In Brief

This report is part of an occasional series that distills learning and highlights resources around specific development issues.

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Feeding a hunger for solutions in rural Tajikistan

High in the Pamir Mountains of Tajikistan, a young engineer demonstrates how unleashing local entrepreneurship can yield an innovative, sustainable solution to the interconnected challenges of food insecurity, environmental degradation, and climate change.

Armed with a small grant, Navras Nekushoev (26) designed an all-season greenhouse heated in part by capturing and recycling used motor oil. To collect the used oil, Nekushoev built a clean, safe oil changing station for motorists, thereby preventing contaminants from seeping into the soil and groundwater. Used in combination with solar and coal heating sources, the recycled oil powers the greenhouse through the cold mountain winters, producing three crops per year of tomatoes, cucumbers, and assorted leaf vegetables, and providing a reliable supply of locally grown produce for his community in the town of Khorog.

The challenge: food insecurity in an increasingly fragile environment

High rates of poverty and malnutrition plague the remote communities along Tajikistan's border with Afghanistan. While the region is one of the world's great storehouses of biodiversity, low agricultural productivity and chronic food insecurity remain significant barriers to development.

This high altitude, seismically-active region has long been prone to natural disasters such as landslides, mudslides, and rock falls, but as noted by the World Food Programme, the effects of climate change have increased the challenges that rural communities here must face:

Recurrent natural disasters in Tajikistan are exposing low-income households in rural communities to chronic food insecurity. Vast swaths of agricultural land are being affected by widespread deforestation, soil erosion and droughts. Climate change is increasing overall temperatures, frequency of extreme droughts and floods, and erratic rainfall. It is also decreasing water availability for agriculture. As a result, climate change is exacerbating the impact of these natural disasters on food security and livelihoods.

Improving resilience to climate change is essential to break the cycle of poverty and malnutrition that leave vulnerable populations more likely to take desperate actions with long-term environmental consequences, such as deforesting mountain slopes.

The innovation: fueling positive change in food production

After completing his engineering studies in Russia and Tajikistan, Nekushoev began his career designing residential buildings, but he retained a dream from his university days: building an all-season greenhouse that could provide a reliable, affordable supply of fresh vegetables year round.

Environmental pollution from used motor oil is a serious problem in Tajikistan.

Carried by run-off, it travels long distances and eventually reaches waterways, contaminating plants and animals, and forming a film on water that impedes oxygenation and photosynthesis. If it reaches water treatment plants, it can cause significant damage to the environment and human health. According to the U.S. Environmental Protection Agency, a single litre of oil can pollute a million litres of fresh water.

After only a few months of operation, Nekushoev's greenhouse was already diverting over 50 litres of oil per week that would otherwise be released into the environment.

Fresh produce is scarce and expensive in the mountains from late September to the beginning of June, and has to be trucked long distances on unreliable roads. Spoilage rates are high and so are prices — up to four times the prices in Dushanbe, Tajikistan's capital.

Nekushoev's greenhouse started as a solar-powered design, but evolved when he discovered the need for another fuel source to maintain a consistent minimum operating temperature during the long winter nights. He realized that he could solve this problem while also addressing two significant threats to the local environment: improper disposal of used motor oil, and deforestation of mountain slopes to provide fuel wood.

Impressive as this is, the environmental benefits go further. Both the demands of heating and of conventional agriculture put pressure on local forests and wood lots. By introducing a new heat source and more intensive, year-round agriculture, his innovative greenhouse reduces pressure on both fronts.

The stove is not Nekushoev's only innovation. Sunny, flat sites large enough for the greenhouse are rare in the mountains, so the greenhouse's modular design is easy to disassemble and move – enabling the owner to change locations to maximize the solar-electric heat at different times of the year or take advantage of a better site.

The Khorog greenhouse project illustrates how a single innovation can lead to multiple benefits. The greenhouse provides nutritious, safe produce at reasonable prices to a remote community, even in the depths of winter. It diverts a harmful pollutant from the soil and waterways, safely burning it to heat the greenhouse. As it does not rely on firewood for fuel, the greenhouse does not contribute to the challenge of deforestation, while its use of solar power helps to mitigate against climate change.

Nekushoev, the industrious engineer, is working with agronomists to raise productivity in his greenhouse, while finding ways to standardize the design and lower construction costs. He hopes to attract investors and encourage other communities to adopt his greenhouse design.

Supporting citizen-led innovation for development

The small grant that enabled Nekushoev to fulfill his dream to design a greenhouse for his community in Khorog came from a wider, Canadian-supported project to harness the potential of local civil society to mitigate the effects of climate change. Implemented through the Aga Khan Foundation's **Mountain Societies Development Support Programme (MSDSP)** in Tajikistan, that project builds on MSDSP's decades of experience working with community organizations in the region to enhance food security, agricultural productivity, livelihoods, and natural resource management. It also reflects MSDSP's growing focus on increasing the resilience of rural, high mountain communities in Tajikistan to the negative effects of climate change on their environment and livelihoods. In its response to the challenges of climate change, MSDSP has recognized the particular burden that the interconnected issues of poverty, malnutrition, environmental degradation, and livelihoods place on women in rural Tajikistan.

Seventy-four-year-old Khudodova recalls trying to eke out a meager living from selling local fruits: "We used to spend almost all our time during the summer and autumn collecting mulberry and apricot, [but] we were not able to make a living out of it.... We often gave it away ... for a very small price."

MSDSP brought women together into community organizations – Village Technology Groups – and provided them training and skills such as grading and drying fruit using advanced techniques that augment traditional knowledge. This support has enabled women to build economic resilience to the vagaries of climate change while also protecting valuable fruit trees from deforestation.

Today, things are considerably different for many who have received training. Thirty-eight-year-old Qurbonshoeva Ravchai has made dramatic strides for herself and her family. "Now I know that life can start from one plant of apricot. Before, we used to sell one

> "Now I know that life can start from one plant of apricot. Before, we used to sell one 50 kilogram bag of dried apricots for a miserable price ... and now we sell just one package, which is normally 500 grams or one kilogram, for the same price. This is the power of business."
>
> - Qurbonshoeva Ravchai

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Working with the Village Technology Groups, MSDSP employs a range of strategies – an all-season greenhouse, improved dried fruit processing, introducing climate-resilient varieties of wheat and potatoes – to build on the knowledge and energies of local women and men to find innovative solutions to their common challenges.

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>
> - Adab Abdulkodirov

Adab Abdulkodirov, an MSDSP program officer, emphasizes that "indigenous knowledge is invaluable when blended with modern techniques to develop practices that are the best for the local context."

As people in the border region of Tajikistan learn innovative new techniques for earning sustainable rural livelihoods, they share these ideas with friends and neighbours, further sowing the seeds of innovation and entrepreneurship.

Aga Khan Foundation Canada

Aga Khan Foundation Canada (AKFC) is a non-profit international development agency, working in Asia and Africa to find sustainable solutions to the complex problems causing global poverty. Established in 1980, AKFC is a registered Canadian charity and an agency of the worldwide Aga Khan Development Network.

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The Khorog Greenhouse project received funding assistance through Supporting Civil Society Initiatives (SCSI), part of the five-year Partnership for Advancing Human Development in Africa and Asia between Global Affairs Canada and AKFC. From Madagascar's rural farmland to isolated towns in the mountains of Tajikistan, SCSI assists local organizations to address key barriers to development in their communities, focusing on climate change and gender inequality. Recognizing that advances in development programming often come from experimentation, SCSI also supports innovation by enabling civil society organizations to test new development approaches across sectors.

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