COMMON THREATS, COMMON SOLUTIONS

Researchers from Central Asia and India see that science diplomacy could help the region cope with climate change.

by **Sean Treacy**

In Central Asia, where the livelihoods of almost half the region's population depend on agriculture from irrigated lands, climate change presents a grave threat. Days are getting hotter, nights are getting cooler, and rising temperatures are causing the essential source of the region's water – high mountain glaciers – to melt away.

Dzhamin Akimaliev, the director of Kyrgyzstan's Scientific Research Institute of Agriculture, said the temperature in his country has risen 1.6 degrees Celsius in the past 100 years. Meanwhile, the melting glaciers atop his country's Tien-Shan mountains are shrinking, causing more agriculture-feeding water to flow. That increase will last for 15 to 20 years, but then, once the glaciers disappear, so will the water.

"For more than 10 years I have been saying that mountain-area research is important for our country," he said, "because the future of agriculture is in the mountain area."

How can the five former Soviet states there, which are already competing for existing water resources, work together and address this common challenge?

This is what Akimaliev and six other representatives of four Central Asian countries sought to answer at a recent TWAS science diplomacy workshop in Trieste, Italy. The workshop, "Climate Change and a Global Research Agenda for High-Altitude Agriculture in Central Asia and India", was attended by scientists from Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan. Running from 9 to 11 December 2014 in Trieste, Italy, it had 17 participants in all and included scientists and policy experts from India, which has experience dealing with similar climate issues, Italy and the United States.

It was the latest event under an agreement between the American Association for the Advancement of Science (AAAS) and TWAS that created a science diplomacy programme focused on developing nations. The workshop was organized by Peter McGrath and Sara Dalafi, who coordinate TWAS's science and diplomacy initiative.

At the workshop, science served as a bridge between countries that don't always agree on how to best use natural resources. But it also presented a starting point for collaborative thinking on an issue that is already putting pressure on their people. In Central Asia, every country has this in common: They are all downstream.

▼ Workshop participants, from left, Timur Ustabayev and Svetlana Dolgikh of Kazakhstan, Kamolidin Abdulloev of Tajikistan, and Saujanendra Swain of India. [Photo: Cristina Serra/TWAS]

A PRESSING DEMAND FOR WATER

Agriculture in all of the Central Asian countries is fed by water that flows from mountain ranges concentrated in Kyrgyzstan and Tajikistan.

All five Central Asian nations are using the water at an intense pace, mostly to support crops in soils that aren't ideal for agriculture. Turkmenistan uses more water per capita

▲ A grain field in Kokshetau, Kazakhstan (Breshuk/Wikimedia Commons)

> "The future of agriculture is in the mountain area." *Dzhamin Akimaliev*

than any other nation in the world, according to a *Nature* report, and the other Central Asian nations are not far behind. This leads to conflicts between the countries as they compete for water.

One example of a crop fed by this water supply is cotton in Uzbekistan, a desert country that supports its fields with irrigation. Workshop attendee and TWAS Fellow Ibrokhim Abdurakhmonov, director of the Center of Genomics and Bioinformatics of the Academy of Sciences of Uzbekistan, said his country is also concerned that more extreme day and night temperatures could hurt cotton yields.

Central Asia's dependence on agriculture is also a pressing issue. The Soviet Union used the land to support a large, sprawling superpower. Now that they are separate nations, each country has to produce the goods needed to sustain itself.

Even the farmland giant of the region, Kazakhstan, is facing threats. Workshop attendee Svetlana Dolgikh, head of the Kazakhstan Division of Climate Research, said less rain in the summer will lead to lower agricultural yields, and higher temperatures will mean more stress on livestock. Kazakhstan, she said, will need water-saving technologies.

"This workshop was really like a first step to use science as a platform to more strongly link the collaboration on an issue of common importance, which is climate change, because it does affect them all", said Cristine Geers, a programme associate of the AAAS International Office.

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IDEAS FOR A UNITED EFFORT

As the climate changes, researchers will need to gather information, store it, and share it among colleagues. To some degree, systems to manage this information already exist in each of the countries, said Kamolidin Abdulloev, a consultant for Tajikistan's Pilot Programme for Climate Resilience. What's needed, he said, is a regional system, especially since fields such as biotechnology are new for some Central Asian countries.

"We need to have a very good coordination mechanism for these activities", said Abdulloev. "As it is now, when I am looking for expertise on farmed goods from Uzbekistan or maybe from India or from other countries, or if I need some information about new agricultural practices or climate-resilient crop, the information is not accessible."

TWAS Fellow Manju Sharma, distinguished woman scientist chair of the National Academy of Sciences, India, and former secretary of India's Department of Biotechnology, said field work is important. Knowledge centres in India, she said, have been successfully getting climate information to rural populations that speak regional dialects.

"So monitoring infrastructure has to be created at the field level through site visits to monitor what the farmer is getting, how much advantage he's getting, and what is the benefit or disadvantage", said Sharma.

Participants also concluded that they should write a white paper – a document that outlines research strategies and policy recommendations that can be made available to decision-makers. Researchers from each country could help create the document, presenting a united front. ◘