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The Kesler Science Professional Learning Network (PLN) group on Facebook has a huge community of engaged and supportive science teachers - come join us!

KESLER SCIENCE

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Name: _____

Date: _____

Fog Harvesting

Alto Hospicio is a Chilean city located on the edge of one of the driest places in the world: the Atacama Desert. Despite being less than two miles from the ocean and often covered in fog, the city receives less than 10 ***millimeters*** of precipitation each year! There are nearly 100,000 people living there - how does a community with such a small supply of rainwater keep running?

Some people in Alto Hospicio are connected to the city water system, which draws water from ancient underground sources. There are two problems with this source, though. Those deep aquifers were filled over 1,000 years ago and are not being refilled in the present day. Also, many people in the city live where there are no connections to the water system, so they have to depend on water delivered by truck. Could the science of "fog fences" improve the water crisis in Alto Hospicio?

Fog fences work on the same principle as the needles of California redwood trees. These huge trees need a lot of water, but the region they live in has many months of dry weather where less than an inch of rain falls. However, fog rolls steadily into the redwood forests. The fog condenses on the smooth redwood needles, slides towards the root system, and supplies the trees with precious water year-round.

Water tends to condense on any smooth, cool surface, which is what makes a fog fence work. In a fog fence, a sturdy frame holds up mesh netting where water droplets in the fog can collect and run down into collection buckets at the base.

Fog fences are not a new idea—places in South America and North Africa have been harvesting fog since the ‘80s, and even the ancient Inca used buckets to collect dew running down from tree leaves. But today’s technology is making it more efficient. Scientists have learned small changes in the mesh make a huge difference in the amount of water collected. Large mesh fibers with large holes can only collect about 2% of the water passing through, but fine strands with small spaces between them can collect closer to 10%!

Modern fog fences have to overcome more problems than just being efficient. Besides being dry, Alto Hospicio has a problem with air pollution. Smog, smoke, exhaust, and other chemicals floating around the city would contaminate the water collected through fog fences, making it unsafe to drink.

The solution? Scientists are working on a special titanium dioxide coating for the mesh. The coating uses the Sun's ultraviolet (UV) energy to break down pollutants when drops collect on the mesh. The coating can also store the UV energy like a battery, so the mesh sanitizes the water even on cloudy days.

Just how scarce is water in the Atacama Desert? On the next page, there’s a graph that shows temperature and precipitation changes over the course of a year.

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Fog Harvesting

1. What are the two dependent variables in this graph?

_____

_____

2. What pattern do you notice between the temperatures recorded in the Atacama Desert and the months of the year? What does this tell you about the seasons in this part of the world?

_____

_____

3. Which months have the most rainfall? Why do you think more rain happens this time of year?

_____

_____

_____

_____

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Blog Link: https://blog.keslerscience.com/phenomenon-and-graphing/fog-harvesting

Fog Harvesting

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1. What are the two dependent variables in this graph?

   The temperature and precipitation are both dependent variables in this graph. Temperature and precipitation depend on the month in which the data was collected.

2. What pattern do you notice between the temperatures recorded in the Atacama Desert and the months of the year? What does this tell you about the seasons in this part of the world?

   The coolest temperatures occur in June and July, while the hottest temperature is in December. The Atacama Desert is in the Southern Hemisphere, so winter occurs during June and July, while summer takes place in December.

3. Which months have the most rainfall? Why do you think more rain happens this time of year?

   February gets 5mm and March gets around 2mm of rainfall. According to the graph, no other months get any rainfall. This might be because the warmer temperatures have brought in more humidity. (Accept reasonable responses.)

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