besides, the irrigation techniques in Central Asian countries, especially in Uzbekistan, are old, inefficient and mostly traditional surface irrigation using open canals.

Therefore, cotton plantations require massive amounts of water sources. To achieve that, many rivers are turned into canals used for irrigation of cotton fields. That in turn can cause other places to desertificate. A notable example would be “Aral Sea”. It used to be the world's 4th largest inland lake/sea in the world, but after it lost its water source as they were channeled into cotton crop fields, It started to shrink. Now, it has lost more than 90% of its original size.[10].

Worst of all, as it shrunk it left hundreds of kilometers long, salt desert which is causing sand storms that is negatively affecting the local population. About 40,000 km² of former seabed has turned into the Aralkum desert, now a major source of toxic dust storms carrying salt, pesticides, and heavy metals over hundreds of kilometers. [12]

In highly exposed areas of Karakalpakstan (Uzbekistan), respiratory illnesses (bronchitis, asthma, TB) and digestive diseases almost doubled compared with pre-crisis levels. Child and infant mortality rates in some districts reached 60–100 deaths per 1,000 live births in the 1990s, among the highest in the former USSR. [13]



[figure 1 : <https://www.britannica.com/place/Aral-Sea>]

The viable alternative

In Uzbekistan, nearly 100% of the cotton lint produced is now used for textile manufacturing, either domestically or for export as yarn, fabric, or finished textiles. As of 2025, domestic cotton consumption is expected to reach 670,000 metric tons, with virtually all of Uzbekistan's annual lint production (approximately 620,000 metric tons) processed within the country's growing textile industry. [11]

As it is a widely available product in the region, it has become the prominent material in the cloth industry.

However, this overshadows another material which can have huge potential, wool. There are more than 24.8 million goats and sheep in Uzbekistan alone, for example. However, their wool is often discarded in landfill. This causes environmental pollution firsthand. The amount of wool that is processed or recycled is so small that it doesn't encompass a mere part of the total amount produced annually as a byproduct.

How the alternative played out in real life

Not going far from central Asia, trends are different in Mongolia. Mongolia has an estimated of 29.4 million sheep, 24.6 million goats,[1] and they exported cashmere and cashmere products worth 441.2 million USD.[2]

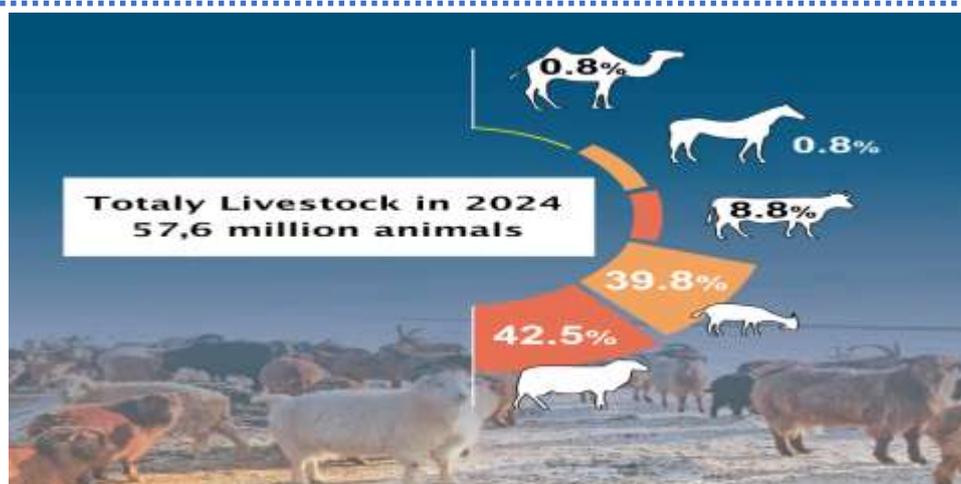


figure 2.

[Mongolia's Livestock Numbers Drop by 7 Million in 2024]

The wool industry not only benefits the economy but the people themselves. Mongolia's wool and cashmere sector provides direct employment to over 10,000 people and 190,000 herder households.[3]



figures 3 and 4.

The problems that affect Central Asian region

However, that trend is totally different in Uzbekistan.

In value terms, wool, not carded or combed exports totaled \$1.6M in 2022,[4] with a whopping 23,074,000 heads of sheep and goats. Therefore, there is a big opportunity being ignored. According to Monika Komorowska and co-authors (2022), the collapse in wool profitability in Kyrgyzstan and neighboring countries “such as Uzbekistan, Tajikistan, and Kazakhstan” has left a large surplus of wool. They note that while sheep meat is sold on local markets, “the sheared wool is left in the fields or stored on the farm,” so waste wool has become an environmental and aesthetic problem in the region.

Central Asian countries use 65-85% of irrigation water for cotton cultivation, while discarding 1.3-2.1 billion tons of sheep wool annually. Key impacts include lost

revenue from wool exports: Mongolia earns \$363M annually from wool, while Central Asia lacks comparable wool infrastructure. There is also the problem of underused labor potential: Tribal communities in India earn income through feather upcycling, a model absent in Central Asia [5].

Mongolia's wool exports are projected to reach about \$400 million by 2026, up from \$363 million in 2021. While this figure is less than \$2 million USD in Uzbekistan. With the great number of livestock and large amounts of wool products being wasted, there is a great potential to raise that number.

Other ways to use the “Alternative”

There are other possible ways than just discarding wool that are both environmentally friendly and profitable. For example, a company in Mongolia is turning wool into natural fertilizers. Those natural additions called “Monpellets” are cheap to manufacture and easy to process. Besides, not only do they provide crops with necessary nutrients but they also reduce the amount of wool being wasted. If this business model was integrated into the Central Asian region, thousands of tons of wasted wool would be turned into profitable and useful commodities. [6]

Nitrogen	9.45%
Phosphorus pentoxide (P2O5)	0.32%
Potassium oxide (K2O)	4.33%
Magnesium oxide (MgO)	0.47%
Sodium (Na)	0.38%
Sulfur (S)	2.11%
pH level	9.47



figures 5 and 6.

With almost 24,000,000 heads of sheep and goats, each producing around 3 kilograms of wool waste, that would turn into 62,000,000 kilograms of yearly waste. If even 1% percent of this amount is processed, that can save 6.2–7.4 billion liters (6.2–7.4 million m³) of water. That water can be used for other purposes in the region, because for cotton ~70–90% of irrigation water is used regionally—driving scarcity, salinization, and ~\$2–6B economic losses annually.[8] To achieve that, local governments should support and subsidize manufacturing of different wool products such as fertilizers, home insulators and clothes.

Conclusion

As stated above, Central Asia spends a significant proportion of its water on cotton production, and as the temperatures rise every year, water sources are becoming scarce. Over roughly the last few decades, annual water availability for Uzbekistan has fallen by about 20% compared with historical levels, largely because of reduced flows in the Amu Darya and Syr Darya, higher temperatures, and less predictable precipitation[14]. To effectively tackle the problem, the government and people should start considering other sources than cotton, such as wool for cloth and thread manufacturing. They should effectively use what is abundantly available and discarded locally. This not only effectively supports battling against global warming, but also provides some aid to many underrepresented families that live off by herding as there are more than 420 thousand people from Uzbekistan alone who sustain themselves in livestock and livestock derived jobs.[7]

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