Project seeks to harvest fog for irrigation

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Fog has been billowing inside a small greenhouse on the University of Washington campus for the past month, but it doesn't arrive on little cat feet. It comes hissing out of high-pressure nozzles.

The man-made mist is part of an effort to help slum-dwellers in Peru harvest moisture from the air. With a small grant from the Environmental Protection Agency, UW students and professors are building and testing fog catchers - and hoping to reel in a bigger grant to mount a full-scale operation in Lima.

"It's like a cold sauna in here," UW ecologist and civil engineer Susan Bolton said recently, ducking into the plastic "hoop house," where industrial-grade misters spewed out a cloud of fine water droplets.

A noisy exhaust fan drew the cloud through a drape of black plastic netting. Droplets settled out on the mesh, coalesced and trickled into a plastic bucket. Forty-five minutes into the morning's first test run, Bolton and graduate student Peter Cromwell emptied the bucket into graduated cylinders to measure the haul: 1,212 milliliters, or about a third of a gallon.

Wringing water from fog is not a new idea. Almost 2,000 years ago, the people of the Canary Islands gathered water that dripped from trees - nature's own fog catchers. Several engineered fog-collection systems are in operation around the world today, including one in the highlands of Guatemala that provides a village of 200 people with nearly 2,000 gallons a day.

Standard fog catchers are large rectangles of plastic mesh suspended on frames. The UW project is exploring new materials and designs that may boost the yield and lower the cost, said Ben Spencer, assistant professor of landscape architecture. "The more water you can get, the better."

Spencer is part of a group of UW faculty that has been working for several years in Lomas de Zapallal, a sprawling squatter community on the northern outskirts of Lima. Few homes have piped water, so people pay a premium to have it delivered by truck, Spencer said.

Lima is also one of the world's most arid cities, with some neighborhoods receiving a scant half-inch of rain a year. But thick fog rolls in off the Pacific between June and December, making the area ideal for fog-catching.

For expert advice, the UW group turned to Robert Schemenauer, founder of FogQuest, a nonprofit based in Kamloops, B.C. An atmospheric physicist, Schemenauer pioneered most of the fog-collection systems in use today.

The technology will never be a substitute for large municipal water supplies, he said.

It works best in small, mountainous communities where frequent fog combines with a steady breeze needed to propel the mist through collectors.

Any new designs the UW team comes up with will have to be practical, above all, Schemenauer cautioned. "You need something that's cheap and strong and will last for 10 years."

Among the materials the UW group is testing are fibrous plastic mats used to stabilize slopes and turf. "We call them our hairy fog collectors,"

Spencer said.

Early results suggest the greater surface area of the fuzzy mats may extract more water than the standard plastic mesh.

Students are also experimenting with collectors of different shapes, including one that resembles the mainsail of a sloop.

The team set up a couple of small test collectors in Lomas de Zapallal, and have been working with the people there to determine whether they're interested in a system and how they would prefer to use it, Cromwell said.

"The community has to buy into it," he said.

What people seem to want most is water to irrigate parks and green spaces, he said.

In some parts of the world, fog nurtures forests, which absorb the water from the air. But in Lima, those forests were cut down hundreds of years ago, Bolton said.

"This is moisture that kind of doesn't go anywhere," she said. "It's not like we're diverting a river."

In fact, locals hope to use water collected from fog to coax trees to grow again. "The idea is that you can use fog to put those forests back," Bolton said.

The UW project is one of 45across the country that won $15,000 grants from the EPA's People, Prosperity and the Planet student research program. The goal is to promote sustainable solutions to environmental problems.

In April, representatives of all the teams will lay out their preliminary results and follow-up plans at the National Sustainable Design Expo in Washington, D.C. Six teams will win $90,000 follow-up grants, though the agency has sent out a letter warning that the federal budget cuts known as sequestration that kicked in this month might require the program to be scaled back, Spencer said.

If the UW team is victorious, members will set up a large-scale fog collector in Lomas de Zapallal and tie it into an irrigation system. Eventually, the system could be expanded to provide household water until neighborhoods can be hooked into Lima's municipal system, Bolton said.

"It can be a bridge technology."