Org. Agr. (2025) 15:183–198
https://doi.org/10.1007/s13165-025-00491-y

RESEARCH

Unequal fields: Political ecology perspective on organic cotton production in Tajikistan

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Received: 25 June 2024 / Accepted: 29 January 2025 / Published online: 25 February 2025

Abstract The paper explores the adoption of organic cotton production by smallholder farmers in Tajikistan's northern Sughd and southwestern Khatlon regions through the lens of political ecology. The research focuses on the complex interactions among socio-economic, environmental and political variables that influence the decision-making processes of Tajikistani smallholders as they navigate the transition towards adopting organic farming practices. This transition, initiated and guided by the external actors, largely from high-income nations, emphasizes broader power dynamics and asymmetries inherent within the global agricultural system. In addition to illuminating the pivotal role of smallholder farmers in sustainable agriculture and rural development, we ask how power relations, institutional frameworks, and market dynamics impacts the adoption of organic cotton by smallholders in Tajikistan, and the implications this has for local communities. By exploring these dimensions, we emphasize the need for supportive policies and the development of inclusive market mechanisms. This study acknowledges the vulnerability of smallholders to the volatility of the global organic cotton markets, influenced by external shocks such as pandemics, wars, and natural hazards. Considering the absence of domestic markets for organic produce in Tajikistan, we stress the reliance of smallholders on turbulent external markets, highlighting the urgent need for resilient and diversified market linkages to safeguard their livelihoods.

Keywords Organic cotton · Tajikistan · Smallholder farmers · Foreign aid · External actors

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Introduction

During the 1980s, heightened awareness of industrialized agriculture's harmful environmental impacts led to increased demand for organic products in Northern America, Europe and Japan, prompting government support and subsidization efforts, resulting in a breakthrough for organic agriculture (Rehber and Turhan 2002). Organic agriculture was uncommon in the Soviet Union, largely due to its emphasis on industrial, high-output farming and its focus on centralized, state-controlled agricultural practices. In addition, the closed economy and ideological resistance to Western approaches further limited the adoption of organic farming methods. After the Soviet

Union's collapse in 1991, most post-Soviet economies transitioned from collective farming to individualized or family-owned models, leading to the emergence of smallholder farmers managing plots of 3–5 hectares on average, particularly in Tajikistan and other Central Asian states (Petrick 2021; Zakirova et al. 2023). They largely persisted, however, with Soviet-era agricultural policies, characterized by the extensive use of synthetic fertilizers and pesticides in an effort to boost farmers' yields and meet informal but mandatory production quotas (Hofman and Visser 2014). Local experts assert that Tajikistani farmers' continued use of synthetic fertilizers and pesticides has led to soil contamination to such an extent that any territory's recovery and transition to purely organic farming would take at least 4–5 years (Expert interview 2023). This presents a pressing dilemma for Tajikistan, where its already limited arable land – about 7 percent of the country's area (Muminjanov 2016) must maintain adequate agricultural production to support its growing population and meet the cotton quotas determined by the authoritarian regime (Hofman 2021a, b; Shtaltovna 2016).

Despite its strong Soviet legacy, Central Asian region has begun to embrace Western ideologies such as sustainable natural resource management, environmental conservation, and market-driven economy (Pomfret 2021). These were often implemented through international development projects, some of which focused on organic cotton, aligning with the region's focus on this cash crop (Kluczewska 2019). Thus, the implementation of organic cotton cultivation in Central Asia was initiated in 2004 by the Netherlands Organization for Development Cooperation (ICCO) and the Swiss Association for International Cooperation (Helvetas)[1] in the Kyrgyz Republic (Bachmann 2012). Despite the prevalent use of agrochemicals across the region, these efforts drew inspiration from similar endeavors in South Asia and Africa (Kahriz et al. 2019). From 2009, similar initiatives began in northern Tajikistan, which was more appealing to western markets for the country's cotton policy and higher cotton production potential (FAOSTAT 2020). The German Corporation for International Cooperation (GIZ) has since built on this initiative by continuing to support farmers to this day (Abrori and Natsuda 2024). The southwestern region, however, was not covered by these initial projects, only appearing in 2020 for the first time through the initiative of a private investor (Expert interview 2021).

Unlike Tajikistan's other agricultural crops, which are primarily grown for domestic consumption, cotton is mainly cultivated as an export commodity aimed at high-income countries. Organic cotton, in particular, represents a higher-value, upgraded version of this export product. Most analyses of organic cotton production and organic agriculture more generally examine different case studies in various geographical areas such as Africa, India, China and Latin America (Willer and Lernoud 2019). Since organic agriculture is a relatively new phenomenon in Tajikistan, it requires closer analysis on the ground. The unique dynamics surrounding its production in Tajikistan's northern Sughd and the southwestern Khatlon regions, which we take as case study areas, warrant a holistic examination both of the constellation of actors involved in the development of organic cotton and their motivations. Following that, we examine each actor's encounter with specific political, climatic, and socioeconomic conditions through the conceptual lens of political ecology (Chandra and Mcnamara 2017), with emphasis on contexts where smallholder farmers predominate. Recognizing that these dynamics' relation to Tajikistan's socio-economic and political context, we strategically position our analysis within the broader scholarly discourse on organic cotton production in the countries of Global South. As we examine the broader landscape of organic cotton farming, our analysis goes beyond actor relationships to explore the wider socio-economic, political, and climatic conditions shaping this sector. Throughout this research paper we address the following comprehensive research question: How do foreign aid, institutional frameworks, market dynamics, and broader socio-economic, political and environmental factors influence the adoption of organic cotton farming by smallholders in Tajikistan?

To address this inquiry, we draw upon a robust dataset comprising 30 in-depth semi-structured interviews and 12 focus group discussions with a wide range of stakeholders – including development workers, private sector representatives, officials, academics, and smallholders – conducted in our selected

[1] https://old.asiaplustj.info/en/news/tajikistan/20100713/areas-under-organic-cotton-expanded-sughd

case study areas in Khatlon and Sughd from 2022 to 2023. Within the framework of political ecology, the paper commences with a contextualization of the concept of organic agriculture, specifically focusing on organic agriculture across various countries. Subsequently, it provides geographical details pertaining to the selected case study areas and rationale for their inclusion in this research. The ensuing sections delve into an analysis of the actors engaged in the advancement and advocacy of local organic cotton production, as well as the socioeconomic implications and power relations inherent to organic cotton production and adoption in Tajikistan. The paper concludes by summarizing key takeaways and includes a critical discussion on whether organic cotton represents a viable future perspective for Tajikistan.

Conceptual framework

Political ecology serves as a conceptual framework for this research on organic cotton production in Tajikistan by providing insights into the complex interplay between historical legacies, socio-economic and political structures at different scales. The framework also brings attention to environmental justice, focusing on how marginalized communities, such as smallholders in Tajikistan, are impacted by both local and global agricultural policies, addressing questions of who benefits from organic farming initiatives and how these benefits are distributed among different actors involved.

According to existing literature, political ecology deconstructs prevailing assumptions about environmental issues in the Global South, challenging conventional notions such as scarcity, overpopulation, degradation, and carrying capacity (Forsyth 2004; Benjaminsen et al. 2010; Desvallées et al. 2022). In Tajikistan, during the Soviet era, the country was mandated to prioritize cotton production to fulfill the demands of a centralized economy – a legacy that continues to influence its agricultural practices today. This approach was rooted in Soviet ideology, which viewed nature as inexhaustible and subservient to human needs, justifying unlimited extraction and exploitation of natural resources. Within this historical context, political ecology plays a crucial role in critically analyzing prevailing assumptions about environmental challenges, such as resource scarcity and land degradation, that persist in Tajikistan's post-Soviet agricultural landscape (Roberts 2020).

In addition to providing historical context, a key principle of political ecology is its emphasis on connecting local, regional, and global scales of analysis (Neumann 1992). This multi-scalar approach enables a comprehensive examination of organic cotton production in Tajikistan, particularly since the market for organic cotton extends well beyond local and regional boundaries. However, Blaikie and Brookfield (2015) argue that the initial focus should be on understanding local land users and their relationships with the land, as this foundational insight is crucial before exploring how these relationships interact with broader societal dynamics.

Incorporating Dianne Rocheleau's call to shift from 'chains of explanations' to 'webs of relations,' our approach remains open to exploring unanticipated connections between actors across various scales (Rocheleau 2008). While it is tempting to view organic agriculture in Tajikistan as a straightforward vertical relationship between local smallholders and foreign development organizations, this perspective neglects the complex horizontal relationships among farmers, as well as the socio-economic hierarchies embedded in these interactions (Adger et al. 2001). By examining both horizontal and vertical dimensions, our analysis acknowledges the diverse actors involved – farmers, development workers, private sector representatives, government officials, and others – and the ways in which their interactions, across different spaces and timeframes, shape the power structures that influence the cultivation, marketing, and promotion of organic cotton. This holistic approach ensures that we account for the multifaceted factors affecting Tajikistan's agriculture and the various power dynamics at play.

Building on our focus on both vertical and horizontal relationships, it is important to recognize that while Tajikistani cotton production has been extensively studied for its heavy reliance on chemicals (Zakirova et al. 2023), the local production of organic cotton has received limited scholarly attention. This oversight misses the introduction of new actors, such as international development organizations, into the agricultural landscape, creating new power dynamics. Expanding on this, we follow Sharleen Hesse-Biber's call to use triangulation to 'seek divergence in the

service of complexity and richness of understanding' (Helmcke 2022). By examining various levels of actors, knowledge, and scales – local, state, and international – we aim to gain insights that would be otherwise unavailable in a study focused solely on either horizontal or vertical relationships.

As we examine the complex relationships shaping Tajikistan's organic cotton sector, it is crucial to place these local dynamics within the broader context of global power structures. Political ecology underscores how underdeveloped regions, like Tajikistan, are vital to maintaining global capitalism by serving as sources of cheap raw materials, markets for manufactured goods, and outlets for excess capital (Roberts 2020). Low-income countries, integrated into the global economy as 'satellites,' engage in limited and often unsustainable economic activities that primarily benefit high-income 'metropole' nations (Frank 1989). This structural dependency on foreign capital and external markets perpetuates underdevelopment (Frank 1989), reinforcing the importance of analyzing local agricultural practices, such as organic cotton farming, within the framework of global capitalist penetration and its effects (Biersack 2006). By integrating these political ecology perspectives, our research provides a comprehensive understanding of organic cotton production in Tajikistan, considering historical legacies, socio-economic and political structures, and contemporary agricultural practices.

Case study areas

Tajikistan, a landlocked agrarian nation in Central Asia, has been significantly shaped by its Soviet history (1924–1991), which continues to influence its economic and political trajectory. During the Soviet era, cotton production was prioritized due to the country's favorable climate, leaving a lasting impact on its agricultural sector and economy. Centralized planning authorities set production quotas for cotton and other crops, which state and collective farms were required to meet (Pomfret 2002). The case study areas of this research comprise two major cotton-producing regions of Sughd in the north and Khatlon in the southwest (Fig. 1), providing a good reference point to analyze any relevant agricultural transformations. These regions experience tough agricultural conditions, such as changing climate, aging infrastructure and irrigation systems. Despite small-scale farms averaging 4.56 hectares in size (Tajik National Statistics 2021), the amount of arable land per person has dropped significantly to 0.123 hectares, driven by population growth (Khodzhaev 2018). This decline emphasizes the increasing scarcity of land and the potential risks it poses to food security and rural livelihoods.

To date, much research has focused on conventional cotton production in these areas (Atta 2009; Hofman 2018; Hofman and Visser 2021a; Zakirova et al. 2023), but little has been completed on its organic counterpart, which has been introduced over the past decade. Examining both the northern and southwestern regions provides a comprehensive framework for analyzing the entire country, particularly as it adopts organic practices. Notably, the organic produce in the northern part of the country predominantly relies on foreign funding, contrasting with the southwestern region, where private investing is more prominent. This dual perspective enables a more nuanced understanding, allowing for broader conclusions regarding the state of organic agriculture in Tajikistan. It also facilitates an exploration of the sustainability of various interventions within the organic farming landscape.

Methodology

This paper relies on qualitative data gathered from 30 semi-structured interviews and 12 focus groups with smallholder farmers, representatives of NGOs and development organizations, as well as experts at state and private sector agricultural institutions in Sughd and Khatlon regions of Tajikistan in 2022 and 2023, and the exploratory field visits to the organic cotton fields. While our initial research was focused on conventional cotton, it became clear over the course of interviews and literature review on agricultural transformations in the country that research on organic cotton deserves its own study within the narrative of organic agriculture and involvement of external actors. It was surprising that organic agriculture could exist in post-Soviet Tajikistan, a country both with a deep Soviet legacy of agricultural chemical use and extremely limited arable land (Zakirova et al. 2023). Over time, the use of these methods exhausted the fertility of Tajikistan's soil, jeopardizing its productivity. This pushed us to investigate smallholders'

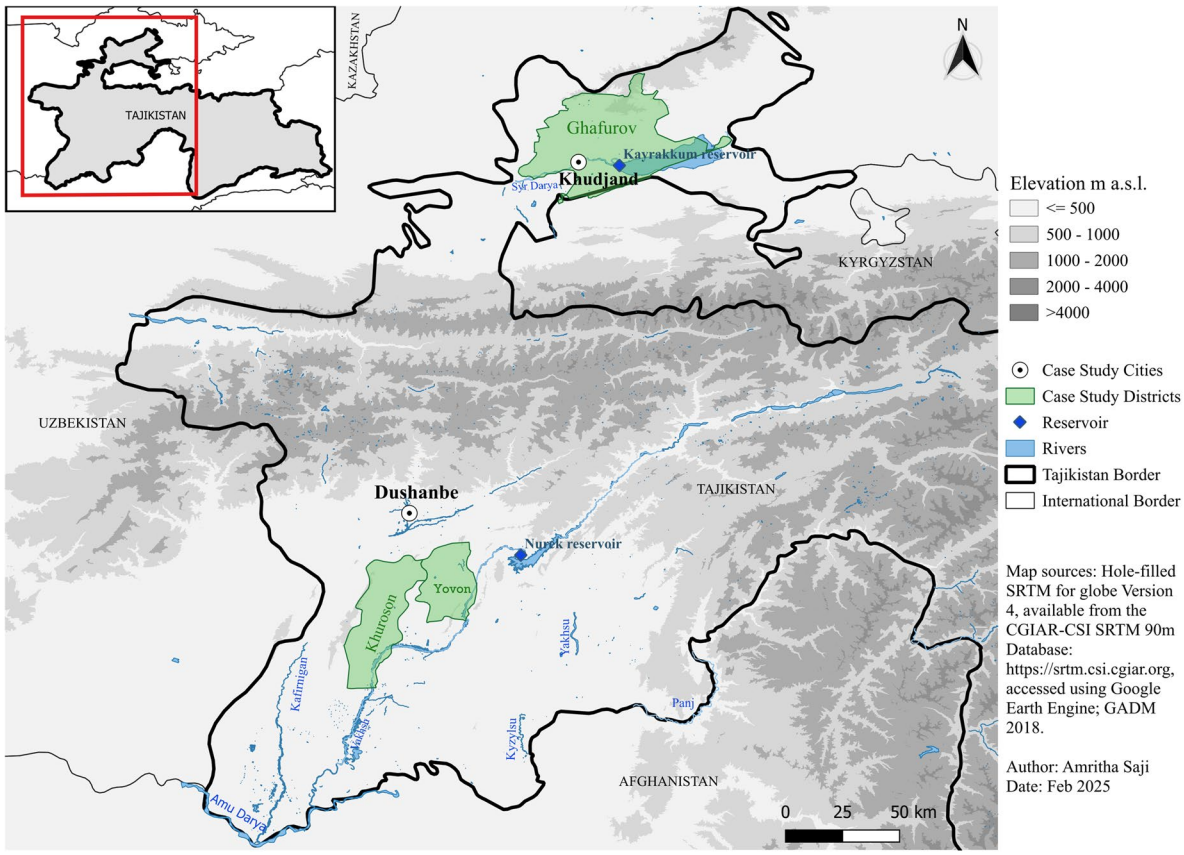

Fig. 1 Topographic map of Tajikistan indicating the case study areas in Sughd and Khatlon regions

embrace of organic cotton, visiting them regularly over the course of the growing season in 2022 and 2023. Our initial engagement with the organic cotton farmers was in the Sughd region, guided by our discovery that organic agriculture had its origins there. Subsequently, upon acquiring information that similar methodologies were recently adopted in the Khatlon region – the primary cotton-growing region of the country and our primary research region – our research focus was redirected accordingly.

Interviews of 45–60 min were conducted on farmers' land plots, as they did not want to be taken away from their work, so that they could work and answer my questions at the same time. Handwritten notes were taken during each interview, as the preservation of farmers' confidentiality and safety was paramount, which made recording undesirable. The notes were then processed and digitized for further data analysis using the Maxqda software for coding. Our interviews focused on demographic characteristics, subjective experience of organic cotton farming, extension services, and international cooperation. In order to verify the quality of the study and to prove the credibility of the data, the authors focused on triangulating it, i.e., collecting data from a variety of sources, in order to provide a more holistic picture of organic cotton development in Tajikistan.

Organic agriculture as sustainable approach to natural resource use

High-income countries in the Global North are actively promoting and subsidizing sustainable agricultural development through research and technological innovations contributing to the broader discourse on sustainable natural resource use (Boyle 2014). This trend has brought increasing environmental awareness and ethical considerations to the

consumer behavior of its populations (Matić et al. 2020; Riar et al. 2017), resulting in a demand for consumer goods characterized by sustainability and environmental friendliness (Chen et al. 2018; Trudel 2019). While the majority of organic producers are smallholder farmers in low-income countries representing a significant share of the world's impoverished and food-insecure population – the demand for organic products in these regions remains minimal (FAO 2014; Qaim 2017). Low-income individuals often cannot afford organic items because they are typically priced much higher than their conventionally grown counterparts (Seufert et al. 2017). Therefore, gaining a deeper understanding of the economic implications of organic farming for smallholders in low-income countries was essential for us (Jouzi et al. 2017).

Low-income countries frequently receive technical and financial support from development organizations and agricultural service companies from high-income nations to implement sustainable production practices (Ligang et al. 2024). While these organizations concentrate their efforts on cultivating organic food crops – such as cocoa, coffee, and tea – in Southeast Asia and Latin America, Tajikistan emerged as a producer of organic cotton in 2009. Although Tajikistani farmers have been producing cotton conventionally for decades, its organic counterpart appeared to be a more profitable proposition. Despite the need for expensive imported organic inputs – such as seeds, bio-insecticides, and bio-fertilizers, which would ordinarily be subsidized by the state – farmers remain highly motivated by the potential for higher profits from selling organic cotton at a premium price.[2] The exact premium price varies and is based on factors such as market demand, certification, and the region of cotton production (Voora et al. 2023). For example, as of January 2022, the global premium price for organic cotton was reported to be approximately 10 to 30 percent higher than that of conventional cotton. Market conditions and premium prices, however, may change over time, so it is essential for researchers to refer to the most recent and specific market data for accurate figures (Voora et al. 2023).

Organic cotton cultivation depends not only on expensive inputs but also on external technical expertise (Thakker and Sun 2023). Access to this vital information and knowledge is essential for farmers (Altenbuchner et al. 2014). Recognizing this need, foreign experts in organic agriculture provide essential knowledge through trainings, workshops, farmer field schools, and outreach activities to help local conventional farmers transition to organic practices and acquire the necessary technical skills. Though foreign development organizations frame such efforts as beneficial to the local economy and empowering to local farmers, the reality is that farmers often become dependent on external expertise and funding (Dzakaklo et al. 2024).

Indeed, certain scholars have drawn attention to the unsustainability of reliance on foreign resource suppliers in building a viable supply chain of environmentally friendly goods in low-income countries (Kogg 2003; Vermeulen and Ras 2006). In fact, according to the existing literature on other similar case studies, farmers with connections benefit the most, thus encouraging social stratification among different groups of smallholders (Fayet and Vermeulen 2014). In addition, such foreign initiatives often depend on success stories, portrayals of morally "transformed" farmers, and uplifting images to attract funding and promote value-added products (Flachs 2016). They frequently neglect, however, to offer transparent insights into the resource-intensive requirements of cotton production, whether conventional or organic (Duveskog et al. 2011 cited in Flachs 2016). These studies suggest that international organizations often construct an overly positive image of organic cotton production, leaving us wondering about the unfiltered outcome on the ground.

Tajikistan's adoption of organic cotton production

Like every novelty in agriculture, organic cotton was received with curiosity when it was introduced to Tajikistan's Sughd region in 2009 (Expert interview 2022). Given the higher sale prices compared to conventional cotton, farmers found themselves more

[2] The premium price for organic cotton producers refers to the higher price paid for organic cotton, intended to compensate organic farmers for the additional costs and efforts involved in organic farming and to support the principles of sustainability, especially given the generally lower yields of organic crops (Palamutcu and Devrent 2017).

inclined to adopt organic practices especially with the support of Dutch and Swiss organizations. Cultivation was first practiced on limited areas of land by 81 farmers in northern Tajikistan, eventually increasing to 1736 farmers within 14 years. The area allocated for growing organic cotton had also increased significantly, from 450 to approximately 5000 hectares, marking a tenfold expansion (Expert interview 2022). The eventual introduction of organic cotton to the Khatlon region a decade later, however, had much higher stakes, as the region is the center of Tajikistan's conventional cotton production and is, as such, closely overseen by Tajikistan's business elite groups (Hofman and Visser 2021b). For the purposes of this paper, we will be focusing on two groups of farmers in the Khuroson and Yovon districts of Khatlon as a continuation of our previous research on agricultural tendencies in Tajikistan (Zakirova et al. 2023).

According to the farmer interviews in 2022 and 2023 despite organic cotton's low yields, certain farmers still prefer it because of its potentially greater profitability. This tendency stems from the recognition that consumers in high-income countries often prioritize their health and environmental considerations and can afford to pay more for sustainably produced products such as organic cotton (Matthews and Rothenberg 2017). Ellis et al. (2012) conducted an in-depth analysis of the organic apparel market, focusing on consumers' willingness to pay a premium for organic clothing compared to conventional options. The study aimed to quantify how much more consumers are willing to spend on organic cotton apparel, particularly given the higher production costs associated with organic products. The findings revealed that, on average, participants were willing to pay 25% more for a T-shirt made from organic cotton than for one made from conventionally produced cotton. By contrast, Tajikistani consumers do not have the same financial resources to prioritize such costly environmentally sustainable and socially desirable goods, raising questions of equity and the motivation behind high-income countries' support of organic cotton in lower-income countries.

> "We [in Tajikistan] do not use expensive organic cotton for ourselves to make clothes. People in Tajikistan wear whatever shirt they can find. In the end, we find ourselves wearing cheap synthetic shirts," said a farmer in Yovon district (Farmer interview 2022).

Studies have shown that organic cotton cultivation frequently turns out to be a risky practice for those farmers, whose livelihood depends solely on their agricultural land, bringing attention to the socioeconomic differentiations among smallholder farmers (Kallas et al. 2010; Serra et al. 2008; Seufert and Ramankutty 2017), which warrant special attention in this research. The substantial costs associated with conversion from conventional to organic farming over a two to three-year period, for example, create a scenario where income generation is more attainable for wealthier farmers (Kleemann et al. 2014). These disparities push us to consider the viability of organic practices among the broader population of Tajikistani smallholders, especially within the context of the pursuit of sustainable agriculture.

Market dynamics and farmer choices

In Tajikistan, the market conditions for cotton predominantly function within a monopsonistic structure, profoundly influencing the economic decisions made by local cotton farmers. In this market structure, private businesses serve as the sole purchasers of conventionally grown cotton from local farmers (Zakirova et al. 2023). This concentration of buying power places significant pressure on farmers, limiting their options and driving down prices, which can negatively impact their livelihoods. On the other hand, cooperatives that advocate for organic cotton production have established exclusive relationships with foreign buyers. These cooperatives serve as the sole intermediaries for organic cotton sales, effectively reinforcing the existing monopsonistic market structure. While these arrangements may offer better prices for organic cotton compared to conventional options, they also create a dependency on specific buyers, which may be a risky proposition for farmers.

Thus, Tajikistani farmers find themselves navigating a challenging landscape, having to choose between selling to private businesses for conventional cotton or aligning with cooperatives to pursue organic production. This duality emphasizes the intricate decision-making process that farmers must undertake, as they weigh the potential for higher

economic returns against the realities of limited market options and the risk of being tied to single buyers. Consequently, this situation illustrates the broader economic pressures that shape agricultural practices in Tajikistan, underscoring the need for policies that promote greater market diversity and empower farmers to make more informed choices in their production decisions.

Labour intensification of organic cotton farming

While high-income countries contribute certain inputs for organic cotton production, they rarely introduce new technologies or machinery, resulting in an increased reliance on manual labor (Meemken and Qaim 2018). Manual labour, as a cornerstone of successful organic cotton cultivation, demands meticulous attention and effort, as demonstrated by practices observed in various agricultural contexts worldwide (Altenbuchner et al. 2014; Bachmann 2012; Eyhorn et al. 2005; Hans and Rao 2018). In Tajikistan, most farms are family-operated, meaning the majority of the work is performed by family members who are not officially classified as external employees. As a result, they are often excluded from official labor statistics. Previous studies have shown that the shift to organic cotton farming has significantly increased the workload for female family members, who typically handle manual land processing tasks such as weeding and the application of organic fertilizers (Altenbuchner et al. 2014; Bachmann 2012). Given that organic agriculture is still relatively new to Central Asia, there is a notable lack of research focused on the increased labor demands associated with its cultivation. This absence of studies highlights the need to further investigate the implications of labor intensification on family structures and the economic viability of organic cotton farming in the region.

Infrastructure, policy and external factors

Foreign investors are often drawn into engagement with Tajikistani cotton *elite groups*, who dominate conventional cotton ginneries. Since Tajikistan's cotton production infrastructure has been built around conventional agriculture, facilities generally do not adhere to organic standards of processing. This has led investors to work with local ginneries to create the necessary conditions for the processing of organic cotton to prepare for export. Since the price of cotton, conventional and organic alike, depends on its quality, local ginners – and, of course, investors and farmers – are incentivized to complete primary processing locally to boost their organic product's price before selling it to foreign markets.

The principles of organic farming create various challenges for the Tajikistani farmers, namely their struggles to observe standard organic regulations regarding chemical use, mandatory crop rotation, and land recovery time (Expert interview 2022). Farmers, for example, believe that occasional, unnoticed chemical use may not substantially affect the organic principles. In addition to this limited knowledge of organic farming, Tajikistani farmers lack basic organic inputs such as organic seeds, fertilizers and processing facilities. Organic cotton cultivation, with its stringent requirements, tends to exclude farmers who lack the resources to meet these strict criteria, thereby marginalizing those without the means or knowledge to participate.

Moreover, the organic agriculture landscape in Tajikistan faces a notable impediment in its political environment, illustrated by the absence of legislation on the subject. For example, in comparison with neighboring Uzbekistan, which has been promoting organic agriculture via the creation of laboratories of bio-insects and production of organic fertilizers (Yusupova et al. 2011), the Tajikistani government does not promote these practices. Consequently, farmers remain unaware of them, despite the fact that they are necessary for official organic status on global markets. In fact, when asked what the prospects were for organic agriculture in Tajikistan, an academic at a local state institution said, "as long as agricultural facilities remain [owned by] the state, there will be little progress," offering the specific example of agricultural laboratories.

> "In Uzbekistan, they [laboratories] have been privatized, and they are business oriented. In Tajikistan, this is not the case. As long as they are state-owned, these laboratories will not receive the appropriate funding for the equipment or skilled staff" (Expert interview 2022).

According to our observations, farmers often see foreign actors – be they international organizations or private investors – as figures of salvation, offering a way out of their economic troubles. Perhaps

it is because of this perception, however, that farmers grow very reliant on or attached to these foreign actors, to the extent that they find themselves unable to make decisions without consulting them first. This attachment – often based on the perception that foreigners have a great deal of money – sheds light on a new aspect of the power relations inherent to organic cotton production. Foreigners hold more power due to their financial status, but also wield greater knowledge, which local smallholder farmers rely on and believe that they are unlikely to receive elsewhere.

Finally, yet importantly, external factors such as natural hazards, pandemics and wars can affect target consumers' purchasing power and preferences (Zakeri et al. 2022). During Covid-19, for example, individuals across the globe suddenly turned inward, largely due to quarantine, and preferred to spend money on food, health, and entertainment – driving down spending on clothing – and, by extension, the cotton textile industry, both conventional and organic (Huang et al. 2023). These external factors demonstrate the vulnerability of Tajikistani farmers to global changes in economics and geopolitics. Indeed, farmers are the least protected actors in the supply chain of organic Tajikistani cotton, as there is no domestic market that they can rely on in the event of dramatic events elsewhere. "The more we sell, the more profitable it is [for us]," said one farmer. "Of course, we are very happy that our local products are exported to other countries but we are entirely dependent on the global market conditions. There's nothing we can do about that," (Farmer interview 2022).

Actors

Given the complexity and novelty inherent to organic agriculture in Tajikistan, the independent pursuit of organic cotton production by farmers is a rarity. Instead, external actors, including private investors and international organizations, play pivotal roles by offering support and ostensibly seeking to benefit farmers while simultaneously creating conditions for a local monopsonistic cotton market. Nonetheless, local actors are equally vital, serving as the implementers and enablers of transformative changes at the grassroots level. In the subsequent section, we will scrutinize each set of actors in this supply chain, adopting a ground-up approach that depicts both the local and international dimensions and unraveling the intricate dynamics shaping organic agriculture in Tajikistan.

Smallholder farmers

The study primarily examines the smallholder farmers in northern and southwestern regions of Tajikistan, who are the main producers of conventional cotton, exerting significant dominance in the selected study areas (FAO 2019). These regions have capitalized on their status as cotton-growing areas to participate in organic cotton farming, leveraging similar conditions and practices to conventional cultivation, albeit without the use of chemical inputs and mechanized labor. According to the criteria established by international organizations working in Tajikistan, Food and Agriculture Organization of the United Nations (FAO), United States Agency for International Development (USAID) and the World Bank, smallholder farmers are recognized as having an average land size of no more than 5 hectares (FAO 2019). Their significance in agricultural initiatives is critical, as they represent a substantial portion of the farming community and are essential to understanding the dynamics of organic cotton production in the chosen regions.

Although organic cotton farming in Tajikistan began with larger collective farms, hired workers have proven not to be as diligent in adhering to strict no-chemical-input requirements, making smallholders foreign stakeholders' preferred choice for successful organic cotton farming endeavours (Expert Interview 2022). As farmers' practices reveal smallholder organic farms are easier to manage in terms of pest and disease control and, notably, compliance with organic standards and requirements. As an agronomist working on a conventional collective farm observed:

> "Smallholder farms manage their land with the direct involvement of family members, whose livelihoods hinge directly upon their dedicated labor, while collective farms typically manage their land through hired labor, where the absence of personal investment may

be discerned, given the compensation based on hourly wages" (Anonym 2022).

Prosperous farmers in Tajikistan commonly possess essential agricultural machinery, including tractors, combines, and irrigators, along with livestock providing important organic inputs. However, acquiring European certification for organically cultivated cotton poses a significant financial and temporal burden even for affluent farmers. While farmers can commence organic cotton cultivation soon after deciding to make the shift, a minimum of three years is necessary for the land to completely transition from conventional practices and produce entirely organic yields suitable for the organic premium price. Local organic farming experts identify this prolonged transition period as a major obstacle, noting that financially secure farmers are better equipped to withstand the interim challenges, thus contributing to the elevated dropout rate observed among new entrants to organic cultivation. As one of the first year organic cotton producer noted:

> "Frankly speaking, due to the fact that we did not use mineral fertilizers, we saved about 10 thousand Somoni (approx. 850 Euro), but about 50–60 thousand Somoni (approx. 4–5 thousand Euro) was lost because of very low yields. If we had received at least 3 – 3,5 tons per hectare of organic cotton yield, it would be a different question. Therefore, I did not notice any financial benefits or advantages" (Anonym 2022).

However, not only financially stable farmers engage in organic cotton production in Tajikistan; among them are also farmers of moderate means who express interest, albeit not transitioning fully, instead dividing their plots into both organic and conventional sections. These middle-income farmers can rarely afford to give up conventional farming entirely, relying on this income during the transition period. The simultaneous cultivation of conventional and organic cotton indicates a notable knowledge gap, raising concerns regarding potential contamination and cross-pollination. These farmers demonstrate incomplete comprehension of organic farming principles, resulting in consistent indications of chemical usage in their yields. A local expert's opinion in this regard was the following:

> "These farmers, engaging in both organic and conventional cotton cultivation concurrently, hold the belief that by just keeping their chemical usage separate, they can evade detection and continue relying on these substances" (Expert interview 2022).

Hence, the reluctance of farmers to adhere to the stringent standards of organic certification impedes their ability to obtain such certification and subsequently market their produce as organic. Consequently, they are deprived of the advantages associated with organic cultivation. Frustrated by recurrent failures to meet certification criteria, these farmers increasingly favor conventional cotton, perceiving it as a more dependable option.

Development organizations

Since the collapse of the USSR in 1991, Tajikistan's economy has struggled to recover and relies in some part on foreign involvement, both for financial and technical support. The civil war of 1992–97 destroyed local infrastructure, particularly harming systems of agricultural production in rural areas (Pomfret 2021). The World Bank entered Tajikistan toward the end of the war, making the absolution of farmers' accumulating cotton debts a precondition for development funding, which helped the country create the necessary conditions for food security and sustainable livelihoods (Atta 2009). This very agreement with a western development organization laid the foundation for similar interactions with other ones, such as the United Nations, Swiss Association for International Cooperation, Netherlands Organization for Development Cooperation and German Organization for International Cooperation etc. Farmers gradually became accustomed to a model where foreigners brought funding, technical support, and extension services (e.g., knowledge and trainings) for a particular project, and then left once it finished, only to have this gap soon filled by another organization (Pomfret 2021).

The rise of organic cotton production in Tajikistan, spurred by initiatives from Swiss, Dutch, and

followed by German organizations, has positioned the country as an important player in the global textile industry.[3] Recent developments, such as the temporary barring of countries like China, India, and Pakistan from Global Organic Textile Standard (GOTS) certification due to concerns over fraudulence and forced labor, emphasize the pressing need for ethical and sustainable practices within the textile sector.[4] Tajikistan's emergence as a viable outsourcing destination for organic cotton production presents a compelling opportunity for Western companies seeking to meet the growing demand for organic products. As fast fashion giants turn to alternative sources like Tajikistan for their organic cotton needs, the industry is poised for further transformation towards more responsible and humane practices.

With the introduction of organic cotton production Tajikistani farmers find themselves between the Scylla of the monopsonistic market created by government-forced conventional cotton production, which is, in turn, driven by local *elite groups* and the Charybdis of the organic cotton production promoted by external groups which promise higher profits and environmental benefits. Whichever of the two options they choose, Tajikistani farmers still find themselves ultimately producing cotton and reinforcing the monopsonistic nature of domestic cotton market. Even if external actors claim to be offering an alternative, this alternative does not offer the local farmers a way out of a system, which entraps them into the production of a dominant crop. However, if Tajikistani farmers are forced to choose the proverbial lesser evil, organic cotton seems to be the preferable option. This is, of course, only true if this guarantees that their living standards are met: that is, if their profit from organic cotton would ensure their subsistence. Given that this is not true, one wonders if foreign actors are taking advantage of Tajikistani farmers' unfortunate entanglement with the cotton policy for their own benefit, i.e., to produce organic cotton at low prices for wealthy consumers abroad.

[3] https://www.rural21.com/english/archive/2017/02/detail/article/organic-and-fairtrade-cotton-a-way-out-of-rural-poverty.html

[4] https://global-standard.org/the-standard/protection/certification-bans

NGOs, non-commercial cooperatives and investors

Local organizations play a vital role in continuing the development projects after they leave Tajikistan by providing inputs, organizing trainings, and offering regular consultation services to farmers, funded either by external actors or the combined resources of participating farmers. Local organizations can be grouped into two main categories: consultative NGOs, mostly funded by external foundations, or non-commercial cooperatives organized by local experts and farmers. Unlike exploitative Soviet-era cooperatives, contemporary Tajikistani ones function as a self-sustaining entity, relying on membership dues in order to cover the costs of management, technical support, marketing to western companies, and lobbying the government. By pooling farmers' production, these cooperatives are able to generate the necessary volume for buyers and generate revenues for farmers. Furthermore, areas with multiple farmers involved in organic production are able to use technical support from such cooperatives to negotiate for better prices on inputs, which altogether boosts their financial stability and lowers their dropout rates.

Unlike cooperatives supported by external funding, private investors must subsidize the initial costs of organic agriculture themselves, funding inputs and providing trainings and in-kind credits. Such individuals bear considerable risk, stemming from volatility in the global market. Cooperatives, as non-commercial entities, lose relatively little in such events as they rely on farmers' membership dues and do not seek to make a profit, they can encourage members to sell their product at conventional prices in case of adversity and avoid negative consequences themselves. On the other hand, private investors by their nature seek to make a profit. Even if they can encourage farmers to sell at conventional prices in times of trouble, both investors and farmers stand to lose organic benefits in this case. In situations where private investors enter a binding agreement to purchase farmers' organic produce at a promised premium price regardless of external factors, investors are dependent on the stability of the world market in order to make a profit. If, however, the market is not favorable to organic cotton at that time, investors must either invest considerable resources into storing the produced cotton until conditions are more advantageous for them or otherwise sell it at a loss. All businesses carry risk,

but agriculture is particularly unpredictable – a reality that every stakeholder in Tajikistan's organic cotton industry must carefully consider.

Socioeconomic prospects and knowledge

The analyses of our qualitative interviews demonstrate that Tajikistani smallholder farmers tend to claim that the economic benefits of organic farming are the primary reason for making the switch. One experienced farmer put it plainly:

> "We understand the environmental idea of growing organic cotton, but for us, it is about making a living from our land. However, if the profits are high, the expenses are high as well: Tajikistan does not produce its own organic cotton seeds and does not have local organic certification, forcing farmers to rely on expensive imports, which make the endeavor expensive from the very beginning" (Farmer interview 2023).

At first glance, organic cotton may seem profitable because of its aforementioned attractive premium price and benefits. Nevertheless, organic cotton may also be more costly, considering the labor input that farmers need to invest into it, which is not factored into their expenses. Organic cotton cultivation also requires a strict crop rotation, which means that farmers must switch their cotton fields with maize or others crops – neither of which are certified as organic and thus cannot be sold as such. Consequently, farmers are compelled to sell rotational crops at conventional prices, leading to financial losses due to its naturally low yields. One noted that while organic agriculture might save farmers some money on fertilizer, it ends up being more costly in other ways. "We had very high expenses last year as we were not aware of what and how much to invest on various pests, buying organic fertilizer, fuel costs, and so on," said one farmer (Anonym 2023).

One of the wedges that organic cotton cultivation has driven between Tajikistani farmers is between those with higher levels of knowledge and adaptability to new practices and those who continue Soviet-era agricultural practices and do not seek out new methods. This is not to say that all organic farmers are pioneers, but due to their exposure to trainings and foreign materials, they are more likely to adopt new practices not only regarding their cotton cultivation, but also their other crops. This, however, points to a broader issue of a lack of new agricultural knowledge among Tajikistani farmers, limiting their potential profits and productivity.

This lack of knowledge comes in tandem with a lack of technology, which is largely a product of the government's reticence to subsidize novel tools in Tajikistan's agriculture. Despite the efforts of individual development projects in the country to promote organic agriculture, these projects have not yet succeeded in advocating for state sponsorship of organic cotton. This situation has created a vicious cycle: farmers are not exposed to new technologies or new methodology in their regular environments and are thus not pushed to adopt new techniques.

It is because of this domestic dearth of agricultural knowledge that has positioned international organizations and investors as the primary conduits of agricultural knowledge among many farmers in Tajikistan, especially those interested in "updating" their practices. Such actors providing extension services, as mentioned above, completely dominate organic agriculture in Tajikistan.

> "I think it is [necessary to change old practices], if they use seminars, for example, to teach and show us and boost our qualifications and knowledge. … Now, farmers try to attend such trainings in order to learn something new and, when possible, apply this when it's appropriate and profitable," said one farmer (Farmer interview 2023).

This farmer is an example of reliance on western organizations for the new agricultural knowledge as he went to seminars sponsored by foreign development projects and has been cultivating organic cotton for two years with high hopes of profit in his third year following the conversion period.

Farmers are often incentivized to turn to these organizations for knowledge because, as mentioned previously, the state offers no subsidies of any kind for the development of organic agriculture in the country. Further, because there is no domestic market for it, the state does not have the power to set a profitable price for the crop. If earlier research has demonstrated that farmers would appreciate greater state involvement in conventional cotton production (Zakirova

et al. 2023), those who have begun organic cultivation are substantially more aggrieved. Even private investors and international development organizations are at risk because of the limited domestic protections on their investment: they cannot count on anyone other than themselves to provide the conditions for farmers to grow organic cotton (Expert interview 2022).

The absence of state subsidies has created an opportunity for local elites to profit by indebting farmers through the provision of in-kind credits (Hofman 2018). Organic cotton producers, however, find themselves in a similarly precarious position. On the one hand, they are disadvantaged compared to their conventional cotton-growing counterparts, who have benefited for decades from the Soviet legacy of cotton farming; on the other hand, they are also vulnerable to local elites who dominate Tajikistan's cotton market, offering consistently low prices for conventional cotton, which limits the economic viability of organic cotton production. This situation emphasizes the challenges faced by organic cotton farmers in navigating a market controlled by powerful interests.

Organic consumers, however, introduce a new – higher-priced – element into the market (Ellis, et al. 2012, Makita and Tsuruta 2017). As a result, there may be underlying tensions between conventional and organic farmers, the latter of whom are perhaps resented by their peers for the high prices they can charge, as well as their avoidance of Tajikistani agricultural norms. Because organic agriculture is only practiced on relatively small areas of land and is not yet well-researched, it is difficult to draw more specific conclusions about the potential tensions between conventional and organic farmers on the ground. Nevertheless, considering the intertwined relations between the various actors at play, including conventional farmers, it is challenging for organic cotton farmers to stake out a place for themselves in a cotton sector largely controlled by the state Fig. 2.

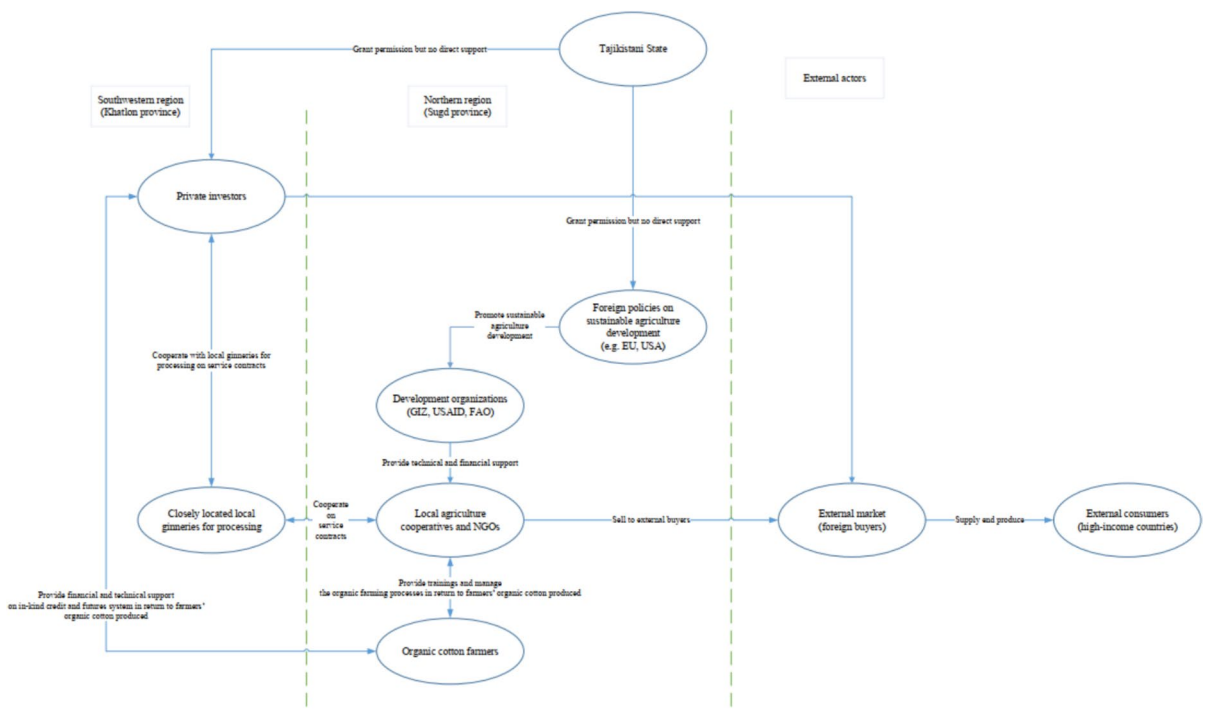

Fig. 2 Actor mapping of organic cotton production in Tajikistan

Discussion

The research highlights the role of various actors engaged in organic cotton production, placing Tajikistan within the existing discourse on sustainable agricultural practices in the developing world. Our findings align with those of prior research in India and Africa (Flachs 2016; Sodjinou et al. 2015; Thakker and Sun 2023) which emphasize farmers' dependence on external support – both financial and technical – as well as a lack of state support, human resources, machinery, and capital investments, irrespective of their geographic locations (Khan 2024; Pattanapant and Shivakoti 2009). Their vulnerability is only exacerbated by *force majeur* circumstances such as wars, pandemics, and natural hazards which disrupt supply chains and cause global market volatility (Gathundu 2022).

Tajikistan, however, presents a unique case study area: smallholder farmers' resource-intensive farming practices remain driven by the state's production quotas, a legacy of Soviet-era cotton policy (Hofman and Visser 2021b). Under the Soviet ideology, natural resources were often perceived as inexhaustible and primarily subservient to human needs. This perspective led to extensive exploitation of resources without adequate consideration for environmental consequences (Zaharchenko 1990). The conventional cotton-driven economy discouraged experimentation and hindered the development of alternative crops or farming practices, thereby jeopardizing the fertility of limited arable land and diminishing crop diversity, even during the post-Soviet period. With that, foreign development organizations' introduction of organically produced cotton without state support or a local market for organic produce diminishes the viability of the crop, as similar findings from other countries have shown (Chiputwa et al. 2015; Panneerselvam et al. 2012; Stolze and Lampkin 2009).

While the interviewed farmers acknowledged the environmental and health benefits of organic farming, they were largely motivated by its premium prices, significantly higher than those of its conventionally grown counterpart – even despite the low yields of organic produce. Even so, those who adopted organic farming mentioned significant financial challenges during the conversion phase – i.e., from conventional to organic – requiring at least three years of investment before earning profits. The absence of support during this period has led self-supported farmers to feel disillusioned and abandon organic practices, resulting in substantial losses of time and labor. Converting to organic farming, then, is not always beneficial for smallholders, which should discourage foreign development organizations from considering it as a general strategy for poverty reduction (Flachs 2016).

Another aspect to bear in mind is the nature of the funding itself, i.e. from international development projects or private investors. As organic farming requires trainings, facilitation of access to certified markets, and financial subsidies, it cannot be considered a practice that spreads easily in low-income countries like Tajikistan simply by sharing knowledge or copying other successful farmers (Meemken and Qaim 2018). From a governance perspective, the research suggests a need for greater coordination between local governments and international stakeholders. Current policies often fail to address the structural barriers farmers face, such as limited access to loans and credit and inadequate infrastructure. Addressing these challenges requires a multi-scalar approach, as emphasized by political ecology frameworks (Neumann 2009). Policymakers could consider establishing public–private partnerships to promote sustainable agriculture and support farmers in transitioning away from conventional farming practices.

Conclusion

In conclusion, applying political ecology principles to the complexities of organic cotton production in Tajikistan reveals the intricate interplay of historical legacies, socioeconomic conditions, and political dynamics that shape agricultural practices in the region. The legacy of Soviet-era resource-intensive farming, combined with the overwhelming influence of foreign development organizations and private investors, creates a landscape where smallholder farmers face significant vulnerabilities, particularly in the face of global market fluctuations and external shocks like the Covid-19 pandemic and Russian-Ukrainian war. These challenges emphasize the critical need for equitable power dynamics among stakeholders, as farmers are often excluded from decision-making processes that directly affect their livelihoods. Furthermore, the reliance on

Western-determined organic standards complicates matters, as local producers must navigate frameworks that may not fully consider their context. This situation calls for a reevaluation of organic certification practices, advocating for approaches that prioritize local needs and empower Tajikistani farmers. Ultimately, fostering a resilient organic cotton sector will require collaborative efforts that incorporate local knowledge and address existing power imbalances, aligning with the broader goals of sustainable development and creating a more just agricultural system that respects the rights and voices of those most affected.

Acknowledgements We express our gratitude to the reviewers for their invaluable input and constructive comments, which greatly improved the quality of this paper during the review process. We also thank Dr Thomas Shipton and Leora Eisenberg for their meticulous editing and insightful feedback during the paper's development. Additionally, we extend our appreciation to everyone who supported us during the extended field research in Tajikistan.

Author contributions AZ conducted the field research in Tajikistan and wrote the main manuscript text. HA and MS contributed to the conceptual analyses and revisions of the manuscript.

Funding Open Access funding enabled and organized by Projekt DEAL. The funding for this paper's research was provided by the German Federal Ministry of Education and Research through the junior research group "TRANSECT – Agrarian Transformation and Social-Ecological Complexities. Local Bioeconomy Scenarios in Central and South Asia" (Grant Number 031B0753) during the period 2019 to 2024.

Data availability No datasets were generated or analysed during the current study.

Declarations

Competing interests The authors declare no competing interests.

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