

SOS4Love Project

Final Action Plan Report

School/Country: Zenon Primary School, Larnaca Cyprus & Saint Spyridon Primary School, Nicosia, Cyprus

Teacher/Facilitator: Name & Last Name-Subject taught in class:

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Autonomous house

Which is the most efficient solution for optimizing water provision for a house located in a non-residential area in the countryside: water supply, drilling, rainwater collection or greywater recycling?

The lack of sufficient water due to the low rainfall in Cyprus is one of the most serious environmental concerns our island is facing. At the same time, poor management of the sufficient available water resources, growing freshwater use and depletion of usable freshwater resources, are constantly exacerbating the problem of water scarcity on our island. Water scarcity is not only a Cypriot problem but a global one as it is already affecting every continent and seems to be the largest global risk in terms of potential impact over the next decade.

In addition to water scarcity, Cypriot society faces a housing problem. Many couples or even families, although they own land in the countryside, find it hard to build their homes there, because their area is not being supported by the water and power supply systems. On the other hand, the prices of land, plots and apartments in the city centre are at constantly increasing, due to the urbanization of previous generations, making their purchase impossible, almost for everyone. This has resulted in the concentration of many people in urban centres and at the same time desertification of the countryside.

The main goal of our SOS4Love project is to investigate alternative sustainable solutions to the issue of water supply of a house in the countryside, outside the water and electricity supply system and disseminate the results of the project to Cypriot society. Moreover, a key contributor to the success of our SOS4Loveproject is collaborations with stakeholders such as Hydranos Ltd company, Environmental

Information and Education Center, Minister of Agriculture, Rural Development and Environment, Cyprus Pedagogical Institute. Through our project we support the Sustainable Development Goal 6 – Clean Water and Sanitation, SDG 9 – Industry, Innovation and Infrastructure, and SDG 11 – Sustainable Cities and Communities.

Students, in the context of their research, sought the most appropriate solution to the issue of water in order to enable the construction of a house in the countryside, outside the water and electricity supply system. The main IDEA was to build an autonomous house capable of running without water from the water supply system and without electricity from the electricity supply system. Through the study of four alternatives (water supply system, drilling, rain water, grey water), the students concluded that the best solution is the combination of a rainwater collection system and a greywater recycling system. With the rainwater collection system, the autonomous house will cover half of its needs (drinking water, kitchen, bathroom), while through the use of the greywater recycling system the other half needs will be covered (cleanliness, toilet, irrigation). At the same time, with the installation of photovoltaic panels on the roof, students managed to solve the issue of electrification.

Our action plan towards the SOLUTION is described in the following Steps:

A. Basic Question

We set the driven question: Which is the most efficient solution for optimizing water provision for a house located in a non-residential area in the countryside: water supply, drilling, rainwater collection or greywater recycling?

B. Positions and possible solutions to the problem:

1. Apply to the Water Supply Company to put tires or pipes so that the water reaches the field
2. Collect the rain water and use it
3. Drilling to take water from the subsoil
4. Recycle greywater

C. Work course design

1. We thought about studying books and the internet on the issue of water and the possible solutions we gave
2. We thought to ask specialists
3. We also thought to discuss in our team whether the solutions we proposed are good and feasible
4. Finally, we thought of making a construction showing the solution or the solutions we would end up with.

D. Study, research and information gathering

1. We searched for answers to the Athalassa Environmental Information and Education Centre. There we participated in the "Apostle Water" educational program. We got ideas on the subject and got a lot of knowledge.
2. Field study. We searched in Athalassa forest, for evidence that it is suffering from drought and we gathered elements of drought
3. We studied the water cycle
4. We studied the 4 unconventional water resources
 - a. Greywater recycling
 - b. Rainwater collection
 - c. Desalination
 - d. Urban waste water - Biological cleaning
5. We studied the greywater recycling system of the Athalassa Environmental Information and Education Centre. The greywater from the wash basins ends up in the cleaning tank and after being cleaned, in the storage tank. From there, it is reused in the garden and the lavatory cisterns.
6. We studied the gutter system of our school. The rainwater, from the gutters, passes into pipes and gets lost to the ground. We investigated possible actions for collecting this water and reuse it.
7. We prepared posters for unconventional water resources where we gathered all the information we learned about each and every one.
8. We contacted Mr. Nikos Nikolaou for providing us further information. Mr. Nikos Nikolaou is a member of the Environmental Education and Sustainable Development Unit of Cyprus.

9. We asked Mr. Chrysostomos Kambanellas, owner of Hydranos Ltd Company for information. His company deals with greywater recycling systems and rainwater collection systems.
10. We studied and watched a lot of NASA videos, songs, educational videos from the Nicosia Water Board and other relevant texts from the Internet.

E. Investigation of 4 alternatives - Results

1. Water supply:

- It costs too much money to join pipes under the earth to bring the water from so far, near the house.
- It requires excessive effort and long time to do this.
- Each month, depending on the amount of water they use, they will pay for the water bill.
- Water is more expensive in recent years, due to water scarcity on our island.

2. Drilling:

- Needs authorization.
- Not a satisfactory solution.
- Water may be inadequate or water may be salty.
- Water may need too much cleaning to use inside the house and make it drinkable.
- The area may still have no underground water.

3. Rainwater:

- Collection of rainwater from the roof.
- Cleaning of water with special medicines and machines.
- Re-use of rainwater in bathrooms, wash basins, cooking, kitchen, washing clothes, and drinking.

4. Greywater:

- Collection of gray water from bathrooms, wash basins and washing machines.
- Cleaning the water with special medications and filters.
- Re-use of water in lavatories, swimming pool, car wash, cleaning, watering.

F. Argumentation – Final Decision – Optimal Solution

1. After gathering our research results, a detailed discussion and analysis followed, aiming to support our final decision. We developed arguments about all the different alternative solutions. Finally, we concluded that the best solution is the combination of rainwater collection and greywater recycling. With the rainwater collection system, half of the family's needs (bathroom, kitchen, laundry, drinking) will be covered, while through the use of the greywater recycling system the other half needs will be covered (cleanliness, toilet, irrigation).

G. Construction of an Autonomous House

We used lego bricks and other parts for building a house capable of running without the need of water from the Water supply company.

1. We put a cloud and hydrophores on the roof to show that we're collecting the rain water. Rain water, then goes down for filtering and cleaning with special medications (a move shown by the lego wedo programming) and ends up in a tank where it is gathered to be used again.
2. We also put tubes that take the greywater from the bathroom, the washbasin and the washing machines outside the house. Greywater, then flows into a special mechanism to be filtered and cleaned with medication (a move shown by lego wedo programming). It ends up in a tank where it is gathered to be used again.
3. We placed pipes around the yard to collect the water again.

The fact that there is no electricity system in the area, contributed to the idea of installing photovoltaics to cover the house's electricity needs. We implemented this in our proposed solution as well.

With this solution, we propose a house which will run without the need of water from the Water Supply Company and without the need of electricity from the Electricity Supply Company. In other words, it will be autonomous. So, any family in the world can build their autonomous home in the field anywhere in the countryside. Despite the expenses of the mechanisms and medicines required to process water (around 15,000 euros), this is a much cheaper solution than building a house on a plot in the city (which is much more expensive). Furthermore, autonomous house will not have any expenses on water and electricity bills, as opposed to the residence in the city, where bill payments to the Water Supply and the Electricity Supply Company

are needed. Autonomous house is a house that will not have any operation costs, since residents do not have to pay either electricity or water. This reduces the cost of living in the countryside and in this way, we help farmers, we support rural development and we contribute to decentralization.

H. Disseminate the idea of building an autonomous house

1. Providing class to class information to inform school community about the operation of the autonomous house we build.
2. Participate in a meeting with the Minister of Agriculture, Rural Development and Environment Mr Costas Kadis, to inform him about the benefits of building an autonomous house especially in the countryside.
3. Publicity of our Sos4love Autonomous House Project by a lot of Cypriot media with the support of the Ministry of Agriculture, Rural Development and Environment.
4. Participate in the First Lego League Junior and promoting the idea of exploiting technology for sustainability through our Autonomous House.

DIFFICULTIES: To accomplish the objectives of the project, many hours of work have been required by both, students and teachers. We have worked weekends and many non-working hours. Also, in some cases, we needed the help of parents to study and for transportation, but fortunately they were willing to offer. Finally, money was required for student transport at various places for the investigation of the problem and the study of the alternatives (water supply system, drilling, rain water, greywater). This was difficult for the families, although Environmental Information and Education Center and also Saint Spyridon Parent Association sponsored a few of our expenses. Money was also required for buying lego material which was sponsored from Cyprus Pedagogical Institute and Saint Spyridon Parent Association.

2) Share the results of your SOS4Love project.

Autonomous house is an innovation for Cyprus and Global reality. Through sos4love program “Autonomous House”, students, parents, trainers developed environmental awareness and contributed to the emergence and dissemination of the idea of building a sustainable city or a sustainable settlement through present innovative proposal, while supporting SDGs 9 and 11. Students, with their simple and pure look

have perceived the negative effects on the environment of simple day-to-day operations, such as washing dishes or lighting a lamp. With remarkable creativity, they built with their bricks a house that lives in harmony with the environment, prompting all people to change attitude and adopt solutions that respect the most valuable natural resource, which is water, but also save energy, to the benefit of conservation and protection of the environment. The main achievement of our project is that the Cyprus Pedagogical Institute will promote the implementation of our project in other schools and communities across Cyprus to maximize the benefits of its implementation to Cypriot society.

3) Share your feelings and reflections on your experience throughout the SOS4Love project.

Feelings of pride, conquest of success, joy, and enthusiasm have emblazoned our hearts when we realized that a handful of people can make a difference in the world by highlighting the innovative idea of building an autonomous home. We felt so happy when our SOS4Love project has been interpreted as a driving force of change, since it has prompted a change in the way several people are thinking, leading them to claim a more sustainable world to live in.

Thank you for Acting 4Love World-Changers! Looking forward to seeing you next school year in the SOS4Love Project again, to Keep Changing the World Together with #Pedagogy4Love!
