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México: Water Scarcity and Vulnerability in Sierra Tarahumara

"Water is life's mater and matrix, mother and medium. There is no life without water." –Albert Szent-Gyorgyi

Problem:

It's very easy to think that water will never run out since we have the privilege to have it at home, at school and basically everywhere we go. For many people using water is just something they do every day but for others, having water is something that doesn't happen that often.

About 1.1 billion people in the world don't have access to water, 2.7 billion have a limited approach for at least a month, a year, and about 2.4 billion people are exposed to diseases such as cholera and dysentery since the lack of water forces them to get water from unsafe sources that contain many infectious organisms (World Wild Life).

Nowadays one of the major problems that Mexico faces is water scarcity. About 40% of the country suffers from lack of water. The states located in the north of the country have been the most affected with severe droughts in the last 3 years (El Economista).

One of the most affected areas in the country is the Sierra Tarahumara, a mountainous zone that forms part of the Sierra Madre Occidental, located in the state of Chihuahua in the north of Mexico, which has an expansion of approximately 60,000 km2 (WWF Mexico).

This area is home of the Tarahumaras, who call themselves Raramuris. The community has been there since the Spaniards arrived in the 16th century. This society is famous for having endurance runners. Tarahumaras are also characterized to be very humble. They like being alone, living in long distances from each other. The typical family size is about 4 or 5 persons. More than 370,000 habitants of Sierra Tarahumara subsist out of forest resources. Most of them survive recollecting and hunting. Some of them own crops to cultivate corn and beans. Others also have a reduced number of farm animals like cattle and goats that are only for them to subsist (FAO). They live in

small houses made out of wood for most part of the year and during winter they stay in caves because of the low temperatures in the area (National Geographic).
Nowadays there are about 50,000 Tarahumaras living in those canyons and most of them lack of health and educational services. At least 500,000 people are being affected due to the lack of water access (Noticias Terra).

Water scarcity is an unavoidable weather phenomenon. We can't just hope that it will eventually stop because we can't control the weather and all the climate changes the planet has been through in the last few years. Having no water means having no food. The agricultural and cattle productivity in these places is having a lot of problems. After losing most of their crops, the uncommon blizzards in the same year made it impossible to plant so easily again. In the case of beans the sowing decreased from 145,747 to 38,000 hectares and 15,000 of these hectares were lost due to climate change as well. Also during 2011 it was necessary to sacrifice in advance about 500,000 animals so they wouldn't starve to death (Noticias Terra).

Without water, how is a community supposed to grow crops and keep animals alive? Since 2011 the Sierra Tarahumara and the northern part of Mexico has had an insufficiency of water caused by the lack of rain in these areas due to the climate change and since it's been at least 70 years since something like this happened in the country, people don't know how to solve the problem (Noticias Terra).

Even though the Tarahumaras have survived for about four hundred years in the Sierra Madre Occidental, today they are struggling to survive because of the lack of water in their region. And the situation is getting worse. Living in a reserved place as they do, makes this situation a lot more complicated because it's not that easy to have access to secluded zone as theirs.

Not having water not only lets them die of dehydration, they don't have the resources they need to produce their own food (as corn and beans). If they don't have food for themselves they obviously don't have food for their cattle that is why it is dying, too. The situation is so severe that these people are pushed to drink water from unsafe places like small holes with water in the middle of the desert which could contain infectious organisms, increasing the risk of having a water-borne infection (World Health Organization).

Proposal:

Today we have different modern techniques to fight water scarcity; the problem is that most of them are designed for cities with a lot of technology, and rural communities don't have the resources to execute them. That is why I managed to find different techniques that could be useful to a community like the Tarahumaras when applied in a way where the community can learn to help themselves and the place they live in to create a better environment for everyone.

I want to show them how to obtain water in the extreme circumstances that they are facing today. Show them to be prepared for the driest times and show them what to do during those times so that they can live as they have in the past 400 years.

First of all it's very important for Tarahumaras to know what they should do before the longest seasons of droughts. Some things that are possible in their communities are:

1. Controlling pollution in rivers and other bodies of water. Maintaining all this bodies of water like streams, lakes and rivers clean. Making them aware of the importance of taking care of the water and garbage so they won't pollute the rivers near their communities. Creating small groups of people from the community to take turns in picking up the trash in the shore of their closest bodies of water.

2. Enhancing the agricultural productivity to get better crops. Even though Tarahumaras don't have a lot of technology, they could improve their crops and make a better use of the water they can get, so that they can find a way to grow more food. For these I propose two things: The first one is to create a family garden. A family can put together an orchard outside their house with corn and beans and water it manually for their consumption. My second proposition is to do the same but involving more people. Instead of each family owning their own orchard the community could put together a bigger place to plant food for their consumption.

3. Having systems that can store water. A well is a good example of this, if the family doesn't have the technology to achieve this there are other alternatives they can consider: digging holes in the ground and covering them with plastic bags so that the water they store don't penetrate through the ground. It's important to know that these systems should be covered because storing water at home can increase the risk of water contamination and provide a

breeding ground for mosquitoes that can carry different diseases such as malaria and dengue fever (World Health Organization).

During a drought it is crucial for them to know the following things as well:

1. Considering they don't have enough water, it's important to plan how they will use the water they have. Organizing the quantity of water they are going to use for their props and daily lives.

2. Doing the work in the early hours of the day so they won't expose themselves to the midday heat (CENAPRED).

To solve the problem that the Tarahumaras have, it's crucial to involve the community in the solution of the problem so that they can feel the project as their own, not depending on external sources for the community to grow as a whole. This is why I have created a small project that consists in the community participating in the creation of special techniques for rural communities to obtain water.

The technique that I plan is called "Condensation Trap" or "Moisture Trap". This rural technique is an ancient technological discovery; some people believe it was used in ancient civilizations like the Incas in Peru.

"The Condensation Tramp" consists on gathering water from the ground through a system of condensation can perfectly work for the Tarahumaras because it is ideal for areas where days are warm and nights are really cold like Sierra Tarahumara.

What happens with this technique is that the water that the ground contains condensates on the bottom of the plastic sheet and falls into the container. You can get up to half a liter every 24 hours. This method also serves as a trap for insects; they'll fall in it and won't be able to get out.

The materials needed to implement this technique are the following: a shovel, a bowl, rocks or a heavy object and a thick plastic bag or plastic sheet.

How to do it:

1. Find a place where the ground is flat and clear.
2. With help of the shovel dig a shallow hole about 2 or 3 feet deeper that your bowl.
3. Place your bowl in the bottom center of the hole; be sure to put it in the center, a few inches apart from the walls of the hole, so it won't be touching them. The bowl will act as the container of your condensation trap.
4. Cover-up the top of the hole with your plastic bag or plastic sheeting (if it's a plastic bag make sure it is not thin enough to break during the day).
5. Use the rocks or heavy objects to hold the plastic into place, putting them in the edges of it. To create a seal between the soil and the bottom of the plastic sheet cover the rocks with soil. This will grant the trap to work better.
6. Place a smooth rock in the center of the plastic sheet, over the bowl, and press it carefully to create a funnel like dip.
7. Let the trap to wait overnight or more before taking off the plastic sheet and gathering the water in the bowl (Hamilton).

To develop this project in the community we will need human resources, financial means and technological training.

What Tarahumaras first need to know is how to be prepared for the droughts that are happening in the place they live, and how they will be able to work the techniques that were described in their community. To show them how the techniques work, I plan on training a group of students from the Universidad de Chihuahua (University of Chihuahua) in order to visit the community every month to assist Tarahumaras. This will not only help the Tarahumaras but it will also help the students in order to learn to get more involved in their community creating and improving social consciousness and to be aware of what is happening in their country nowadays.

To carry out the techniques we don't need too many economic resources, but we do need a few materials that can be given to the families to facilitate the realization of the techniques. One institution that can help them get the economic funds they need is the FAO (Food and Agriculture Organization of the United Nations). This organization's main goal is to guarantee food security for people all around the world, improve agricultural productivity, nutrition and assure a better condition for rural populations in order to contribute to their economic growth.

Conclusion:

Making this research made me realize that the world is full of people that don't have the power to choose, and that I have the power to help them change that. Some people who need help can't always help themselves. Having all the opportunities and privileges that we have makes us somehow responsible to find a way to help the ones who need it, so that we can create a better world for everybody in the future, but mainly in the present time.

Helping the Tarahumaras with my proposal of applying different techniques to obtain water in places with water scarcity and vulnerability gives them the opportunity to:

- Gain a better management of the water they can get in order to improve their nutrition.
- Learn to organize the ways they use water so that it can be reachable and know how to make water sufficient to use for their personal hygiene in order to improve their health.
- Improve their human development.
- Preserve their heritage and culture and remain living in their homeland.
- Obtain better education and have the same opportunities every other person has as Mexican citizens.
- Give them the opportunity to work together as a team and fight for better educational and health systems

At the end of the project I realized that if you want to do something you can do it. If everybody helps even just a little bit with what they can, the world can become a better place for everyone to live in. And I hope that all this becomes a reality someday soon.

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