FONDATION
IMPACT HOPE

An alternative to youth emigration from Lebanon: an innovative and sustainable agricultural production model

Background

Over the past decade, large parts of Middle Eastern society have suffered from war, terror and other forms of violence.
Violence, trauma, and corruption have led to an alarming trend of fragmentation and disintegration of different communities that are either distrustful of each other or are turning inward. Tensions also exist between host communities and refugees, mainly on the basis of ethnic and religious criteria.

Lebanon tipped into a serious crisis as early as October 2019, triggering massive protests by the population.
The explosion of the port of Beirut in August 2020 and the staggering devaluation of the Lebanese pound (more than 500% of its value in 6 months) wrecked the country's economy. Prices have more than tripled for basic foodstuffs.
The massive influx of Syrian refugees has shaken the country's demographic and labour market balance. Unemployment has skyrocketed and the country is facing unprecedented social inequalities. More than half the population now lives below the poverty line (including 70% of refugees) and the middle classes are threatened by accelerated impoverishment.
In this context, more and more young people are trying to leave the country permanently to ensure an acceptable socio-economic future for their families.

Faced with this great socio-economic challenge of Lebanon, we have been thinking about the best way to accompany the civil society to rebuild itself, to empower itself, to create jobs and to enhance its exceptional heritage. Youth will have to play an important role in this process and we can help them by involving them in innovative social and entrepreneurial dynamics.

Brief summary of the project

After a feasibility study in 2020 and 2021, we are about to launch a new prototype of energy self-sufficient greenhouses integrating the production of plant and animal biomass (fish).

The system consists of a 110 m2 greenhouse in which a seedling area for plant germination is installed and also freshwater ponds of natural origin (river, lake, rain or similar).

The fish excrements produce the necessary nutrients for the plants. The plants filter the water which is returned to the fish.

The system is controlled by a computer that monitors various parameters including watering, PH and water temperature.

Already tested in Chile, this type of greenhouse can supply vegetables to more than 300 people per year. We are currently adapting it to the semi-desert areas of the Middle East, starting with Lebanon. Our objective is to encourage young Lebanese people to invest in an income generating job that will also allow them to feed their community. The project will also create new dynamics of mutual aid and integration, especially with the refugees who are mainly present in the semi-arid areas. The project will also benefit from the technical and pedagogical support of two Lebanese universities.

Specific objective and expected results

Our objective is to slow down the exodus of young Lebanese and to encourage them to invest in a job that will allow them to live with dignity. The project will also aim to create a dynamic of living together, including with refugees from semi-arid areas.

Results:

- ✓ 300 people supplied with vegetables each year for each greenhouse
- ✓ New jobs created in semi-desert areas
- ✓ Integration of refugees into the local population in the framework of a shared work
- ✓ Technical apprenticeships opening new work opportunities
- ✓ New socio-economic dynamics created

Activities

AYA technologies leverages smart, circular agriculture that is soil-independent, adaptable to space availability, and efficient in resource use.

Designed by a Chilean university, Aya technologies simulates the symbiotic relationship between plants and aquatic life, requires no additional chemical inputs, produces virtually no waste, requires little energy and water to produce vegetables.

The system consists of a 110 m2 greenhouse in which a seedling zone is installed for the germination of plants. The plants will then be transferred to 12 aeroponic growth modules with a capacity of approximately 350 plants each. The capacity of each module is determined by the type of plant and the need for space between floors for its proper development. Outside the greenhouse are two fresh water basins of natural origin (river, lake, rain or similar). These basins contain fish and filtering animals (clams and freshwater molluscs) and the other a detritivorous animal (freshwater snails) in a controlled aquaculture environment. The most appropriate species are chosen according to local availability and feeding habits. A third tank, with a capacity of 1,000 liters, stores the reserve water.

The animal biomass pool system is connected by pipes to the greenhouse modules and works in a similar way to traditional aquaponics: the fish excrement produces the necessary nutrients, the water is filtered to remove materials harmful to the fish and avoid the production of acidic sludge and the plants are watered by an aeroponic system. Once the plants have absorbed the nutrients and oxygenated the irrigation water, it is collected by decantation and returned to the ponds by gravity. The detritivorous animal naturally cleans the ponds by feeding on the algae and detritus that may be deposited there and also serves as food for the fish.

The system is controlled by a small computer installed between the ponds and the greenhouse. It controls the frequency of watering, measures the PH and temperature of the water and triggers alerts via the computer network in case of possible variations of these parameters.

Contribution of the project to a real change

The greenhouse system has the potential to produce up to four times as many plants as traditional soil-based cultivation. It allows the production of vegetables and fish as long as species suitable for consumption are used. The production process is carried out in a controlled and continuous environment, with a larger cycle of harvests per year. This allows in the medium/long term to increase the availability of vegetables for both self-consumption and commercialization, thus improving food security and income of the beneficiary communities.

The system allows the production of food using less water, which is a great advantage in contexts where this resource is scarce. This type of circular agriculture saves water in two ways :

On the one hand, by using an aeroponic misting irrigation system and automatically controlling the irrigation patterns, so that the roots of the plants receive the necessary nutrients for their growth using the essential minimum of water;

On the other hand, by continuously reusing the irrigation water in an efficient and natural way, estimating that the water loss of the system is less than 10%. The water is reused and re-injected in a natural way thanks to the aquaponics system.

As it is a system that works independently of soil and nutrient availability, it allows cultivation in environments with low quality or low nutrient soils. With the environmental advantage that it does not contribute to further depletion.

Finally, the communities involved are those who build and manage the system. They receive adequate training and supervision so that in the medium term they are able to manage it autonomously, reproduce it and scale it up.

Location of the project

The first prototypes will be installed in early 2022 in the regions of Jezzine and Kharka, in southern Lebanon.

Local partner

Clevercap helped us identify the first sites and collect the socio-economic and technical data for the installation of the first greenhouses.

CleverCap International (CCI) is a Lebanese company that strives to create and implement innovative concepts that build long-term, trusted partnerships. The company is specialized in project management, civil engineering, water and environment. Projects must be socially sustainable, aim at management excellence and focus mainly on water, waste and environmental issues.

Direct beneficiaries

- ✓ 300 people for each greenhouse, or about 50 families of 6 people
- ✓ 4-5 young people involved more specifically in the technical aspects and operation of the greenhouse
- ✓ About 50 workers directly involved in the agricultural and fish production

Sustainability of the project

If the project location has an Internet connection, the system can be controlled remotely since the software sends the data to the cloud. This data can be consulted in real time on the Internet.

The AYA device consists in encapsulating a biological system in a technological system. This allows it to be implemented independently of field conditions with a great capacity for adaptation. AYA allows plants to grow independently of soil and nutrient availability in the environment.

It can be constructed and designed using locally available building materials. Operation and operator training are easy. Water use is efficient.

It has the potential for a variety of applications with positive social impacts, including urban gardening, access to fresh food for people in crisis, and learning agricultural trades open to all.

While it is true that the construction of the system requires an initial investment, this is quickly amortized by its productivity.

Monitoring and evaluation

The project will be monitored in the field by a specialized technician. It will be supervised by the company Clevercap, which will ensure exchanges between the sites, quality control of production and possible marketing for niche products allowing the contribution of foreign currency.

The mini consortium of the DUOC technical institute, designer of the system, the company WAP Consulting and the Impact Hope Foundation will provide training, methodological monitoring and evaluation. These institutions will regularly measure the economic and social impact on the populations involved.

Duration of the project

March 2022 to February 2023 for the launch of the prototypes.

2023 to 2025 for the first phase of extension of the project in the various micro climates of Lebanon.