Rehabilitation of Arid Ecosystems and Barren Lands through Agroforestry Systems in the Southern Coast of Peru

Plantations on barren lands in the southern coast of Peru. Photo: COSTA VERDE

Project title: Rehabilitation of arid ecosystems and wastelands through agroforestry systems in the southern coast of Peru [Project ID: 2022P1-PER]
Supervisory agency: National Forest and Wildlife Service (SERFOR)
Executing Agency: COSTA VERDE NGO
Implementing Agency: Fundacion Para El Desarrollo Agrario (FDA)
Budget in USD (total/APFNet grant): 520,294 .00 / 348,540.00
Duration: October 2022-March 2024
Project Category: Demonstration Project
Target economy: Peru
Location: Chala, Camana and La Joya, Arequipa Department; Locumba, Moquegua Department

Goals:
To contribute with the rehabilitation of degraded ecosystems and recuperation of barren land to improve the environmental conditions and livelihood of the population in the southern coast of Peru, and to mitigate climate change negative effects and strengthen the availability of food, water and energy.

Objectives:

- To propose and develop, in a participatory manner, an experimental productive agroforestry system in degraded/barren lands, for the improvement of the local economy and the mitigation of the climate change effects;
- To connect strategic stakeholders and partners in production and value chains that not only perform reforestation and agroforestry actions, but also contribute substantially to reactivate local economies and promote well-being across the communities involved.

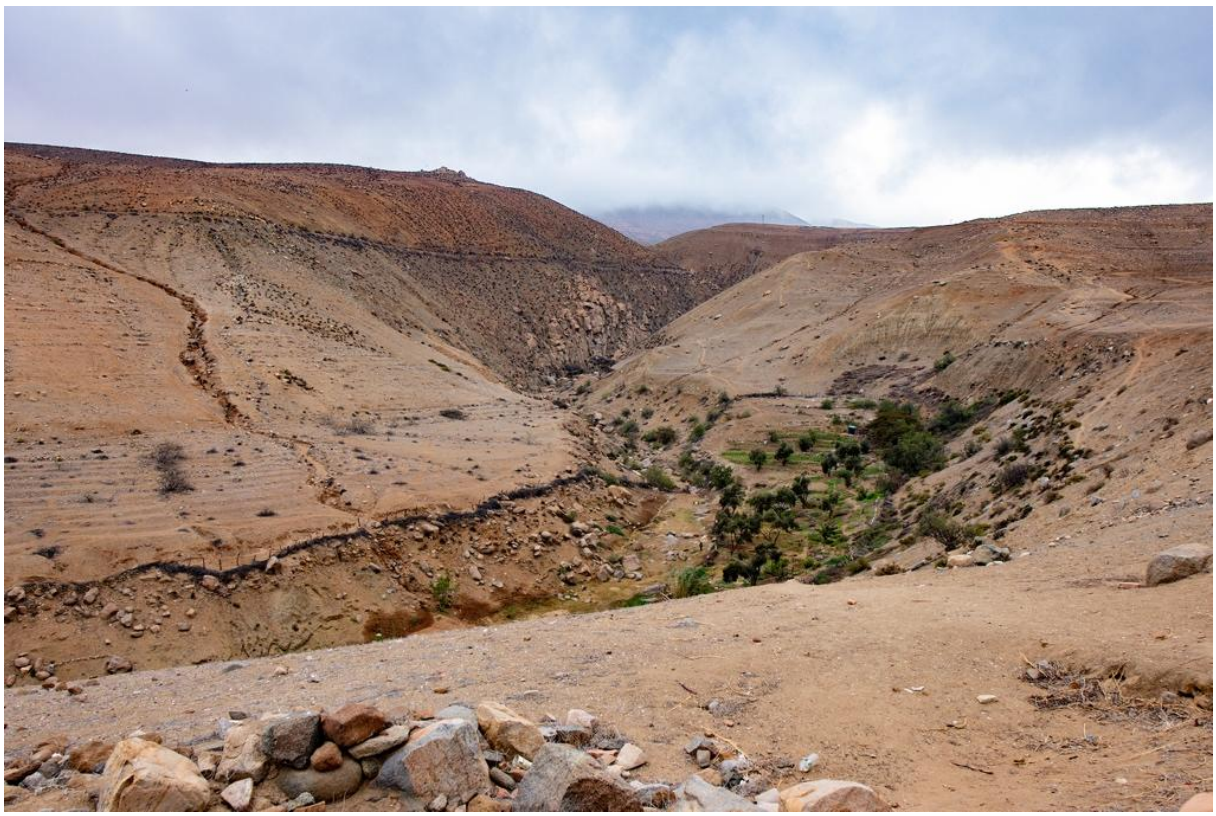
Activities:

1. Integration of information related to experiences about restoration of degraded land on arid and semi-arid zones for the area of influence of the project in the southern coast of Per and updating an environmental and socioeconomic baseline for the area of influence of the project.
2. Organization of regional workshops and trainings for small farmers on reforestation, agroforestry, product processing and marketing.
3. Installation of forest nurseries.
4. Installation of drip irrigation systems and water catchment meshes.
5. Summarization of both technical and socioeconomic information on target areas, including lessons learned and best practices and Developing a policy brief on multifunctional rehabilitation of arid or semi-dry ecosystems in southern coastal region of Peru

Project background

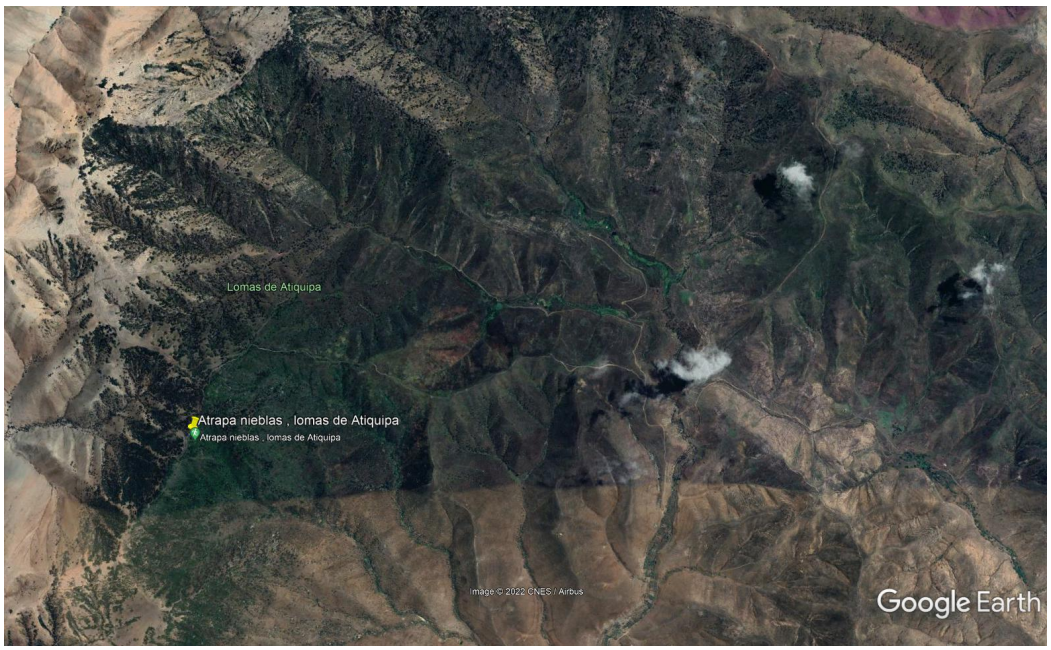
In Peru, the total land area is about 128.5 million hectares, including 78 million hectares of forest, with a forest coverage rate of more than 58 percent. Peru's forests are mainly tropical rain forests, but also semi-humid forests, arid and semi-arid forests and mangroves, which means a great advantage of natural resources out of its unique climatic conditions. However, there are still more than 7.7 percent of Peru's total land (10 million hectares) belongs to degraded land.[1] Especially in the southern coastal region of Peru, approximately 0.6 million hectares of its lands that have been degraded or are in the process of becoming severely degraded. The main cause of degradation comes from the migratory population coming down from the Andean region to the Amazon region since the late 19th century, practicing shifting (subsistence) agriculture, illegal crops, fires, water erosion, overgrazing, infrastructure, illegal mining, and soil fragmentation, among others. Approximately 60 percent of the national population (more than 200 million people) is settled along the southern coastal region and that this region accounts for 30 percent of the national territory.

[1] Ministry of foreign affairs of China (2021) P*eru country profile*. Available from:https://www.fmprc.gov.cn/web/gjhdq_676201/gj_676203/nmz_680924/1206_680998/1206x0_681000/.

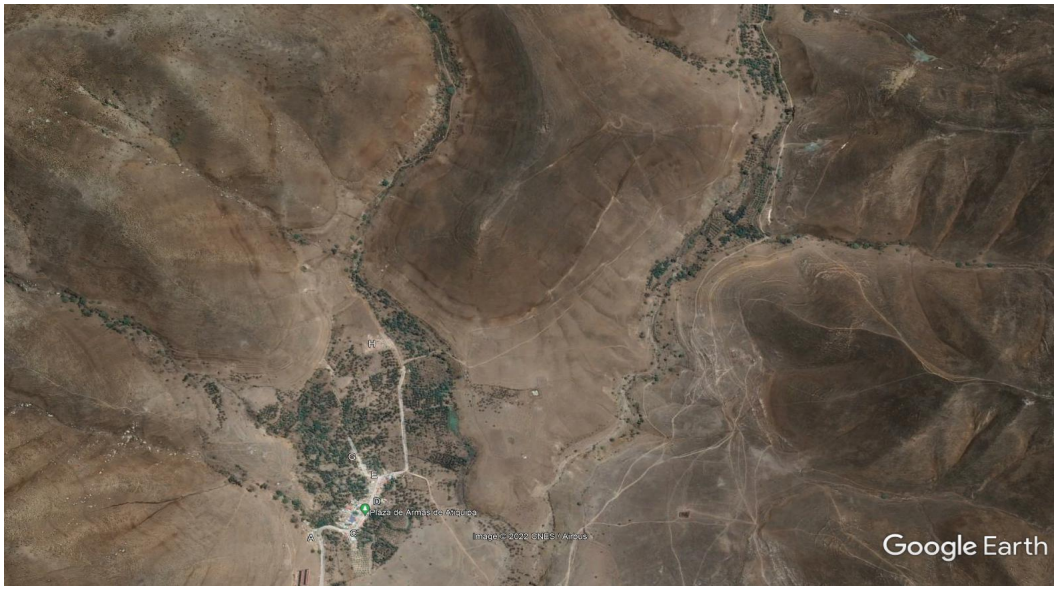


Barren and degraded landscape in the southern coast of Peru. Photo: COSTA VERDE

Given poor economy of the southern region, social and ecological benefits for transforming its degraded lands into healthy and productive agroforestry areas have become vital. The southern region of Peru, which has the arid coastal belt, is one of the world's most ancient arid regions and is considered one of the driest. Based on the governing influence of marine currents, Andean uplift, and climatic extremes, the arid zones formed a unique ecosystem, fog oasis ecosystem (lomas), which hosts a highly endemic flora, providing vital ecosystem services (e.g. water supply, agriculture) and genetic resources. The moisture for the vegetation in the lomas comes from fog which rolls in from the nearby Pacific Ocean and embraces mountains. However, current threats from communities, including illegal mining and crops, overgrazing, shifting cultivation and other inappropriate land uses that keep on exacerbating the degradation trend may put at risk on the whole ecosystems, which has made it suffered 90 percent anthropogenic reduction in area and reduce the trees and bushes that could have trapped the fog and create more moisture for other plants. Recently, people have tried to establish tree plantations, like tara (*Caesalpinia spinosa* Mol.) to help restore the forests.



Different levels of land degradation in Arequipa in 2022. Photo: Google Earth 2022

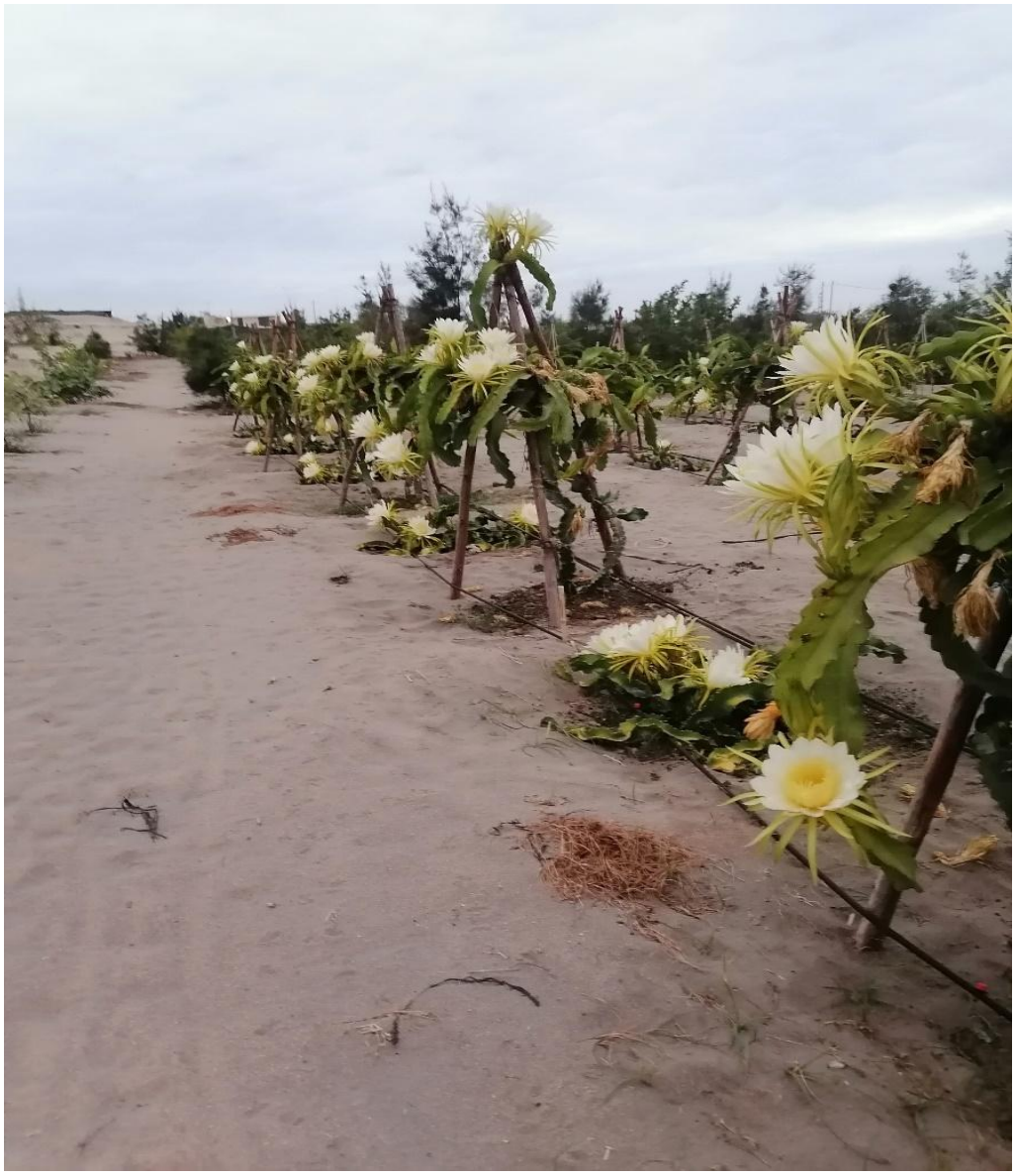


Deforestation of lomas project sites in 2022 due to fuels collection and cattle grazing in local communities. Photo: Google Earth 2022

Local communities in the Arequipa and Moquegua are still lacking of food, water, energy, and relying on loans. People make a living by agriculture and grazing. The crops that they plant include alfalfa, rice, corn husk, onion, potato, dry grain beans, and prickly pear.[2] To rehabilitate the degraded ecosystems and improve the economy of the arid zones and its rural population in the southern region of Peru, APFNet funded and initiated the project 'Rehabilitation of arid ecosystems and wastelands through agroforestry systems in the southern coast of Peru' in October, 2022. The project aims to connect stakeholders and partners, like COSTA VERDE, SERFOR, local government and

[2] White Lion Foods. (2021) *Why is Arequipa a good place to grow garlic?* Available from: https://whitelionfoods.com/why-is-arequipa-a-good-place-to-grow-garlic/#:~:text=Products%20grown%20in%20the%20region%20In%20agricultural%20activity,%E2%80%93%20cochineal%2C%20garlic%2C%20olive%2C%20quinoa%2C%20wheat%2C%20starchy%20corn.

specialists, in production and value chains that not only perform reforestation and agroforestry actions, but also contribute substantially to reactivate local economies and promote wellbeing across the communities involved. Costa Verde, the local NGO which has a long and rich national and international experience in deforestation and agroforestry, will be the main responsible agency for the technical and administrative conduction of the project. SERFOR is the Peruvian public forestry agency which will exert a general supervision role along the project life.



18 month-Pitahaya plantation at the project site. Photo: Jorge Malleux/COSTA VERDE NGO

Project feature topics

Establishing pilot plots to conduct agroforestry and conservation activities

The new Peru project will not only expect the restoration and sustainability, but also implement a participatory governance that enables the communities to increase their resilience and adaptability in a climate change context. Through the implementation of project activities, the first output that we are going to make is establishing a conglomerate pilot trial of 20 pilot plots of 5 ha each to conduct conservation, reforestation, and agroforestry activities in degraded lands. The project will

revise and analyze the previous experiences at the national and international level to synthesize the background information in the arid and semi-arid zones of the southern coast of Peru. Based on that, a local expert will be invited to update the environmental and socioeconomic baseline of the demonstration sites to investigate influences that will be bought to the area. After that, two typical ecosystems in the experimental sites, including lomas and barren lands will be chosen for the project. Then executing agency COSTA VERDE will design agroforestry plots after interviewing and consulting the participants and stakeholders, considering the characteristics of the terrain, water supply and personal preferences. The project will also hold training classes for 100 small farmers and install forest nurseries and composting units, which is crucial for the whole implementation of the project. All the seedlings will be produced in the nurseries. To deal with the lack of water in the arid zone, the project is going to install drip irrigation systems and water catchment meshes to provide water and capture fog water. Five native species *Caesalpinea spinosa, Schinus mole, Tamarix sp, Punuica granatum* and *Moringa oliefera* will be planted in the terrain sites through enrichment planting way support and restore the degraded land. After the plantations, all the experimental plots will be monitored monthly by beneficiaries, the small farmers who participate in the project, and biannually by project technical staff.

Organizing a production chain from the cultivation to final consumers

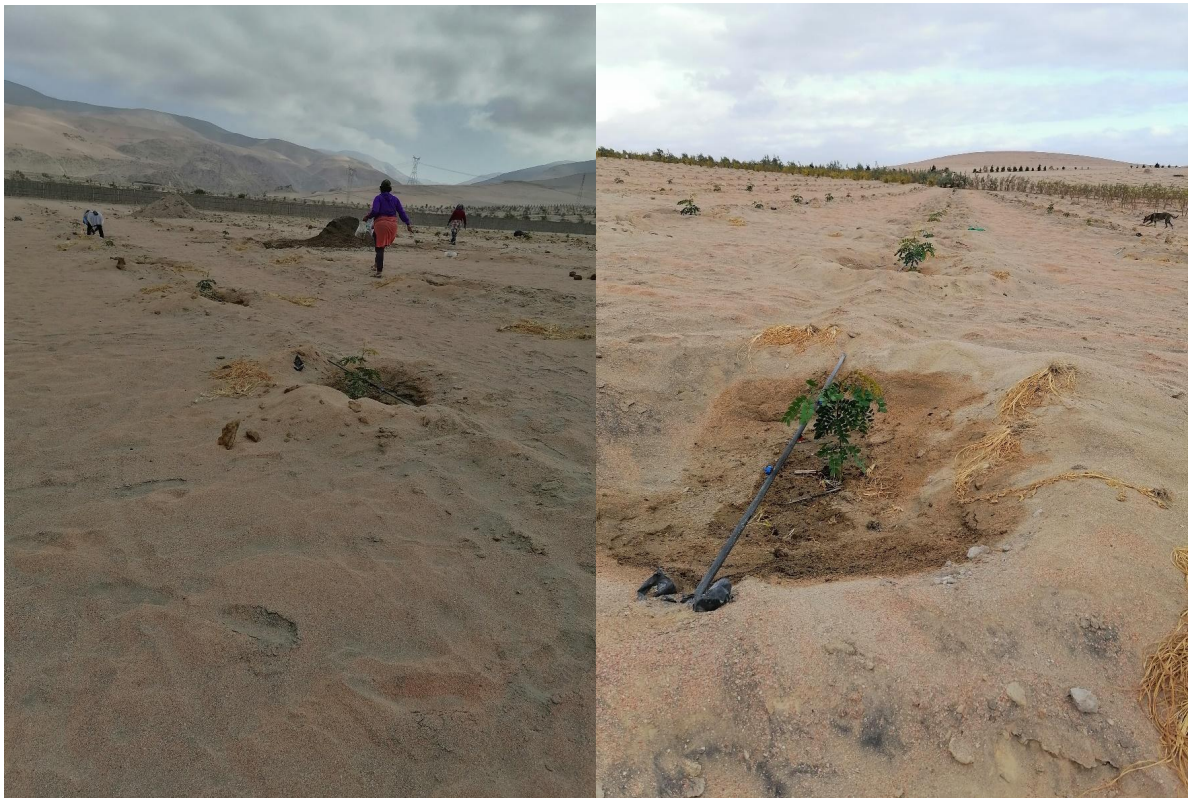
Once the experimental modules are installed, the next step is to organize production and harvesting activities, according to the methodology and protocols elaborated for each module, before, during and after harvest, transport, processing, and quality screening. During the time, all stakeholders, particularly the small farmers who are directly beneficial from the project will participate in the learning process of workshops to learn how to earn additional and sustainable income via the restoration of degraded lands. Apart from that, participants will also be trained on marketing and sales knowledge. The project will elaborate technical manuals and guidelines before, during and after the training activities to offer technical support in consultation and interaction with beneficiaries.

Establishing processing unit for added value of non-timber forest products (NTFPs)

When the production chain (system) is designed and adopted, the next step is going to establish experimental processing module (unit) for processing NTFPs including seeds, fruits and leaves coming from the experimental trial. All the participants are supposed to be aware about the details, capacity, and functioning aspects of this equipment, to assess its performance, practicality and obtaining data for future bigger plants. All beneficiaries will have the right to use the processing unit, particularly for processing the products resulting from the experimental trial, according to the pre-established schedules and volumes. Lessons learned in this project will be summarized as a technological package for the management of agroforestry systems in arid lands and ecological restoration of natural lomas. Since the project focuses on the rehabilitation of arid or semi-dry ecosystems in southern coastal region of Peru, a policy guideline on the multifunctional rehabilitation based on the best practices we made in that area will also be developed.

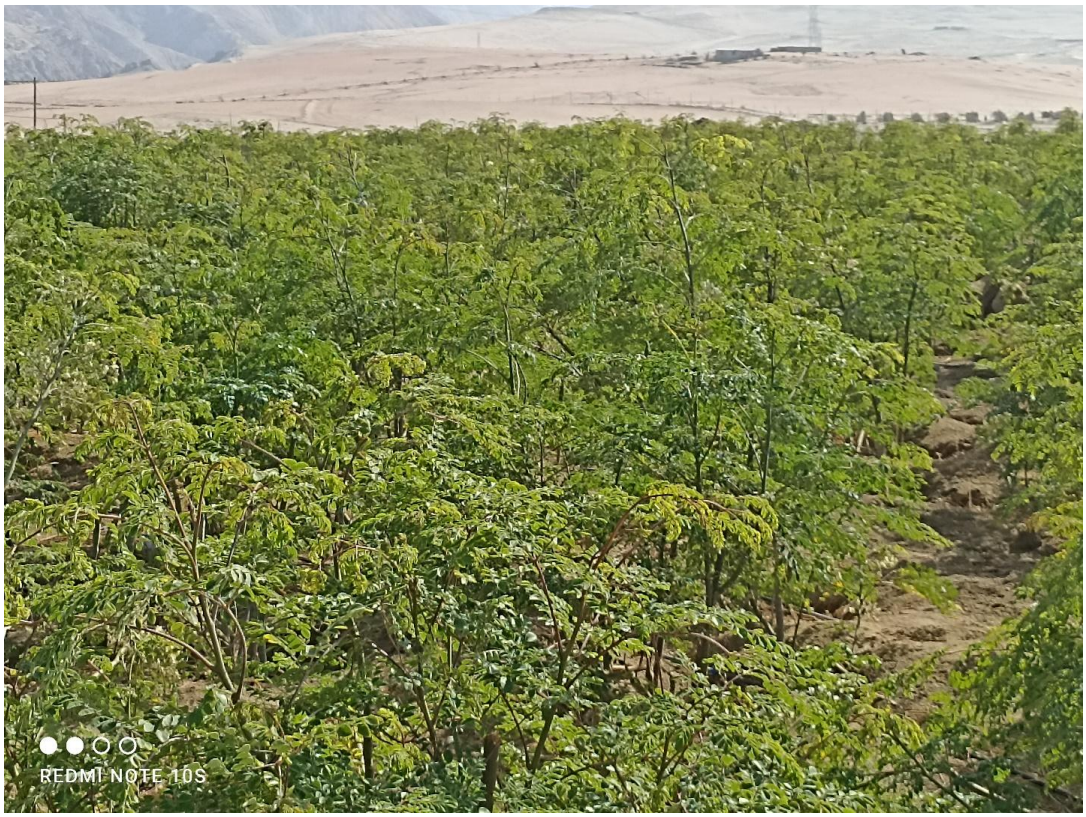
In short, the project will develop small scale production systems from 100 ha pilot plots in total, 5 forest nurseries and composting units, drip irrigation systems and water catchment mesh, seedlings. To engage local communities and local governments through the stakeholder interviews, workshops

and other training classes will be hold, in close collaboration and coordination with the regional governments, and National Public Institutions like SERFOR.



Terrain preparation and drip irrigation system installment at project sites. Photo: Jorge Malleux/COSTA VERDE NGO

These agroforestry systems will rely on species, like *Caesalpinia spinosa, Moringa oleifera, Schinus molle, Olea europaea and Punica granatum* that have proven to be the key drivers of ecosystem services recovery, as well as being adaptable to the extreme arid conditions across the sites. The final production systems with enhanced infrastructure development, will allow the direct beneficiaries and other stakeholders obtain added value to their products, increasing the revenues to the benefit of their livelihoods. Also, degraded land in the project sites will benefit from drip irrigation systems and water catchment meshes, which can provide complementary water and fog water capture services in the degraded area.



Plantations of *Moringa oleifera* of 12 months for 4 harvesting. Photo: Jorge Malleux/COSTA VERDE NGO

Peru has made commitments in 20x20 Initiative in 2014 to restore and rehabilitate a total of 3.2 million hectares degraded lands, comprising 2.0 million hectares for reforestation and 1.2 million hectares for rehabilitation in the Coastal, Andean (highlands) and Amazon (rainforest) regions[3]. In this context, APFNet initiates the project to help Peru contribute towards the restoration of degraded lands. Also, APFNet's core strategic objectives, which promote activities related to climate change, food, energy security and clean development to improve sustainable forest management and rehabilitation in the APEC region, will be reflected and nicely designed in project activities. The lomas and arid zone in the experimental sites are allergic to the climate change due to its formation relying on the moist dense fog and mist from the Pacific. Therefore, in this project, APFNet funds to assist the plantations of adoptable species and to install drip irrigation systems and water catchment meshes to reduce the influence of climate change.

[3] Initiative20x20 (n.d.) *Peru* Available from: https://initiative20x20.org/regions-countries/peru