



INSPIRING PRACTICES |  FINALIST 2023 |  DOMINICAN REPUBLIC

#ENVIROMENT

Young people are protagonists of multiple environmental solutions for local problems

With STEM innovation, students created an electrical system that generates energy and acts as a water filter to remove organic waste.

TEACHER

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COMMUNITY/CITY

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STEM AREAS

Science, Engineering, Technology and Mathematics

STUDENTS

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SCHOOL

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OUTRAS ÁREAS DE CONHECIMENTO

Sociology and Environmental Education

PROJECT NAME

Hidrosung

Imagine yourself in a situation where you are left without electricity and sometimes even without drinking water, although there are rivers near your community. For four students from the Dominican Republic, this seemed like a contradictory context, so they decided to use their knowledge in [STEM](#) (Science, Technology, Engineering, and Mathematics) projects to offer a sustainable energy solution. And so they created “Hidrosung”, a prototype that generates electricity by taking advantage of water flow while removing organic waste.

The creation was a 2023 finalist in Solve for Tomorrow Central America and the Caribbean region, which brings together 11 countries: the Dominican Republic, Costa Rica, Panama, Guatemala, Honduras, Nicaragua, El Salvador, Ecuador, Venezuela, Belize and Barbados. “Hidrosung” is a combination of words. Hidro stands for hydroelectricity and Sung refers to Samsung, for the [Samsung Solve for Tomorrow Latam](#) program. The system promotes sustainability while storing waste, converting it into organic compost, and, by cleaning it, prevents drains from becoming clogged, maximizing the efficient use of water.

The initiative started after a visit by representatives of Solve for Tomorrow to the school. The young people were motivated to make a project to apply for and asked teacher Maria Noroibi

Muñoz to be their [mediator](#). “For me, it is a great honor to help them develop and be part of the transformation of the world,” says the educator.

In the Dominican Republic, work is done by area. The four students from “Hidrosung” are from the IT area and were in the sixth year of high school, the last year of compulsory schooling. In addition to the knowledge they had in class, they used family learning: two of them are cousins and their family owns blacksmith shops; others are mechanics relatives.

Innovate solution of sustainable energy with a focus on the own reality

The first step was to diagnose which [problems](#) in the country could be helped with STEM knowledge. They observed that there is a great shortage of water in the Dominican Republic. According to the World Bank, six out of 10 urban households and half of rural households in the country in 2021 reported an intermittent water supply. In addition, the low quality of the service leads to resorting to bottled water, which is more expensive.

“We often lack energy and have many problems with the accumulation of waste. This is where the idea of creating an environmental impact to meet these challenges comes from,” says Muñoz.

The students also had help from their Natural Physics teacher to get the idea off the ground. They discovered that they needed to use diodes, a battery, a propeller, filters to collect water waste, and a motor to drive the energy. “They were able to see with the teacher, for example, how many volts they needed to charge the battery and what kind of motor they were going to use,” says the teacher.

With the materials purchased and in hand, they went to the workshop of one of the boys’ fathers to build the toy. “It took one to two weeks to create the prototype; with moments of enjoyment because it was not just work: they also shared good times, they laughed,” recalls the teacher.

The dirty water is passed through a water jug with a homemade turbine inside that agitates the water to separate the organic waste. The non-organic waste that sometimes appears in the filter is removed and taken to the corresponding garbage container. Finally, the water is clean and the energy from the movement generates electricity. In addition, the separated waste can be used as a sustainable fertilizer for agriculture.



With some mechanical materials and simple everyday utensils, the students managed to create the prototype.



Eureka moment!

Everything seemed to be going well with the assembly of the prototype. But when they tested the propeller, it didn't turn as expected. "We tried to understand what it could be until we realized that we needed to change the propeller and we couldn't find the model we were looking for; then the students had to create one practically from scratch," says the teacher. One of the team members suggested using plastic spoons that were cut and adapted to the shape they needed; they placed it on the engine and eureka! It worked.

In addition to the technical work that brought them together, participation in the program also stimulated the group's soft skills, especially communication and the ability to express themselves in public. "For the program, they had to record a video, but they were very shy. They had to record many times because at first their voices could not be heard or practically nothing could be understood. Now, after this experience, we see them very differently. You can see the change in the way they speak and how they defend their ideas," Muñoz proudly admits.

For the educator, beyond being a school lesson, being part of a project like this is an opportunity for the youth protagonism, for them to have better prospects in life, considering that, according to her, the region where they live suffers from violence and crime.



“Participating in projects like Solve for Tomorrow opens doors for them and gives them a little push to move forward,”

she believes.

The experience also sparked a whirlwind of ideas for the three young people, and they continued to participate with new proposals in the following years. “For me, it was also satisfying because I was able to learn a lot more about electricity, which is not what I usually do. It was a new and very good experience,” she adds.



Explaining!

In the city of Santiago, located in the Yaque del Norte River basin, [only 20% of the city's wastewater is treated](#). The Yaque del Norte River, which runs through the city, collects wastewater along its 296 kilometers and provides irrigation to 70 thousand hectares of farmland, supplies water to dams that generate 488 gigawatts of energy per year, and affects more than two million people.




Focus on practice!

Take a look at the teacher's guide on how to create a prototype that generates electricity while acting as a filter to remove organic waste.




Empathy

 The first step was to diagnose the country's [problems](#) that could be helped with STEM knowledge. They observed that in the Dominican Republic, there is a great shortage of water and energy and there are problems with garbage accumulation.




Definition

 The idea was to create an environmental solution that would respond to all these challenges. With the help of their mediator teacher, their families, and a Natural Physics teacher, they concluded developing a kind of filter for the dirty water in the rivers of their community.




Ideation

 They realized that the environmental solution could also generate electricity, through the movement of the propeller used in the filter. Other electrical materials were diodes, a battery, filters to collect waste from the water, and a motor to drive the energy. With the materials in hand, they went to the workshop of the father of one of the students to build it.




Prototype

 Dirty water passes through a water jug with a homemade turbine inside that stirs to separate organic waste. In the end, the water is clean and the energy of movement produces electricity. In addition, the separated waste can be used as fertilizer for agriculture.



Testing

 When they tested the prototype after assembly, the propeller did not work as expected. They needed to change the model but could not find it. So they made another one with their own hands, using plastic spoons that were cut and adapted to the shape they needed and placed on the engine. The experience motivated the young people to keep trying until the end and resulted in more confidence in themselves, better communication skills, and the will to continue doing STEM projects to transform their communities.