Harvesting water, sowing resilience
The rural community of El Limón in the dry corridor of El Salvador
The El Salvador country office of the Food and Agriculture Organization of the United Nations (FAO), with the support of the Mesoamerica Hunger Free Program, helped to develop community and family Rainwater Harvesting Systems (SCALL in Spanish) to mitigate the effects of the drought facing the central american dry corridor. The low cost and relatively simple technical aspect of the initiative helps to ensure access to water, thus improving the food and nutritional security of the participating families. In addition, it represents an excellent example for scaling-up, based on its proven technical parameters and especially the valuable lessons learned related to empowerment and social participation, multilevel and multisectoral consultation, and the exchange of knowledge between countries. These processes, which support the success of the initiative, help to ensure its sustainability and replicability. For example, similar projects have already been developed by El Salvador’s Ministry of Agriculture and are being planned as part of the Green Climate Fund’s RECLIMA project.

Location: El Salvador, Morazán Department, Municipality of Sensembra, El Limón Canton, community of El Guarumal.
No. of direct participants:
150 families with 675 members (community SCALL for drinking water)
12 families (family SCALLs for food production).
Executors: FAO, Mesoamerica Hunger Free Program.
Funders: FAO, Mexican Agency for International Development Cooperation (AMEXCID in Spanish), Municipality of Sensembra.

Investment (includes technical assistance):
Total amount for the project: USD 77 000
Cost of the community drinking water system: USD 53 000  (USD 353 per family)
Cost of family reservoir: USD 2 000 per family

Key words: SCALL, drinking water, food and nutrition security, fish farming, exchange network.
An arid area where the increasing scarcity of water deepens the cycle of poverty

Access to water and natural resources management in drought prone areas is one of the great challenges currently faced by Central American countries, specifically in the Central American Dry Corridor, where more than one million families live mainly by subsistence agriculture.

In El Salvador, the progressive deterioration of soils and increasingly variable and extreme climatic cycles are deepening the cycle of poverty and social exclusion. These effects are especially critical in municipalities located in the Dry Corridor (an area that comprises 83.8 percent of the Salvadoran territory), as is the case of the municipality of Sensembra, which is in the department of Morazán in the northeast of the country.

In this municipality, in El Limón Canton, the community of El Guarumal faces increasingly difficult access to water, both for human consumption and food production. As a consequence of the lack of drinking water, a high prevalence of gastrointestinal diseases has been observed. In addition, fluctuations in the rainfall regime resulting from climate change generate crop losses. As a result, families that practice subsistence agriculture are at risk of reduced food availability and diversification, thereby increasing their conditions of vulnerability, especially in children under five years of age, pregnant women and infants.

**Impacts of climatic variations in El Salvador**

**Key figures**

<table>
<thead>
<tr>
<th>Year</th>
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<tbody>
<tr>
<td>2008</td>
<td>Production of vegetables decreased by 46 percent, sugar by 41 percent, and coffee by 11.6 percent (2.7 percent of national production).</td>
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<tr>
<td>2008</td>
<td>Milk production decreased by 11.1 percent.</td>
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<tr>
<td>2010</td>
<td>The drought generated losses of USD 85 million (corn and beans). The most affected crops were corn (23 percent), followed by beans (33 percent), sorghum (19 percent) and rice (8.2 percent).</td>
</tr>
<tr>
<td>2010</td>
<td>In La Unión Department, milk production was reduced by 30 percent.</td>
</tr>
<tr>
<td>2012</td>
<td>Losses of coffee crops between 33 and 100 percent.</td>
</tr>
<tr>
<td>2015</td>
<td>Increase in corn and bean prices compared to 2014.</td>
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</tbody>
</table>

*Source: Own elaboration based on Calvo-Solano O.D and others, 2018, Impacts of drought in the agricultural sector of the Central American Dry Corridor.*
Challenges

Guaranteeing access to water for human consumption and food production

The project was developed to face the challenge of ensuring access to water for the families of the community by installing two types of Rainwater Harvesting Systems (SCALL in Spanish):

» A community system for the collection, use and purification of rainwater for human consumption.

» Family reservoirs for agricultural use and fish farming.

Participants

Families of the El Guarumal community

» 150 families, comprised of 650 members, have gained access to drinking water.

» 12 farming families have gained access to water for food production.
4 Description

A community system for drinking water and family systems for food production

Installation of a Rainwater Collection System with a purification plant at the El Guarumal School

Selection criteria for the school to be designated as the location for the system:
- It is a meeting place for families and the Association of Community Development (ADESCO in Spanish).
- It has physical space for the construction of the cistern.
- The roof is in good condition for water collection and pipes.
- The local government is willing to co-finance (contribute 25 percent of the investment).
- The Ministry of Education approves the installation of the system and is willing to provide the necessary electricity supply for the operation of the purification equipment.

Components of the system built with the technical assistance and experience of Mexico’s Colegio de Postgraduados (COLPOS):
- A storage tank with capacity for 105,000 liters of water.
- A pumping system.
- A purification system with ultraviolet lamps.
- Two storage tanks for drinking water.

| Total cost: | USD 53,000 |
| Investment amount: | USD 32,500 |
| Cost of capacity development: | USD 20,500 |

SCALL operation and administration model:
- The parents’ committee of the school is responsible for maintaining and operating the SCALL.
- Drinking water is delivered free to families according to their needs, each of which is able to collect water in clean 20-liter containers. The maintenance of the system is financed by the municipality.

Construction of 12 family reservoirs

Selection criteria for participating families:
- Families facing water limitations for food production.
- Families willing to: i) make the necessary physical changes on their land; ii) participate in training; iii) perform maintenance of the reservoir and water pipes; iv) help other families through the exchange of knowledge.

Components of each reservoir:
- Hole dug in the ground, covered with a geomembrane, with a storage capacity of 25,000 liters. The reservoir must be located in the upper part of the plot to be able to irrigate by gravity.
- Water collectors located on the roof of the house.
- Drip irrigation system (400 m², for a period of 90 to 120 days depending on the crop).

| Total cost per family: | USD 2,000 |
| Investment amount: | USD 1,000 |
| Technical assistance (SCALL and irrigation): | USD 1,000 |
Rainwater Harvest Systems (SCALL): Did you know?

- According to the World Health Organization (WHO), a person should consume on average 50 to 100 liters of water per day to meet the needs of both consumption and hygiene.

- With 1 millimeter of rainfall, an area of 1 m² can collect 1 liter of water. That is, with an annual rainfall of 500 mm and a roof of 50 m², 25,000 liters per year can be collected.

- There are different rainwater storage systems, which should be chosen based on the situation where they will be installed (precipitation, type of soil, seismic character, among others). The most common systems include cement plate cisterns (used in the Brazilian program “One million cisterns”), ferrocement cisterns, plastic cisterns, brick cisterns, and reservoirs with geomembranes, among others.

Approximate cost of the investment (does not include technical advisory services):

- SCALL ferrocement system and purification plant with capacity for 105,000 liters: USD 32,500.
- Cement plate cistern with capacity for 16,000 liters: USD 1,200.
- Family reservoir with capacity for 25,000 liters: USD 1,000.
5 Results and impact

Better water, better diets and key information to replicate the initiative elsewhere

Community drinking water system

» Characteristics of the community system:
  » Production capacity: 30 to 45 liters per minute.
  » Storage capacity: up to 105,000 liters, stored for a period of five months.
  » Direct benefit: average consumption of 2 liters of drinking water per person per day throughout the year.

» Capacity development:
  » 25 people have developed their capacities in Rainwater Harvest Systems (8 local government technicians, 3 mayors and a governor, 5 teachers and 8 ADESCO leaders).

» Water availability:
  » Access to safe and good quality water.
  » Reduction of the probability of gastrointestinal diseases that make food consumption less efficient and incur medical expenses by compromising access to other basic products that complement the daily diet.

Family water reservoirs to produce food

» Benefits of family reservoirs:
  » Extension of the sowing period and area, which increases the availability and diversity of food in the dry season (October to April), and watering of family gardens through drip irrigation systems.
  » Incorporation of fish farming: production of 500 fish (Tilapia nilotica) per reservoir, which adds a source of animal protein with excellent nutritional value to the family’s diet.

Cross-cutting benefits

» Time and effort saved in the collection and hauling of water for domestic and productive use.

» Exchange of experiences and knowledge between producers, technicians and academics in order to replicate the SCALL initiative using the most appropriate technology for each situation.

» Information and communication about the importance of harvesting and storing water. Raising awareness among the members of El Salvador’s Network of Food and Nutrition Security Communicators (REDCOSAN in Spanish) who have participated in a diploma on Food and Nutrition Security (FNS) and Climate Change. Members have also reported on exchanges and activities related to the promotion of the importance of efficient water use.
6 Success factors

Empowerment of the community and participation of the local government

» Empowerment of the community: raising awareness among participating families and promoting their capacity development has helped prepare them to manage the community SCALL.

» Coordination between local and central governments, as well as between the public and private sectors: co-financing by the municipality for the community SCALL and support provided by the Ministry of Education (installation in the school, financing of energy costs) and the Ministry of Agriculture (technical assistance to producer families), has helped to strengthen the initiative.

7 Sustainability

Public policy, empowerment and clear results

The sustainability of the project is ensured by the same factors responsible for its success, namely: i) the participation of the local and central governments that provide the necessary resources for maintenance of the systems; ii) the empowerment of the families in the communities through a process of participation and capacity development; and iii) the results and impact on the well-being of families.
8 Replicability and scalability

The initiative is being replicated elsewhere by the public sector and the Green Climate Fund

Based on FAO’s experience in the municipality of Sensembra, the following actions have been replicated or are in the process of being replicated:

» The Ministry of Agriculture, through the National Center for Agricultural and Forestry Technology (CENTA in Spanish), financed the construction of 138 family reservoirs, with the capacity to capture and store 90,000 liters of rainwater and a micro-irrigation system for 400 m² of land.

» The RECLIMA project, funded by the Green Climate Fund and executed by the FAO office in EL Salvador, includes the installation of 45 community SCALLs for rainwater harvesting and purification.

9 Lessons learned

Main conclusions

» Learning by doing: the different exchanges of experiences and knowledge that were developed as part of this project — in particular with Mexico and Brazil — have been crucial in convincing the different actors (local authorities, families, producers, technicians and workers, among others) of the feasibility and usefulness of SCALL.

» Disseminate local and concrete initiatives to influence policies: the information and communication effort based on this initiative has been crucial to mobilize programs and resources for its replicability in other communities.

» Provide on-going technical assistance: providing on-going support to family farmers is essential to ensure good productive use of SCALLs.

» Achieve a multilevel and multisectoral agreement: the coordination of efforts between governments at different levels and between different sectors, helps to increase the impact and sustainability of the initiative.
Exchanges: an effective tool for persuasion, action and reflection

The installation and management of Rainwater Harvest Systems in El Limón Canton has provided a space for interesting exchanges of knowledge and experiences. Highlights include:

International exchanges:

» Mexico: professionals from Mexico’s Colegio de Postgraduados (COLPOS) provided advice related to the construction of the community SCALL.

» Brazil: an exchange with Brazil’s Semi-Arid Network (Red ASA) was held in three stages:
  • Early 2018: a group of producers and officials from Brazil visited El Salvador to learn about successful experiences, analyze and discuss alternatives to improve access to water, and train producers regarding issues of water access, transport and treatment.
  • June 2018: a group of producers and technicians from El Salvador and Guatemala traveled to Brazil to learn about the experiences in the semi-arid region of the country, where they identified water management practices that helped to produce food more efficiently and increase resilience.
  • November 2018: a Brazilian mission of producers and four builders from Brazil’s Semi-Arid Network (Red ASA in Spanish) went to Guatemala to build a cistern and a digester, with producers and builders from Guatemala and El Salvador (learn by doing).

“For Red ASA, it has been extremely important to promote the exchange of experiences with other countries whose climatic and environmental characteristics are similar to those of the Brazilian semi-arid region, thereby increasing support for the idea that semi-arid areas of the world can and should learn from each other. In addition to making us reflect on our own practices, this initiative reaffirms the capacity of civil society to contribute to the development and management of public policies, while reinforcing the idea of semi-arid areas as potential places of life where technologies developed in the region can contribute to mitigating the effects of climate change. Although this issue has been widely discussed, little is said about practical actions and exchanges provide clear examples of how it is possible to discuss and act in regards to this problem.” (Red ASA Report, December 2018)

National exchanges:

» Government officials: Ministry of Agriculture and Livestock (MAG in Spanish), CENTA, CENTA regional supervisors, and technicians from government institutions related to water and soil.

» Academia: Universidad de El Salvador, Universidad de Oriente.

» El Salvador’s Network of Food and Nutrition Security Communicators (REDCOSAN in Spanish).

» Mayors of other municipalities in El Salvador — Brazil’s Semi-Arid Network (Red ASA in Spanish).
The initiative has helped to make access to water a priority in communities, governments and agencies

- The low cost and simplicity of the systems ensures their sustainability and replicability in other locations.
- The co-financing that has been mobilized and the continuous scaling-up process, shows that SCALLs have been identified as a possible solution by governments and other agencies.
- The empowerment of families shows that awareness about water use is growing.
- Management and optimization of water use: in addition to the short-term impact of SCALLs, their development helps to raise awareness and address the broader issue of water management.

### Highlights

- All family members participate in the project.
- The reduction in the need for water transport mainly benefits women, who generally perform this task.
- Participants are very vulnerable families, located in remote communities.
- Building trust between families and local and central governments.
- Exchanges with peers from other countries help to strengthen self-esteem.
- Participation in the construction and management of SCALLs.
## Rainwater Harvesting Systems in the Region: some recent FAO initiatives

<table>
<thead>
<tr>
<th>Country</th>
<th>Location</th>
<th>Period of Implementation</th>
<th>Objective / Type of system</th>
<th>No. of direct participants</th>
</tr>
</thead>
</table>
| Costa Rica       | Hojancha Cantón, Guanacaste Province          | 2017-2018                | • Water for livestock and cleaning pens during four months.  
                         |                                |                          | • Installation of one SCALL in a model farm, with 65 animals that require 100 liters / day.  
                         |                                |                          | • Training for 200 technicians and farmers.                                                   |
                         |                                |                          | • Installation of one SCALL in a school.                                                     |
| Colombia         | San Andrés; Indigenous communities of Zaragoza, La Libertad and San Martín de Amacayacu | 2017 - 2019              | • Water for human consumption (purification).  
                         |                                |                          | • Installation of four SCALLs.                                                               |
| Dominican Republic | Monte Plata Province                            | 2016 - 2019              | • Water for human and domestic consumption, and school gardens.  
                         |                                |                          | • Installation of a SCALL in one school.                                                     |
| Guatemala        | Chiquimula Municipality                        | 2016 - 2017              | • Water for human consumption and food production.                                          |
                         |                                |                          | • Community tanks with a capacity of 450 000 liters for human and domestic consumption of 1 000 families.  
                         |                                |                          | • 200 families with individual tanks (fish and snail farming).                              |

### More information:

- **Contact:** Food and Agriculture Organization of the United Nations  
  Representation in El Salvador  
  Boulevard Sergio Vieira de Mello No. 110 Colonia San Benito, Zona Rosa undefined  
  San Salvador, El Salvador  
  Email: FAO-SV@fao.org  
  Website: www.fao.org/elsalvador

- **FAO press releases:** [Nota 1](#), [Nota 2](#), [Nota 3](#), [Nota 4](#), [Nota 5](#)