Fostering Climate Education and Youth Entrepreneurship in Central Asia

The Path to Climate Resilience

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Fostering Climate Education and Youth Entrepreneurship in Central Asia: The Path to Climate Resilience

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Acknowledgments

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Abbreviations and Acronyms

ACE	Africa Higher Education Centers of Excellence
ADB	Asian Development Bank
AUCA	American University of Central Asia
CAHEA	Central Asian Higher Education Area
CBO	Community-Based Organization
CDA	Centre for Dryland Agriculture
EET	Entrepreneurship Education and Training
ENB	Environment, Natural Resource and Blue Economy
FITD	Fund for Innovation and Technological Development
GBAO	Gorno-Badakhshan Autonomous Oblast
GDP	Gross Domestic Product
HCD	Human-Centered Design
HEI	Higher Education Institution
ICT	Information and Communication Technology
IMF	International Monetary Fund
IPF	Innovation Project Fund
KIC	Knowledge and Innovation Communities
LEAD	Leaders for Education, Activism and Development Association
MoES	Ministry of Education and Science
NEET	Not in Employment, Education, or Training
NGO	Nongovernmental Organization
OECD	Organisation for Economic Co-operation and Development
OSCE	Organization for Security and Co-operation in Europe
PISA	Programme for International Student Assessment
RESILAND CA	Resilient Landscapes Central Asia (World Bank Program)
SDGs	Sustainable Development Goals
SMART	Specific, Measurable, Achievable, Relevant, and Time-Bound
SMEs	Small and Medium Enterprises
SPCE	School of Professional and Continuing Education
STEM	Science, Technology, Engineering, and Mathematics
TES	Tertiary Education and Skills
ToT	Training-of-Trainers
TVET	Technical and Vocational Education and Training
UCA	University of Central Asia
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
VET	Vocational Education Training
WASH	Water Supply, Sanitation, and Hygiene

Executive Summary

Climate education and youth entrepreneurship are pathways for young people to become agents of change in their communities in response to the environmental challenges of today, particularly climate change. This report provides recommendations on developing climate education and youth entrepreneurship in Central Asia, as the region transitions to building resilient and green economies. This report presents key findings from the study *Rural Schools and the Development of Entrepreneurship Skills Related to Natural Resources and Climate in Central Asia*—a three-year initiative aimed at integrating climate change awareness and entrepreneurship education with landscape restoration investments across the region.

Education is a vital tool for climate action, shaping behaviors, developing essential skills, and fostering innovation needed to address climate change. A new flagship publication from the World Bank, *Choosing Our Future: Education for Climate Action*,[1] addresses this promising development strategy. Educated individuals are more resilient, adaptable, and capable of working in green jobs. However, education is largely overlooked in the climate agenda, with little climate finance directed toward it. Redirecting climate funding to education could significantly enhance both climate change mitigation and adaptation (Sabarwal et al. 2024).

This report addresses a series of interlocking issues in Central Asia, including:

- Unsustainable employment opportunities for youth due to slow economic growth, limited employability, and a lack of entrepreneurship skills training.
- Lack of community-driven, locally relevant solutions to building landscape resilience and climate change mitigation.
- Disconnect between national landscape restoration and climate resilience initiatives, and environmental, climate change, and entrepreneurship education.
- Under-resourced education systems, especially in rural areas, with outdated curricula, materials, and technology; insufficient pedagogy and teacher training; limited extracurricular programming; and inadequate facilities.

To address these challenges, governments can adapt education systems to support climate action by enhancing foundational skills, mainstreaming climate education, and focusing on green skills in tertiary education. Green skills are broad, encompassing technical, science, technology, engineering, and mathematics (STEM), socio-emotional, and sector-specific competencies that can help green both new and existing jobs. However, the demand for these skills can be unpredictable, requiring flexible policies and equitable access to ensure climate resilience across all sectors. By investing in education and aligning it with climate goals, societies can bridge knowledge and skills gaps, driving the innovation needed for a sustainable future.

The report's first three chapters explore Central Asia's environment, education, and youth entrepreneurship landscapes, presenting them as distinct yet interconnected components of a common solution pathway. Building on that context, the report presents the regional study which developed a replicable model for youth climate action in rural schools. The study engaged hundreds of participants through 19 school-based workshops, three university-hosted launchpads, and a regional stakeholder workshop, involving eight universities, 28 student interns, and 19 rural schools. Recommendations on critical issues are presented, along with an in-depth focus on country-specific case studies. Finally, the report culminates in a comprehensive roadmap designed to integrate and promote sustainable youth climate entrepreneurship throughout Central Asia.

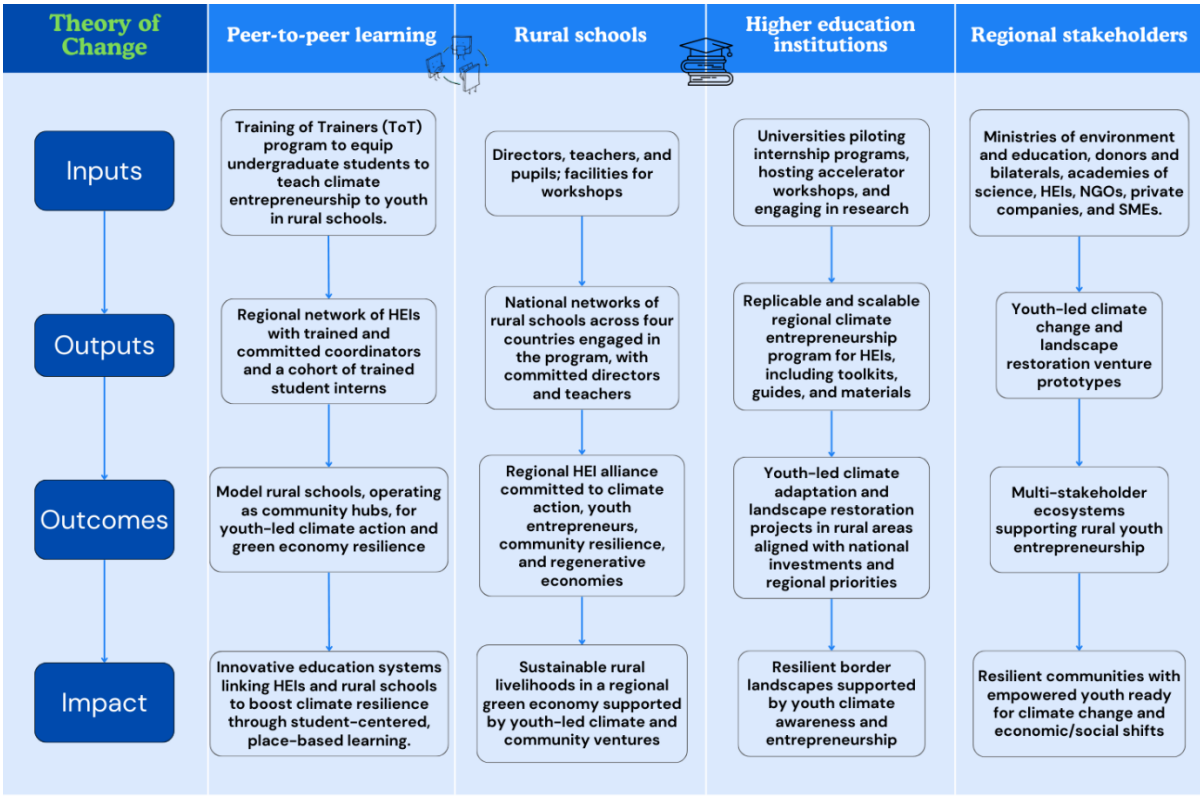
A two-tiered workshop series was designed and delivered by university student peer educators. This set the stage for empowering youth to contribute to sustainable economic growth and a climate-resilient future with the infrastructure and support of their local schools**.** University internship programs

[1] https://openknowledge.worldbank.org/server/api/core/bitstreams/9d1c318a-bcd3-49fa-b1c6-cc03e18d4670/content.

engaged students to lead training, workshops, policy briefs, and related events. Interns from Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan participated in regional virtual training covering entrepreneurship, climate science, facilitation, policy, and project management. Monthly virtual sessions and on-site support prepared them to conduct two-day workshops at rural schools. School teams then attended in-depth workshops at universities. Interns also evaluated the initiative through surveys, interviews, and policy briefs.

The approach, refined throughout the course of the regional study, aims to create a replicable and scalable model that builds school-to-university pipelines for rural youth, while providing hands-on training for teachers and introducing innovative curriculum and pedagogy to under-resourced schools. It helps transform schools into community hubs for climate adaptation and entrepreneurship, giving rural youth a sense of agency, connection, and opportunity. The model also supports the launch of youth-led ventures that address local environmental issues, while offering university students valuable peer networks and real-world work experience. Ultimately, it contributes to strengthened higher education networks, fostering shared goals, practices, and research. Table 1 elaborates on the theory of change for the proposed model.

Table 1. Logic model summary



Source: Original elaboration.

For the success of youth-driven programs that foster social entrepreneurship and sustainable development, three elements are key: peer-to-peer learning, schools as community activation hubs, and youth entrepreneurship ecosystems anchored by higher education institutions (HEIs). With support from multi-stakeholder networks across government, civil society, and the private sector, youth can be enabled as agile social entrepreneurs to respond to the challenges their communities face. Over the long term, as education systems continue to improve and investments in climate adaptation expand, rural schools can become key outposts where young people learn, prototype, and collaborate in creating sustainable livelihoods and contributing to resilient futures.[2]

[2] As noted in the World Bank's Education Strategy 2020, "the overarching goal is not just schooling, but learning" and that we must “analyze globally, [and] act locally” (World Bank 2020).

Policy recommendations stemming from the study reflect the distinct yet interconnected elements at play.

- **Integrate Green Skills and Entrepreneurship in Education:** Reform curricula at all education levels to include climate change awareness, sustainable practices, and entrepreneurial skills. This integration should encourage hands-on, project-based learning to prepare students for green jobs and enable them to contribute to sustainable economic growth.
- **Tailor Youth Entrepreneurship Programs:** Develop training initiatives that focus on business skills, entrepreneurial mindsets, environmental consciousness, and social responsibility.
- **Support Rural Collaboration and Networks:** Foster village and rural school networks to promote collective action on climate and environmental challenges. These networks can serve as platforms for knowledge-sharing, resource pooling, and community-driven solutions to enhance climate resilience.
- **Enhance Teacher Training:** Invest in targeted teacher training to equip educators with modern, student-centered teaching methods and climate-responsive pedagogies. These efforts will ensure that teachers can effectively deliver new curricula and inspire youth to take action on climate and sustainability issues.
- **Expand Innovation Ecosystems:** Support the establishment and growth of innovation hubs, technology parks, and start-up incubators focused on green industries. These ecosystems should provide resources, mentorship, and networking opportunities for youth to launch and scale sustainable enterprises.
- **Address Infrastructure Gaps in Rural Schools:** Prioritize investments to modernize rural schools with access to reliable information and communication technology (ICT), clean water, sanitation, and energy infrastructure. These improvements will create equitable learning environments and empower students in underserved areas to participate in climate and entrepreneurial initiatives.
- **Strengthen Support Mechanisms for Youth Entrepreneurs:** Develop robust support systems for youth entrepreneurs, including access to financing, mentorship, and public-private partnerships. These mechanisms will help young innovators turn ideas into action, scale their ventures, and contribute to solving local environmental and economic challenges.

Youth play a crucial role in driving progress and innovation and must be empowered to fulfill this potential. Schools are a critical community asset where this investment begins. Education and environment ministries and other government agencies, along with their peer stakeholders in civil society and the private sector, are called on to collaborate in creating the educational, social, and financial conditions necessary for innovative, far-reaching youth climate action.

Chapter 1. Resilient Landscapes and Climate Change in Central Asia

1.1 Regional Vulnerabilities and Opportunities

Central Asia — comprising Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan — encompasses the largest contiguous rangelands in the world, which provides critical livelihoods for the region and an essential global environmental service as a carbon sink (Mirzabaev et al. 2015). However, regional conditions are exacerbated by dramatic changes in climate patterns and threatened by anthropogenic forces including intensified commercial agriculture, extractive industry and mining, urbanization, deforestation, increased water extraction, continuous livestock grazing, and road and other infrastructure development; these factors converge to make border areas particularly vulnerable.

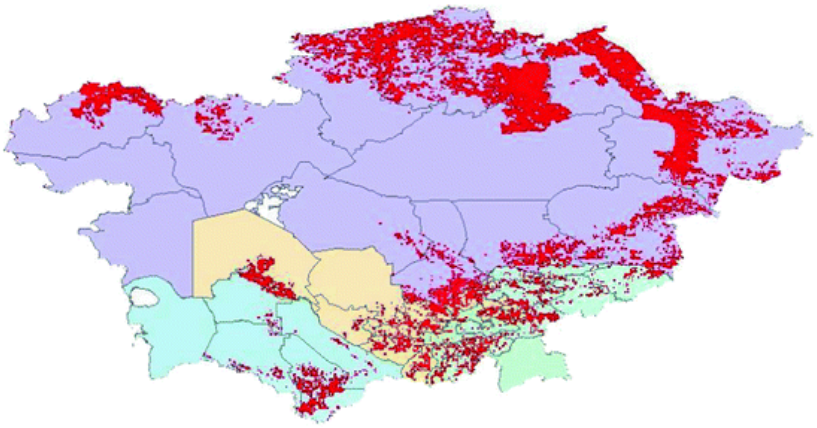
Central Asia drylands are one of the world's most rapidly degrading and vulnerable regional landscapes due to unsustainable land management practices, deforestation, and desertification. Overgrazing, soil erosion, and land conversion for agriculture are some of the primary reasons for degraded landscapes, with the aridness of the region's climate making it particularly susceptible. The result is expanding drylands with extensive erosion that are susceptible to destructive mudslides, further exacerbated by extreme risk of seismic activity. Rapidly receding high mountain glaciers are adding to these tenuous conditions and will eventually lead to long-term water shortages. Moreover, climate change impacts are expected to worsen the condition of countries' natural resources and the overall resilience of their populations and ecosystems. Given the interconnected reasons for degradation, Central Asia requires multifaceted solutions that take into consideration nature, environmental engineering, community engagement, job creation, and effective policies.

Countries in Central Asia experience severe environmental stressors that jeopardize both ecological status and public health. According to the UN Convention to Combat Desertification, over 20 percent of the region's land is degraded, leading to adverse impacts such as loss of biodiversity, reduced soil fertility, and diminished ecosystems (UNCCD 2023). Land degradation in Central Asia is largely driven by overgrazing, poor irrigation, deforestation, and land mismanagement—exacerbated by the region's arid climate (Mirzabaev et al. 2016). Addressing these issues requires sustainable land management practices and effective conservation strategies to mitigate further landscape degradation in the region.

The naturally arid region is increasingly subjected to intense weather events and natural disasters, which further degrade the landscapes, living conditions, and economic opportunities of people (Setlur, Agostini, and Brenden 2023). Desertification caused by climate change and human activities has led to land degradation, soil erosion, and loss of vegetation and biodiversity that is costing Central Asia over 5 percent of regional gross domestic product (GDP) (Quillérou et al. 2016). With approximately 60 percent of the region's population living in rural areas, agriculture serves as the main economic development driver (UNCCD 2023).

Regional approaches are essential for Central Asian countries transitioning to green, resilient, and inclusive economies, especially in border areas with heightened vulnerabilities to climate change and environmental degradation. Border areas around Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan are the focus of the Resilient Landscapes Central Asia (RESILAND CA) Program because they have been identified as environmental 'hot spots' with particularly degraded landscapes, often located along major rivers.

Map 1. Land degradation hot spots in Central Asia



Source: Mirzabaev et al. 2016.

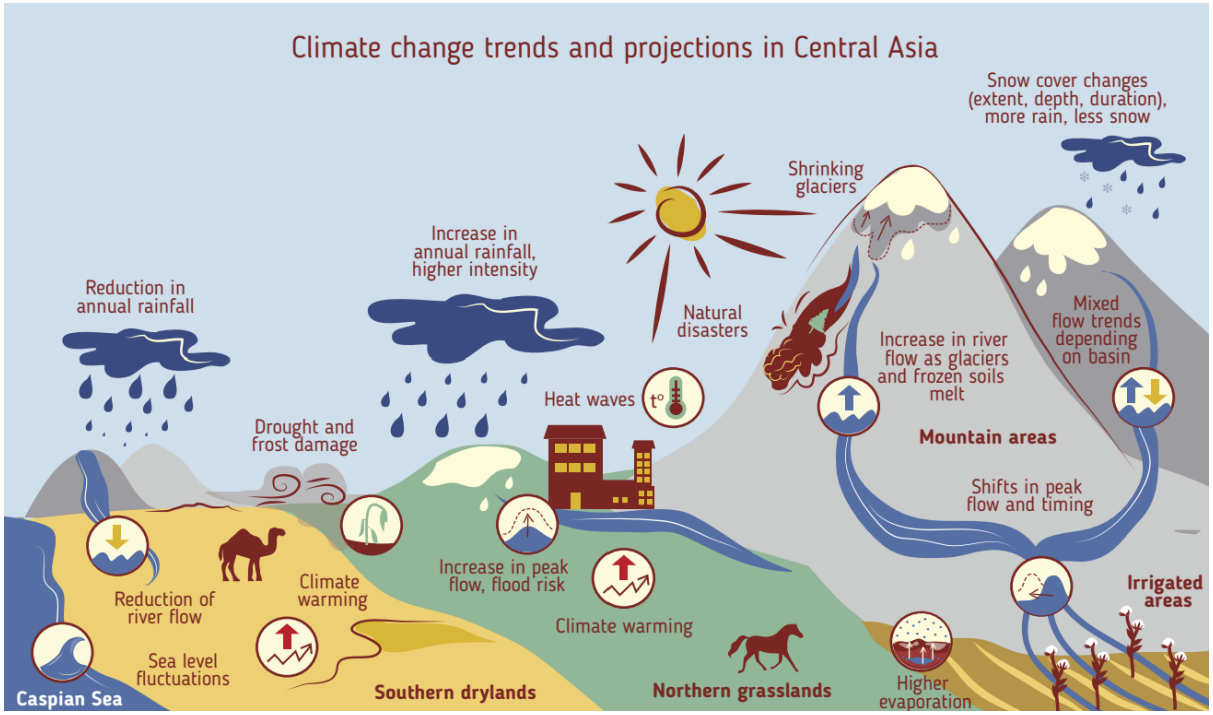
Ensuring climate resilience in water management in Central Asia is a critical challenge, as inefficient water management practices, competition over water resources, and the retreat of glaciers threaten the availability and quality of freshwater supplies. The region's major rivers, including the Syr Darya and Amu Darya, are subject to extensive upstream water diversion for irrigation, leading to reduced downstream flow and heightened competition over water resources (Heaven et al. 2002). The Aral Sea crisis, exemplifying the consequences of extensive irrigation and unsustainable water diversion, underscores the urgent need for improved water governance and conservation measures, Additionally, inefficient irrigation practices and inadequate water management exacerbate water scarcity and contribute to the degradation of aquatic ecosystems. As a result, access to clean water for drinking and sanitation is limited, further increasing health risks for the region's population.

Central Asia grapples with severe pollution across various fronts, including air, water, and soil contamination. Industrial activities, agricultural runoff, and inadequate waste management practices contribute to widespread pollution levels, posing significant risks to human health and ecosystem integrity. Air pollution, especially $PM_{2.5}$[3] levels in Central Asian cities exceed WHO guidelines by up to 12 times, with health costs estimated at $15.2–$21.7 billion annually. While soil and desert dust contribute 20–50% of exposure, 50–80% comes from controllable human activities, such as solid fuel combustion for residential and commercial heating, the largest source of $PM_{2.5}$ pollution.[4]. Moreover, water pollution from untreated industrial effluents and agricultural runoff threatens freshwater ecosystems and compromises water quality for both human consumption and irrigation purposes. Air, water, and soil pollution degrade environmental resources, exacerbate health disparities, and hinder the capacity of communities to adapt to changing environmental conditions.

Central Asia is highly vulnerable to the impacts of climate change, which exacerbate existing environmental challenges and pose new risks to socioeconomic development. Rising temperatures, shifting precipitation patterns, and increased frequency of extreme weather events, such as droughts and floods, disrupt agricultural productivity, exacerbate water scarcity, and threaten food security in the region. Moreover, melting glaciers in the mountainous regions of Central Asia, including the Tien Shan and Pamir ranges, contribute to water insecurity, affecting millions of people who depend on glacier-fed rivers for their livelihoods. Heightened risks of natural disasters further threaten livelihoods, food security, and economic stability in the region.

[3] Particulate matter 2.5 microns or less in diameter.
[4] World Bank. Forthcoming. Air Quality Management in Central Asia.

Figure 1. Climate change trends and projections in Central Asia



Source: Bubenko, Zhakenova, and Novikov 2020.

Addressing these formidable environmental challenges requires concerted efforts from governments, international organizations, and civil society to promote sustainable land management practices, improve water governance, mitigate pollution, and build resilience to climate change. Failure to take decisive action risks further environmental degradation, undermining the region's prospects for sustainable development and jeopardizing the well-being of its population. Land restoration 'bright spots' include mitigation efforts in Kazakhstan, the Kyrgyz Republic, and Uzbekistan, while all four study countries are making progress toward land degradation neutrality commitments under UNCCD (UNCCD 2023).

1.2 Key Trends, Challenges, and Opportunities

Regional Synthesis

Central Asia faces complex environmental challenges that are intertwined with socioeconomic development imperatives. This chapter analyzes key trends, challenges, and opportunities related to landscape degradation, water scarcity, pollution, and climate change in the region. By identifying these factors, policy makers and stakeholders can devise effective strategies to promote sustainable development and resilience in Central Asia. In light of these challenges, enhancing landscape and community resilience in Central Asia emerges as a critical imperative.

Key Trends and Interdependencies

Landscape degradation: Central Asia witnesses ongoing trends of landscape degradation driven by unsustainable land management practices, including deforestation, overgrazing, and soil erosion. These trends compromise ecosystem integrity and resilience, posing risks to biodiversity and exacerbating vulnerabilities to natural disasters.

Water scarcity: The region experiences increasing water scarcity exacerbated by inefficient water management practices, competition over water resources, and the retreat of glaciers. The Aral Sea crisis exemplifies the consequences of extensive irrigation and unsustainable water diversion, highlighting the urgency of improving water governance and conservation measures.

Pollution: Stemming from industrial activities, agricultural practices, and inadequate waste management systems, pollution poses significant risks to human health, environmental quality, and ecosystem resilience. Air, water, and soil pollution degrade environmental resources, exacerbating health disparities and hindering adaptation to environmental changes.

Climate change impacts: Central Asia is highly vulnerable to the impacts of climate change, including rising temperatures, altered precipitation patterns, and increased frequency of extreme weather events. Melting glaciers, shifting agricultural zones, and heightened risks of natural disasters threaten livelihoods, food security, and economic stability in the region.

See Annex 1 for a detailed table of key challenges and opportunities related to climate and environment in Central Asia.

Central Asia stands at a critical juncture in addressing its environmental challenges while pursuing sustainable development objectives. Addressing landscape degradation, improving water management practices, mitigating pollution, and building adaptive capacity to climate change are essential components of resilience-building efforts. Furthermore, fostering community engagement, promoting sustainable land use practices, and enhancing institutional capacity are crucial for building resilient communities capable of coping with environmental shocks and uncertainties.

Chapter 2. Education and its Role in Central Asia's Green Transition

2.1 Overview

This chapter provides an overview of the current state of education in Central Asia, highlighting key trends, challenges, and opportunities for improvement, specifically regarding rural contexts and pressing needs driven by climate change. To understand education in the region, it is essential to consider the state of curriculum, pedagogy, teacher training, and school infrastructure as well as the policy landscape. Most critically, movement away from Soviet-era systems and outdated approaches toward globally informed policies and future-focused, nationally, and regionally relevant practices is evident but inconsistent across geography (urban versus rural), economic status, and gender.

Since independence, the Central Asia countries' advancements include improved elementary school attendance and literacy rates, a doubling of HEIs and introducing of privatization, and a commitment to STEM[5] and 'green' education, with each country setting strategic goals for sector development. Shortcomings include inadequate teacher training and compensation, outdated and underfunded basic school infrastructure and science research facilities and faculty capacity, and HEI funding and scholarship models that exacerbate inequities. Rural areas generally fare far worse along most metrics compared to urban areas, despite the majority of the population being rural (OECD/UNICEF 2021).

Progress on education for green transition varies across Central Asia countries due to competing national priorities and available resources, creating a patchwork of change that has, through regional collaboration and cross-fertilization, the potential for impactful transformation. In some cases, ministries of education have developed policies and are implementing strategic initiatives aimed at addressing the unique needs of rural schools. In Tajikistan, this includes provisions for additional funding, targeted teacher recruitment initiatives, and infrastructure development projects (Republic of Tajikistan, Ministry of Education and Science of Tajikistan 2022). Kazakhstan has invested in a network of innovative secondary schools through partnerships with national and international higher education institutions (HEIs) to drive modernization and develop capacity across the education system[6]. In Uzbekistan, the multisectoral project of the Ministry of Economy and Finance and UNDP, 'Sustainable Rural Development', supports communities and institutions across four regions with, among other anticipated outcomes, environment-friendly renovated schools (UNDP 2024). The 2024 Higher Education Quality and Innovation Project of the Kyrgyz Republic, funded by the World Bank, focuses on market-relevant education modernization for a green economy, with an emphasis on multidisciplinary innovation and female researchers.

While Central Asia countries have made progress in advancing formal education systems, significant challenges persist across various dimensions. Ensuring equitable access, enhancing quality and relevance, promoting skills development, and improving school infrastructure, especially in rural areas, are essential priorities for advancing educational outcomes, fostering socioeconomic development, and adapting to climate change. Collaborative efforts among governments, development partners, civil society, and the private sector are crucial for addressing these challenges and building a more inclusive and resilient education system in Central Asia.

Secondary Education in Central Asia

Elementary and secondary education across Central Asia has expanded in terms of access and enrollment rates, reflecting regional commitments to achieving universal primary education goals. However, disparities persist in access and quality, particularly in rural and remote areas. While enrollment rates have increased, dropout rates remain a concern, with socioeconomic factors and inadequate infrastructure contributing to the problem. Furthermore, curriculum relevance, teacher

[5] Science, technology, engineering, and mathematics.
[6] https://www.nis.edu.kz/en. The Nazarbayev Intellectual Schools, which have entrance exams but are fully funded by the government at rates over three times higher than public schools, have drawn criticism for increasing social stratification and education inequality (Malikova 2023).

quality, and the availability of educational resources pose challenges to ensuring quality education for all children in the region (UNESCO 2021).

Some countries have implemented teacher support programs to improve teacher training and professional development opportunities in rural areas. These programs may include mentorship initiatives, incentives for teachers working in rural schools, and distance learning options (Ministry of Education of the Republic of Kazakhstan 2022). Ministries of education collaborate with other government agencies, international organizations, and nongovernmental organizations (NGOs) to implement infrastructure development projects in rural schools. These projects broadly aim to improve school facilities, provide access to clean water and sanitation, and create conducive learning environments.

Teacher recruitment and training in Singapore

Central Asia's education systems face challenges in recruiting and retaining qualified teachers, especially in rural areas. An aging workforce and rapid population growth (United Nations 2022) demand increased teacher recruitment, but low pay, poor training, and inadequate working conditions hinder progress. Resource constraints negatively impact teachers' ability to foster effective learning, ultimately affecting student outcomes (Teixeira, Amoroso, and Gresham 2017).

Teacher training in Central Asia remains insufficient, with gaps in practical relevance, rural inclusivity, and alignment with modern education needs, despite progress in Kazakhstan (OECD 2020; Monk 2007). Many programs still reflect outdated, Soviet-style rote learning methods, but reforms like Uzbekistan's Education for Excellence Program are shifting toward student-centered, competency-based approaches. These initiatives focus on updating curricula, integrating culturally relevant materials, enhancing ICT resources, and promoting evidence-based evaluation systems to improve teacher retention and student outcomes (USAID 2020; U.S. Embassy in Uzbekistan 2023).

Singapore has one of the world's most impactful and admired education systems, with the Programme for International Student Assessment (PISA) scores consistently in the highest percentiles globally. Many factors contribute to this success and the country's rapid rise from widespread poverty, conflict, and isolation to economic, innovation, and education powerhouse including small size, strategic location, and highly centralized systems. Studies have concluded, however, that a key variable to improving educational outcomes and student success that Singapore does so well, and that other countries can emulate, is teacher excellence.

Key takeaways from Singapore's teacher development (Asia Society 2024):

- Teaching is a high-status profession supported by competitive starting salaries.
- Teachers receive regular and consistent professional development and resources.
- Structured collaboration, shared accountability, and leadership opportunities for teachers reinforce learning and excellence.
- Curriculum and pedagogy are grounded in cultural norms and national priorities.
- National education strategy—the approach to teaching and learning—is informed by global innovations.

Investing in lifelong learning and innovative training models is vital to support educators and align education with national development goals.

Some challenges persist in ensuring the quality and equity of education, particularly in rural and remote areas (World Bank Group 2017). Dropout rates remain a concern, influenced by socioeconomic disparities and inadequate infrastructure (Allah and Mackie 2022). Addressing these challenges requires targeted efforts to improve teacher quality, curriculum relevance, and educational resources. Kazakhstan has made significant progress in expanding access to elementary and secondary education, achieving near-universal enrollment rates, offering a model for the other countries

of the region. In comparison to other Central Asian countries, Kazakhstan has made notable progress in educational cooperation with international partners. Having undergone significant reforms, the country has sought to align with international standards and best practices as well as respond to future market labor needs by investing in teacher training at scale, promoting inclusivity, and fostering innovation in teaching and learning practices. Uzbekistan continues to make gains in strategic reforms including increasing access to education for children of all backgrounds, modernizing education with an emphasis on science and technology, enhancing vocational education and training to meet market needs, and internationalizing learning through exchanges and global partnerships (Ministry of Preschool and School Education Republic of Uzbekistan and Global Partnership for Education 2023).

Higher Education

Higher education in Central Asia has undergone significant reforms to align with global standards, address labor market requirements, and meet the demands of an expanding youth population. In recent years, the region has seen an expansion of HEIs and the diversification of academic programs, contributing to increased enrollment rates. Further reforms will lead to follow-on outcomes such as stemming the brain drain and bolstering economic growth (World Bank 2023). However, challenges persist in ensuring the quality and relevance of higher education, addressing market-driven skills mismatches, and promoting research and innovation.

Enrollment in higher education remains low and access inequitable, with women, low-income, rural, and other marginalized populations facing barriers to entry. Progress is evident in Uzbekistan where overall enrollment went from among the lowest in the world in 2014, at only 9 percent—with more than half of those students from higher-income households (Ajwad et al. 2014)—to 42 percent in 2024 (Republic of Uzbekistan 2024). Tertiary education rates are also low in Tajikistan at 31 percent, while Kazakhstan and the Kyrgyz Republic are making strides at 56 and 65 percent, respectively. The most recent data on women's attainment of a bachelor's degree illustrates inequitable access at the following rates: 40.75 percent in Kazakhstan (2019), 24.6 percent in the Kyrgyz Republic (2018), 7.1 percent in Tajikistan (2017), and 14.1 percent in Uzbekistan (2022) (UIS 2023). In the Kyrgyz Republic, 26 percent of rural students will attain higher education compared to 56 percent of urban students (World Bank 2024).

Private institutions, internationalization, and regional collaboration among HEIs are emerging in the region, setting the stage for improvements across systems. Opening up to private colleges and universities and expanding international collaboration with institutions in Australia, China, Europe, Japan, Korea, the United States, and elsewhere will integrate the region's higher education systems globally and diversify the overall landscape. Such institutional relationships are enhancing academic quality and research capacity, increasing access to resources and expertise, and building institutional capacity and global recognition. An increase in students from outside the region attending universities is further internationalizing higher education. In addition, bilateral and regional HEI collaborations, including the formation of the Central Asian Higher Education Area (CAHEA), indicate a shift toward regionalization that can strengthen systems and promote regional sustainable development (Pogorelskaya et al. 2024).

National strategies for higher education sector development have opened possibilities for regional collaboration and growth. The strategies address specific country challenges, needs, existing assets, and conditions for change. At the same time, similar and overlapping priorities create conditions for a regional approach. Priorities include improving quality assurance through modernized accreditation systems, expanding access for underrepresented populations through reformed funding and scholarship mechanisms, expanding STEM and research capacity, ensuring up-to-date professional development for staff and faculty, aligning curriculum and skills with labor market needs, modernizing facilities and infrastructure, and strengthening management capacity and strategic leadership. Regionalization and internationalization—processes critical to positive advancements in each country and regionally—are also key and beginning to emerge (World Bank 2023).

With expanded funding and strategic reform, universities and technical institutes can emerge as centers of innovation. There are more than 430 HEIs in Central Asia, including state-owned and private universities as well as institutes and academies, that serve over 1.8 million university students and over 1 million vocational education students (World Bank 2023). HEIs include universities, academies, and institutes. Institutes offer bachelor and specialist degrees while universities and academies offer a full range of degrees including doctorates (Eiko et al. 2021). Institutes and academies are typically aligned with the governmental bodies under which they fall, such as environment, forestry, mining, and education. While still insufficient to address the needs of this extensive system, finance mechanisms such as the World Bank's Tertiary Education and Skills (TES) Program, various Asian Development Bank (ADB) projects, and other funding sources are supporting governments to transition outdated and under-resourced HEIs (and Technical and Vocational Education and Training [TVET] institutions) into digitally connected, locally focused, and market-oriented teaching and learning spaces (Martinez et al. 2023).

School Infrastructure

In Central Asia, especially in rural areas, school infrastructure remains a major challenge. Many rural schools lack basic amenities like electricity, clean water, and sanitation, compromising student health, safety, and learning environments (Save the Children 2018). In the Kyrgyz Republic, 10% of schools are beyond repair, 25% need major rehabilitation, and most lack water, sanitation, and essential resources like furniture, lab equipment, and computers (ADB 2022). Poor roads, limited public transport, and weak internet infrastructure exacerbate urban-rural divides, hindering access and modern teaching methods (Synowiec 2021). Higher education institutions also face infrastructure deficits, though progress has been made in Kazakhstan with facility upgrades, ICT modernization, and research investments. Tajikistan's schools show high enrollment but poor learning outcomes due to inadequate facilities, teacher skills, and resources (World Bank 2023). Addressing these gaps is crucial for improving education quality and regional development.

2.2 Climate Change, Environmental Education, and Green Skills

Environmental education is emerging in the region, offering key opportunities for sustainable development and green innovation. Environmental and climate change studies, and related 'green skills', are included in national education strategies and are being integrated into curricula across education systems including primary and secondary general education, TVET, higher education, and community programs. Raising awareness and building capacity for developing green economies requires these foundations. Through continuous learning, research, and collaboration, education can drive sustainable development, mitigate climate change impacts, and foster a culture of environmental responsibility in Central Asia.

Green skills development at all education levels is vital for addressing environmental challenges, promoting sustainable development, and driving innovation. 'Green skills' encompass a variety of competencies that include knowledge, values, and attitudes: cognitive skills, technical skills, interpersonal skills, and intra-personal skills (Pavlova and Singh 2022). These skills empower individuals to adopt pro-environmental behaviors and contribute to more resilient communities and are acquired through formal education, work experience, and on-the-job training. By integrating green skills into education and training programs, students, workers, and the broader public can acquire the necessary knowledge and capabilities to drive positive change toward a more sustainable future (Thirupathy and Mustapha 2020). These skills also enhance employability for youth, with a growing demand for workers with expertise in areas such as renewable energy, waste management, and other sustainable practices as well as the soft skills that are transferable across all industries and sectors.

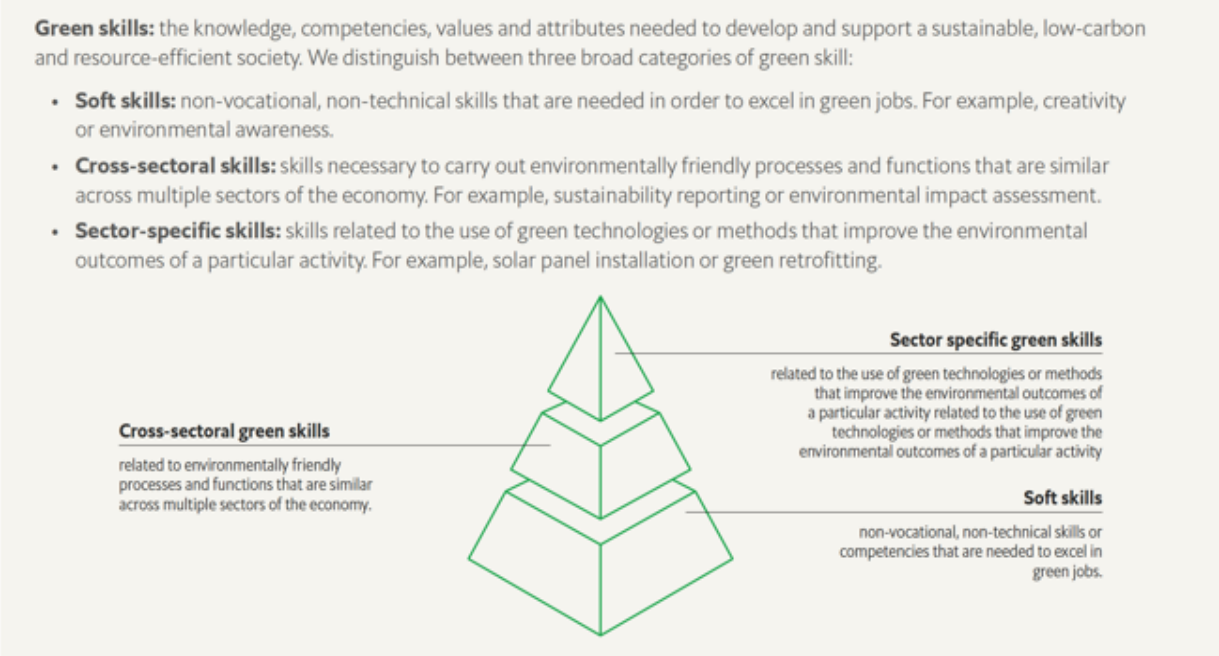
Curriculum reform and integration of green skills based on global quality standards at the secondary level and in TVET are a priority but still in their early stages. Climate change science

and environmental studies are often insufficiently incorporated into formal education curricula in Central Asian countries. Existing curricula lack adequate coverage of climate change concepts, environmental sustainability principles, and related scientific knowledge. In rural schools in particular, limited time may be dedicated to climate science and related subjects due to the existence of two or three shifts in a day, insufficiently trained teachers, or a lack of supporting materials and resources.

Universities in the region are addressing climate change, incorporating sustainability principles into degree programs, promoting green technology innovation, and strengthening their science research capacity. Collaborative research projects and international partnerships are a priority for top-tier universities to enhance environmental education initiatives and facilitate knowledge exchange and capacity building across borders. Incorporation of climate change science, environmental studies, and related green skills in education systems is becoming more common.

Investment in environment-focused higher education is reinforcing the significant strides made in the transition to 'green' economies**.** Uzbekistan has demonstrated its commitment through initiatives aimed at increasing energy efficiency and promoting the sustainable use of natural resources and adopting a green economy transition strategy in 2019. A key milestone in this effort is the establishment of the Central Asian University of Environmental and Climate Change Studies, also known as Green University.[7] Founded by the Ministry of Ecology, Environmental Protection, and Climate Change in 2024, the university serves as a regional hub for training specialists to address environmental challenges. Green University is poised to play a crucial role in building the next generation of environmental leaders and advancing sustainable development in the region.

Figure 2. Green skills



Source: Economic Impact 2024.

2.3 Entrepreneurship Education and Training

Integration of entrepreneurship education into secondary curricula and teacher training is still in its early stages. Despite growing recognition of the importance of entrepreneurship for economic development and youth job creation**,** creating cultures and systems of innovation, entrepreneurship remains marginalized or overlooked within the education systems of Central Asia. Included in national education strategies, existing curricula still lack sufficient coverage of entrepreneurial concepts, skills, and aptitudes, leading to a gap between education and the needs of the labor market (Ajwad et al.

[7] https://greenuniversity.uz/.

2014). The lack of teacher knowledge and skills due to limited targeted professional development and availability of classroom materials hinders teachers' ability to cultivate entrepreneurial competencies among students. Moreover, identifying resources for students to pursue mentorship, seed funding, and networking opportunities is beyond most teachers' knowledge and capacity.

Progress integrating entrepreneurship education into higher education is well under way. Private and public universities are establishing entrepreneurship centers, innovation hubs, start-up incubators, and accelerators that train potential and existing entrepreneurs, both adults and youth. For example, in Kazakhstan, Nazarbayev University's Graduate School of Business opened a Research Center for Entrepreneurship and Al-Farabi Kazakh National University has The Center for Entrepreneurship and Innovation. In the Kyrgyz Republic, the American University of Central Asia (AUCA) has a School of Entrepreneurship and Business Administration which includes a major in Social Entrepreneurship and Design Thinking. Uzbekistan has launched the Graduate School of Business and Entrepreneurship under the Cabinet of Ministers of the Republic of Uzbekistan and Tashkent State University of Economics includes the Young Entrepreneurs Generator program. Key to these and other HEI programs, including at technical institutes, are partnerships with the private sector, NGOs, and international organizations, enabling enhancements to curriculum development, teacher training programs, and the establishment of support ecosystems.

Entrepreneurship training programs offered in the nonformal and continuing education space provide alternative models for designing and implementing entrepreneurship teaching and learning. Offered by HEIs as well as NGOs, training programs are both ongoing and one-time initiatives. Through the School of Professional and Continuing Education (SPCE), the University of Central Asia (UCA) in Tajikistan has established the Khorog Center for Entrepreneurship in rural Badakhshan Autonomous (Gorno-Badakhshan Autonomous Oblast [GBAO]). In Kazakhstan, UCA's SPCE offers entrepreneurship short courses for adult learners and entrepreneurs. An example of international organizations operating in the Entrepreneurship Education and Training (EET) space is the Organization for Security and Co-operation in Europe (OSCE) with a program for women entrepreneurs in digital skills in Kazakhstan, the Kyrgyz Republic, and Tajikistan, in collaboration with Silicon Valley stakeholders.

2.4 Gender and Education in Central Asia

In Central Asia, gender disparities persist within the education sector, despite advancements in access and enrollment rates. While girls' enrollment in primary and secondary education has increased in recent years, significant gaps remain in secondary and tertiary education attainment, particularly in rural and marginalized communities. Cultural norms, socioeconomic factors, and discriminatory practices contribute to these disparities, limiting girls' access to educational opportunities and hindering their academic progression (UNESCO 2021).

Sociocultural norms and gender stereotypes continue to hinder girls' educational attainment and limit their opportunities for academic and professional advancement. Furthermore, gender-based violence and discrimination within educational institutions remain prevalent, creating barriers to girls' participation and retention in school. Contributing to the gender gap is the trend of girls dropping out of school prematurely, particularly in rural areas. This is partially the result of traditional norms that prioritize education of boys over girls (ETF 2023) as well as economic factors. Girls who leave school early are more likely to lose the opportunity to gain skills and knowledge that will benefit them later in the workforce as well as in life generally. Women are also vastly underrepresented in many fields of study including STEM fields.

Various initiatives have been aimed at promoting gender equality and empowering girls through education. These efforts include targeted interventions such as scholarship programs, gender-sensitive curriculum reforms, and initiatives to increase female representation among teachers and educational leaders. Additionally, awareness-raising campaigns and community engagement initiatives play a vital role in challenging gender stereotypes and promoting the value of girls' education. A targeted effort to empower women economically is crucial, including deliberate investment in social care

services. The gender gap in proportion of time spent on unpaid domestic and care work averages 52 percent in Europe and Central Asia, with tangible consequences on employment outcomes (Bassani 2024). Investment in childcare infrastructure and parental leave policies can help rectify these imbalances, while improving access to quality early childhood education services can enhance children's lifelong earning potential in the labor market.

Social entrepreneurship is one promising solution to gender disparities in the labor force, by supporting women economically through strong social partnerships and networks. By prioritizing girls' education and implementing gender-responsive policies and programs, Central Asian countries can unlock the full potential of their female population and foster inclusive and equitable education systems. To address these challenges, a multifaceted approach is needed, encompassing policy reforms, capacity-building initiatives, and community engagement efforts. Governments must prioritize the implementation of comprehensive strategies that address the root causes of gender disparities in education and promote an enabling environment for girls' education. Empowering girls through education not only benefits individual girls but also contributes to broader socioeconomic development and the realization of SDGs in the region.

2.5 Key Trends, Challenges, and Opportunities

Positive momentum is building as the countries of Central Asia navigate being at a critical juncture in their education sector development. Governments are advancing policy reforms, expanding public-private partnerships, and leveraging technology to enhance learning outcomes. Efforts to address quality disparities, skills mismatches, and infrastructure gaps are gaining traction, empowering citizens to thrive in a knowledge-driven economy.

Key Trends

Expansion of access: Central Asian countries have made significant strides in expanding access to education, with increased enrollment rates at all levels, including elementary, secondary, and higher education.

Curriculum diversification: There is a growing trend toward diversifying curricula to align with global standards and meet the demands of the modern workforce and the climate crisis, with a focus on technical education, vocational training, and STEM disciplines.

Integration of technology: The integration of technology in education is becoming increasingly prevalent, with the adoption of e-learning platforms, digital resources, and online teaching methods to enhance access to quality education, particularly in remote and underserved areas.

Focus on inclusive education: Central Asian countries are placing greater emphasis on promoting inclusive education, aiming to ensure equitable access and opportunities for students from diverse backgrounds, including girls as well as marginalized and vulnerable populations.

Table 2. Key challenges and opportunities: Education

Key Challenges	Key Opportunities
Quality disparities: Despite improvements in access, disparities in educational quality persist, particularly between urban and rural areas, with rural schools facing challenges related to teacher quality, resources, and infrastructure.	**Policy reforms:** Opportunities exist for policy reforms aimed at addressing the identified challenges and promoting comprehensive education sector development, including curriculum reforms, teacher training initiatives, and infrastructure investments.
Skills mismatches: There is a mismatch between the skills acquired through formal education and the demands of the labor market, leading to unemployment and underemployment among youth, especially in emerging sectors such as technology and innovation.	**Public-private partnerships:** Collaboration between governments, private sector entities, civil society organizations, and international donors presents opportunities for leveraging resources and expertise to support education sector initiatives and innovations.
Teacher shortages and capacity: Central Asian countries face challenges related to teacher shortages, particularly in rural and remote areas, as	**Harnessing technology:** There is potential for leveraging technology to enhance education delivery, expand access to quality educational resources, and

well as issues concerning teacher training, professional development, and retention.	bridge the digital divide, particularly in remote and underserved areas.
Infrastructure deficits: Inadequate school infrastructure, including outdated facilities, overcrowded classrooms, and lack of basic amenities, impedes the delivery of quality education and compromises the learning environment.	**Promotion of entrepreneurship education:** Entrepreneurship education presents an opportunity for fostering innovation, creativity, and economic empowerment among youth, preparing them for the evolving demands of the labor market and driving entrepreneurship-led growth.

Technical education and vocational training play a crucial role in preparing youth for employment and fostering economic development. Efforts have been made to enhance the relevance and quality of technical education programs, aligning them with industry needs and market demands (Álvarez-Galván 2014). Nevertheless, challenges persist in terms of outdated curricula, inadequate infrastructure, and limited collaboration between educational institutions and the private sector. Addressing these challenges is essential for promoting skills development and enhancing the employability of youth.

The formal education systems of Central Asian countries can play a pivotal role in shaping the entrepreneurial mindset and skills of youth. Secondary and higher education institutes are key platforms for fostering entrepreneurship through curricular and extracurricular activities. However, despite efforts to integrate entrepreneurship education into formal curricula, challenges persist in terms of limited access to quality entrepreneurship education, inadequate teacher training, and outdated curricular content (OECD 2016). Addressing these challenges requires comprehensive strategies that prioritize curriculum integration, teacher training, resource provision, and policy implementation. By fostering an entrepreneurial mindset and providing students with the necessary skills and support, Central Asian countries can nurture a culture of innovation and entrepreneurship that drives economic development and prosperity.

To effectively integrate climate resilience and green skills into education systems, it is crucial to implement comprehensive curriculum reforms that embed climate change awareness, sustainable practices, and entrepreneurial skills from early through tertiary education. This should be accompanied by targeted teacher training initiatives focused on student-centered, experiential pedagogies and climate-responsive curricula. Additionally, addressing infrastructure gaps in rural schools, including access to modern ICT, water, sanitation, and energy, is essential to ensure an equitable and conducive learning environment. Long-term investments in these areas will foster a generation of youth equipped with the skills and mindset necessary for sustainable development and green economy growth.

Support mechanisms such as financing, mentorship, and public-private partnerships are essential to equip youth with the skills and resources needed for green entrepreneurship, even beyond formal education. Building inclusive entrepreneurial ecosystems, offering networking opportunities, and establishing women-friendly co-working spaces are crucial for fostering diverse and innovative green enterprises.

Chapter 3. Youth Entrepreneurship in the Green Economy

3.1 Overview

In a region that is not yet able to meet the higher education needs of its growing youth population, entrepreneurship provides critical skill-building, employment, and economic opportunities for the next generation of young people. Within the next decade, over half the global population will be 30 years old or younger (UNCCD 2023). Entrepreneurship can have a strong ripple effect in families and communities and can stem some of the brain drain that hinders long-term development and stability. With a very young population and rapid growth rate of 15–24-year-olds, coupled with slow job creation growth, Central Asia faces high rates of youth not in employment, education, or training (NEET) (Ambasz et al. 2023).

HEIs can play an important role in the development of youth entrepreneurship ecosystems. Universities and technical academies are beginning to establish accelerator programs and incubator spaces, conduct research, provide expertise and mentorship, and host youth-centered conferences, for students and unenrolled youth. These interventions are opportunities for cross-border HEI collaboration as well as cooperation with regional NGOs, corporate entities, and international organizations.

Youth entrepreneurship is a vital driver of economic growth and innovation in Central Asia. Strengthening support through education, civil society, and the private sector can help young entrepreneurs transition successfully and contribute to sustainable development. Empowering youth to lead green, regenerative ventures will accelerate the region's shift toward a circular economy and environmental resilience**.**

Opportunities for youth entrepreneurship in Central Asia are abundant, driven by factors such as demographic trends, technological advancements, and evolving market dynamics. However, significant challenges persist, including limited access to finance, regulatory barriers, lack of business support services, and cultural barriers that discourage risk taking and innovation among youth (UNESCO 2020). Addressing these challenges requires concerted efforts from governments, development partners, civil society organizations, and the private sector to create an enabling environment for youth entrepreneurship to thrive.

3.2 Youth Entrepreneurship Driving Environmental Change

Central Asia is a promising landscape for youth entrepreneurship, driven by a burgeoning entrepreneurial culture and supportive government policies. While still nascent, this ecosystem encompasses aspects of formal education, informal opportunities, training and mentoring, accelerators and incubators, and funding sources. Some initiatives support youth entrepreneurship and align with the United Nations (UN) SDGs, including those related to the environment and climate change. One example is the World Bank's Livelihoods for Youth Community Support Project which "piloted innovative ways of working with vulnerable groups in a fragile region and country where youth-centered and community-driven economic development support has not been provided in the past." (Nora 2023)

Youth entrepreneurship initiatives in Central Asia are increasingly aligned with the UN SDGs, particularly those related to environmental sustainability and climate change. Youth-led ventures focusing on renewable energy, sustainable agriculture, and waste management can contribute to the achievement of SDG targets, promoting economic growth while addressing environmental challenges. In May 2024, Tajikistan joined over 40 countries from around the world in endorsing the Declaration on Children, Youth and Climate Action. The country is the third in Central Asia to sign onto the commitment, following the Kyrgyz Republic and Uzbekistan, which aims to accelerate inclusive climate policies and actions that prioritize the well-being of children and young people at the national level. In Kazakhstan, the UN Country Team works alongside government, civil society, and private sector partners on adapting SDGs to the national context, promoting and implementing the SDG agenda.

3.3 Infrastructure for Youth Entrepreneurship

An ecosystem of accelerators and incubators is growing but does not yet include extensive support to youth entrepreneurs in either urban or rural areas. For example, the majority, 95 percent, of start-ups in the Kyrgyz Republic are in Bishkek, with some emerging in regional centers such as Osh, yet very few are in rural areas and prioritize youth (StartUp Central Eurasia 2022). For instance, the Silk Road Innovation Hub and the PEAK Public Foundation, successor to the PEAK Enterprise and Innovation Programme funded by UK Aid, provide a range of services to people launching ventures in multiple sectors, including education and social impact, but do not serve youth.[8]

Programs that create spaces for young and new entrepreneurs demonstrate the importance of investing in innovation.

- Incubator for female entrepreneurs in Lebanon contributes to the rise of women in entrepreneurship.
- Agrifood incubator has brought together a wide variety of agrifood stakeholders.
- EIT Knowledge and Innovation Communities (KIC) of the European Institute of Innovation & Technology such as the Climate-KIC.
- VTT Launchpad is an in-house business incubator that aims to create fundable spin-off companies built on technologies developed by the researchers working at VTT Technical Research Centre of Finland.
- 10K Incubator for students seeks to support prospective students in entrepreneurship, by targeting students from all possible fields of studies at Amsterdam University of Applied Sciences (Netherlands).
- Demonstrator Lab: Where entrepreneurial academics become academic entrepreneurs at Vrije Universiteit Amsterdam (Netherlands).
- Innovation Fund of the University of Ljubljana offers financial support for projects as well as mentoring of research teams and support to commercialization activities. (Slovenia)
- Funding innovation from academic research. The Innovation Project Fund (IPF) provides a grant aimed at valorizing and supporting innovation from academic research from the three partner universities. (Milano Bicocca, Bergamo, and Pavia - Italy)
- Crowdfunding for university born projects - BiUniCrowd is a funding program launched in 2018 to give the academic community the opportunity to fund projects and ideas with the support of people outside the university (Italy).

Source: European Commission n.d.

The civil society sector in Central Asia plays a crucial role in promoting youth entrepreneurship through various initiatives and programs. NGOs, community-based organizations (CBOs), and youth associations offer training, mentoring, and networking opportunities to aspiring young entrepreneurs, particularly those from marginalized and disadvantaged backgrounds (UNESCO 2021). These initiatives aim to address gaps in the formal education system and provide practical support to youth.

The private sector in Central Asia is increasingly recognizing the potential of youth entrepreneurship as a driver of innovation and economic development. Corporate entities, start-up incubators, accelerators, and venture capital firms are actively engaged in supporting youth-led entrepreneurial ventures. These entities provide financial resources, mentorship, access to markets, and networking opportunities to young entrepreneurs, contributing to the growth of the entrepreneurial ecosystem in the region (Al-Thani 2023).

The Kyrgyz Republic's ecosystem for youth entrepreneurship is characterized by a range of formal and informal opportunities, training and mentoring programs, accelerators and incubators, and funding sources. By leveraging these resources and aligning entrepreneurship initiatives with the UN SDGs, particularly those related to the environment and climate change, the Kyrgyz Republic can harness the creativity, innovation, and energy of its youth population to drive sustainable economic growth and address pressing social and environmental challenges. Start-up and

[8] https://peak-kg.yorc.org/en/.

seed funding opportunities are available for youth entrepreneurs in the Kyrgyz Republic through various channels. Government-backed programs provide financial support and grants to start-ups and small and medium enterprises (SMEs), including those led by young entrepreneurs. NGOs such as the International Youth Foundation offer training programs, workshops, and mentorship initiatives to support young entrepreneurs. Initiatives such as the Enactus Kyrgyzstan meanwhile provide networking opportunities and access to resources for youth-led start-ups. The United Nations Development Programme (UNDP) Open Innovation Challenge Inno4KG, implemented in partnership with the State ICT Agency and High Technology Park, provided funds to address health and education issues stemming from the COVID-19 pandemic (UNDP 2020).

In Uzbekistan, jobs for youth and youth entrepreneurship remain at the top of the development agenda. The government's youth policy has two main priorities in Uzbekistan: to provide modern education and ensure the employment of young people. This is reflected by the fact that the country's number of universities has increased and the quota for admission to HEIs has more than doubled over the past five years. In addition to existing active labor market programs, new measures to promote youth employment and entrepreneurship have been introduced in the past year, including wage subsidies for youth, subsidized internships in firms for vocational education training (VET) students, concessional loans for entrepreneurial projects, and investment in youth techno parks.

3.4 Gender and Youth Entrepreneurship

In Central Asia, a gender analysis of youth entrepreneurship reveals significant disparities and challenges faced by young women entrepreneurs, intertwined with cultural norms, socioeconomic factors, and institutional barriers. Women in the region encounter obstacles in accessing quality education, fair wages, and leadership positions, leading to occupational segregation and limited opportunities for advancement (UNECE 2021). A dearth of jobs, especially among women and youth, contributes to discontent and inhibits economic mobility (Dávalos et al. 2016). Gender gaps persist in labor force participation, earnings, and leadership roles, with women facing barriers such as limited access to financial services and markets (World Bank 2022).

Challenges Faced by Young Women Entrepreneurs

Social and cultural norms: Deep-rooted gender stereotypes and cultural norms often impede young women in Central Asia from pursuing entrepreneurship, relegating them to traditional gender roles and limiting their access to economic opportunities (UN Women 2021).

Access to finance and resources: Women entrepreneurs encounter significant challenges in accessing finance, capital, and resources compared to men. Discriminatory lending practices, limited collateral, and lack of financial literacy further exacerbate these barriers (Kishor and Pai 2022).

Limited access to networks: Women entrepreneurs in Central Asia face constraints in accessing networking opportunities, mentorship, and support networks crucial for business growth. Male-dominated business networks and professional associations may exclude or marginalize women, hindering their access to critical resources and opportunities (De Vita, Mari and Poggesi 2014).

Opportunities for Gender-Inclusive Entrepreneurship

Gender-sensitive policy and programs: Central Asian governments and development agencies can design and implement gender-sensitive policies and programs to promote women's entrepreneurship. This includes targeted financial assistance, training, and capacity-building programs tailored to the specific needs and constraints faced by young women entrepreneurs (International Labour Organization 2024).

Promoting financial inclusion: Efforts to promote financial inclusion and access to finance for women entrepreneurs are critical. This may involve initiatives such as microfinance programs, women-focused venture capital funds, and innovative financial products designed to meet the needs of women-led businesses (World Bank 2017).

Building supportive ecosystems: Creating supportive entrepreneurial ecosystems that foster inclusivity, diversity, and gender equality is essential. This involves establishing women-friendly co-working spaces, incubators, and accelerators as well as providing mentorship and networking opportunities specifically targeted at women entrepreneurs (UNDP 2024).

Changing social norms: Addressing deep-seated social and cultural norms that perpetuate gender inequalities is fundamental. This requires concerted efforts to challenge stereotypes, promote positive role models, and empower young women to challenge traditional gender roles and pursue entrepreneurship with confidence (Bjerde 2022).

A gender-inclusive approach to youth entrepreneurship in Central Asia is imperative for fostering economic empowerment, social equity, and sustainable development in the region. By addressing the unique challenges faced by young women entrepreneurs and implementing targeted evidence-based interventions, Central Asian countries can unlock the full potential of their youth population and foster inclusive and resilient economies. Overall, addressing gender inequalities in youth entrepreneurship includes improving access to education, promoting financial inclusion, empowering women in leadership roles, and ensuring an inclusive and responsive enabling environment for women entrepreneurs.

3.5 Key Trends, Challenges, and Opportunities

Despite regional challenges, several trends indicate broadening opportunities for young entrepreneurs in Central Asia. A growing awareness among youth about sustainability issues is leading to an increased interest in green entrepreneurship and socially responsible business ventures. The expansion of the entrepreneurial ecosystem in Central Asia has been conducive to an increase in accelerators, incubators, and mentorship programs tailored to support youth-led start-ups. Finally, and crucially, advancements in and increased access to technology and digital platforms are empowering youth to launch innovative start-ups and leverage e-commerce, digital marketing, and online networking tools to grow their businesses.

Concerted and coordinated efforts to empower young entrepreneurs and foster innovation will drive sustainable economic growth in rural areas. Central Asia can unlock the potential of its youth population to drive entrepreneurship, create employment opportunities, and contribute to the achievement of SDGs. The local economies of rural and remote border areas, where industry and other commercial interests tend not to invest, stand to benefit from entrepreneurial ventures connected to the unique assets of those areas (UN 2020).

Table 3. Key challenges and opportunities: Youth entrepreneurship

Key Challenges	Opportunities for Intervention
Policy and Regulatory Barriers: Inadequate policy frameworks, bureaucratic hurdles, and regulatory complexities pose barriers to entrepreneurship and hinder the growth of youth-led start-ups, particularly in sustainability-related sectors. Ambiguities in environmental regulations and cumbersome administrative procedures deter investment and innovation in sustainable ventures.	**Policy reforms and institutional support:** Advocate for policy reforms that incentivize entrepreneurship, streamline regulatory processes, and provide fiscal incentives for sustainable investments. Strengthen institutional capacity and coordination mechanisms to facilitate the growth of youth-led start-ups and support sustainable entrepreneurship.
Limited awareness, knowledge, and capacity: Many youths in Central Asia lack awareness and understanding of entrepreneurship beyond a limited 'business' model. A sense of agency to make change and build viable ventures within their communities and the country is limited. Entrepreneurship in the green and circular economy space is not well understood, hindering youth ability to conceptualize and implement sustainable models.	**Education and skills development:** Enhance entrepreneurship education, vocational training programs, and skills development initiatives to equip youth with the knowledge, skills, and mindsets required for entrepreneurship and sustainable business ventures. Implement targeted awareness campaigns and educational programs to enhance understanding of green economy principles, circularity concepts, and sustainability practices. Integrate sustainability education into formal and informal education systems to foster a culture of environmental stewardship and entrepreneurship.

Access to finance and resources: Youth entrepreneurs face challenges in accessing finance, technical assistance, and resources necessary to develop and scale sustainable business ventures. Limited availability of seed funding, venture capital, and supportive infrastructure restricts their ability to innovate and implement sustainable solutions.	**Access to finance and support:** Establish dedicated funds, grants, and financial mechanisms to support youth-led start-ups, particularly those focused on green, regenerative, and circular economy solutions. Strengthen support systems such as accelerators, incubators, and mentoring programs tailored to green entrepreneurs, providing technical assistance, market access, and networking opportunities.
Skills and capacity gaps: There is a mismatch between the skills demanded by the job market and those acquired through formal education, leading to a lack of entrepreneurship skills, technical know-how, and business acumen among youth. There is a shortage of skilled workforce equipped with the knowledge, skills, and competencies required to thrive in green industries and adopt circular economy practices. Educational curricula often lack emphasis on sustainability, environmental stewardship, and green entrepreneurship.	**Skills development and capacity building:** Enhance vocational training programs, entrepreneurship education, and skills development initiatives to equip youth with the knowledge, skills, and competencies required for green jobs and sustainable entrepreneurship. Foster partnerships between educational institutions, industry stakeholders, and civil society organizations to deliver targeted training programs and promote lifelong learning in green sectors.
Market fragmentation and lack of networks: Fragmentation of markets, limited networking opportunities, and lack of collaboration between stakeholders inhibit the growth of green enterprises and hinder knowledge exchange among youth entrepreneurs.	**Market integration and networking:** Facilitate collaboration, knowledge sharing, and networking opportunities among youth entrepreneurs, investors, policy makers, and industry stakeholders. Establish platforms for matchmaking, market linking, and knowledge exchange to foster innovation, collaboration, and the scaling-up of green enterprises.

Chapter 4. A Regional Study of Youth Climate Action in Rural Schools

4.1 Overview

The purpose of this study was to create a pathway for the Resilient Landscapes Central Asia Program[9] (RESILAND CA) investments in restoring degraded landscapes to be sustained over the long term by engaging rural schools and fostering youth entrepreneurship. The investments made by the World Bank through the RESILAND CA program are focused on environmental hot spots, primarily in border areas between countries. These initiatives focus on protected areas, smallholder farms, forests, rangelands, glaciers, and other resources that are essential to an environmental, economic, and socially resilient future for the region's people.

Schools, scattered across rural areas, especially in the hot spot areas, are key assets that can prepare youth with the knowledge, skills, and mindsets needed to understand climate change dynamics and environmental impacts, solve related local problems, and create value from natural resources. Furthermore, partnerships between schools and parks or protected areas, farmers and farmer associations, research institutions, and other relevant organizations provide opportunities for integrating 'real-world' teaching and learning into curricula. Those learning experiences become foundational to lifelong engagement. Thus, the question driving this study was the following: How might rural schools become community hubs for youth climate entrepreneurship that focuses on restoring degraded landscapes, fostering resilient communities, and building green economies in environmental 'hot spots' across Central Asia?

A pilot study conducted in 2021 in Tajikistan was the basis for the regional study. Conducted in the GBAO in the high Pamir Mountains of eastern Tajikistan, the 2021 pilot study demonstrated the feasibility of engaging youth in landscape restoration by delivering programs in rural schools. A peer-to-peer learning approach to fostering awareness, shifting mindsets, and building skills was tested using university undergraduate students as peer educators. Data indicated increased knowledge of and concern about climate change among participating youth and suggested increased interest in entrepreneurship to solve local climate-related problems (World Bank 2022). Moreover, participants responded positively to peer learning.

This four-country study expanded the pilot, resulting in a replicable model and an early-stage regional network of universities. Eight universities across Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan participated, providing country coordinators and student interns. The methodology included a virtual training-of-trainers (ToT), school-based workshops, national-level workshops, and a regional stakeholder workshop. The core peer-to-peer approach started with teams of university students from partner universities receiving hybrid training in design thinking and entrepreneurship as well as the fundamentals of climate change science. With those skills, student teams facilitated workshops with rural youth at their schools, using a project-based curriculum. Youth identified climate and environment-related problems and developed locally based solutions. Data were collected using pre- and post-activity surveys with interns and youth as well as teacher and school director interviews.

Results indicate high levels of awareness of climate change among the region's youth and strong orientation to entrepreneurship as a means to make a difference in their communities and countries. Importantly, participants' knowledge of the causes and impacts of climate change increased and their confidence in their opinions improved. While most participants were enthusiastic about climate and environment-oriented entrepreneurship, many were not confident that it is a viable way to make a living, perhaps due to a lack of exposure to successful ventures.

School directors and teachers responded positively to the program. In some cases, the workshops reinforced existing science curricula. For other schools, climate change is either not included in the curriculum or teachers are ill-prepared to deliver science lessons beyond basic content. Similarly, the

[9] https://www.worldbank.org/en/topic/environment/brief/climate-and-environment-program-in-central-asia#RESILAND.

workshops either reinforced schools' existing environment and community programs, such as tree planting and recycling, or, for remote and highly under-resourced schools, offered a model for extracurricular community-based projects. In some cases, the workshops were an introduction to an interactive, student-centered pedagogy for both students and educators.

A set of *essential questions* that emerged from the pilot guided the regional study and provide a framework for ongoing work:

- How might rural schools become incubators for building a youth entrepreneurship sector that is focused on restoring degraded landscapes, fostering resilient communities, and building green economies in environmental 'hot spots' across Central Asia?
- How might 'ecosystems' for skill-building, mentoring, networking, and investing—that include key stakeholders in government, civil society, and the private sectors—be developed for youth entrepreneurs working on climate adaptation and landscape restoration?
- How might landscape restoration and other environmental and climate change adaptation projects in border areas of Central Asia, including in protected areas, provide opportunities for youth entrepreneurs and become partners to rural schools for place-based, real-world learning?

Figure 3. Study in numbers

- **4** countries
- **8** universities
- **9** university coordinators
- **28** student interns
- **19** rural schools
- **388** youth (pupil) workshop participants
- **19** school-based workshops
- **3** university-hosted 'launchpads'
- **41** youth (pupil) launchpad participants
- **13** teacher launchpad participants
- **1** regional stakeholder workshop
- **93** stakeholder workshop participants (81 in-person, 12 virtual)

4.2 Goals and Objectives

This study sought to contribute to building sustainable responses to climate change in Central Asia by piloting and preparing to scale activities across the World Bank's RESILAND CA program. The overarching goal was to implement a replicable model for localized, youth-powered climate action that can unearth new forms of sustainable livelihoods grounded in rural schools and anchored within regional universities.

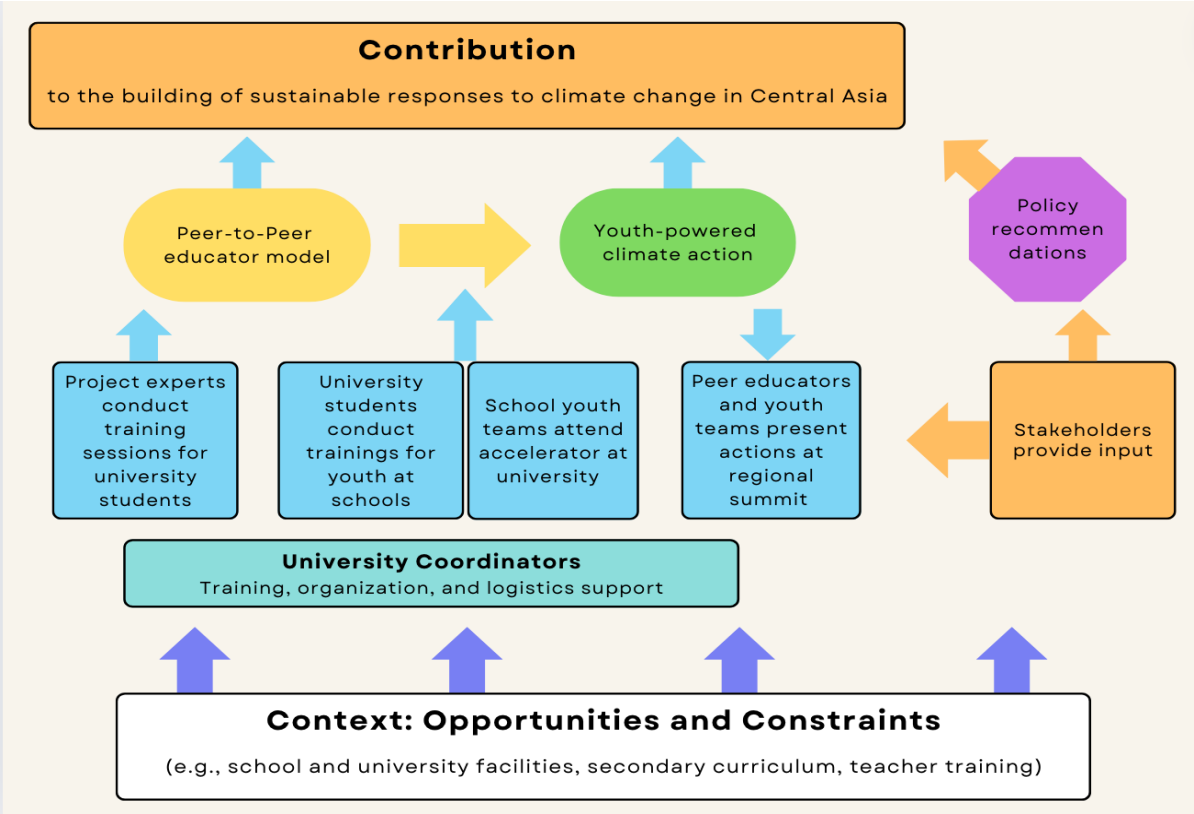
The study addressed a set of conditions in Central Asia at the intersection of youth employability, sustainable livelihoods, climate change and environmental degradation, and education innovation and modernization including the following:

- Unsustainable livelihood options for youth due to limited employability and entrepreneurship skills training
- Lack of community-driven, locally relevant solutions to landscape resilience and climate change mitigation
- Lack of connection between landscape resiliency, environment and climate change initiatives and entrepreneurship education for youth
- Outdated and under-resourced education systems, including curriculum, pedagogy, extracurricular programming, teacher training, technology, facilities, and supplies.

Objectives

- Offer local-level trainings for university and school students that enhance green economy opportunities using a peer-to-peer learning model .
- Activate university-led support 'ecosystems' for rural schools that support climate-responsive youth entrepreneurship culminating in a regional conference.
- Integrate climate change responsive natural resource management with education modernization for rural schools, including curriculum and teacher training related to climate change, technology, and entrepreneurship.
- Develop policy recommendations for climate change and education integration.

Figure 4. Study methodology flow chart



Source: Original elaboration.

4.3 Methodology

The four-country initiative tested a peer-to-peer approach to climate-centered learning and entrepreneurial action in rural schools, where landscape degradation and climate vulnerability is most pronounced. Key to the approach is a regional network of universities engaging undergraduate students in collaborative, experiential learning who are trained to design, plan, and facilitate a series of workshops that supplement school curriculum and model student-centered learning.

The peer-to-peer model is based on university internship programs for undergraduate students. Each participating university established an internship program, hiring students to participate in the training, deliver youth workshops, develop policy briefs, and engage in related conferences and symposia. The internships were coordinated by university faculty or staff hired as consultants responsible for intern participation, team deliverables, data collection, and regional collaboration.

Table 4. HEI participation by country, including numbers of program coordinators and interns

Country	University	Coordinators	Interns	Interns: terminated or dropped out
Kazakhstan				
	Nazarbayev University	1	5	0
Kyrgyz Republic				
	UCA/Naryn	2	6	0
	Naryn State University	1	2	0
Tajikistan				
	Tajik National University	1	0	2
	Khorog State University	1	1	1
	Lomonosov Moscow State University	1	1	1
	UCA/Khorog	1	4	0
Uzbekistan				
	National Univ of Uzbekistan	1	9	0
	Totals	**9**	**28**	**4**

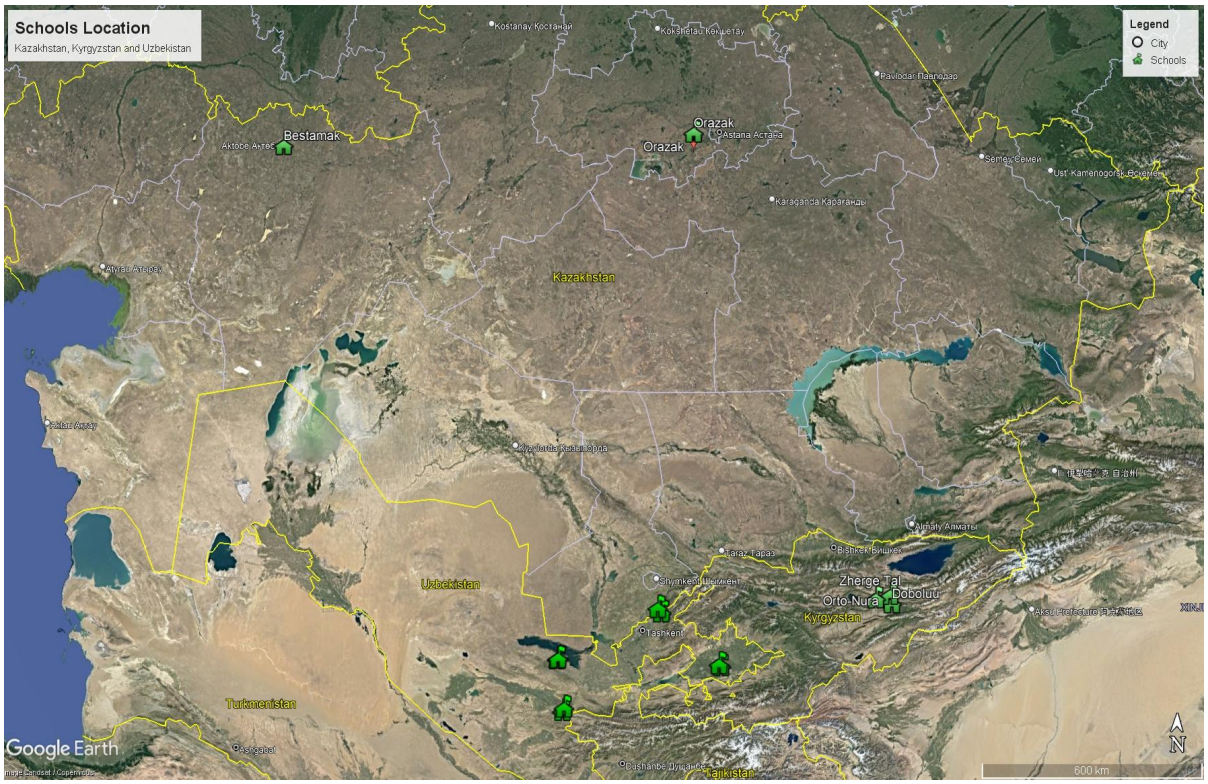
Source: Original compilation.

A virtual ToT included entrepreneurship fundamentals, climate change science, workshop planning and facilitation, policy development, and project management. Intern teams from each country, some with multiple university partners, participated in five monthly virtual workshops between January and May 2023 on entrepreneurship and design thinking as well as three sessions on the fundamentals of climate change science and natural resource adaptation. Intern teams then delivered their school workshops between May and September, mostly over the summer break. Additionally, teams received on-site support from faculty coordinators and virtual 1:1 coaching with the trainers. Workshops and launchpads were implemented at different times due university calendars, ministry approvals, and school and youth availability.

Climate entrepreneurship workshops held at rural schools were led by university teams that designed, planned, and facilitated two-day workshops in schools identified in collaboration with ministries of education. The peer educators provided foundational content on climate change, its human and natural causes, and its impact on the environment and human societies. Educators employed a project-based curriculum and student-centered pedagogy that connected lessons with human-centered design (HCD), facilitating participants in ideating solutions to local climate impact and landscape degradation problems.

Schools selected by ministries of education in collaboration with participating universities represented rural areas of each country. In Kazakhstan, two schools participated in both the Akmola and Aktobe oblasts. A total of four schools in the Kyrgyz Republic participated, all in the Naryn region. In Tajikistan, six schools were selected in the Khatlon oblast. And in Uzbekistan seven schools were involved in four oblasts: two in Jizzakh, one in Fergana, two in Samarqand, and two in Tashkent.

Map 2. Study school sites by country



Source: Google Earth.

Table 5. Workshop participation data by country

Country	Universities	Coordinators	Interns	Schools	Directors[a]	Teachers[a]	Youth/ Pupils
Kazakhstan	1	1	5	2	2	1	55
Kyrgyz Republic	2	3	8	4	2	6	82
Tajikistan	4	4	6	6	0	12	119
Uzbekistan	1	1	9	7	0	7	132
Totals	**8**	**9**	**28**	**19**	**4**	**26**	**388**

Source: Original compilation.
Note: a. Incomplete: data not collected uniformly across workshops.

Table 6. Workshop locations by country, region, district, town, and school

Country	Region/Oblast	District	Town	School
Kazakhstan				
	Akmola	Tselinograd	Orazak	Orazak general secondary school
	Aktobe	Alga	Bestamak	Bestamak high school
Kyrgyz Republic				
	Naryn	Naryn	Dobolu	O. Toktosunov
	Naryn	Naryn	Min-Bulak	Aktan T.

Country	Region/Oblast	District	Town	School
	Naryn	Naryn	Orto-Nura	Bekzhanov
	Naryn	Naryn	Zherge-Tal	A. Tabaldiev
Tajikistan				
	Khatlon	A. Jomi	Navobod	School #21
	Khatlon	A. Jomi	Navobod	School #50
	Khatlon	Khuroson	Abdurahmoni Jomi	School #46
	Khatlon	Khuroson	Asadullo N.	School #12
	Khatlon	Yovon	Pakhtakor	School #35
	Khatlon	Yovon	Sargah	School #38
Uzbekistan				
	Fergana	Oltiariq		School #22
	Jizzakh	Forish		School #11
	Jizzakh	Forish		School #28
	Samarqand	Urgut		School #3
	Samarqand	Urgut		School #27
	Tashkent	Bostonliq		School #24
	Tashkent	Bostonliq		School #26

Source: Original compilation.

National-level 'launchpads' hosted by universities brought school teams together to learn, share, and launch solutions. Select teams of youth and teachers from participating schools attended in-depth, multiday workshops at host universities. These 'launchpads' were a deeper dive into both climate change content and entrepreneurship skill-building, culminating in project idea pitches to expert panels. Pre- and post-activity surveys were administered to capture changes in awareness and attitudes toward climate change as well as orientation to entrepreneurial mindsets and opportunities.

Table 7. Launchpads by region, district, town, and school

Country	Region	District	Town	School	Number of youth	Number of teachers
Kazakhstan						
	Aktobe	Alga	Bestamak	Bestamak high school	8	1
	Akmola	Tselinograd	Orazak	Orazak general secondary school	5	1
					13	**2**
Kyrgyz Republic						
	Naryn	Naryn	Jerge-Tal	A. Tabaldaiev	4	1

Country	Region	District	Town	School	Number of youth	Number of teachers
	Naryn	Naryn	Min-Bulak	Aktan Tynybek	4	1
	Naryn	Naryn	Orto-Nura	B. Bekjanov	4	1
	Naryn	Naryn	Doboluu	Omur Toktosunov	4	2
					16	**5**
Tajikistan						
	n.a.	n.a.	n.a.	n.a.	—	—
Uzbekistan						
	Fergana	Oltiariq	Oqqurgan	School #22	2	1
	Fergana	Oltiariq		School #25	2	1
	Jizzakh	Forish	Uchma	School #11	2	1
	Jizzakh	Forish	Uchma	School #28	2	1
	Samarkand	Urgut		School #3	2	1
	Samarkand	Urgut		School #27l	2	1
					12	**6**

Source: Original compilation.

Table 8. Number of launchpad schools and youth participants by country

Country	Number of schools	Number of participants	Female	Male
Kazakhstan	2	13	8	5
Kyrgyz Republic	4	16	12	4
Uzbekistan	6	12	8	4
Grand total	**12**	**41**	**28**	**13**

Source: Original compilation.

Table 9. Launchpad participants by grade and country

Grade	Kazakhstan	Kyrgyz Republic	Uzbekistan	Total	Percent
8	3	1		**4**	**10**
9	7	2	3	**12**	**29**
10	2	12	4	**18**	**44**
11	1	1	5	**7**	**17**

Source: Original compilation.

Table 10. Age of launchpad participants by country

Age	Kazakhstan	Kyrgyz Republic	Uzbekistan	Total	Percent
14	4	1		**5**	**12**
15	4	6	1	**11**	**27**
16	4	8	6	**18**	**44**
17	1	1	2	**4**	**10**
18			3	**3**	**7**

Source: Original compilation.

Table 11. Launchpads by gender, grade level, and age

Country	Number of schools	Number of youth	Number of females	Number of males	Grades	Age	Number of teachers
Kazakhstan	2	13	8	5	8–11	14–17	2
Kyrgyz Republic	5	16	13	3	8–11	14–17	5
Tajikistan	—	—	—	—	—	—	—
Uzbekistan	6	12	8	4	9–11	15–18	6
	13	**41**	**29**	**12**			**13**

Source: Original compilation.

Data were collected using surveys administered at workshops and launchpads in languages appropriate to the specific school. Surveys were administered by the university teams with support from school personnel. Participants completed the surveys in writing. Variables affecting responses include inconsistent translations, participant levels of understanding, and, in some cases, school personnel interference. In some schools, limited space made it difficult to prevent participants from viewing each other's responses or discussing responses.

4.4 Stakeholder Workshop

In addition, a stakeholder workshop brought together experts, policy makers, educators, and students from across the region to examine outcomes, generate policy alternatives, and explore action steps. Hosted by the Ministry of Ecology, Environmental Protection and Climate Change of the Republic of Uzbekistan, along with the Mirzo Ulugbek National University of Uzbekistan and Central Asian Green University, and in conjunction with the World Bank and UCA, the one-day symposium was the culmination of the three-year rural schools initiative under RESILAND CA. Other participating academic institutions were Nazarbayev University, Naryn State University, Khorog State University, and Tajik National University. Additional stakeholders included World Bank environment and education experts, environment and education ministry officials and policy makers, civil society representatives, higher education leaders and researchers, teachers and pupils from program schools, and university students.

Table 12. Stakeholder workshop participation by country

Kazakhstan	**Kyrgyz Republic**
● Nazarbayev University	● Department of School and Extracurricular Education, Ministry of Education and Science (MoES), Kyrgyz Republic ● UCA/Naryn

	● Kyrgyz Association of Forest and Land Users (KAFLU)
Tajikistan ● Environmental Information Division, Committee on Environmental Protection, Government of the Republic of Tajikistan ● Khorog State University ● Little Earth (NGO) ● National Academy of Sciences ● UCA/Khorog	**Uzbekistan** ● Department of Environmental Education, Research and Innovation, the Ministry of Ecology, Environmental Protection and Climate Change of the Republic of Uzbekistan ● Ministry of Water Resources ● International Relations Department, Mirzo Ulugbek National University of Uzbekistan ● Mirzo Ulugbek National University of Uzbekistan ● Central Asian University of Environmental Studies and Climate Change (Green University) ● PERFECT University ● Schools #11 and #28, Forish District, Jizzak Region ● Schools #22 and #25, Altiarik District, Fergana Region
Region ● The World Bank, Environment, Natural Resource and Blue Economy (ENB)	**International** ● Petra College for Tourism and Archaeology (Jordan) ● United Nations Children's Fund (UNICEF) ● The World Bank, Education Global Practice (EGP)

The aims of the workshop were to:

- Share results and insights gained from the RESILAND CA *Rural Schools* initiative, including youth voices and early-stage climate solutions from rural schools;
- Facilitate knowledge exchange and collaboration among stakeholders interested in education innovation, youth entrepreneurship, natural resource management, and climate adaptation; and
- Explore avenues for scaling up and sustaining the impact of climate-, environment-, and entrepreneurship-centered education and action in rural schools across Central Asia.

Policy recommendations set the stage for youth to create their own climate-resilient future. Presentations and panel discussions provided regional and global context as well as examples of how youth, through entrepreneurship, can make impactful local contributions to national and regional efforts to address landscape degradation and climate adaptation. A working session on cross-cutting policy issues generated regionally relevant recommendations based on the perspectives of the diverse constituents represented.

4.5 Key Findings: Climate Change

Over 380 youth participated in workshops at 20 schools across the four countries (Table 13).[10] The number of participants was greater in Tajikistan and Uzbekistan owing to more schools being covered. Roughly, 65 percent of the participants were female and 35 percent were male. In all countries, except for Tajikistan, there were twice as many female participants as male participants. Majority of youth, 83 percent, were studying in grades 9–11 (*Source:* Original compilation. Table 9), and 75 percent were age 15–17 years (*Source:* Original compilation. Table 10).

Table 13. Number of workshop participants and number of schools they came from

Country	Number of schools (post-surveys completed)	Number of participants in pre-survey	Number of participants in post-survey	Female	Male

[10] Details in Appendix 1.

Kazakhstan	2	55	55	37	18
Kyrgyz Republic	4	82	81	51	29
Tajikistan	7	118	113	68	45
Uzbekistan	7	132	132	88	42
Total	**20**	**387**	**381**	**244**	**134**

Source: Original compilation.

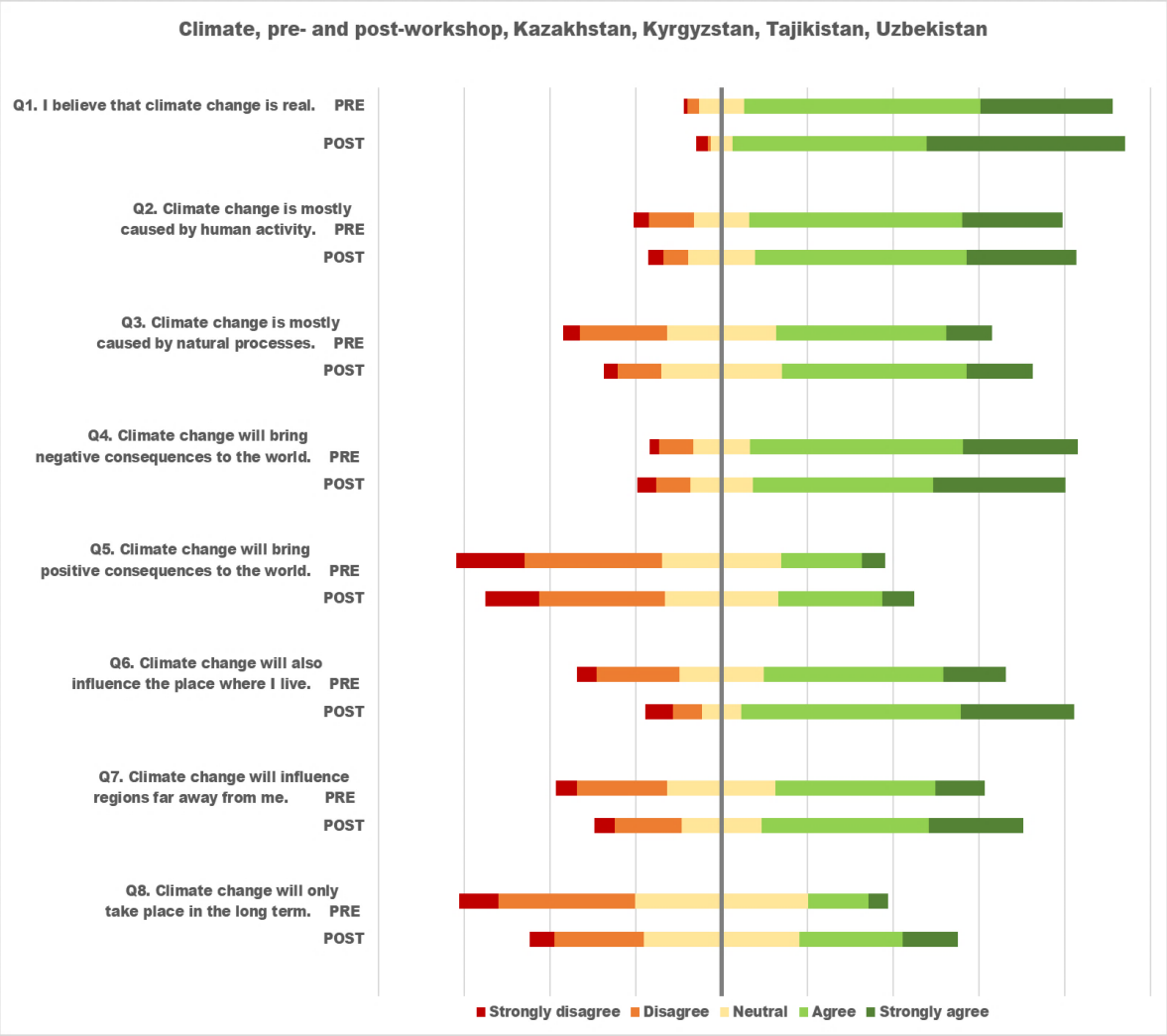
Overall, a large majority of the youth participants believe that climate change is real. Before the workshops, 58 percent agreed and 35 percent strongly agreed; after the workshops, 43 percent agreed and 49 percent strongly agreed. Findings indicate that workshop participants learned about the human and natural causes during the workshop and became more confident in their opinions.

Attention to the negative consequences of climate change increased. Participants seem to have become more attentive to the negative effects of climate change after the workshop (42 percent agreed, 31 percent strongly agreed) than before the workshop (50 percent agreed, 27 percent strongly agreed). At the same time, they appear to have learned more about positive effects—from 19 percent agreed and 5 percent strongly agreed before the workshop to 24 percent agreed and 7 percent strongly agreed after the workshop.

While understanding that climate change affects locations both near and far increased, some confusion remained as to the immediacy of the problem. Before the workshop, 42 percent agreed and 15 percent strongly agreed that climate change would influence the place where they lived, while after the workshop 51 percent agreed and 27 percent strongly agreed. Before the workshop, 14 percent agreed and 4 percent strongly agreed that climate change will only take place in the long term. After the workshop, 24 percent agreed and 13 percent strongly agreed. Notably, 32 percent disagreed and 9 percent strongly disagreed before the workshop, while 21 percent disagreed and 6 percent strongly disagreed after the workshop.

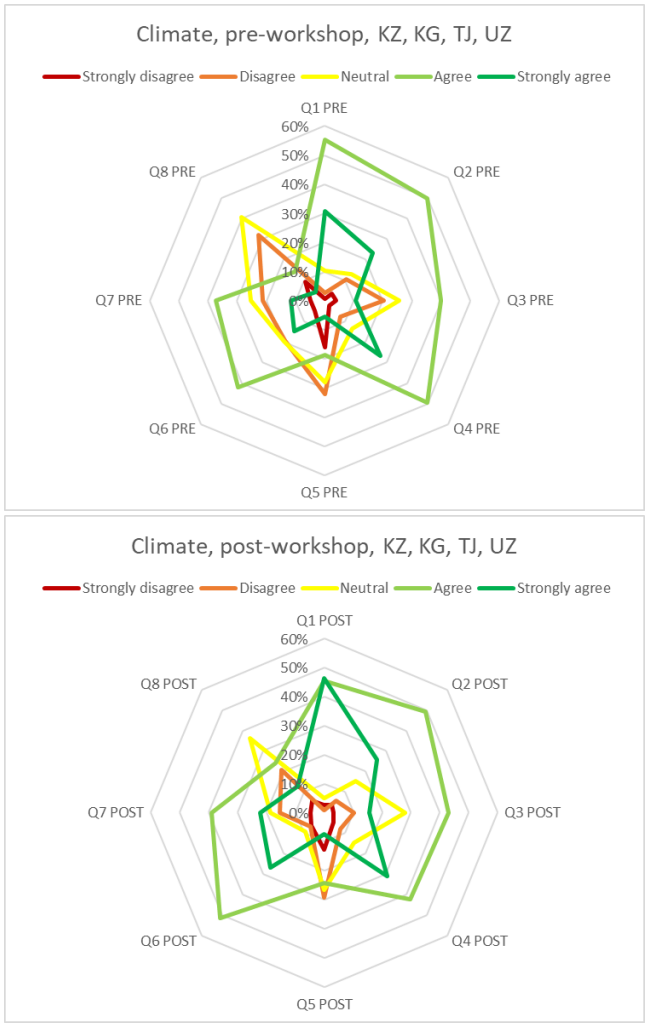
Young people surveyed in rural areas of Kazakhstan, the Kyrgyz Republic, and Tajikistan already appear to have a high awareness of the reality of climate change, its causes, and its consequences. The workshop seems to have further increased their awareness as their responses to the survey statements after the workshop were more definitive. At the same time, in some cases, the material may have been largely new content for participants, leaving them somewhat unsure and requiring additional learning.

Figure 5. Workshop survey responses to climate change statements by young people in rural schools in Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan



Source: Original elaboration.

Figure 6. Stronger agreement in post-workshop survey to climate change statements by young people in rural schools in Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan



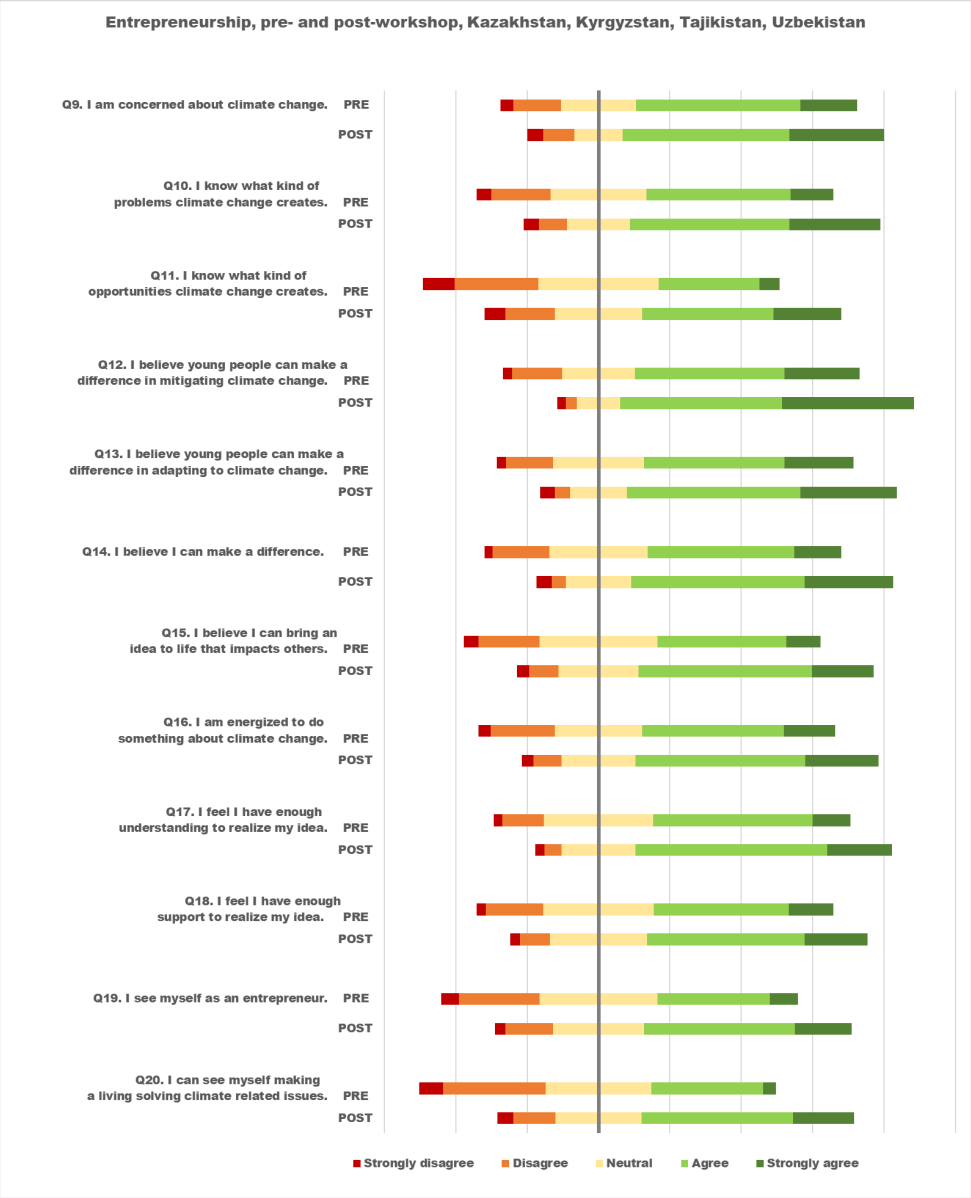
Source: Original elaboration.

> "This is a very useful project, especially if it is carried out in rural schools. Because schoolchildren in schools of rural areas experience a kind of disconnection from the world, a narrower view of the world. They learned a lot by attending the conference and launchpad. They even want to test the projects they developed with the help of trainers in the area where they live."
>
> *Teacher, Samarkand Region, Uzbekistan*

4.6 Key Findings: Entrepreneurship

Youth workshop participants reported strong orientation to entrepreneurship and are highly motivated to address climate-related challenges in their communities. A majority of workshop participants, 66 percent (agree and strongly agree), believed that they can bring an idea to life that can affect others, an increase from 51 percent. And a similar percentage (63 percent to 67 percent) reported being energized to do something about climate change.

Figure 7. Workshop survey responses to entrepreneurship statements by young people in rural schools in Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan



Source: Original elaboration.

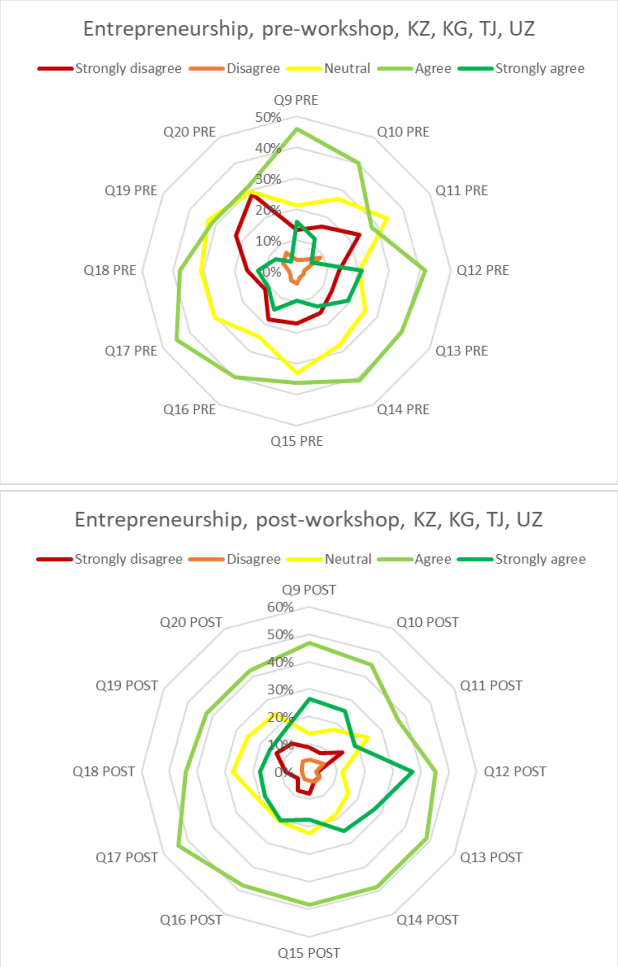
While confidence in entrepreneurial potential among youth is evident, participants expressed the need for support and are unsure of the livelihood viability of climate-centered entrepreneurship. Participants' sense that they had enough support to realize their idea held steady (55 percent to 57 percent) with 13 percent strongly agreeing both before and after. Only 33 percent agreed and 3 percent strongly agreed that they could see themselves making a living solving climate-related issues before the workshop, increasing after the workshop to 36 percent and 15 percent, respectively.

Young people were substantially more concerned about climate change while seeing opportunities at the same time. Following the workshop, youth more strongly believed in themselves and their peers' ability to actively mitigate and adapt to climate change. Moreover, they felt more energized to take action, sensing greater understanding and support to bring their ideas to life. The most remarkable change after the workshop appears to be the youth's perception of themselves as entrepreneurs that substantially increased, highly likely due to learning about this during the workshop. This is even more pertinent because more youth believed they could earn a living while solving climate-

related problems. The difference between pre- and post-workshop responses can be vividly seen in Figure 5, where the area of dark green color expanded but the area of dark red shrank—as did the area of yellow, indicating a shift away from neutrality toward stronger agreement (see also Figure 6).

Youth believe in youth. Participants across all four countries believe young people can make a difference. After the workshop, 82 percent agreed or strongly agreed that young people can make a difference in mitigating climate change, just a 1 percent increase from before the workshop. The power of youth to affect climate change adaptation was strong but took more convincing: before the workshop 73 percent agreed (48 percent) or strongly agreed (24 percent) while after the workshop 79 percent agreed (52 percent) or strongly agreed (27 percent).

Figure 8. Stronger agreement in post-workshop survey to entrepreneurship statements by young people in rural schools in Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan



Source: Original elaboration.

4.7 Youth Solutions

There are a number of compelling reasons to provide youth with a designated space to share ideas and concerns when it comes to the environment. Aside from having a stake in these problems, as young people are inevitably affected by the consequences of climate change, youth have the capacity to identify solutions to local problems. At the same time, it is neither costly nor time consuming to engage young people in ideating solutions among school teams during workshops and launchpads. The value and potential for impact is immense, and a great deal can be gained from 2-day workshops, 3-4-day launchpads, with a small amount of funding (usually in the feasible range of US$200–300). Workshops and launchpads allow young people to remain engaged and move forward

with their ideas, and the variation in solutions ideated by school teams during workshops and launchpads illustrates creativity, range of issues, and opportunities.

Solutions generated during the study workshops and launchpads illustrate the range of youth experiences and concerns as well as their capacity to problem solve. Table 14. is a sampling of concepts from micro-level, local ideas to large-scale complex ventures. Not all solutions generated were feasible for young people to implement. However, each one is an exercise in creative problem-solving with potential for impact.

Table 14. Examples of solutions generated by workshop and launchpad youth participants

Recycling clothes	Collect old clothes for making eco-friendly shopping bags and other household necessities.
Sun batteries (Solar energy)	Reduce water consumption using solar panels and design houses where these batteries are the source of energy.
Recycling plastic bottles	Reuse plastic bottles to make souvenirs and decorative glasses as well as household items.
Eco club	Create a school club that conducts classes for villagers on environmental topics.
Eco-dishes factory	Build a factory that would recycle garbage and turn it into dishes.
Drinking water from local river	Build a filtration system that would turn water from the local river into potable drinking water; the water is then delivered to special stations.
Forest fire-detecting mechanism	Design a mechanism that works as an alarm, making a noisy sound when it detects a fire.
Robot that cleans the river shores	Build a robot that is able to collect solid waste from the shores and surface of the local river.
Water filter for the Nura River	This filter uses the Nura River water to make it usable for domestic animals.
Rainwater collection and filtering for domestic usage	A system that collects and filters rainwater for domestic purposes: watering plants, washing, and so on.
H_2O: Storm water treatment	A system that purifies storm water/rainwater and cleans storm drains, thereby reducing flooding and replenishing water resources of a village or city.
Acqua. CL - solid waste collection robot	A portable robot that collects garbage and other waste along river shores that is easy to use in hard-to-reach places around rivers and other similar water basins.
No-waste technologies in agriculture	A project for processing and recycling chicken manure from the local poultry factory that is used for agricultural needs as a soil fertilizer.
Animal composting	Concrete stations for livestock and other animal carcass incineration.
Mini glaciers	Creating mini glaciers out of piped water during the winter, which melts slowly in warmer seasons for ongoing use.

Source: Original compilation.

Additional entrepreneurship training and exposure to community-based environmental initiatives and programs gave youth the confidence to implement their ideas. School teams that participated in the advanced workshops hosted by regional- or national-level universities engaged in pitch competitions judged by representatives from ministries, national academies, HEIs, and NGOs. Ideas selected to receive funding and deliver prototypes included the following:

No-Waste Technologies in Agriculture: Poultry Manure Composting
Bestamak, Aktobe Region, Kazakhstan


Photo Credit: Damir Abuov, Zhangul Maksotova, and Sabina Nursultanova

Problem:	Poor air quality and acid rain resulting from poultry factory waste
Solution:	Compost poultry manure into organic soil and sell it in areas with poor soil quality.

New Life: Recycled Clothing
Min-Bulak, Naryn Region, Kyrgyz Republic



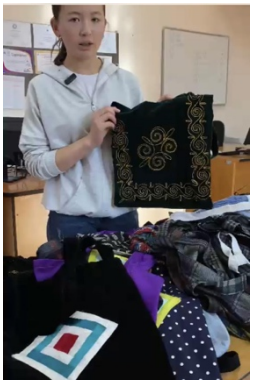


Photo credits: Aliia Asanova (left), Nazira Babaeva (center and right)

Problem:	Air pollution
Solution:	Recycling old clothes into 'shoppers', using traditional Kyrgyz designs. Seventy bags made for the stakeholder workshop.

Future for Forish!: Tree Planting
Schools #28 and #11, Forish District, Jizzak Region, Uzbekistan


Photo credit: Qobiljon Kengashev

Problem:	Loss of trees leading to increased soil erosion and a rise in flood events
Solution:	Planting indigenous tree species

Eco-bankomat: Plastics collection
Schools #22 and #25, Altiarik District, Fergana Region, Uzbekistan

Photo Credit: Muazzam Murodaliyeva

Problem:	Increase a sense of responsibility for the environment among people of all ages and stations in life and address plastic pollution.
Solution:	A plastics collection and payment system at schools and in the town; selling of plastics to a processing company; an awareness campaign for school children.

4.8 Conclusion

The findings from the youth entrepreneurship workshops underscore the significant potential of young individuals in Central Asia to address climate-related challenges through entrepreneurial initiatives. Despite uncertainties about the viability of climate-centered entrepreneurship, participants exhibited strong motivation and confidence in their ability to make a difference. However, to fully harness this potential, it is crucial to provide tailored support and training programs that equip youth with the necessary skills and knowledge to initiate and lead sustainable ventures. Leveraging the assets of HEIs to improve rural schools' capacity to deliver innovative learning can have a sustained impact on communities and the environment.

Foundations have been laid for school-based youth climate entrepreneurship to grow in rural Central Asia. Awareness of and concern for climate change is high and the potential for youth to find agency as changemakers is strong. Schools are community assets in rural areas with directors and teachers using the resources available to engage students in real-world learning and problem-solving. Universities have the intellectual and human resources, including students, to play a pivotal role in helping rural schools become centers for community-based climate and landscape restoration innovation. School innovation and reform are under way on some level in each country including expanding climate, environmental, and entrepreneurship curricula and teacher training in student-centered pedagogies. Environment and related ministries have national and regional strategies in place to address deforestation, water scarcity and contamination, wildlife conservation, regenerative agriculture, and other key priorities. Moreover, pressures on the private sector including farming and industry are increasing the transition to a green economy.

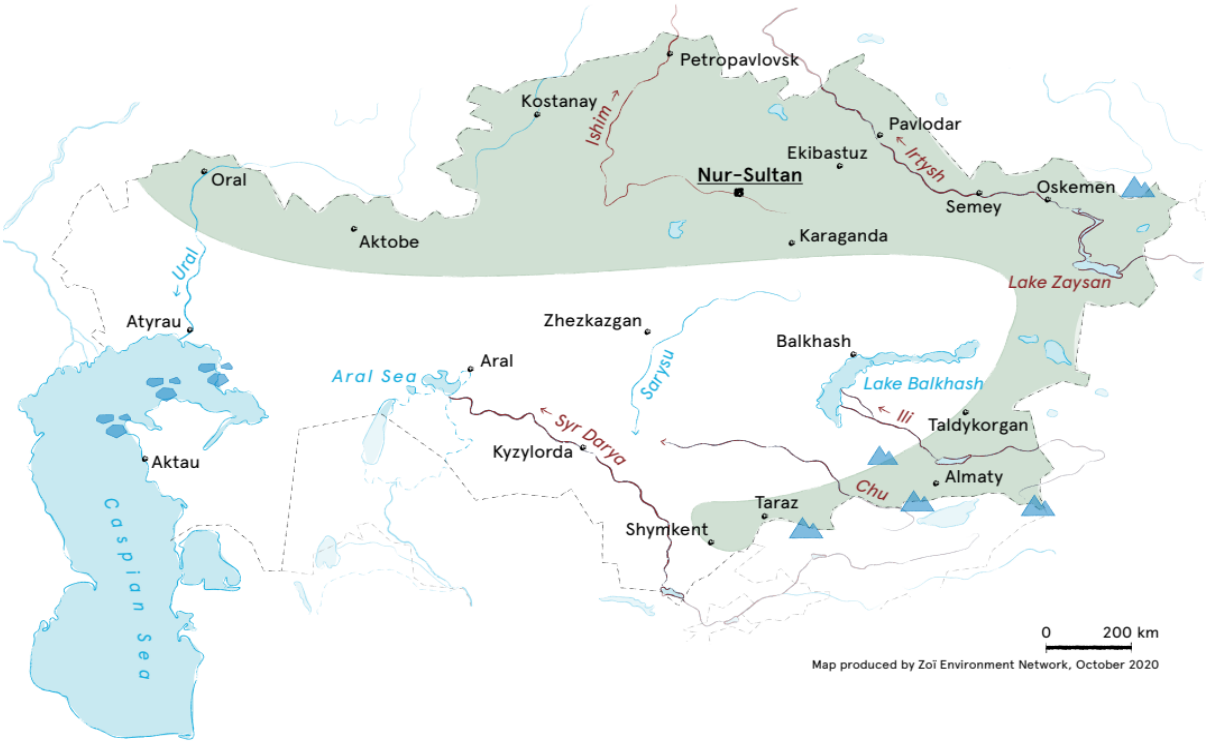
Chapter 5. Country Case Studies

The countries of Central Asia share many of the same challenges and can benefit from aligned solutions found at the intersection of environmental degradation, climate change, and education. Country case studies linked to intern team learning and experiences highlight different aspects of those shared conditions and offer an opportunity to explore targeted approaches and policy recommendations. Sharing information, building stakeholder networks, and collaborating especially on cross-border solutions is essential and under way.

Photo Credit: Gulomjon Umirzakov

5.1 Kazakhstan: Supporting Economic Opportunities for Youth Through Climate Entrepreneurship

Map 3. Environmental challenges in Kazakhstan



Climate impacts

- Rivers with intense cross-border water use and increased stress from climatic and hydrological changes
- Major food producing and populated areas: risk of extreme weather impact on people and food security
- Caspian Sea: risk of flooding due to sea level fluctuation and changes in winter ice cover
- Mountain hazards, reduction of ice cover and risk of glacial lakes outburst floods

Source: Bubenko, Zhakenova, and Novikov 2020.

Country spotlight: Youth social entrepreneurship—ensuring the economic well-being of young people through tackling environmental and climate change issues.

Youth in Kazakhstan are under-equipped to address climate change adaptation and environmental degradation through entrepreneurship. Inconsistent engagement by government agencies, outdated and under-resourced education and targeted funding, low stakeholder collaboration, limited access to decision-making forums, and high unemployment, among other variables (Abibulloeva and Mukhtar 2024), affect young people's capacity and motivation to pursue climate-centered entrepreneurship. In short, a lack of training programs with sufficient funding coupled with the need for youth to have stable income may outweigh the desire to take action on environmental issues.

Kazakhstan's state policies, institutional frameworks, and government programs provide a strong foundation for the growth of youth entrepreneurship (UNESCO 2021). The Kazakhstan Strategy 2050 (Republic of Kazakhstan 2012), established in 2012, emphasizes education, economic opportunity, tolerance, and well-being. Other government investments in youth include the NEET Youth Employment and Socialization Road Map, addressing the needs of marginalized and under-resourced young people; state-funded youth resource centers operating in both rural and urban areas; and the 'Year of Youth' in 2019 that modeled a comprehensive approach to youth development, including science and digital innovation. While not specific to youth, a social entrepreneurship law established in 2022 provides tax incentives and access to financing and technical support to entrepreneurs who address social and environmental issues and employ disadvantaged persons.

Connecting youth entrepreneurship education to landscape resilience and climate adaptation equips young people with the skills and networks to create innovative solutions and contribute to more resilient, sustainable communities. In turn, this expands their potential for innovation and social impact. Internships, entry-level jobs, and research projects are potential entry points for young adult learners who require hands-on experience and effectively contribute to and benefit from these initiatives.

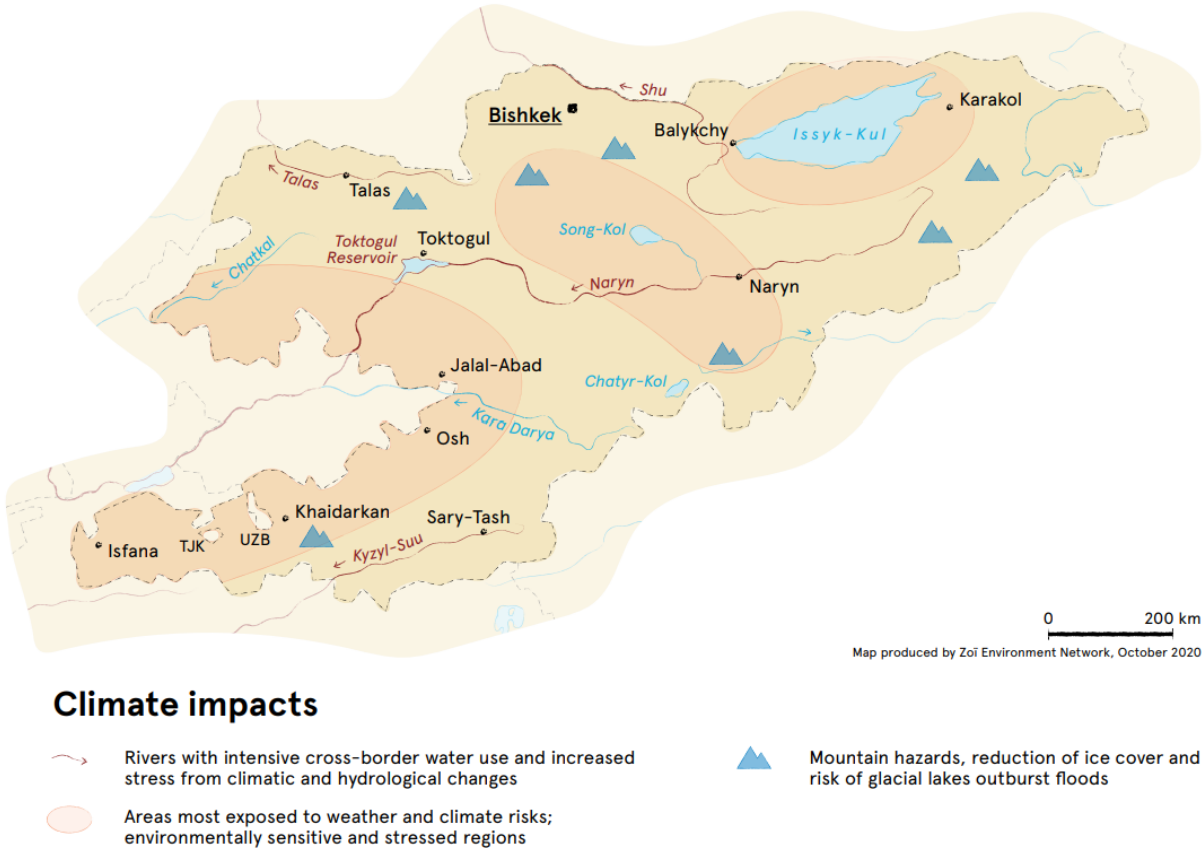
Policy Recommendations

- **Implement entrepreneurship training programs tailored specifically for young individuals,** emphasizing entrepreneurial mindsets, business skills, social responsibility, and environmental consciousness. By providing practical training and mentorship, youth can be equipped to initiate and lead sustainable ventures. Specific skills include public speaking, critical thinking and analysis, communication and teamwork, and facilitation.
- **Integrate landscape resilience and climate change education into existing youth entrepreneurship programs.** Instill a sense of responsibility and encourage the development of eco-friendly business ideas. Integrating landscape resilience and climate change education into existing youth entrepreneurship initiatives will further encourage environmentally conscious endeavors.
- **Foster village and rural school networks for collaborative action**. Youth and teachers are eager to exchange perspectives, ideas, and plans related to urgent infrastructure, economic, and environmental challenges such as water resource depletion and contamination. Formalizing these ties enables information sharing, collaborative advocacy, and joint application fundraising and financing.
- **Support private innovation ecosystem growth through the establishment of innovation hubs, technology parks, and start-up incubators.** Collaboration among relevant government agencies, NGOs, higher education, and the private sector creates a unified effort toward empowering youth and promoting sustainable livelihood options.

> "The best part of the event was the active participation of the students who were involved. The spark that they had in their eyes helped us to make the conference go smoothly . . . They were interested in how they might be able to solve local issues related to climate change. Moreover, I liked very much the way that we were able to show the local issues and adopted versions of the solutions. I guess, we managed to show why adapting to climate change with the help of new skills is helpful. It was noticeable that they intend to continue working on their projects even after the end of the conference, which confirms that the work done was not in vain."
>
> *Coordinator, Nazarbayev University*

5.2 Kyrgyz Republic: Building Youth Climate Action 'Ecosystems'

Map 4. Environmental challenges in the Kyrgyz Republic



Source: Bubenko, Zhakenova, and Novikov 2020.

Country spotlight: Build ecosystems among universities, schools, civil society organizations, and the private sector that engage, support, and invest in youth capacity for sustainable climate solutions.

The challenges facing the Kyrgyz Republic are multifaceted, encompassing issues such as unsustainable youth livelihoods, landscape resilience, climate change mitigation, and education improvement. These interconnected challenges require a comprehensive and inclusive approach with government, civil society, higher education, the for-profit sector, local communities, and youth stakeholders engaged in sustained networks. The Mountain Partnership, a UN voluntary alliance among mountainous countries worldwide, and the affiliated Mountain Partnership Central Asia Hub develop climate adaptation strategies with diverse stakeholders at national and local levels.

A lack of community-driven, locally relevant solutions to climate change and environmental challenges affects progress and undermines sustainability. To enhance landscape resilience and climate change mitigation, without risking further degradation of natural resources, agricultural production, and rural livelihoods, the people who are most directly affected must be core to the design, implementation, and monitoring of solutions. Involvement of the 'next generation' in such efforts ensures the transfer of indigenous knowledge, integration of technology, and development of leadership capacity. Multi-stakeholder and multi-generational ownership of the challenges and the solutions drives and sustains change.

"To address this predicament and contribute positively to the environment, it is imperative that we implement a comprehensive recycling and waste sorting system in our village. Such an initiative would not only alleviate the immediate problem of inadequate rubbish disposal but also promote sustainable practices that can benefit our community and the planet in the long term. By establishing recycling bins and educational programs, we can significantly reduce our environmental impact and mitigate our contribution to climate change."

Teacher, Naryn, Kyrgyz Republic

Integrating formal and informal education into collaborative, networked approaches bolsters both climate resilience and sustainable livelihood options for youth. Limited employability and entrepreneurship skills among Kyrgyz youth leads to challenges in finding sustainable livelihoods. The mismatch between educational offerings and market demand exacerbates this issue, with an oversupply of graduates in certain fields and a lack of practical skills required by local industries. Outdated curriculum, pedagogy, and infrastructure hinders students' preparedness for the modern economy. Additionally, there is a lack of emphasis on developing practical skills and competencies needed for entrepreneurship and environmental stewardship. By addressing these issues, young people can become active participants in efforts to protect their local environment and mitigate the impacts of climate change while also developing the skills needed to create sustainable businesses and livelihoods.

Government structures and systems, including primary to tertiary education as well as youth development organizations and employment training centers, are a critical foundation for leveraging younger generations for a peaceful, inclusive, and green economy. NGOs, associations, and CBOs offer essential services, generate information, raise awareness, and offer opportunities for engagement and advocacy. Also critical to the youth ecosystem are private sector actors, from SMEs and farmers to industry and financial investors.

Policy Recommendations

- **Revise training structure and promote private sector cooperation:** To address youth unemployment, the government should revise educational programs to align with market demand, emphasizing vocational training and practical skills. Closer collaboration with the private sector can facilitate internships and on-the-job training, bridging the gap between education and industry needs.
- **Community-driven climate change solutions:** Implement a participatory approach to develop locally relevant solutions for climate change mitigation. This involves engaging key stakeholders, including local communities, NGOs, and government agencies, in identifying and implementing strategies such as agroforestry, sustainable water management, and renewable energy initiatives.
- **Integrate entrepreneurship and environmental education:** Enhance the education system by integrating entrepreneurship and environmental education into the curriculum. This involves collaborating with educational institutions to offer courses that develop entrepreneurial skills and environmental awareness. Furthermore, promoting information technology use in teaching can modernize the learning process and improve access to information for both students and teachers.
- **Improve quality of school education:** Implement specific, measurable, achievable, relevant, and time-bound (SMART) goals to measure and improve the quality of education, focusing on measurability, significance, concreteness, feasibility, and achievability. Provide training for teachers to utilize internet resources effectively and update curriculum to emphasize competency-based learning. Additionally, ensure sufficient technology and resources are available in schools to support digital literacy and self-study among students.

"This event served as a source of motivation for the students, inspiring them to independently explore and boost their self-assurance. If the event spanned over a longer duration than just a few days, it would allow for a more extensive and in-depth learning experience."

Principal, Naryn, Kyrgyz Republic

"The LAUNCHPAD event . . . served as a pivotal gathering, bringing together participants from the villages of Zherge-Tal, Orto-Nura, Dobolu, and Min-Bulak in the Naryn region . . . Throughout the event, a wealth of knowledge and enthusiasm converged, fostering collaborative discussions on crucial ecological matters. [T]he event achieved significant success, notably in promoting shared dedication to environmental resilience . . ."

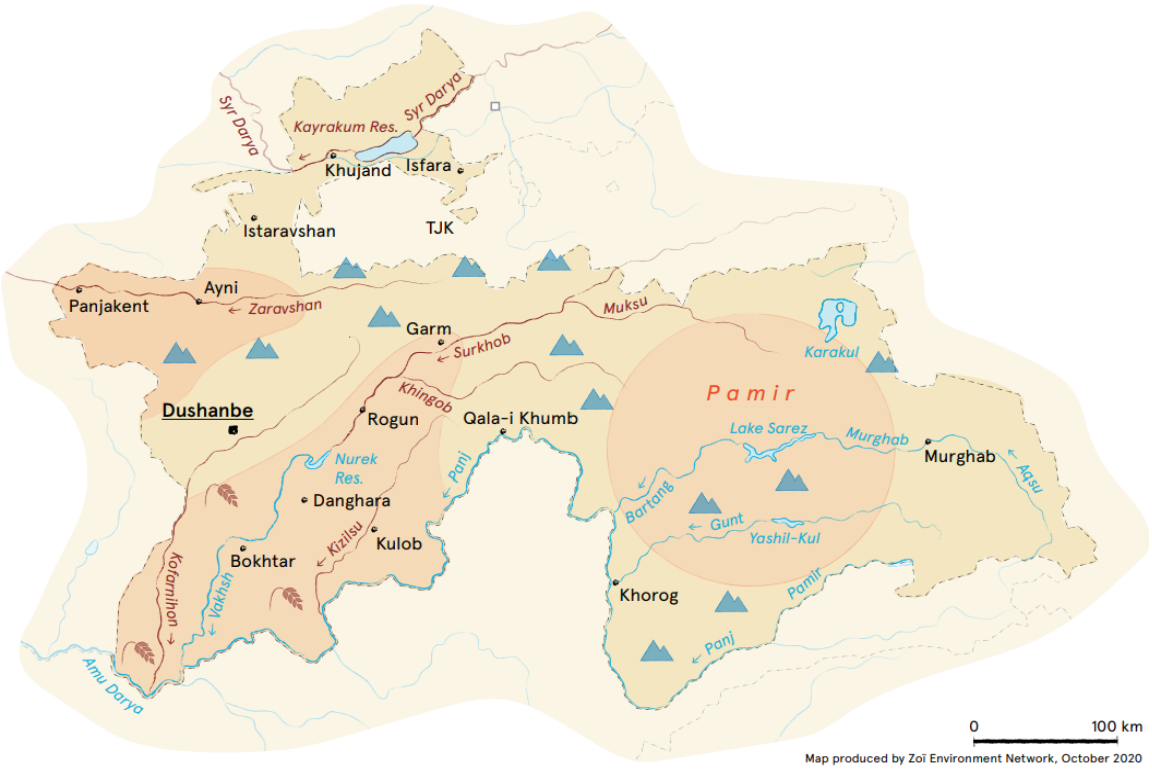
Coordinator, UCA/Naryn

"The school takes great pride in its students and firmly believes that through their participation in the workshop, they can make a positive impact not only within the school community but also among the villagers, the entire country, and even beyond. The initiatives undertaken by the school, such as the cultivation of plants and waste sorting, demonstrate their commitment to environmental sustainability and their aspirations for a better future."

Coordinator, UCA/Naryn

5.3 Tajikistan: Modernizing the Education System and Infrastructure

Map 5. Environmental challenges in Tajikistan



Source: Bubenko, Zhakenova, and Novikov 2020.

Country spotlight: Education infrastructure—Invest in schools and modernize teaching and learning to meet the needs of current and future generations.

In Tajikistan—the poorest and most mountainous country in the Central Asia—rural communities and mountain landscapes are particularly vulnerable to climate change impacts. Converging conditions that impede efforts to reduce poverty in rural communities include a generally arid climate, ill-adapted agricultural practices, deforestation, extractive industries, insufficient

transportation infrastructure, lack of employment opportunities, limited risk management capacity, and under-resourced schools. Climate change exacerbates the challenges with extreme weather events leading to flash flooding and mudslides that devastate remote communities and block roads, leading to markets and employment centers. Inconsistent rainfall, higher temperatures, and diminishing glacial runoff affect crop and animal health, diminishing agricultural productivity.

The educational infrastructure in Tajikistan, particularly in rural and remote areas, struggles under outdated curricula and pedagogy, insufficient teacher training and compensation, marginal school facilities, inadequate equipment and supplies, and oftentimes nonexistent modern technology. Conditions observed by the intern team include teachers needing to work in cotton fields alongside their pupils to supplement their salaries, traditional teaching methods based on memorization, teachers and students lacking experience in collaborative learning involving group work and projects, and few if any extracurricular activities or externally provided supplemental workshops. A shortage of teachers in some schools, especially with math and science training, clearly affected student knowledge of the climate and environment; in one school visited, students had no knowledge of glaciers and their formation.

Government efforts to improve conditions and raise environmental awareness are a critical starting point yet require more attention to climate change. A long-standing legal framework for environmental education, comprehensive public education programs, teacher training, research and monitoring, youth development organizations, learning resources, and public awareness campaigns are a solid foundation. In the region where the pilot was implemented, the 'State program on behavioral development and environmental awareness of the population of Khatlon region for the years 2021-2025' exemplifies government investment.

In 2023, the World Bank approved US$50 million in grant financing for Tajikistan from the International Development Association (IDA) for Learning Environment – Foundation of Quality Education in Tajikistan Project.[11] The project aims to enhance the quality of secondary teaching and learning through a revised national education framework, enhanced systems to improve learning outcomes, modernized schools and more resilient learning environments, and expanded capacity for assessing learning and overall progress (World Bank 2023a). The outcomes and recommendations from the RESILAND CA rural schools initiative fully align with this wide-reaching and promising investment.

Policy Recommendations

- **Invest in foundational and modernized educational infrastructure**, from sufficient and safe school buildings to technology-enhanced classrooms, laboratories, and libraries.
- **Implement continuous teacher professional development**, focusing on globally recognized impactful pedagogies, with an emphasis on student-centered, competency-based, experiential, project-based, and solutions-oriented approaches.
- **Update curricula to include learning focused on local and global real-world relevance** to enhance local livelihoods, improve employability, and develop job-generating entrepreneurship through a focus on critical thinking, problem-solving, collaboration, creativity, and digital literacy.
- **Create enabling conditions for sustained regional and international partnerships** at secondary and higher education levels for resource sharing, joint research initiatives, faculty exchange programs, and school-to-school engagement.
- **Conduct public awareness campaigns** to highlight the importance of proposed policy initiatives, build public buy-in, and encourage community participation where possible.

> "I think that this issue is pretty concerning, because the school is located in a dangerous location. There is high probability of floods and rock falls."
>
> *Principal Khatlon Region, Tajikistan*

[11] https://projects.worldbank.org/en/projects-operations/project-detail/P177475.

"Schools play a very important role in solving these issues. The topics that will be covered in school, will certainly be discussed at home with parents further."

Principal, Khatlon Region, Tajikistan

5.4 Uzbekistan: Activating Universities to Leverage the Potential of Youth

Map 6. Environmental challenges in Uzbekistan

Climate impacts

- Rivers with intense water use and increased stress from climatic and hydrological changes
- Impact of regional climate change and dust storms due to shrinkage of the Aral Sea
- Increased risk of climate-related hazards in the mountains and impacts on populated areas and infrastructure
- Densely populated and agriculturally important areas with increased environmental stress and projected impacts of climate change
- Mountain hazards, reduction of ice cover and risk of glacial lakes outburst floods

Source: Bubenko, Zhakenova, and Novikov 2020.

Country spotlight: The importance of HEIs in climate-centered youth entrepreneurship, a green economy, and creation of multi-stakeholder youth support 'ecosystems'.

The 'youth bulge' of Uzbekistan, at 60 percent of the population under 30 years old, is an unprecedented opportunity for the country to respond to the green growth imperative (UNICEF). With a high youth unemployment rate at 13.83 percent (2022) for ages 15–24 years (Statista 2024)[12] and a mismatch between education and skills required in the job market, the need to activate alternative approaches to traditional industries and employment strategies is evident. At the same time, many young people want to actively participate in decisions affecting their lives and contribute to actions that improve the well-being of their community (mahalla), yet oftentimes feel excluded with their voices not valued or trusted by the older generations (UNICEF 2020). Likewise, youth seek opportunities to start small businesses or initiate innovations in their communities but have limited access to skills training, investment capital or loans, social capital networks, and sufficient consumer markets.

[12] The youth unemployment rate refers to the share of the economically active population ages 15–24 years currently without work but in search of employment. The youth unemployment rate does not include economically inactive persons such as the long-term unemployed or full-time students.

HEIs leveraging their human, intellectual, and facilities resources are the lynchpin for 'green' youth ecosystems. Universities, sector-specific colleges (for example, forestry schools), and specialized research academies that collaborate across rural-urban, industry sectors, and research expertise raise the prospects of multisectoral, integrated innovation advancements. Such university-led collaborations that extend to secondary and vocational education systems, civil society, and the private sector further open up opportunities for youth.

> "Our pupils were especially interested in this project. Their horizons have changed. They began to take climate change seriously. They thought about the changes happening in the area where they live. They intend to continue the project and to be involved in the project themselves."
>
> *Teacher, Samarkand Region, Uzbekistan*
>
> "The fact that Launchpad was held at the Charvoq educational field practice base [of the National University of Uzbekistan] made it possible to study natural landscapes."
>
> *Teacher, Jizzakh Region, Uzbekistan*

Policy Recommendations

- **Strengthen university-industry partnerships:** Facilitate and incentivize collaborations between HEIs and industries, particularly in green technology and sustainable practices. This can be achieved through grants, tax breaks, and shared research initiatives, which would align academic programs with market needs and create pathways for youth to gain relevant skills and employment opportunities in emerging green sectors.
- **Enhance vocational and technical education:** Develop and expand vocational and technical education programs focused on green economy skills, such as renewable energy, sustainable agriculture, and environmental management. This includes integrating climate-centered entrepreneurship modules into curricula and providing hands-on training through apprenticeships and internships with green businesses and organizations.
- **Establish youth innovation hubs:** Create innovation hubs and incubators within universities and technical colleges dedicated to supporting youth-led start-ups and social enterprises in the green economy. These hubs should offer access to mentorship, business development services, seed funding, and networking opportunities, fostering an environment where young entrepreneurs can thrive and contribute to sustainable community development.
- **Promote inclusive youth participation:** Implement policies that ensure meaningful youth participation in decision-making processes at local, regional, and national levels. Establish youth advisory councils, forums, and platforms that give young people a voice in the development and implementation of green growth policies and initiatives. Encourage intergenerational dialogue to bridge the gap between young people and older generations, fostering mutual trust and collaboration.
- **Expand access to financial resources:** Improve access to financial resources for young entrepreneurs by creating youth-targeted loan programs, microfinance schemes, and investment funds. Partner with banks and financial institutions to develop financial products tailored to the needs of young people starting green businesses. Additionally, offer financial literacy training to equip youth with the knowledge to manage and grow their enterprises effectively.

5.5 From the Outside Looking In – Exploring International Success Stories

Countries facing social and political volatility that have successfully developed multisector networks linking education and climate action offer valuable lessons for Central Asia. The following initiatives demonstrate the effectiveness of collaborative networks in addressing climate change through education and youth programs:

Armenia - In 2020, United Nations Children's Fund (UNICEF) Armenia, with funding from the Austrian Development Agency, rolled out 'Adolescents for Climate Action in Communities', a comprehensive approach to scaling up climate action through project-based learning in formal and nonformal education and community engagement initiatives (UNICEF 2020).

Belarus - The Ministry of Education and the Ministry of Natural Resources and Environmental Protection are partnering with education institutions, United Nations Development Programme (UNDP), and other international players to establish hundreds of 'green schools', making climate change education an integral and impactful part of the learning experience for students from primary school to university. (Sustainable Development Goals in Belarus 2024; UNDP 2024).

North Macedonia - UPSHIFT is a program tailored to tackle climate change issues at the local level through youth entrepreneurship. Implemented by UNICEF in partnership with the Leaders for Education, Activism and Development Association (LEAD), with financial support from Sweden and the Fund for Innovation and Technological Development (FITD), the program focuses on 13- to 19-year-olds outside the formal education system (UNICEF 2023).

The Africa Higher Education Centers of Excellence (ACE) Impact Project, launched by the World Bank in 2014, fosters collaboration across 17 African countries to strengthen HEIs through applied research and training centers. Focused on STEM,[13] environment, agriculture, social science, education, and health, the project partners with governments, universities, and industries. After success in West and Central Africa, the project expanded to East and Southern Africa in 2018, focusing on sustainability, public health, and technology. The initiative is improving skills development, employability, entrepreneurship, and resilience to climate change, health crises, and economic challenges across the continent. Centers with particular relevance for Central Asia include the following:

The Centre for Dryland Agriculture (CDA);[14] Bayero University, Kano, Nigeria

- 22 ha research and training farm
- Development of a skilled workforce to address drylands development challenges
- Research focused on poverty, agriculture, food security, natural resources, climate change, human conflicts, and migration
- Innovative teaching focused on problem-solving and practical experience
- Academic-industry links both regionally and internationally
- Over 420 MSc and 129 PhD students enrolled; over 2,500 professionals trained
- Extension services to over 20 'adopted communities'.

The Africa Center of Excellence for Waste to Value (ValoPro);[15] Institut National Polytechnique (INP-HB) in Yamoussoukro, Côte d'Ivoire

- Innovation and research on the circular economy to combat climate change
- Reduction in raw material consumption and waste production and promotion of waste recovery in agriculture, agro-industry, household, electronic, electrical, and plastics
- Training pathways for high-skilled and employable workers
- Over 2 ha world-class research facility and a plastic waste recycling plant
- Transfer of technology to communities
- 65 MSc students and 35 PhD students with approximately 50 percent female enrollment; over 170 short-term trainees
- Over 100 publications and more than US$1.4 million in revenue generated.

Sources: ACE Impact Project 2022, 2024.

[13] Science, technology, engineering, and mathematics.
[14] https://cda-buk.edu.ng/.
[15] https://cea-valopro.inphb.ci/.

Chapter 6. Roadmap for an Integrated Approach to Sustainable Youth Climate Entrepreneurship in Central Asia

6.1 Overview

A comprehensive approach is necessary to move the needle toward a sustainable future for Central Asia. Intersecting policy pathways key to this shift are climate change adaptation, education innovation and reform, youth entrepreneurship, and green economy. These pathways aim to enhance youth employability and entrepreneurial capacity, foster community-driven solutions for landscape resilience and climate action, integrate environment and social impact initiatives with education, and modernize education infrastructures and systems. Central Asia countries stand at a critical juncture where the promotion of youth entrepreneurship intersects with the imperatives of education modernization and the transition toward a green economy.

Progress at the local, national, and regional levels, reinforced by collaboration across borders, requires a framework and plan of action based on experience and research. The roadmap (Table 16), summarized in Table 15, is a synthesis of the *Rural Schools* study outcomes, policy recommendations derived from the regional stakeholder workshop and research on integrated multisectoral approaches to regional and global challenges. The *Rural Schools* study provided insights into the potential for intersecting dynamics: barriers and opportunities for youth entrepreneurs ('end users'); mindsets, practices, and systems influencing institutions such as rural schools and universities (stakeholders); and shifting policy landscapes related to environment and climate change adaptation, education modernization, and youth entrepreneurship. Building on the study activities, the stakeholder workshop allowed for synthesis and analysis of outcomes and consideration of policy recommendations. Research into similar and parallel programs or interventions offers exemplars from around the world that illustrate how countries can build on their unique assets and how regional cross-fertilization and integration can reinforce and expand outcomes.

Table 15. Summary roadmap for integrating landscape restoration and education through youth entrepreneurship

Integrate youth entrepreneurship, internships, and science research programs into public and public-private landscape and other environment restoration and green economy initiatives.
Implement entrepreneurship training programs tailored for youth, emphasizing entrepreneurial mindsets, business skills, social responsibility, and environmental consciousness.
Integrate landscape resilience and climate change education into existing youth entrepreneurship programs.
Foster village and rural school networks for collaborative action on urgent challenges.
Support private innovation ecosystem growth through innovation hubs, technology parks, and start-up incubators.

Key stakeholders, most notably ministries of education and environment, can use the framework as a guide for key interventions at multiple levels and within both short- and long-term time frames. A set of strategic impact goals set the stage for national and regional interventions across three pillars: Environment, Education, and Youth Entrepreneurship. Operating within those pillars, or key intervention areas, specific actions, both unilateral and collaborative, are outlined along short- (1–3 years) and long-term (4–6 years) time frames. Local and national actions make up the bulk of the recommendations and may require context-specific adaptations, with regional interventions providing the connectivity for positive interdependence.

6.2 An Integrated Framework for Sustained Change: Local Action, National Reforms, and Regional Collaboration

At the intersection of resilient environments, education modernization, and green economies is the future of youth who have the skills, knowledge, and mindsets necessary to build a sustainable future for Central Asia. As outlined in the roadmap (Table 16), to build a resilient, sustainable future, countries can facilitate, invest in, and build ecosystems based on;

- collaboration among HEIs, schools, and local communities, with support from other key stakeholders;
- education reform that integrates climate change and environmental action with real-world learning; and
- skill development to equip the next generation to take climate and environmental action through entrepreneurship that creates social value and green jobs.

Effective green transformation requires stakeholder collaboration across sectors. The recommendations that emerged from the study emphasize enhancing primary and secondary curricula in climate change science and entrepreneurship; training teachers in project-based learning and other real-world, inquiry-driven, experiential pedagogies; investing in school infrastructure, equipment, and technology to facilitate student engagement in local-to-global learning and action; and fostering multisectoral 'ecosystems' that support climate-centered youth entrepreneurship, including accelerator programs, incubator hubs, and start-up funding that enable educators, scientists, business leaders, and others to fast-track next generation solutions.

Gender equity and technology are critical cross-cutting themes. Gender equity is especially relevant in the Central Asia context where rural women and girls are often living and working at the front lines of environmental impact (collecting firewood, tending family farms, maintaining water supplies, and so on). Investment in technology has to keep pace with global trends in learning and green economic transitions, including AI, smartphones, social media, as well as more traditional technologies such as laptops.

Robust support networks for both youth and rural schools are critical to scaling the model and ensuring the success of youth in impacting their communities. Sustained impact requires stakeholders working together to create the conditions for ecosystems that support youth entrepreneurs with technical support, investments, and mentoring. As the next generation, these youth entrepreneurs will create local green economy jobs, regenerate the landscape upon which their livelihoods depend, and ensure their communities are resilient to the impacts of climate change: receding glaciers, mudslides, deforestation, flooding, drought, and out-migration. Ongoing engagement and targeted investment by ministries of education and environment, universities, NGOs, businesses, and funders will be essential to their success as local changemakers.

Schools can serve as local incubators and innovation hubs, a model that can be scaled even in remote rural areas. Nurturing and empowering young people to become changemakers in their communities is key, and schools can become spaces where young people learn how to identify, test, and launch solutions to the environmental impacts of climate change. Peer-to-peer learning approaches that are supported by universities and NGOs can provide extracurricular programs to rural schools as national curriculum reforms are put into place. Entrepreneurship skill-building, which also improves workforce readiness, includes youth engagement in citizen research, volunteering, professional internships, and entrepreneurial ventures. Examples of community engagement include the following:

- Students from local schools work with scientists in protected areas to collect data on flora and fauna species, water quality, forest cover, and so on.
- Small farmer agricultural projects raise start-up funding for value-add product development and market access for youth entrepreneurs.

- Rural schools engage in education and income-generating initiatives, such as greenhouses, production of nutritious foods, tree planting, recyclables collection, and materials repurposing .

Teacher shortages in Central Asia can be mitigated in the short term, in part, through enhancements provided by peer-to-peer programs. The hands-on experience in the classroom through such extracurricular programs also provides university students positive exposure to the teaching profession and the potential for having an impact on their communities. Countries may seek to establish post-university teaching programs to build pipelines and elevate the profession.

Universities, as regional anchor institutions, are critical to establishing sustainable initiatives in rural schools and communities. Universities can contribute to enhancing local, national, and regional capacities to address climate change and build resilient communities by focusing on priority needs including enhancing education in rural schools; expanding rural youth entrepreneurship and green economy capacities; expanding access to higher education, engaging in teacher professional development; and building climate, environment, and social science research capacity. Shifts in education priorities at the national level to include climate change awareness, environmental science, and entrepreneurship open up these opportunities for impact.

Advancing integrated multisector approaches that are based on regional networks and cross-boundary relationship building among youth is foundational for a peaceful future. Collaboration around water supply sharing and management, land and forest restoration and sustainability, and other forms of climate mitigation and adaptation is critical today and in the years ahead as climate change accelerates and economies must respond. Environmental, economic, and education cooperation rests on the interconnectedness of the next generation of leaders and citizens who know, respect, and care for each other.

6.3 A Circular Climate Change-Education-Youth Entrepreneurship Model

The model presented in this study allows for gaps to be filled while current policies and investments move forward, and government initiatives gain momentum. Gaps that can be bridged include employment, especially green economy jobs, for youth; teacher training in globally recognized innovative pedagogies for both secondary and tertiary faculty; education-industry alignment; preparation of secondary students for higher education; HEI funding and opportunities to conduct climate-related research; and regionalization of higher education. Additional areas where the model contributes include regional collaboration and building entrepreneurial culture.

Circular education emphasizes a symbiotic relationship between universities, schools, communities, and government, fostering a dynamic environment for environmental education and sustainability initiatives. Universities and communities engage in a rich exchange of knowledge and resources, with universities bringing their research capabilities to bear on community projects, from local conservation efforts to environmental health initiatives. These projects not only offer practical learning experiences for students but also enable communities to benefit from cutting-edge research. Through public lectures and workshops, universities disseminate their findings, educating both the academic and local community members on pressing environmental issues.

6.4 Conclusion

Schools play a crucial role in extending education and outreach into communities. As public assets in even remote areas, schools are essential and often underutilized as spaces for community workshops and training sessions on climate crisis awareness, landscape and water resource restoration, and environmental conservation. Service-learning projects can bridge the gap between theoretical knowledge and practical application, allowing students to engage directly with community-based and broader regional initiatives. A hands-on approach not only enriches the educational experience but also fosters a sense of civic responsibility in young people and demonstrates to older generations the impact youth can have today.

Governments recognize the value of collaboration across sectors, acting as facilitator and supporter of these interconnected efforts. Through policy development, funding, and resources, governments create the conditions for the growth of these initiatives. Youth participation on community advisory councils and other participation mechanisms allow for feedback loops from universities, schools, and communities to the government, ensuring that environmental policies remain responsive and informed by on-the-ground experiences. This collaborative model highlights the potential for circular education to significantly affect both local and wider environmental policy and practice, illustrating a forward-thinking approach to sustainability education.

Extracurricular learning in underutilized rural schools can become an essential bridge for today's youth as national curriculum reforms are implemented. Extracurricular programs that can be eventually absorbed into regular curricula which promote climate change awareness and activate youth entrepreneurship require additional resources and innovative partnerships to sustain impactful learning. Rural schools are key assets for sustainable and equitable development of local communities that require consistent, relevant, and innovative support and investment.

HEIs leveraging their human, intellectual, and facilities resources are the lynchpin for 'green' youth entrepreneurship ecosystems. Universities, sector-specific colleges (for example, forestry schools), and specialized research academies that collaborate across rural-urban, industry sectors, and research expertise raise the prospects of multisectoral, integrated innovation advancements. Such university-led collaborations that extend to secondary and vocational education systems, civil society, and the private sector further open opportunities for youth to become change agents in their communities, their countries, and across the region.

Table 16. Roadmap for an Integrated Approach to Sustainable Youth Climate Entrepreneurship in Central Asia

<table>
<tr><td colspan="3">Impact Goals

● Climate change, its sources and impacts, and opportunities for local mitigation and adaptation are broadly understood by rural youth and adults.
● Border areas of Central Asia are regenerated, resilient environments that are highly adaptable to the impacts of climate change.
● Rural schools are well-resourced community hubs staffed with educators trained in place-based, student-centered learning; schools have impactful public-private partnerships with local and regional climate/environment initiatives that are integrated into curriculum and programs.
● HEIs are centers of innovation, contributing to local, national, and regional climate adaptation and sustainable development in collaboration with government, private sector, and civil society.
● ‘Green’ or regenerative economies provide local, sustainable livelihoods linked to the unique assets of rural areas; youth entrepreneurs operate in this environment, employing other youth.
● Youth have a strong sense of agency, purpose, and opportunity; they choose to stay in—or return to—their communities to improve the environment, build resilience to extremism, and strengthen local economies.
● Rural communities are resilient, supporting empowered youth who are prepared to mitigate climate change, economic transitions, and social extremism.</td></tr>
<tr><td colspan="3">Recommendations for Key Interventions</td></tr>
<tr><td></td><td>Short term
(1–3 years)</td><td>Long term
(4–6 years)</td></tr>
<tr><td colspan="3">Pillar 1: Environment
(Ministries of environment, ecology, climate change, natural resources, water resources, and so on)</td></tr>
<tr><td>National</td><td>➢ Conduct public awareness campaigns via radio, TV, and social media on climate change, its impacts, and local solutions to highlight the importance of proposed policy initiatives, build public buy-in, and encourage community participation by children, youth, and adults.

➢ Pilot green skill-building programs for youth at environmental and climate change related local, oblast, and national level projects in regenerative agriculture, protected areas, wildlife conservation, soil erosion, water conservation, and so on.</td><td>➢ In collaboration with ministries of education, develop programs for elementary and secondary schools linked to environmental, climate change, and related national initiatives; engage teachers from areas where initiatives are located in the design and training process.

➢ Invest in and launch green skill-building programs to enhance youth workforce readiness: citizen science projects, professional internships, and hands-on training in sustainable practices.</td></tr>
</table>

	➢ Establish mandates that environmental and climate change initiatives include educational components for rural schools and green skill-building for youth. ➢ Require that town/municipality, oblast, and national-level advisory boards for environment and climate concerns include local youth representatives; ensure gender balance in all representation.	➢ Establish inclusive policies that actively involve youth in decision-making processes related to green growth and sustainable development, including youth advisory councils and forums on environmental policies. ➢ Integrate youth programs that focus on awareness-raising and green skills building into public projects in renewable energy, sustainable agriculture, protected areas, environmental management, and so on. ➢ Incentivize the private and civil society sectors to develop apprenticeships and internships for youth in green industries and organizations working on sustainability, climate change, and resilience communities.
Regional	➢ Implement regional strategies in areas of agroforestry, sustainable water management, ecotourism, and renewable energy initiatives.	➢ Collaborate on regional public awareness campaigns via radio, TV, and social media climate change, its impacts, and local solutions to natural resource restoration and resilience, to generate common understanding, cooperation, and cross-border goodwill.
Pillar 2: Education (Ministries of education and science, primary and secondary school, higher education, innovation)		
National	**Primary Education** ➢ Incorporate climate change science and environmental studies into national curricula. ➢ Integrate financial literacy into primary math, social studies, and other relevant subjects to build a foundation for entrepreneurship. ➢ Fund extracurricular programs for under-resourced rural schools in environmental 'hot spot' regions, focusing on climate change curriculum enhancement and teacher training in student-centered, experiential pedagogies. **Secondary Education**	**Primary Education** ➢ Integrate entrepreneurship education into the K-12 curriculum, starting with foundational 21st-century skills in early elementary. ➢ Update curricula to focus on real-world relevance, enhancing critical thinking, problem-solving, collaboration, creativity, and digital literacy. ➢ Upgrade water supply, sanitation, and hygiene (WASH) facilities using sustainable greywater recycling systems to improve health and learning conditions. **Secondary Education**

	➢ Integrate entrepreneurship, human-centered design (HCD), and project-based learning methodologies into the national curriculum. ➢ Establish formal rural school networks to promote shared learning, joint fundraising, and collaborative advocacy on climate and infrastructure challenges. ➢ Reform teacher training to include climate change science, climate adaptation strategies, place-based learning, and experiential pedagogies, with a focus on teaching in rural areas. ➢ Increase IT resources in rural schools, including internet connectivity and laptops for students through international partnerships. ➢ Integrate financial literacy into secondary math, social studies, and other curricula to enhance entrepreneurship skills. **Tertiary Education** ➢ Incentivize higher education institutions (HEIs), including universities and technical colleges, to form partnerships with secondary and vocational schools, private sector entities, and civil society for research and development projects addressing real-world environmental challenges. ➢ Identify and support HEIs to collaborate with demonstration schools to design, build, and implement innovation labs and accelerator programs. ➢ Establish interdisciplinary, hands-on learning opportunities in teacher continuing education programs in partnership with NGOs, the private sector, and extracurricular initiatives for pupils. **Cross-Level Initiatives** ➢ Establish demonstration 'green schools' for climate-based entrepreneurship innovation labs and accelerator programs in key environmentally vulnerable oblasts, in collaboration with HEIs, NGOs, and green industries. ➢ Allocate funding for constructing and retrofitting school buildings to withstand extreme weather conditions, with green	➢ Expand entrepreneurship education with internships, apprenticeships, venture start-ups, and other experiential learning opportunities. ➢ Invest in science labs, maker spaces, and entrepreneurship incubators in rural schools located in environmental "hot spot" regions. ➢ Install renewable energy sources, such as solar panels, in rural schools for stable and sustainable energy. ➢ Reform vocational and technical education (TVET) to align with green economy demands, updating curricula with green technologies and practices and fostering industry-TVET links. **Tertiary Education** ➢ Establish centers of excellence in sustainable industries to prepare students for green jobs and promote innovation. ➢ Foster partnerships between TVET institutions, the private sector, and civil society to ensure training aligns with market needs. **Cross-Level Initiatives** ➢ Invest in modernized educational infrastructure, including safe school buildings, technology-enhanced classrooms, labs, and libraries. ➢ Expand internet access and invest in educational technology to enable virtual learning in rural areas. ➢ Implement continuous teacher professional development, emphasizing globally recognized student-centered, experiential, and project-based pedagogies.

	building standards emphasizing energy efficiency and sustainable materials. ➢ Develop curricula linked to climate-resilient construction and school renovation projects. ➢ Increase teacher capacity for using IT in teaching methods, enhancing digital literacy across all education levels.	
Regional	**Secondary and Higher Education** ➢ Enable sustained regional and international cooperation through resource sharing, joint research initiatives, faculty exchange programs, and school-to-school engagement to strengthen educational quality and foster global expertise. **Cross-Level Initiatives** ➢ Collaborate with the private sector to align education programs and curricula with green market demands by incorporating vocational training, skills development, and on-the-job training opportunities.	**Primary and Secondary Education** ➢ Establish a national and regional network of model rural schools for knowledge sharing, professional development, and funding to enhance educational quality and collaboration in rural areas. **Tertiary Education** ➢ Incentivize national and private higher education institutions (HEIs) to collaborate with smaller, oblast-level HEIs (e.g., schools of forestry, hydrology, and education; continuing education centers) to improve rural students' access to higher education. ➢ Create mechanisms to incentivize undergraduate students to pursue master's and PhD tracks in priority fields such as climate and environmental sciences, sustainability, regenerative economics, business, and entrepreneurship in their home or neighboring countries. **Cross-Level Initiatives** ➢ Fund university student cross-border exchanges (short and long term) and participation in regional conferences to foster collaboration and regional expertise in climate resilience and sustainable development.

Pillar 3: Youth Entrepreneurship (Ministries of youth development, economy, employment, poverty reduction, and education)		
National	Integrate comprehensively youth entrepreneurship into national development strategies. Adapt and optimize the business environment—national development strategies, policies, regulations, and practices—to be friendly and accessible to youth entrepreneurs. Develop financial support mechanisms and products, such as low-interest loans, grants, and investment funds, specifically targeted at young entrepreneurs in green industries. Ensure financial systems and services targeting rural youth entrepreneurs include information tailored to a young demographic, appropriate training and trainers (for example, women trainers), and accessible support mechanisms. Establish policies to ensure financial support mechanisms are known, available, and distributed equitably by geography (with an emphasis on remote rural border areas), gender, and ethnicity. Integrate landscape resilience and climate change education into existing youth entrepreneurship programs. Support public-private funding mechanisms for innovation hubs, technology parks, and start-up incubators that are accessible to rural youth, in particular at rural schools, secondary schools, and HEIs. Incentivize HEI-industry partnerships, particularly in green technology and sustainable practices through grants, tax breaks, and shared research initiatives, aligning academic programs with market needs, creating pathways for youth employment in emerging green sectors.	Develop national innovation and support systems for entrepreneurs prioritizing engagement of rural youth, young women, youth with disabilities, and other marginalized youth. Create youth innovation hubs and incubators within universities and technical colleges dedicated to supporting youth-led start-ups and social enterprises in the green economy, offering access to mentorship, business development services, seed funding, and networking opportunities. Link youth entrepreneurship—and hubs in rural schools—with university-based innovation hubs, technoparks, and incubators for mentorship, experiential learning, and venture growth. National multi-stakeholder ecosystems actively support youth climate entrepreneurship through on-site training, mentoring, technical support, and financial investment. Improve access to financial resources for young entrepreneurs by creating youth-targeted loan programs, microfinance schemes, and investment funds. Partner with banks and financial institutions to develop financial products tailored to the needs of young people starting green businesses. Offer financial literacy training to equip youth with the knowledge to manage and grow their enterprises effectively. Provide public-private-civil society mentorship that equips youth to initiate and lead sustainable ventures, building soft skills key to

	Implement policies that ensure meaningful youth participation in green growth decision-making at local, regional, and national levels through youth advisory councils, national and regional forums, and online platforms. Create policy conditions for youth-led enterprises (for- and non-profit) to employ other youth, improving local environmental conditions and contributing to rural economies. Implement entrepreneurship training programs through HEIs, community-based continuing education centers, NGOs, and other stakeholders tailored specifically for young individuals; focus training on entrepreneurial mindset, business skills, social responsibility, and environmental consciousness.	entrepreneurship: public speaking, critical thinking and analysis, communication, teamwork, and facilitation. Establish certification courses and virtual 'badges' in key areas of the green economy, such as energy efficiency, waste management, and eco-friendly technologies, designed to meet industry standards and enhance the employability of young people who are not accessing higher education. Provide access to laboratories, makerspaces, and other facilities where youth can experiment with and develop green technologies, including materials, equipment, and expert advice to foster innovation and entrepreneurship. Develop systems to assess financial services and products that target young entrepreneurs to mitigate unlawful and unethical behavior; establish timely and appropriate communications and warnings of associated risks through social media.
Regional	Establish a regional association of multi-stakeholder ecosystems formed to support youth entrepreneurs, improve education, and generate integrated cross-border impact. Engage rural youth leaders routinely in local, national, and regional education and environment/climate change policy development processes through multilateral and civil society mechanisms such as the Regional Environmental Center for Central Asia (CAREC) and the UN.	Through a regional HEI alliance, offer climate/environment entrepreneurship training and accelerator programs, conferences, and policy dialogues that focus on regional issues and cross-border solutions. Collaborate across borders to develop a regional innovation system that leverages the priority organizations and technologies of each country.

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Appendices

Appendix 1: Key challenges and opportunities: Climate and environment

Key Challenges	Key Opportunities
Integrated resource management: Addressing environmental challenges requires integrated approaches to land and water management, encompassing sustainable land use practices, improved water governance, and pollution control measures. However, institutional fragmentation and inadequate coordination hinder effective resource management across sectors and jurisdictions.	**Regional cooperation:** Strengthening regional cooperation and collaboration among Central Asian countries is critical for addressing transboundary environmental challenges and promoting shared solutions. Platforms for dialogue, knowledge exchange, and joint initiatives can facilitate the alignment of policies, investments, and actions toward common goals.
Socioeconomic vulnerability: Vulnerable communities, particularly rural populations dependent on natural resources for their livelihoods, are disproportionately affected by environmental degradation and climate change impacts. Limited access to basic services, inadequate infrastructure, and socioeconomic disparities exacerbate vulnerabilities, impeding efforts to build resilience.	**Green growth strategies:** Investing in green growth strategies and sustainable development pathways can unlock opportunities for economic diversification, job creation, and poverty reduction while safeguarding environmental resources. Promoting renewable energy, sustainable agriculture, ecotourism, and green infrastructure can enhance resilience and contribute to inclusive growth.
Technological and financial constraints: Limited access to appropriate technologies and financial resources constrains the implementation of sustainable practices and adaptation measures. Insufficient investments in infrastructure, research and development, and capacity building undermine the resilience of communities and ecosystems to environmental shocks and stresses.	**Community engagement:** Empowering local communities through participatory approaches, capacity-building initiatives, and knowledge-sharing networks can enhance their resilience to environmental changes. Community-based natural resource management, supported by tailored interventions and inclusive governance structures, can foster adaptive responses and sustainable livelihoods.
Education vulnerability: Despite efforts to modernize systems and improve educational outcomes, rural schools continue to lag behind their urban counterparts, affecting social, economic, and environmental resilience and perpetuating inequalities**.** Inconsistent environment, climate change and innovation-related curriculum, lagging teacher training on student-centered pedagogies, insufficient updated educational resources, and degraded school infrastructure characterize the current state of education across the region.	**Education innovation:** By integrating environmental education into school curricula, universities, and community-based continuing education programs, countries can raise awareness, build capacity, and foster a culture of both environmental stewardship and creative innovation. Disseminating knowledge and skills related to climate change, sustainable practices, conservation, and problem-solving empowers individuals to make informed decisions and take action to protect the environment. Comprehensive policy implementation and regional strategies are essential to sustainable change.
Centralization and dependency: A legacy of centralized government, planned economies, and ideologically based education combined with socially conservative cultural norms inhibits community-generated actions to address persistent problems. Women, youth, and socially marginalized groups are often excluded from community initiatives and local decision-making in such contexts. Compounding these factors limiting	**Local solutions:** The potential for developing enduring solutions to climate-related challenges in Central Asia lies in local action. Supporting citizens and communities to generate solutions that take advantage of natural resources, local knowledge, and collectivist cultures, especially strong in rural areas, requires relevant learning opportunities, appropriate technology, social capital networks, professional mentoring and support, and accessible financing. Social entrepreneurship, a globally proven approach in particular for youth, women, and

community-based, grassroots efforts include lack of adequate infrastructure, inconsistent information and communication technology (ICT), and weak financing mechanisms for rural communities.	marginalized groups, drives innovation that improves livelihoods and builds community resilience.

Appendix 2: Surveys

Workshop Participant Survey (English)

Date:

First, let's create your personal code. Your code will be made up by 1) the number of the month you were born in (July = 07; December = 12); 2) the initial of your name and surname (John White = JW); 3) the number of the day you were born on (e.g., 03, 06, 13). Write your code here: _____

Country: Region: District: Town/Village:

School: Grade: Gender: Age:

#	Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	I believe that climate change is real.					
2	Climate change is mostly caused by human activity.					
3	Climate change is mostly caused by natural processes.					
4	Climate change will bring negative consequences to the world.					
5	Climate change will bring positive consequences to the world.					
6	Climate change will also influence the place where I live.					
7	Climate change will influence regions far away from me.					
8	Climate change will only take place in the long term.					
9	I am concerned about climate change.					
10	I know what kind of problems climate change creates					
11	I know what kind of opportunities climate change creates					
12	I believe young people can make a difference in mitigating climate change					
13	I believe young people can make a difference in adapting to climate change					
14	I believe I can make a difference					
15	I believe I can bring an idea to life that impacts others					
16	I am energized to do something about climate change					
17	I feel I have enough understanding to realize my idea					
18	I feel I have enough support to realize my idea					
19	I see myself as an entrepreneur					
20	I can see myself making a living solving climate related issues					

Workshop Participant Feedback Instrument

Please express your opinion on the below statements by ticking a box. Your honesty is appreciated!

Date:

First, let's create your personal code. Your code will be made up by 1) the number of the month you were born in (July = 07; December = 12); 2) the initial of your name and surname (John White = JW); 3) the number of the day you were born on (e.g., 03, 06, 13). Write your code here:

_____

Country: Region: District: Town/Village:

School: Grade: Gender: Age:

Please express your opinion on the below questions. Your honesty is appreciated!

1. Did you feel that the workshop increased your understanding of climate change?

   Strongly disagree *Disagree* *Neutral* *Agree* *Strongly agree*

2. Did you feel that the workshop increased your understanding of entrepreneurship?

   Strongly disagree *Disagree* *Neutral* *Agree* *Strongly agree*

3. Can you identify specific concepts or ideas that you found particularly interesting or useful?

4. Did you find the workshop well-organized and structured?

   Strongly disagree *Disagree* *Neutral* *Agree* *Strongly agree*

5. Were the topics and activities presented in a clear and engaging manner?

   Strongly disagree *Disagree* *Neutral* *Agree* *Strongly agree*

6. Did you find the materials and resources provided during the workshop helpful in understanding the topics covered?

   Strongly disagree *Disagree* *Neutral* *Agree* *Strongly agree*

7. Were there any additional materials or resources that you would have liked to see included?

8. Did you feel that the two-day workshop was an appropriate length for the topics covered?

   Strongly disagree *Disagree* *Neutral* *Agree* *Strongly agree*

9. Were the breaks and schedule sufficient for your learning and engagement?

   Strongly disagree *Disagree* *Neutral* *Agree* *Strongly agree*

10. Did you find the activities and discussions engaging and helpful in your learning?

    Strongly disagree *Disagree* *Neutral* *Agree* *Strongly agree*

11. Were there any activities or discussions that you particularly enjoyed?

12. Were there any activities or discussions that you particularly found challenging?

13. How would you rate the knowledge and expertise of the workshop facilitators?

    Poor 1 ---------- 2 ---------- 3 ---------- 4 ---------- 5 Excellent

14. Did the facilitators effectively engage and interact with the participants?

    Strongly disagree *Disagree* *Neutral* *Agree* *Strongly agree*

15. Do you believe that the workshop has influenced your perception of climate change?

    Strongly disagree *Disagree* *Neutral* *Agree* *Strongly agree*

16. Do you believe that the workshop has influenced your perception of entrepreneurship?

    Strongly disagree *Disagree* *Neutral* *Agree* *Strongly agree*

17. Can you identify any specific actions or changes you plan to make based on what you learned in the workshop?
18. How would you rate your overall experience in the workshop on climate change and entrepreneurship?

    Poor 1 ---------- 2 ---------- 3 ---------- 4 ---------- 5 Excellent

19. Would you recommend this workshop to other pupils?

    Not at all 1 ---------- 2 ---------- 3 ---------- 4 ---------- 5 Absolutely

20. What recommendations do you have for future workshops on climate change and entrepreneurship?

School Representative Interview Protocol

Interviewer's name:

Date: Country: District: Town/village:

School: Representative's position:

Gender: Age:

1. How many years is your administrative/leadership experience? Of this experience, how many years at this school?
2. Have you taught before as well? If so, how many years is your pedagogical experience? And which subjects have you taught?
3. As you know, a major topic of our workshop with your students is climate change and the impact it has on the local environment.
   3.1. To what extent do you view climate change as a concern and in what ways do you see it impacting this community?
   3.2. How aware do you think these young people are regarding climate issues? How would you describe youth attitudes towards the environment in this community?
4. We're also interested in figuring out how schools can best help build awareness of how the landscape is impacted by climate change and support young people to find solutions to local environment/landscape problems.
   4.1. To what extent is climate change and environmental studies present in the school curriculum? Does your school offer classes or lessons related to climate change or environmental studies? If so, what topics are covered?
   4.2. Are there any specific challenges or barriers to addressing climate change awareness within the school curriculum?
   4.3. Besides the school curriculum, have there been any initiatives or programs focused on raising awareness about climate change or environmental issues in your school? If yes, could you provide some examples?
   4.4. How might the school support students in identifying and pursuing solutions to local problems? What does the school need to achieve that?
   4.5. What do you see as the role of schools in addressing climate change and environmental degradation? Do you see ways that the school can support the local community to become more resilient to climate change and environmental degradation?

5. We're also interested in how schools in the region are connected to other schools and different resources, such as NGOs, and how that might support efforts to increase climate/environment awareness and generate youth entrepreneurship.
    5.1. Have you ever worked with another school in another village? What are the opportunities and barriers to school-to-school connections or collaborations?
    5.2. Do you have any examples of organizations or groups visiting your school to provide programming? If so, what was good about the experience? How could it have been better?
    5.3. Are there programs or initiatives in this area (at schools or elsewhere) that are having a positive impact on the people of the local community? In what ways are young people/students impacted? What are the key elements that make it/them successful?
    5.4. Are there any perceived barriers or challenges to implementing youth entrepreneurship initiatives in your school to tackle local environmental challenges?

6. Finally, what do you think is needed most in this community?

Appendix 3: Results and Illustrations of Workshop and Launchpad Surveys

1. Workshop

Data for pre- and post-workshop surveys were available for Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan. The results are presented separately for climate change and entrepreneurship components.

It should be noted that given the nature of the survey, namely using Likert items, responses were grouped according to each level, that is, strongly disagree, disagree, neutral, agree, strongly agree. Because this type of data is not interval (continuous), descriptive statistics of min, max, mean, or standard deviation do not have meaning. For interpretation, thus, the degree of agreement (disagreement) should be used. Neutrality is more difficult to interpret because it is unclear whether the respondents lack knowledge, are uncertain, or have a genuinely neutral stance. However, it would be useful to explore if neutrality changes after the workshop, by looking at the difference in the number (or percentage) of respondents between pre- and post-workshop survey. This could indicate that respondents became more (or less) decisive (or certain) in their responses that could be at least partially influenced by their participation (learning) at the workshop.

1.1 Information on Workshop Survey Participants

The youth participants from 19 schools filled the pre-workshop survey and from 20 schools the post-workshop survey across the four countries, as shown in Table A3.1. A total of 387 young people participated in pre-workshop surveys, while a few dropped out in post-workshop surveys, thus totaling 381 participants. The number of participants were greater in Tajikistan and Uzbekistan owing to more schools being covered. Roughly, 65 percent of the participants were female and 35 percent were male. In all countries, except for Tajikistan, there were twice as many female participants as male participants. Majority of youth, 83 percent, were studying in grades 9–11 (Table A3.2), and 75 percent were ages 15–17 years (Table A3.3).

Table A3.1. Number of workshop participants and number of schools they came from

Country	Number of schools (pre-survey)	Number of schools (post-survey)	Number of participants in pre-survey	Number of participants in post-survey	Female	Male
Kazakhstan	2	2	55	55	37	18
Kyrgyz Republic	4	4	82	81	51	29
Tajikistan	6	7	118	113	68	45
Uzbekistan	7	7	132	132	88	42
Total	**19**	**20**	**387**	**381**	**244**	**134**

Table A3.2. Workshop participants by grade and country

Grades	Kazakhstan	Kyrgyz Republic	Tajikistan	Uzbekistan	Total	In percent
5			1		1	0.3
6		1		2	3	1
7		4	10	8	22	6
8	6		19	14	39	10
9	25	16	22	66	129	34
10	15	42	36	9	102	27
11	9	18	25	32	84	22
12				1	1	0.3

Table A3.3. Age of workshop participants by country

Age	Kazakhstan	Kyrgyz Republic	Tajikistan	Uzbekistan	Total	In percent
11				1	1	0.3
12		1			1	0.3
13		4	6	1	11	3
14	9		20	17	46	12
15	20	22	23	28	93	24
16	16	35	37	45	133	35
17	9	14	24	11	58	15
18	1	4	3	28	36	9
19		1			1	0.3

1.2 Climate Change

The results are illustrated in Figure A3.1. Overall, a large majority of young people believe that climate change is real. Before the workshop, 55 percent agreed and 31 percent strongly agreed, after the workshop, 45 percent agreed and 46 percent strongly agreed. It is possible that their awareness of the climate change increased, thus influencing the change in their responses, namely, becoming more confident in their agreement to the statement.

On the causes of climate change, 50 percent agreed and 23 percent strongly agreed before the workshop that it was mostly due to human activity, after the workshop, 49 percent agreed and 26 percent strongly agreed to this. On natural processes mostly causing climate change, 40 percent agreed and 11 percent strongly agreed before the workshop, whereas after the workshop, 43 percent agreed and 15 percent strongly agreed. These findings indicate that some may have learned more about the human and natural causes during the workshop.

Whether climate change brings negative or positive consequences to the world, the young people indicated more negative than positive effects. They seem to have become more attentive to the negative effects after the workshop (42 percent agreed, 31 percent strongly agreed) than before the workshop (50 percent agreed, 27 percent strongly agreed). At the same time, they appear to have learned a bit more about positive effects, from 19 percent agreed and 5 percent strongly agreed before the workshop to 24 percent agreed and 7 percent strongly agreed after the workshop.

The next three statements concerned the spatial and temporal effects of climate change. Before the workshop, 42 percent agreed and 15 percent strongly agreed that climate change would also influence the place where they lived; after the workshop, 51 percent agreed and 27 percent strongly agreed to this statement. On regions far away that would be influenced by climate change, 37 percent agreed and 11 percent strongly agreed before the workshop, 39 percent agreed and 22 percent strongly agreed after the workshop. While before the workshop, 14 percent agreed and 4 percent strongly agreed that climate change will only take place in the long term, after the workshop, 24 percent agreed and 13 percent strongly agreed to this statement. Notably, 32 percent disagreed and 9 percent strongly disagreed before the workshop, while 21 percent disagreed and 6 percent strongly disagreed after the workshop. It seems that young people may have arrived at a greater realization that climate change affects the locations near and far; however, the impacts may occur more in the future. It is likely that they may have misinterpreted the statement about temporal effect (as it requires paying attention to the word ‘only’), especially after learning during the workshop about potentially devastating long-term effects of climate change.

In short, the young people in rural areas of Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan already appear to have a high awareness of the reality of climate change, its causes, and its consequences. The workshop seems to have further increased their

awareness, as their responses to the survey statements after the workshop were more definitive. This can be visually seen in

Figure A3.3 where the dark green in post-workshop increased in area, whereas the dark red decreased (also see Figure A3.4).

1.3 Entrepreneurship

The results are illustrated in Figure A3.2. The entrepreneurship spirit of the young people in Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan was assessed though a range of questions related to taking action.

First, they were asked about their concerns about climate change, to which, 46 percent agreed and 16 percent strongly agreed before the workshop compared to 47 percent agreed and 27 percent strongly agreed after the workshop, showing greater level of concern. Regarding their understanding of the problems that climate change creates, 40 percent agreed and 12 percent strongly agreed before the workshop versus 45 percent agreed and 26 percent strongly agreed after the workshop, indicating stronger knowledge. On the opportunities that climate change creates, 28 percent agreed and 6 percent strongly agreed before the workshop while 37 percent agreed and 19 percent strongly agreed after the workshop, showing even greater knowledge.

Next, they were asked about young people's ability in general to make a difference in mitigating climate change. Before the workshop, 42 percent agreed and 21 percent strongly agreed, whereas after the workshop, 45 percent agreed and 37 percent strongly agreed. On adapting to climate change, 39 percent agreed and 19 percent strongly agreed before the workshop compared to 49 percent agreed and 27 percent strongly agreed after the workshop. It appears that the youth perceived a substantially higher ability of their peers to take action in both mitigation and adaptation to climate change.

The youth were then asked about their personal beliefs to make a difference, to which 41 percent agreed and 13 percent strongly agreed before the workshop and 49 percent agreed and 25 percent strongly agreed after the workshop. This question was followed by asking about their ability to bring to life an idea that affects others. Before the workshop, 36 percent agreed and 10 percent strongly agreed compared to 49 percent agreed and 17 percent strongly agreed after the workshop. Similar to the perception of their peers, the youth held stronger personal beliefs in taking action after the workshop.

Then, they were asked if they felt energized to do something about climate change, which showed that 40 percent agreed and 14 percent strongly agreed before the workshop and 48 percent agreed and 21 percent strongly agreed after the workshop. To the question of whether they had sufficient understanding to realize their ideas, 45 percent agreed and 11 percent strongly agreed before the workshop versus 54 percent agreed and 18 percent strongly agreed after the workshop. On whether they had sufficient support to realize their ideas, 38 percent agreed and 12 percent strongly agreed before the workshop compared to 44 percent agreed and 18 percent strongly agreed after the workshop. Once again, after the workshop the youth felt more energized to take action and more confidently believed in their understanding and support to realize their ideas.

Last but not least, they were asked if they saw themselves as entrepreneurs. It appears that more youth believe so after the workshop—before the workshop 32 percent agreed and 8 percent strongly agreed compared to 42 percent agreed and 16 percent after the workshop. On making a living solving climate-related issues, before the workshop 31 percent agreed and 4 percent strongly agreed versus 42 percent agreed and 17 percent strongly agreed after the workshop, indicating much greater confidence.

In short, the young people in rural areas of Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan appear to have substantially changed the perspectives after the workshop. They had become more concerned about climate change, learning about the problems that it may entail, while at the same time, they learned more about the opportunities too. The youth more strongly believed in themselves and their peers' ability to take action in mitigating and adapting to climate change. Moreover, they felt more

energized to take action, sensing greater understanding and support to bring their ideas to life. The most remarkable change after the workshop appears to be the youth's perception of themselves as entrepreneurs that substantially increased, highly likely due to learning about this during the workshop. This is even more pertinent because more youth believed they could earn a living while solving climate-related problems. The difference between pre- and post-workshop responses can be vividly seen in Figure A3.5, where the area of dark green color expanded but the area of dark red shrank—as did the area of yellow—indicating a shift away from neutrality toward stronger agreement (see also Figure A3.6).

1.4 Country Comparisons - Climate Change and Entrepreneurship

The results for each country are presented separately, namely climate change in *Source:* Original elaboration.

Figure A3.7 and entrepreneurship in *Source:* Original elaboration.

Figure A3.8.

Some differences are visible among the four countries and these differences appear consistent in both climate change and entrepreneurship domains. In Kazakhstan, the youth responded with greater certainty to post-workshop survey questions as is evident in larger area of the dark green color (strong agreement) and smaller area of dark red color (strong disagreement) along with reduction in the area of yellow color (neutral). This trend also holds in the case of Tajikistan, although agreement prevails over strong agreement. Remarkably, the change is even more pronounced in case of Uzbekistan, where disagreement visibly shifted toward agreement, quite strongly. However, in the Kyrgyz Republic, the pattern is not that clear.

2. Launchpad

Survey data were available for pre- and post-launchpad events in Kazakhstan and the Kyrgyz Republic, whereas in Uzbekistan, only post-launchpad data were available. No launchpad was conducted in Tajikistan; hence, no data available. Thus, aggregating the data for overall pre- and post-launchpad comparisons across countries is not possible. Instead, each country's results are presented separately under climate and entrepreneurship sections. Caution is advised in interpretation due to very small numbers of launchpad participants surveyed.

2.1 Information on launchpad survey participants

A total of 41 youth participants from 12 schools attended the launchpad events, separately in Kazakhstan, the Kyrgyz Republic, and Uzbekistan, and filled the surveys (Table A3.4). About 68 percent of the participants were female and 32 percent were male. In Kazakhstan and Uzbekistan countries, there were twice as many female participants as male participants, while in the Kyrgyz Republic, the female participants were three times higher in number. Majority of youth, 73 percent, were studying in grades 9–10 (Table A3.5), and 71 percent were ages15–16 years (Table A3.6).

Table A3.4. Number of launchpad participants and number of schools they came from

Country	Number of schools	Number of participants	Female	Male
Kazakhstan	2	13	8	5
The Kyrgyz Republic	4	16	12	4
Uzbekistan	6	12	8	4
Grand Total	**12**	**41**	**28**	**13**

Table A3.5. Launchpad participants by grade and country

Grade	Kazakhstan	Kyrgyz Republic	Uzbekistan	Total	In percent

8	3	1		**4**	**10**
9	7	2	3	**12**	**29**
10	2	12	4	**18**	**44**
11	1	1	5	**7**	**17**

Table A3.6. Age of launchpad participants by country

Age	Kazakhstan	Kyrgyz Republic	Uzbekistan	Total	In percent
14	4	1		**5**	**12**
15	4	6	1	**11**	**27**
16	4	8	6	**18**	**44**
17	1	1	2	**4**	**10**
18			3	**3**	**7**

2.2 Climate

Selected youth who participated in the launchpad events in Kazakhstan and the Kyrgyz Republic, as shown in Figure A3.9 and Figure A3.11 respectively, fully concurred that climate change is real, especially more strongly after the launchpad. In Uzbekistan, shown in Figure A3.13, however, only half agreed, whereas 17 percent disagreed and 33 percent were neutral. It is rather surprising that greater skepticism was detected although it is difficult to make sense of this finding because pre-launchpad data do not exist. In other words, it is unclear whether or not those participating were skeptical before the launchpad. Owing to the anomaly, other questions for Uzbekistan are not interpreted.

The youth in Kazakhstan and the Kyrgyz Republic attributed the causes of climate change to human activity as well as natural processes. After the launchpad, the agreement increased albeit greater for human than natural causes.

A large majority of youth perceived the consequences of climate change would be mostly negative. Especially in the Kyrgyz Republic, more youth disagreed that there would be positive consequences.

Almost everyone agreed that climate could influence the places where they lived as well as regions far from where they lived. This was more evident in case of the Kyrgyz Republic youth after the launchpad.

Regarding whether climate change would only take place in the long term, it seems that those who were undecided before the launchpad changed their views toward agreement about long-term occurrence of climate change after the launchpad. Possibly, this could be due to learning more about future climate scenarios and impacts that may have gotten in the way of some of the young people to realize that climate is already occurring.

2.3 Entrepreneurship

Looking at Figure A3.10 and Figure A3.12 respectively, the youth in Kazakhstan and the Kyrgyz Republic shared very similar views on entrepreneurship questions except for two instances. One is on concern about climate change that was unanimous in the Kyrgyz Republic and quite large in Kazakhstan, with the exception of 15 percent of youth who disagreed. The other is on perception of making a living solving climate-related problems, as youth in the Kyrgyz Republic were more skeptical than in Kazakhstan; nonetheless, after the workshop more youth in the Kyrgyz Republic showed greater confidence. Note that questions for Uzbekistan are not interpreted here either (Figure A3.14).

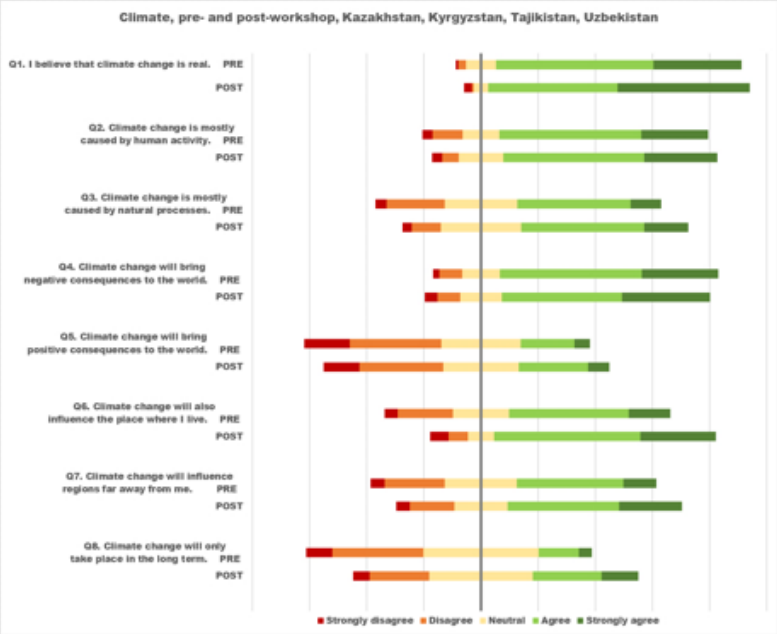
3. Observations about Workshop versus Launchpad

A general but very cautious observation can be made when comparing the findings of the workshop surveys to those of the launchpad. With a caveat of small numbers of participants in the launchpad and a further note that participants were selected to attend the launchpad, it can be observed that after the launchpad the young people in Kazakhstan and the Kyrgyz Republic expressed their views more

confidently both on climate change and entrepreneurship domains. The results of the launchpad surveys in Uzbekistan are somewhat perplexing.

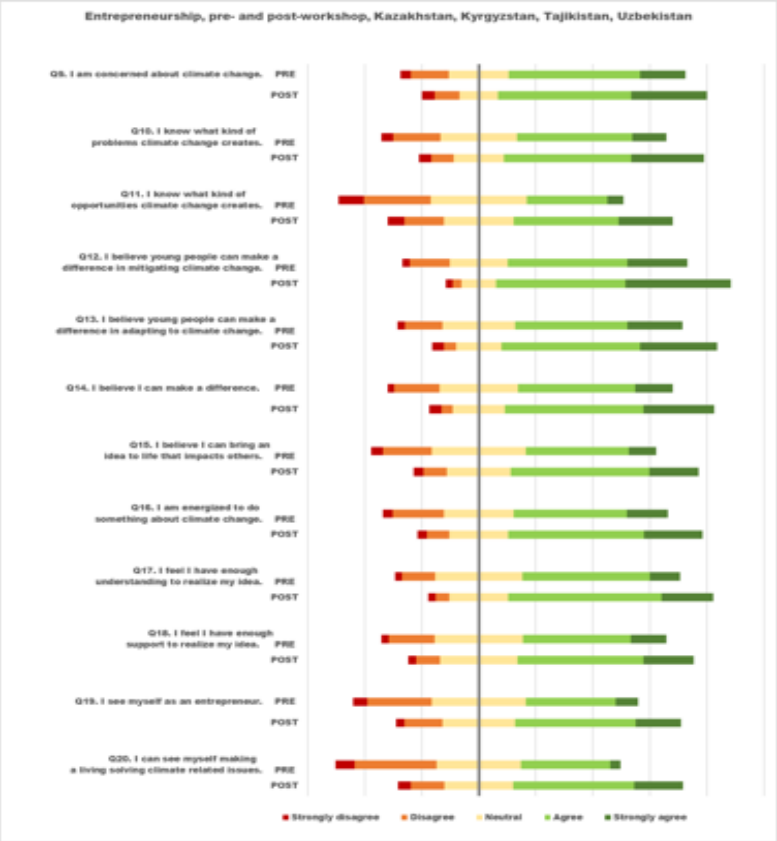
4. Workshop Illustrations

Figure A3.1. Workshop survey responses to climate change statements by young people in rural schools in Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan



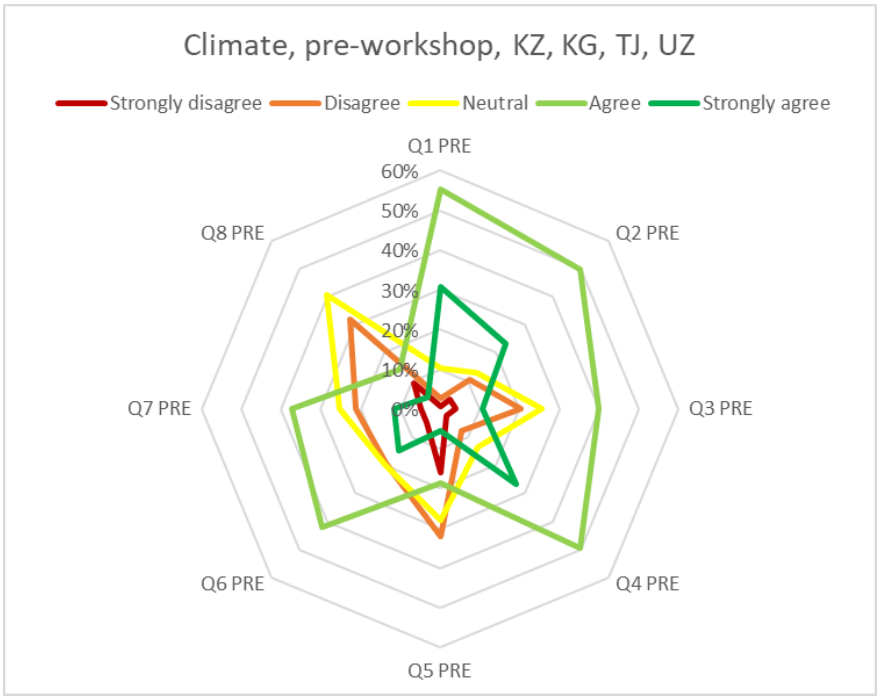
Source: Original elaboration.

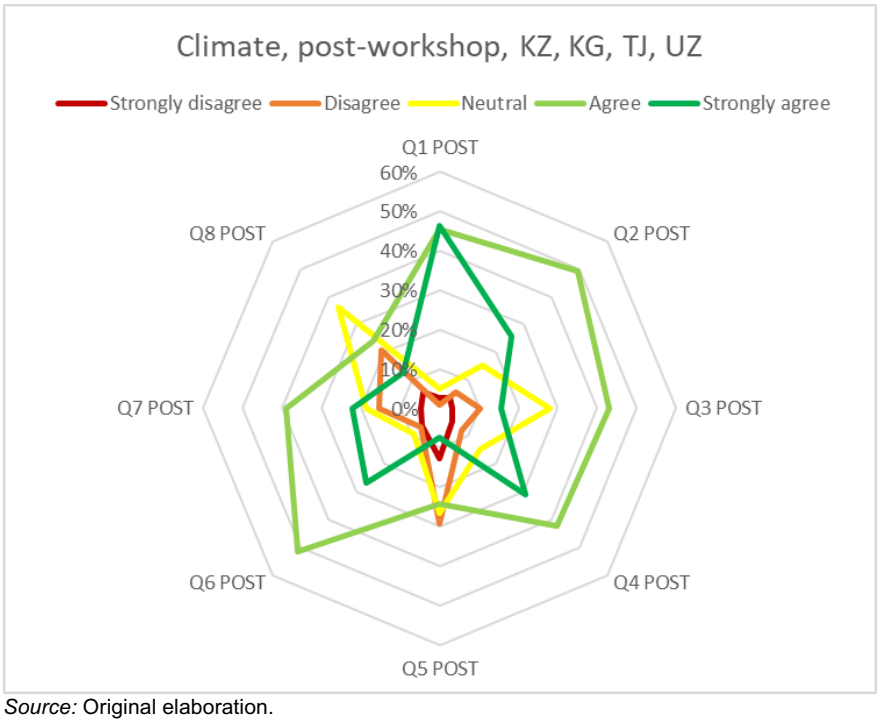
Figure A3.2. Workshop survey responses to entrepreneurship statements by young people in rural schools in Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan



Source: Original elaboration.

Figure A3.3. Stronger agreement in post-workshop survey to climate change statements by young people in rural schools in Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan



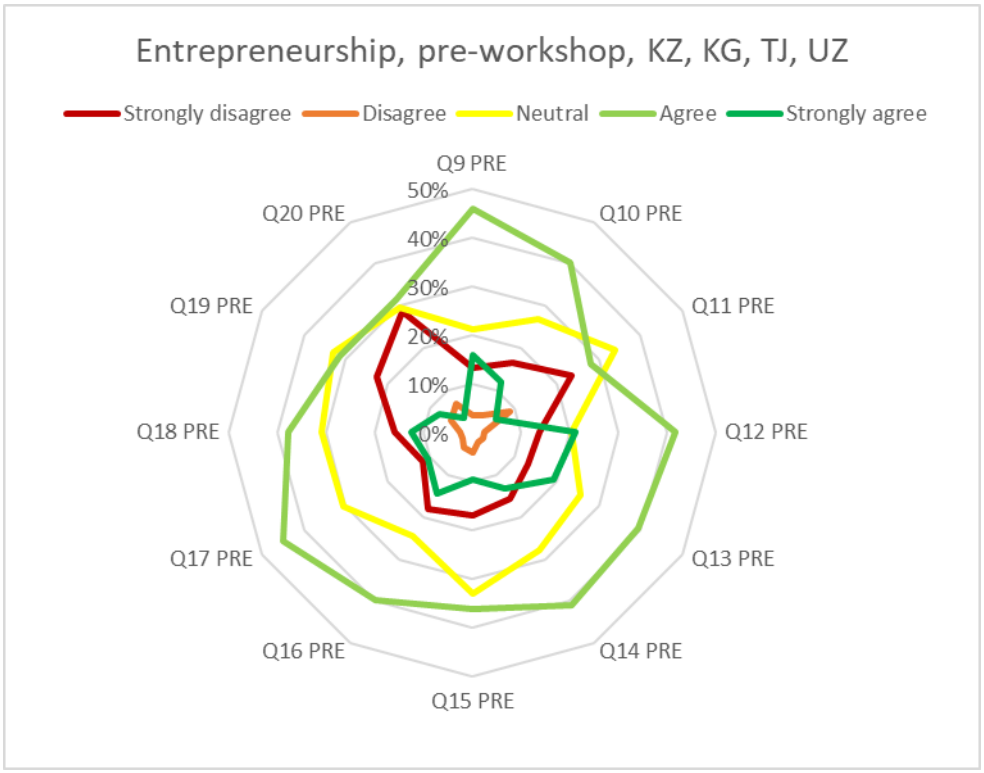


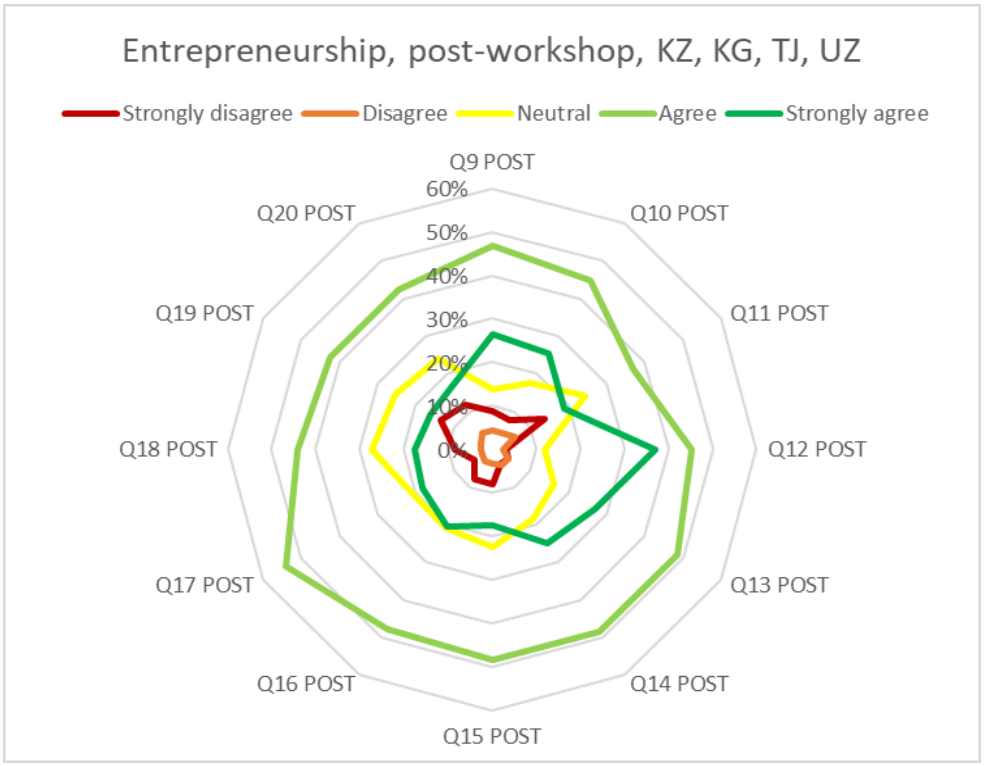
Source: Original elaboration.

Figure A3.4. Workshop survey responses to climate change statements by young people in rural schools in Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan (by question, vertical bars)

Source: Original elaboration.

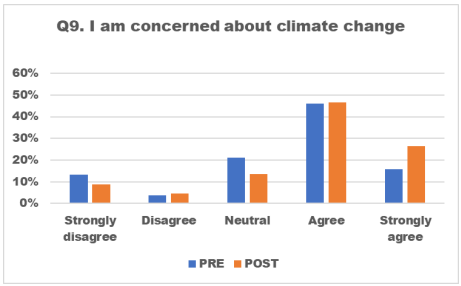
Figure A3.5. Stronger agreement in post-workshop survey to entrepreneurship statements by young people in rural schools in Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan

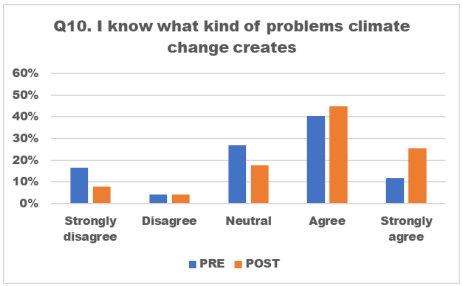


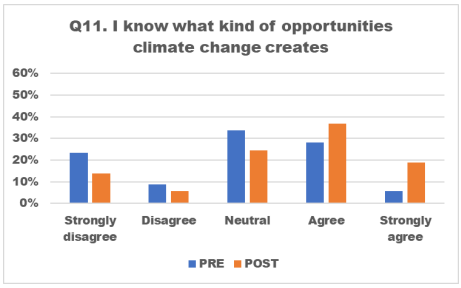


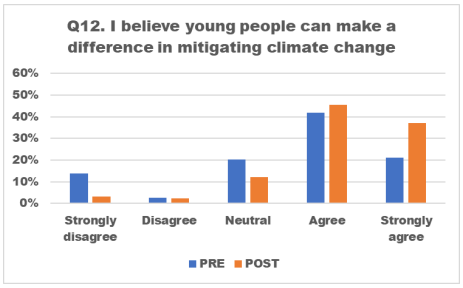
Source: Original elaboration

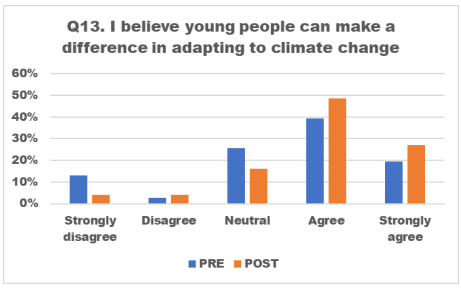
Figure A3.6. Workshop survey responses to entrepreneurship statements by young people in rural schools in Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan (by question, vertical bars)

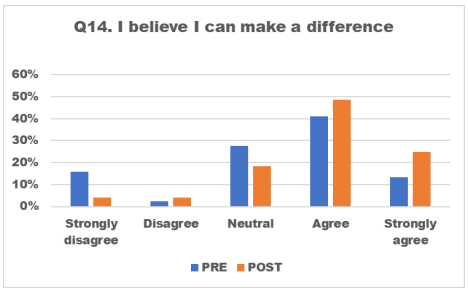


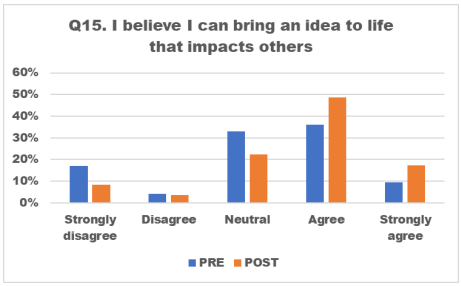


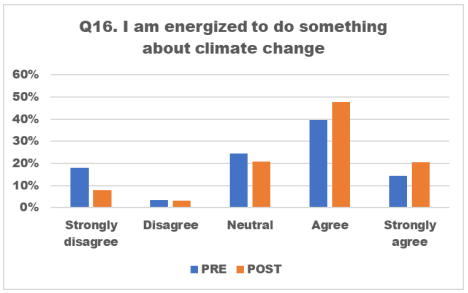


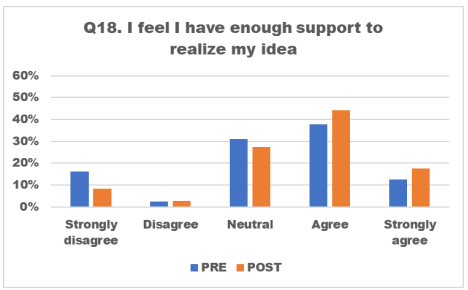


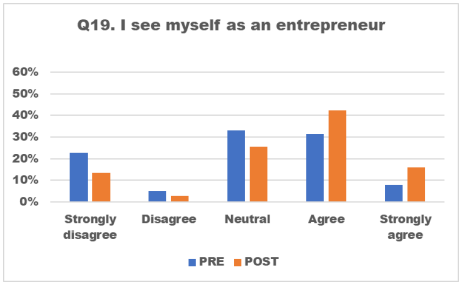


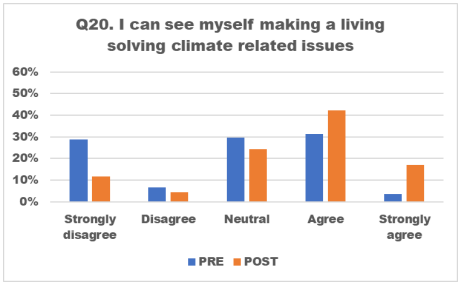






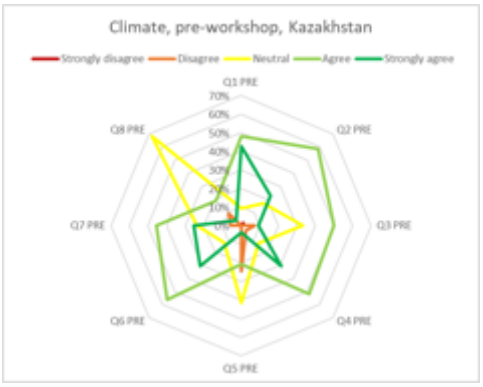


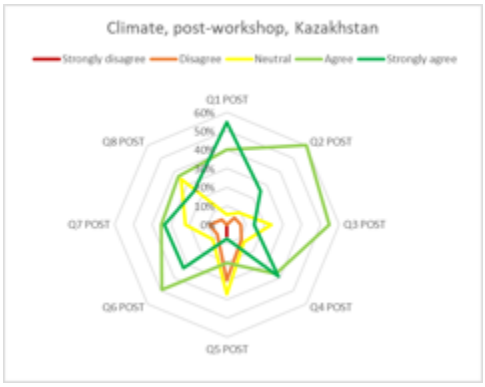


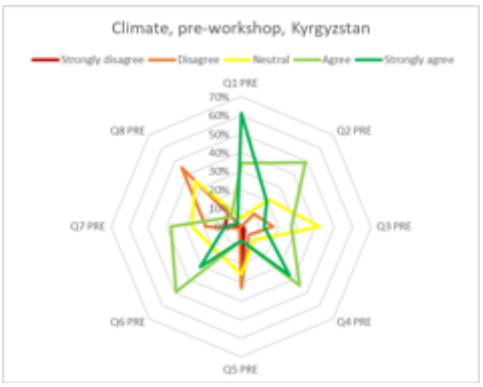


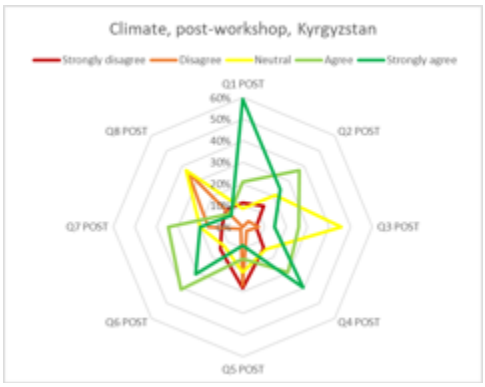
Source: Original elaboration.

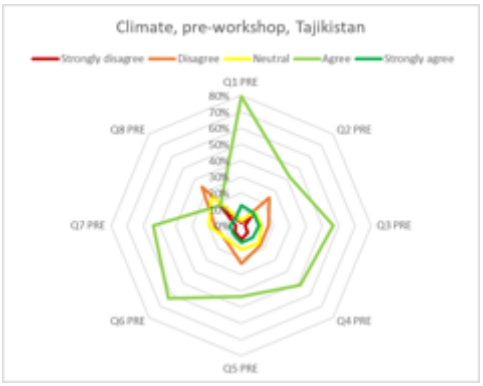
Figure A3.7. Country comparisons of workshop survey responses to climate change statements by young people in rural schools in Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan

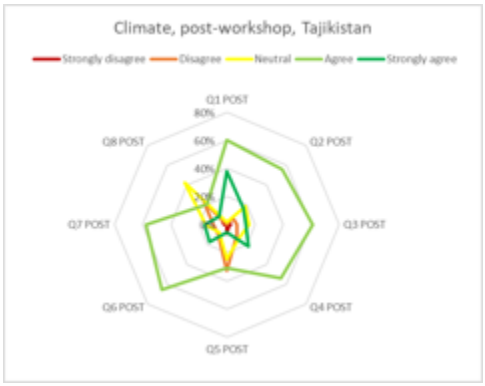


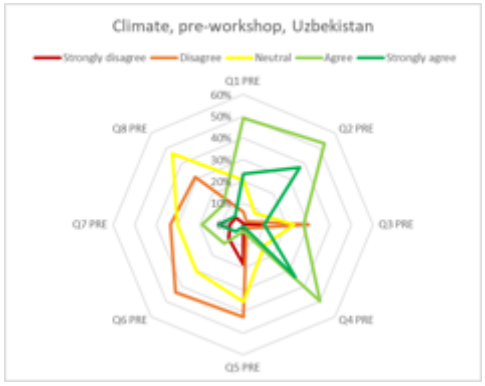


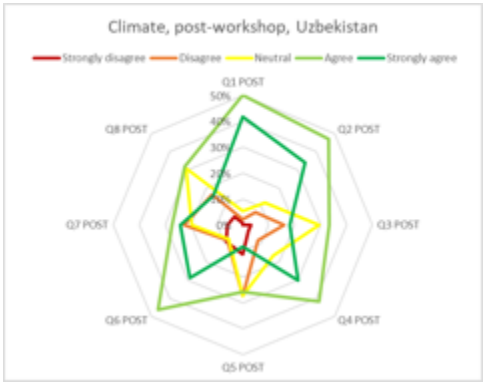






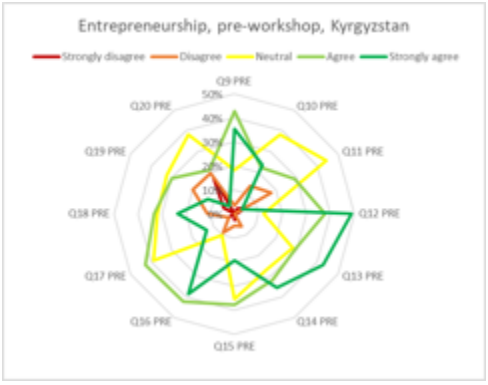


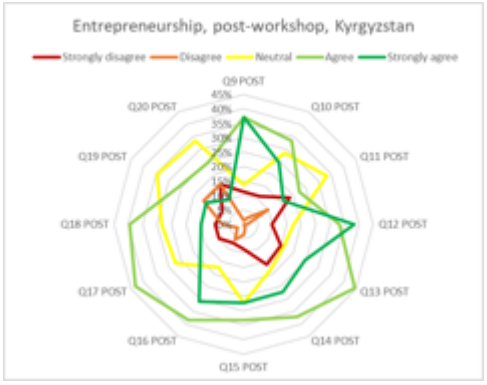




Source: Original elaboration.

Figure A3.8. Country comparisons of workshop survey responses to entrepreneurship statements by young people in rural schools in Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan

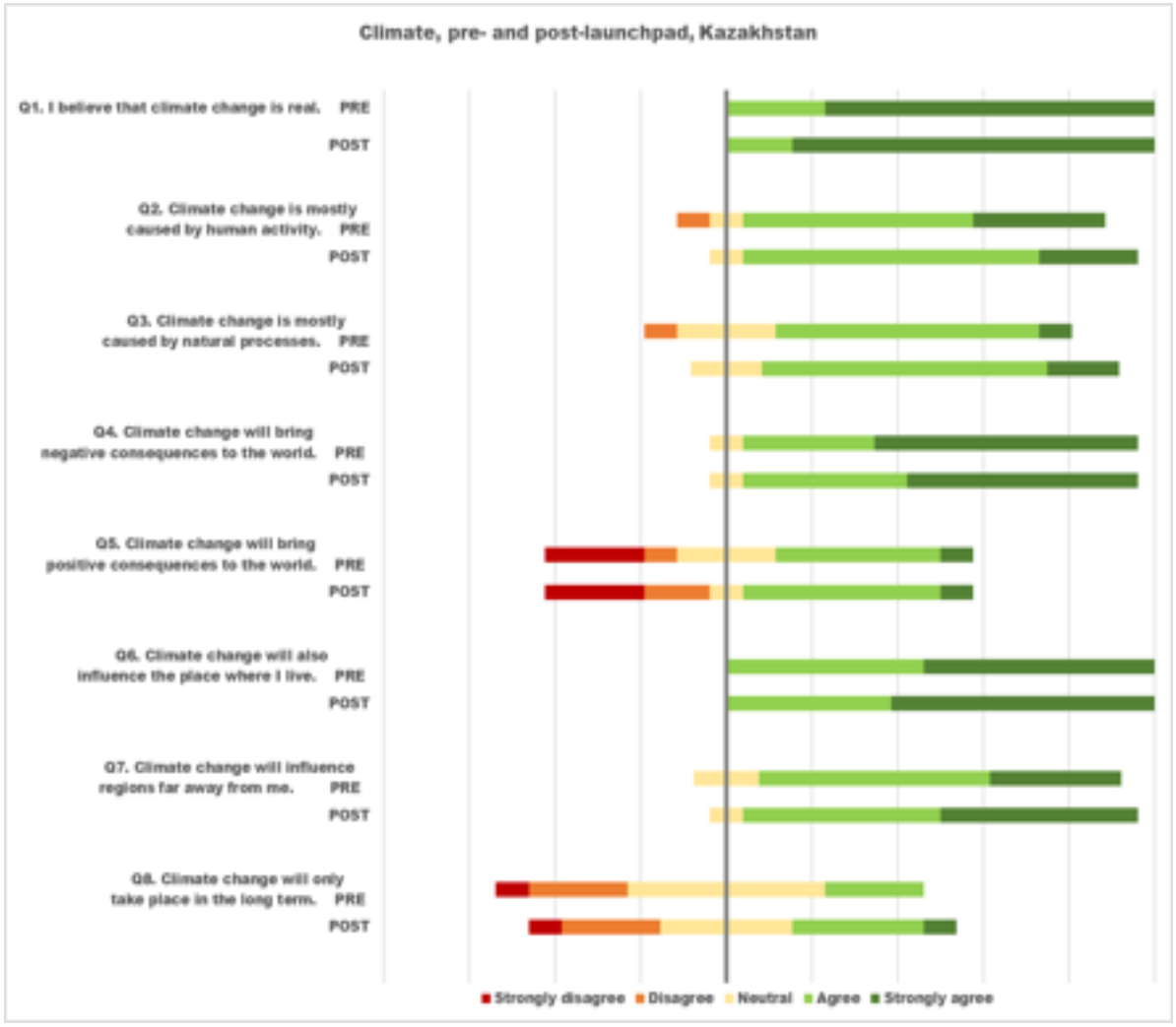




Source: Original elaboration.

5. Launchpad Illustrations

Figure A3.9. Launchpad survey responses to climate statements by young people in rural schools in Kazakhstan

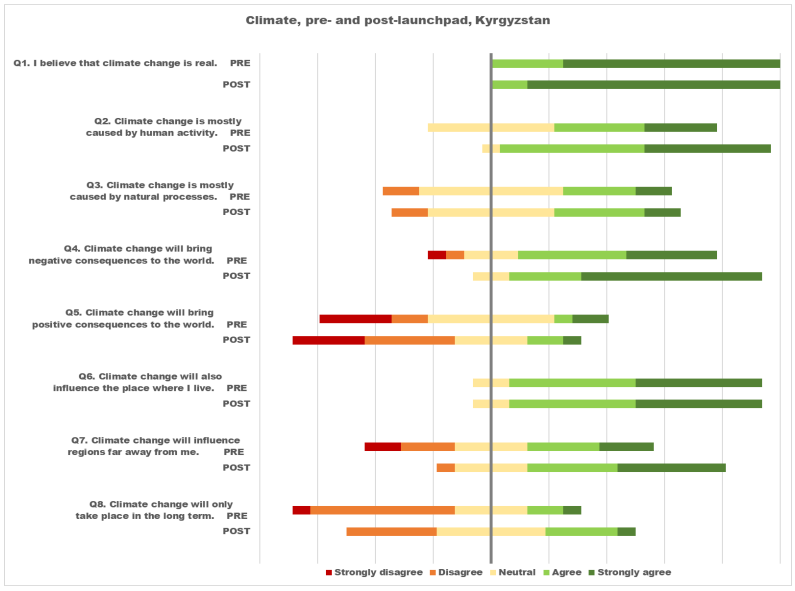


Source: Original elaboration.

Figure A3.10. Launchpad survey responses to entrepreneurship statements by young people in rural schools in Kazakhstan

Source: Original elaboration.

Figure A3.11. Launchpad survey responses to climate statements by young people in rural schools in the Kyrgyz Republic

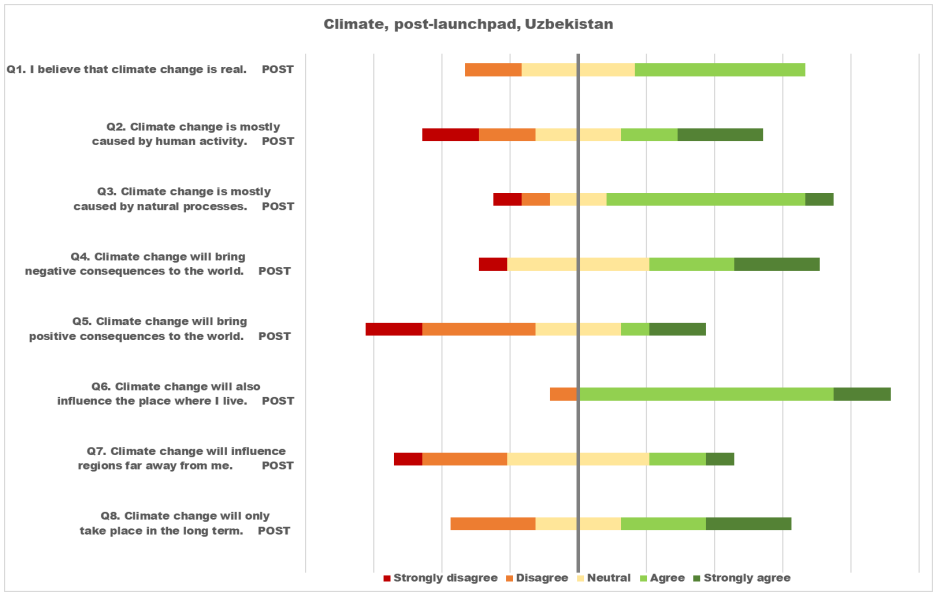


Source: Original elaboration.

Figure A3.12. Launchpad survey responses to entrepreneurship statements by young people in rural schools in the Kyrgyz Republic

Source: Original elaboration.

Figure A3.13. Launchpad survey responses to climate statements by young people in rural schools in Uzbekistan



Source: Original elaboration.

Figure A3.14. Launchpad survey responses to entrepreneurship statements by young people in rural schools in Uzbekistan

Source: Original elaboration.

Appendix 4: Logic Model

Inputs	Activities	Outputs	Short-term outcomes (1–4 years)	Long-term outcomes (5–10 years)	Impact
International client funding/investment, expertise, and initiative oversight International program design, management, and coordination Regional, national, and local-level engagement of government stakeholders (ministries of environment and education) Network of HEIs collaborate in peer-to-peer learning approach to climate change awareness, experiential learning, and youth entrepreneurship NGO/civil society and private sector stakeholders engaged as advisers,	University internship programs for undergraduate students Virtual trainings, meetings, and collaboration session for university program coordinators Virtual ToT in entrepreneurship and climate that brings together interns from across the region Youth workshops in rural schools led by trained interns Youth entrepreneurship accelerators, with pitch competitions, for school teams hosted by universities (post-school workshops) Data collection conducted by student interns and	University intern programs piloted (4 countries, 8 participating HEIs) Network of university coordinators established (8 HEI coordinators) Regional cohort of university students trained (28 student interns) Intern program toolkit for participating universities prepared Replicable and scalable ToT with facilitator's guide, curriculum, forms, collaboration platforms, and resources Youth workshop models designed by intern teams	HEIs in each country with established internship programs (coordinators, job descriptions, contracts, budgets, and so on) Regional alliance of HEIs committed to activating youth climate entrepreneurship through peer-to-peer model in partnership with rural schools established University programs integrated with local, national and regional climate adaptation and environmental restoration initiatives (for example, research in protected areas, value-add agriculture products, water	National multi-stakeholder ecosystems actively support youth climate entrepreneurship through training, mentoring, technical support, and financial investment Regional association of national multi-stakeholder ecosystems formed to generate funds, share knowledge, and build impact National and regional network of model rural schools established for knowledge sharing, professional development, funding, and so on. Youth-led enterprises (for- and non-profit) improve local environmental	Climate awareness: Broad awareness of climate change, its sources and impacts, and understanding of opportunities for local mitigation and adaptation among rural youth and adults Resilient landscapes: Reduction in land degradation and increase in sustainable adaptations along border areas of Central Asia Rural education innovation: Rural schools are vibrant, well-resourced community hubs rooted in place-based, student-centered learning that is integrated with local and regional climate/environment initiatives

Inputs	Activities	Outputs	Short-term outcomes (1–4 years)	Long-term outcomes (5–10 years)	Impact
collaborators, mentors, and investors ToT pedagogy focused on student-centered instruction, competency and mastery learning, experiential and place-based learning, peer-to-peer instruction ToT curriculum related to climate change science, regenerative ecology and landscape restoration, social entrepreneurship and circular economics Digital tools that facilitate national level and regional collaboration, student learning and engagement, teacher engagement and professional development, and data collection and analysis	coordinators of youth, teachers, and school directors Country-level stakeholder meetings with ministry officials, NGO representatives, university representatives Regional stakeholder workshop/symposium to share outcomes generate policy recommendations Webinars to share learnings and expand regional and global network Program promotion, stakeholder dialogue, and regional peer engagement through social media	Multiple rural schools pilot the youth entrepreneurship program (19 schools) School-age youth received climate awareness and entrepreneurship skill-building (388 youth workshop participants; 41 youth accelerator participants) Youth-designed and youth-led climate and landscape restoration projects are piloted and launched (3 pilots) School directors introduced to program objectives, implementation, and potential for impact and expansion (19 school directors/representatives)	conservation in drought-prone areas) Innovative curriculum and pedagogy introduced in under-resourced schools through extracurricular program Teacher training integrated into extracurricular on-site workshops and university-based accelerator program ‘Demonstration schools’ in each country model the community hub approach to climate adaptation and youth entrepreneurship through establishment of innovation labs and accelerator programs HEIs and other key stakeholders (NGOs, donors, corporates)	conditions and contribute to rural economies by employing youth. Increased numbers of rural youth access higher education through program participation due to expanded school-to-university pipelines Rural youth leaders are routinely engaged in local, national, and regional education and environment/climate change policy development processes Alignment with national curriculum and pedagogy strategic reform enabling student-centered, place-based innovations in rural and remote schools Alignment with national strategic advancements and	Higher education innovation: HEIs are key contributors and leaders of climate adaptation and sustainable development Sustainable livelihoods: ‘Green’ or regenerative local economies are strengthened with higher youth employment linked to unique assets of rural areas Youth empowerment: With an increased sense of agency, purpose, and opportunity young people choose to stay—or return—to their communities and countries to make economic, social, and environmental impacts, build resilience to extremism, and strengthen their communities Resilient communities, with empowered youth,

Inputs	Activities	Outputs	Short-term outcomes (1–4 years)	Long-term outcomes (5–10 years)	Impact
		Teachers exposed to program pedagogies and curricula (26 teacher workshop observers - estimate/data incomplete; 13 teacher accelerator participants) Regional stakeholders engaged in lessons learned and policy dialogue (93 stakeholders)	partner with demonstration schools to pilot innovation labs and accelerator programs	investments in teacher training, education technology, and facilities improvements	that are prepared against climate change, economic transitions, and social extremism

Fostering Climate Education and Youth Entrepreneurship in Central Asia

The Path to Climate Resilience

March 2025

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