



Royal Academy
of Engineering

MAPwater:
combatting
water scarcity
and sanitation
with sustainable
solutions

POZO AZUL ABASTECE RED LOMA DEL RIO

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Combatting water scarcity and sanitation with sustainable solutions



Project

MAPwater: mapping availability and pollution of water resources

Awardee

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Collaborators

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Conagua

- Consejo Consultivo de Agua,
- Engineers without Borders, Isla Urbana, Saya

Challenge

Water scarcity affects every continent across the globe and climate change and overpopulation has only exacerbated the issue. In Mexico, lack of available drinking water is a widely acknowledged problem. This is partly because water management and infrastructure are not well developed, but also because the country depends on aquifers for drinking water, underground layers of rock saturated with water. These have been overexploited through urbanisation and do not adequately replenish during the rainy season. In the rural communities of Mexico, water scarcity is even more severe. For example, in Llano Grande, a community on the outskirts of Mexico City, no households are connected to a public water supply and only 59 households out of 110 have sanitary installations. There is no running water for cleaning, cooking, or domestic consumption, and drinking water is collected from a well and a natural spring, which are both located far away from the settlement.

Project solution

A group of UK academics collaborated with Mexico-based NGO Fomento Mexicano, local stakeholders from NGOs, government bodies and water companies to develop an effective water management and resilience strategy for rural Mexican communities, focused on Llano Grande. They gathered historical data on water

availability and quality from academic literature and government reports and hosted a workshop about sustainable water provision to foster open discussions between experts in rural water availability. The researchers also engaged with residents of Llano Grande to gain insight into the challenges they face when obtaining safe water.

Interdisciplinary collaboration

To understand the issue of water availability in the country, the researchers built a collaborative network of water experts from academia around the world. Their expertise was combined with the input from key Mexican stakeholders to enable an open discussion on the issues of water availability, quality and treatment in rural Mexican communities. Engagement with the community of Llano Grande was critical to understanding the end-user perspective of the water challenge. The team worked closely with local NGOs who had intimate knowledge of the culture of rural communities. Overall, the researchers gained a thorough understanding of both top-down and bottom-up perspectives of water security, which was key to developing impactful strategies.



**Sustainable
development goals**

Impact

Through their research, the team found that rainwater harvesting is one of the most viable solutions for water scarcity in the area. Working with the local NGO, Isla Urbana, they installed a rainwater harvesting and purification system at the local school, Miguel Angel de Quevedo, that has a capacity of over 450,000 litres per year and can provide more than 65% of the community's water needs. A school activity called 'Escuelas de Lluvia' was developed with another NGO, Saya, to educate young people and their families on the importance of water safety and raise awareness of sustainable water use. As part of this activity researchers trained a small committee of parents, teachers and students on the maintenance of the rainwater harvesting and purification system to build local capacity and ensure that the system can be used for many years to come. This activity has so far been used by over 200 students and teachers and the researchers hope to bring these activities to other rural schools.

Future plans

By working with local communities and key stakeholders, the team has mobilised government bodies to find more sustainable solutions to water scarcity in rural Mexico. However, the team acknowledge that there is still much to do. The outcomes of this project can be

applied to other communities where access to safe water is critical and the team is now looking for further funding to expand the scope of the project and help bring a sustainable clean water supply to other communities that need it.



“When working with vulnerable communities it is essential to build a relationship of trust, and this could not have been possible without the knowledge and experience of NGOs and other academics that I met through Frontiers. The ability to collaborate with people around the world, and in the community itself, really made all the difference to this project.”

Mirella Di Lorenzo, University of Bath (PI)

Funding

This nine-month project received £20,000 in funding from the Frontiers of Engineering for Development programme in 2017.



School activity on sustainable water use has been used by 222 students



Committee of eight parents, students, and teachers trained to maintain the rainwater harvesting and purification system

For more information, including eligibility, please visit raeng.org.uk/frontiers and follow [@RAEngGlobal](https://twitter.com/RAEngGlobal)

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