Activity 1: Develop design idea for your team township challenge

Group W3
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Design Ideas for Tanh Linh Town Water Shortage:

In the previous week's activity, our team has come up with ideas to develop the design and set up guiding principles in order to solve the problem and also turn it into a sustainable solution. In this activity, we will demonstrate design idea for solving Tanh Linh water shortage. According to last week's activity, we decided to take the lack of source of untreated water and water pollution as two main issues causing water shortage. In this week's activity, section 1 will provide general ideas to the issues and then in section 2, a list of three technologies/devices, including Rainwater Harvesting and Storage System, Solar-Powered Water Purification System and Community Greywater Recycling System will be discussed in details.

1. **Develop your team design ideas based on the on the identified problem and list technologies/devices for each solution**
    - **Problem 1:** Lack of source of untreated water:
        i. Elevated water storage tanks for maintaining pressure and ensuring consistent water supply. Its method helps

improve the water distribution system by creating water pressure through gravity, which makes the water easier to transfer. It can also be a backup water supply in case of power outages or disruptions at the water treatment plant.

ii. Collecting an alternative source of water from rainwater. In the rainy season, the rainfall is very high, so that every household in Tanh Linh could collect a large amount of rain water through a system of gutters, filters, and storage tanks. However, this source of water needs to be treated by a filter system, which we will demonstrate in the later part. Another method to collect water is from the fog and desalinating the sea water, but it would require significant financial investment and research resources.

- Problem 2: Water pollution - Another root cause to reduce the source of untreated water.
  i. Improved sanitation facilities and wastewater treatment systems to prevent contamination of water sources by applying greywater recycling systems. Grey water refers to wastewater from household activities like cooking, laundry, and bathing. Unlike blackwater (tolet waste), grey water, which has a lower level of fecal matter, can be recycled and reused as irrigation water. With black water, each household could build a sepic tank with proper drainage fields in order to treat wastewater at the source and reduce the expensive piping network.
  ii. Planting buffer strips along rivers and streams to filter pollutants from agricultural runoff. Buffer strips are narrow plantings of perennial plants that are primarily used to reduce water runoff from fields, including the loss of pesticides and fertilizers, and they could be harvested for biomass production.

To sum up section 1, these two problems should be addressed and improved at the same time. It means that we can increase the source of

untreated water while protecting the existing water source that we already have by minimizing water pollution.

2. **Each design idea should list combination of technologies/devices for a solution**

   After carefully selecting and refining ideas to address and improve the water situation in Tanh Linh, we have curated a list of technologies that we will utilize to implement these ideas and bring clean water to Tanh Linh to tackle the water issues. We have chosen and compiled a list of technologies that we will employ to execute these ideas and deliver clean water to Tanh Linh, thereby addressing the water challenges.

   List of technologies/devices to be used:

   1. Rainwater Harvesting and Storage System:

   - Addresses the issue of untreated water scarcity by collecting rainwater for various purposes, reducing pressure on the main water supply, and minimizing the risk of water shortages.

   - Provides a clean water alternative to water from untreated sources.

   2. Solar-Powered Water Purification System:

   - Solves water pollution problems by filtering water from untreated or polluted sources.

   - Provides clean water by using solar energy to efficiently and sustainably purify water.

   3. Community Greywater Recycling System:

   - Addresses water pollution by recycling greywater from household activities, reducing the amount of wastewater discharged into the environment.

   - Supplies recycled water for irrigation purposes or activities that do not require clean water.

3&4. List each device properties and how it functions & Use a smart tool (use shapes, draw in MS word or Power point) to create, visualize and design your team design ideas

To solve the problem of untreated and polluted water, our team has come up with three ideas that can be optimal in overcoming this situation.

Solar-Powered Water Purification System

The machine is equipped with a large solar panel, two water tanks, a water pipe, and an advanced filtration system. The solar panel absorbs solar energy, which is then converted into electricity to power the mechanism that draws water up through pipes from wells or underground sources. Once extracted, the water is collected in the first tank and subsequently passed through the filtration system. Following filtration, the purified water is stored in the second tank, ready for distribution to consumers.

Rainwater Harvesting and Storage System

This system includes gutters, pipes, and first splitters. The function of this device is to collect rainwater from the roof and lead it into tanks, then the first splitter will remove the first stream of water that may contain pollutants. With a large capacity tank and filter combined with activated carbon and UV technology, it will ensure safety for daily use for consumers.

Community Greywater Recycling System

This technology includes collection pipes connected to sinks, showers, and washing machines. The main function is to collect used water from households. Using simple materials combined such as sedimentation tank, biological treatment unit, sand filter. This system can treat gray water to remove contaminants and make it suitable for irrigation.

5.

To be able to use technological devices effectively, users naturally need to possess a certain level of knowledge and a basic understanding of technology. This foundational knowledge allows them to navigate and utilize the features and functionalities of the devices. However, for these devices to achieve widespread adoption and usage, they must be designed in a way that prioritizes simplicity and ease of use. This means that manufacturers and designers strive to create user interfaces and experiences that are intuitive, straightforward, and accessible to as many people as possible, regardless of their technical expertise. By simplifying the technology, they ensure that a broader audience can benefit from the advancements and conveniences that these devices offer, thereby enhancing their overall utility and appeal.