

Background

Chicche is a rural community located in the central Andes of Peru at 3800 meters above sea level. Due to the frigid climate, often dropping below 0°C, Chicche has specialized in growing cold resistant food, mainly potatoes and small vegetable crops, for family consumption. However, climate change in the region has triggered more extreme and unpredictable weather, with temperatures as low as -16°C, especially from May to September. These conditions make it impossible to grow vegetables in open spaces. Thus, the diet of the people of Chicche today consists mainly of potatoes and other carbohydrates, lacking the complementary nutrients that vegetables provide. Climate change has certainly created food insecurity issues in Chicche that need to be addressed. Facilitating alternative crops growing in Chicche through inexpensive rustic greenhouses could contribute to alleviating the effects of climate change by enhancing the diet of the community with locally grown vegetables.

Rustic Greenhouses

Rustic greenhouses represent an innovative alternative. They are inexpensive and rely on sun energy to create an ideal environment for vegetable growing. Furthermore, unlike foreign agricultural technology, the construction of rustic greenhouses utilizes the knowledge of the community, combining it with modern greenhouse materials. The walls of the rustic greenhouses will be built with adobe, the same material that people from Chicche use to build their own homes. The adobe structure offers great durability and thermal mass. The greenhouse roof or covering, doors and windows will be made of agrofilm—an amber polyethylene film resistant to UV rays, with the capacity to transmit up to 90% of visible light and heat. The agrofilm, an excellent material for the rustic greenhouse roofs, will take advantage of the strong sun rays available at this altitude of the Andes. The heat retained will create an interior atmosphere that will protect the crops from low temperatures, cold winds, and excess humidity. Depending on exterior weather, the doors and windows may be used as ventilation sources.

Present Situation

- (1) Chicche is in an isolated location, where transportation is very limited; buying vegetables from the nearby cities is difficult. Only one bus per week goes to the closest city, located two hours away, at a cost not many can afford. Consequently, the community diet has become more carbohydrate based; access to food groups such as vegetables is lacking. Meals fail to supply all the nutrients necessary for a healthy diet.
- (2) This unhealthy diet is reflected in the malnutrition rates of children living in rural areas. Although

malnutrition statistics are not published for small communities such as Chicche, the last report of the Peruvian Ministry of Health tells that, in the region Junin, home to Chicche, about 51% of children from rural areas suffer from chronic malnutrition (2012). Providing the community of Chicche with rustic greenhouses could be a starting point for alleviating malnutrition by generating sustainable, healthy diets.

Goals

- (1) Ameliorate the cold weather challenges that Chicche faces to grow vegetables by installing fifteen low environmental impact rustic greenhouses of 6x4x3.25 m and build these rustic greenhouses by bringing together the skills of the Chicche community and the Caritas staff.
- (2) Promote peace by sustainably diversifying the diet of the community with vegetables that will be locally grown in the rustic greenhouses. This will make a positive impact on the community's health and will likely motivate them to stay in the community instead of migrating to the cities.
- (3) Present rustic greenhouses as an innovative model for adaptation to the cold weather, a model that could be disseminated to other communities facing similar problems.

Partnership

Caritas-Peru works towards implementing and sustaining food security projects in the rural zones of Peru. When I talked to the executive secretary, Engr. Juan Quispe Rodriguez, he expressed his enthusiasm and extended his support for the project. Caritas will provide agronomist engineers with experience in greenhouses to accompany and facilitate the installation of the rustic greenhouses.

Young People For (YP4), of which I am a member, is a one-year long fellowship focused on leadership development. The fellowship staff has also extended its support by committing to contribute \$500 to the project budget.

Components of the project

Working with the community

Involving the community in the decision making process of this project is crucial to truly identify and satisfy community needs. Involvement gives them agency and prepares them to independently sustain the greenhouses when Caritas' staff and I leave. Therefore, I started my conversations with Mr. Huaman, leader of the Chicche community, last June. He is very enthusiastic about the project and very involved in it. Together we have discussed different possibilities. Last December, I asked Mr. Huaman to hold a conversation with the community

about the idea of developing rustic greenhouses to grow vegetables they need now as well as those they were able to grow before the onset of climate change. The community response is positive; they have already expressed enthusiastic acceptance of the project. They listed needs for chard, garlic, celery, tomatoes, onion, col, spinach, lettuce, radishes and carrots—crops the rustic greenhouses will be able to support. In addition, the agronomist engineers of Caritas will lead an initiative to grow cauliflower and broccoli to further diversify diets. Mr. Huaman and I also reached the agreement that from the total cost of \$132 to build the adobe walls, each group of three families would be able to contribute \$80; the project will finance the rest. The community's contribution enhances their sense of ownership of and active participation in the project.

Identifying beneficiaries

During May, the staff of Caritas in cooperation with Mr. Huaman will begin identifying families and organizing them in such a way that each group of three families will own a rustic greenhouse. Mr. Huaman will also start promoting the project in the community, preparing the way for the installation of rustic greenhouses in June. In the first two weeks of June, after my arrival, we'll gather the community, and I will briefly explain Projects for Peace as well as the goals and timeline of our project. After that, we'll start selecting the land to build on. Each family has agreed to spare 40 m² from their gardens or plots. Caritas, the community, and I will come together to select the most appropriate land according to elevation, water accessibility, soil quality, and wind.

Construction

During the third and fourth week of June, the community will lead the construction of the foundations and the adobe walls in the Ayni tradition—a social practice among indigenous people from the Andes in which the members of a village cooperate in a community project. Since the community holds the expertise at building with adobe, the engineers from Caritas and I will only act as accompanists in this process. After the construction of foundations and walls, the Caritas staff will guide us in the installation of the rustic greenhouse roofs, windows, and doors using 35m² of agofilm material per rustic greenhouse. All the roofs are expected to be completed by the second week of July.

Guiding the first growing season

In the second week of July, the growing process will begin. Each greenhouse will grow a set of three different vegetables (eg. lettuce, onion, tomato); this variety provides an opportunity for exchange or selling. During this time while the vegetable seedlings are developing, the Caritas staff and I will also provide orientation on topics such as crop rotation, prevention and control of plagues, use of natural fertilizers and control of the internal environment in the rustic greenhouses. The seedlings will be transplanted to native soil by the last week of August.

By this time I will have to return to college, but Caritas has agreed to continue monitoring the rustic greenhouses and will document the crops' growth process and will share this progress with me.

Outcomes

There cannot be peace in Chicche when unhealthy diets are compromising the well-being of the community. This situation worsens Chicche's poverty problems and encourages Chicche population, youth specially, to migrate to the cities where their future is uncertain. This project will re-build harmony in Chicche by diminishing vegetable supply concerns—change that reduce rates of migration.

Fifteen rustic greenhouses will be installed in the Chicche community, an action that will benefit approximately 290 people. The rustic greenhouses will diminish the challenges of cold weather for vegetable growing and will provide an environment for rich crop yields (eg. 15 kg. of lettuce-two months growth, 15 kg of chard-three months, 16 kg. of onions- two months, 20 kg of celery, and 6 kg of tomatoes-six months growth). Without traveling far distances and without being limited by the colder temperatures, the community of Chicche will be able to count on independent sources of vegetables to diversify the local diet.

Coming together to build these rustic greenhouses will empower and motivate Chicche to make their community stronger and more resilient in the face of the seemingly undefeatable consequences of climate change. Besides that, rustic greenhouses will serve as inspirations for Chicche, encouraging the community seek other innovative responses to the challenges of their changing environment. Lastly, the involvement of an influential organization, such as Caritas in Peru, may inspire other organizations to incorporate the rustic greenhouse model in their programs addressing the negative effects of climate change in other rural places.

I grew up close to the Chicche community and am still in frequent contact with it. I understand their dietary challenges, and the urgency of effective measures to alleviate them. As a leader of this project, I will be the bridge between all the participants, creating the effective communication to make this project a success. I will use and be in contact with all the resources that St. Olaf College, Caritas and YP4 have offered me to lead this project and to maximize the benefits of our funds. I will work shoulder to shoulder with the community and Caritas staff in the planning and installation of rustic greenhouses, and will eagerly follow their functioning from abroad. I believe rustic greenhouses are small yet powerful innovations that have the potential to create lasting positive change.