Trópico Agroforestal S.R.L.

Costa Rica, San José, San José, Catedral

WE ARE JUNGLE * SCALE-UP PLAN

WE ARE a regenerative enterprise dedicated to Trees, Training and Trade. Through the promotion of our tropical agroforestry model we establish and research underutilized crop species like breadfruit with smallholder farmers and create value added supply chains.

We began in 2016 by registering our brand Jungle Foods in Costa Rica. This has allowed us to validate our potential in the food market and to introduce the versatility of breadfruit in the "beyond organic" food category.

WE OFFER training and best practice agroforestry techniques to rural farmers, facilitating certification process to increase their income, integration strategies for other tropical species, and social impact follow up. All of this is done through our program *Revitalizing the Tropics* (RLT), which is designed to support farming communities, revalue underutilized crops, diversify production and income by seeking market opportunities for their harvests, and foster the investigation and development of value added innovative products sourced from their edible forest gardens.

Agroforestry is a resilient, efficient and sustainable method used by our ancestors to maximize the way we grow, share and consume a diverse variety of food in the same space. Applying agroforestry as a sustainable production system with community educational programs and strengthening the value-added commercial webs will support four of the global *Sustainable Development Goals [1]*:

ZERO HUNGER:
Right now many rural women and men in our tropical context can no longer make ends meet on their land because of the degradation of our soils, freshwater, oceans, forests and biodiversity generated by conventional agriculture and the pressure of climate change. This results in generations being forced to migrate to cities in search of opportunities, that in most cases ends up in even more poor situations. Other results are poor food security and malnutrition.

- **29% of Central America's workforce is focused on agriculture *[2]*, many of them living in poverty. The smallholder farmers provide up to 80% of food consumed in the region.**
  - Investing in smallholder women and men is crucial to create more opportunities and improve wages, while supporting food security and sovereignty, as well as food production for local and global markets
- **Since the 1900s, 75% of crop diversity has been lost from farmers' fields globally.**
  - Better use of agricultural biodiversity can contribute to more nutritious and diverse diets, enhanced livelihoods for farming communities and more resilient and sustainable farming systems, protecting the environment.

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RESPONSIBLE CONSUMPTION AND PRODUCTION:

By 2050, the projected 9.6 billion humans will need almost three planets to provide the natural resources needed to sustain current lifestyles. This production system is unsustainable; from inputs to emissions or spoilage, a huge proportion of the resources that go into food production never make it to the plate. Households influence these impacts through their dietary choices and habits. This consequently affects the environment through food-related energy consumption and waste generation.

- **1/3 of all food produced each year – worth around $1 trillion – ends up rotting in the bins of consumers and retailers, or spoiling due to poor transportation and harvesting practices.**
    - "Doing more and better with less" is about promoting resource and energy efficiency, sustainable infrastructure, and providing access to basic services, green and decent jobs and a better quality of life for all, while reducing resource use, degradation and pollution along the whole life cycle.
- **The food sector accounts for around 30% of the total energy consumption and 22% of total Greenhouse Gas emissions. Land degradation, declining soil fertility, unsustainable water use, overfishing and marine environment degradation are all lessening the ability of the natural resource base to supply food.**
    - The need to operate on an integral supply web is significant, in which the economic and social development is supported by the promotion of regenerative productive chains and broad communal participation, involving everyone from producer to final consumer into delivering a manageable and sustainable production over time. This includes educating consumers on sustainable consumption and lifestyles, resulting in the generation of diverse productive options that are pertinent to the possibilities of the local and regional market.

CLIMATE ACTION:

Climate change affects every single country, disrupting national economies and affecting lives, and the problem keeps going. Weather patterns are changing and becoming more extreme, sea levels are rising, and greenhouse gas emissions are at their highest levels in history. Without action, the world's average surface temperature will keep rising and the most affected are likely to be the poorest and most vulnerable people. The vulnerability of countries, and regions within countries depends on their adaptive capacity, which is closely associated with level of development.

- **From 1880 to 2012, average global temperature increased by 0.85°C. For each 1°C of temperature increase, grain yields decline by about 5%. Major crops like maize and wheat have experienced significant global yield reductions of 40 megatons per year between 1981 and 2002 due to a warmer climate.**

- Deadly droughts, hurricanes, floods and mudslides are projected to intensify further in Central America *[3]*, which will hit small farmers especially hard. Climate change and rising temperatures may undermine local and national agriculture sectors both directly, by reducing crop yields and favor pests propagation, and indirectly, by affecting world prices and market conditions and forcing rural families to flee from their homes *[4]*.

- **Global emissions of carbon dioxide (CO2) have increased by almost 50% since 1990. Emissions grew more quickly between 2000 and 2010 than in each of the three previous decades**
  - Developing a better understanding of the likely impacts of climate change on agricultural yields and production is a critical first step toward identifying strategies to increase agricultural resiliency. All Central American countries have signed the Paris Agreement *[5]*, and our region intends to become a world leader in empowering local populations to take up climate change mitigation and adaptation actions through learning *[6]*.

- **It is still possible, using a wide array of technological measures and changes in behavior, to limit the increase in global mean temperature to two degrees Celsius above pre-industrial levels. The "point of no return" for this climate crisis is 2030 *[7]*, what are we doing now?**
  - Central America has a strong agricultural history, capable technical and skilled ag-engineers, and surging interest in entrepreneurship. Combining these ingredients with the right community-building framework could support to scale adaptation strategies and technologies such as: improving crop, soil and water management; using climatic forecasts in agricultural planning; providing innovative insurance schemes; and developing new crop varieties, including the value recognition of some traditional farming practices, water harvesting, and conservation of watersheds and wetlands.

LIFE ON LAND:

Forests cover 30.7% of the Earth's surface and provide food security and shelter, combate climate change, protects biodiversity and it's home for indigenous population. Although 15% of land is currently under protection, biodiversity is still at risk. Thirteen million hectares of forests are being lost every year while the persistent degradation of drylands has led to the desertification of 3.6 billion hectares. Deforestation and desertification, caused by human activities and climate change, pose major challenges to sustainable development and the fight against poverty.

- **Forests are home to more than 80% of all terrestrial species of animals, plants and insects. Around 1.6 billion people depend on forests for their livelihood, including 70 million indigenous people.**
  - By protecting forests, we will also be able to strengthen natural resource management and increase land productivity.

- **2.6 billion people depend directly on agriculture, but 52% of the land used for agriculture is moderately or severely affected by soil degradation. Arable land loss is estimated at 30 to 35 times the historical rate, while 74% of the poor are directly affected by land degradation globally.**

- Agroforestry can be used as buffer zones for protected forest areas, alleviating the production needs as well as embracing the forests as part of the system.

- **Over 80% of the human diet is provided by plants. Only three cereal crops – rice, corn and wheat – provide 60% of energy intake. In terms of medicine, as many as 80% of people living in rural areas in developing countries rely on traditional plant--based medicines for basic healthcare.**
  - Of the over 80,000 tree species, less than 1 per cent have been studied for potential use. Micro-organisms and invertebrates are key to ecosystem services, but their contributions are still poorly known and rarely acknowledged.

These are **our common reasons** of why we are working with smallholder farmers and their families towards strengthening their economic resilience and adaptive capacity to climate change. The pace of change is quickening as more people are turning to renewable energy and a range of other measures that will reduce emissions and increase adaptation efforts, but we need to move faster. At the same level of importance, the promotion of a diversified reforestation of productive species that favor the well-being of the environment is key to the increase in biodiversity and the conservation of natural resources. By implementing *Revitalizing The Tropics (RLT),* we aim for resilient agro productive models with the equal sharing of the benefits that are consistent with the ecological and economic realities of the locality, while their trees and soil sequester more carbon and their harvests respond to the market demand.

OUR Vision

A world that thrives through regenerative food forests

OUR Mission

To provide a community-based agroforestry model by planting trees and training farmers, resulting in amazingly healthy and tasty products.

OUR Impact Goal

To develop a regenerative agro-culinary network that supports the plantation of agroforestry systems and education in the humid tropical zones for the manufacture and consumption of value-added products, that results in increasing forest areas, food sovereignty and community resilience in the face of climate change

WHAT WE HAVE ACCOMPLISHED:

In 2016 we launched “The Breadfruit Model”, a 4-year pilot program with the purpose of verifying the feasibility of agroforestry models that are accompanied by training, investigation and product development.

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To introduce the model to our targeted communities, first we invest in:

- 2 approach visits: one to show the RLT program requirements & benefits, the other to validate that interested farmers requirements fit with the program.
- Contract meeting: visit to review and sign a contract with new farmers per community.
- Annual educational tour: we take the farmers for an educational case study, the first tour is to EARTH University campus, where we collaborated in 2014 to establish the first breadfruit based agroforestry system plots for academic research in the world.

After this introduction process, each year of training the communities receive:

- 1 Annual evaluation visit: we start the year with an evaluation of last year's Workshops and consulting with them what are their needs for the coming year.
- 3 Essential Workshops: social impact - follow up, technical training (in agroforestry, organic management + bio-fertilization & organic pest control, harvest & post-harvest good practices, and introduction to processing techniques for added value products) plus research data collection for each community to monitor agronomic indicators.
- 1 Annual educational tour: we take the farmers to successful examples for educational case studies.
- 1 Annual community celebration: to bring all farmers closer, we meet up to celebrate the year and reflect on achieved goals.

NEXT STEPS:

Training Scaling Project

We are working with 14 families within RLT program in two communities and with 50 families that provide over 200,000 kilos of breadfruit from aged wild trees. By 2030 we will grow to 900 farmers reached.

In **phase 1** of our scaling, we must review the educational information generated, interview the farmers for additional content needs, and standardize the education materials. Also we must keep mapping where the breadfruit is produced in Costa Rica and help register the next 36 new farmers to RLT program. We have a consultant and assistant who will be helping map the country with breadfruit.

As we expand the communities, we will have *Train The Trainers* (TTT) pilot program. We will hire a manager and consultant to design and develop this program to prepare trainers that will help to expand RLT for the communities, partnering with governmental agencies and education centers. Additionally, we budgeted for training our lead team in further education on topics such as organics, soil health, pest control, and teaching tools.

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In **phase 2** of the scaling program, the standardized education materials (including videos, agroforestry guides, cook books...) will be rolled out to the next 36 farmers, which will be trained with the TTT trainers. Also, we will identify the strongest farmers in each community as specialist within the communities, promoting them for farmer to farmer training as well for the next group of farmers within the RLT program.

In **phase 3** of the scaling program, we will expand to another 200 farmers with the 3rd addition of education materials. The tested trainers identified during the last cycle will lead the training of the new farmers, potentially spreading to other regions within the tropics.

Impact Measurement Program

With the first families within RLT program, we hosted an anthropologist to study and validate their profile, social context and difficulties to execute the change needed. Now we have the need to translate this qualitative knowledge and measure the true effects, results and impacts being generated by RLT, starting with the baseline. By 2030 we expect to continue measuring and apply continue improvements for the next targets (adapted to context):

SDG	Targets [1]	**Key Performance Indicators**
	**(2.3)** By 2030, double the agricultural productivity and incomes of local small-scale food producers, through equal access to productive resources and inputs, knowledge, markets and opportunities for value addition. **(2.4)** By 2030, ensure sustainable food production systems and implement resilient agricultural practices.	• *Agricultural Productivity* • *Average Income (per semester)* We will study the cost model for each farmer per hector and the products produced, plus the base line of average income plus amount and diversity of harvests. • *Need of external inputs* • *Food resilience / security of families* • *Exposure to harmful ingredients* We will survey each family to determine their agricultural inputs & food purchases vs. self-production. Also, we will audit the exposure of harmful ingredients in purchased products.
	**(12.2)** By 2030, achieve the sustainable management and efficient use of natural resources **(12.3)** By 2030, reduce or eliminate food losses along production and supply chains, including post-harvest losses	• *Use of sustainable practices* • *Agricultural Productivity* We will work toward ROC certification of over 50% of our farmers and perform soil analysis and crop diversity documentation for cross comparison. • *Food loss along the supply chain* • *Waste management practices* We will monitor the food loss per season plus waste management proposals generated by the supply chain such as compost, animal feed, other products.

	(12.8) By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature	• *Follow up on educational guidelines* As part of our scaling program we are standardizing educational content, which includes composting, harvesting, pruning, and land management guidance. We will evaluate the use of these guidelines into the farms.
	**(13.1)** Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	• *Breadfruit CO2 sequestration* • *Adaptation strategies and technologies* We will measure the breadfruit agroforestry carbon sequestration and adaptation methods adopted by smallholder farmers.
	**(15.1)** By 2020, ensure the conservation, restoration and sustainable use of land and their services, in line with obligations under international agreements **(15.2)** By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, and substantially increase afforestation and reforestation **(15.5)** Take urgent and significant action to reduce the degradation of natural habitats and halt the loss of biodiversity	• *Hectares transformed* • *Conservation areas supported* We will reach the transformation of over 2000 hectors ensuring sustainability use through agroforestry, and using it as buffer zones to support the conservation of biodiversity. • *Adoption of Technological Package* Through our standardization of training materials we will be able to scale regenerative practices throughout the tropics. We will measure the adoption of the technological package through families reached, alliances and regeneration of ecosystems. • *Soil health* • *Biodiversity* As part of our ROC certification process, we will measure the soil health and nutrient density, performing periodically analysis, plus comparison of farms with conventional agricultural neighbor lands vrs forested areas We will survey each farm for % conservation, and take inventory on plant diversity.

During the next 5 years in phase 1, 2, and 3 of this project, we will hire a field study consultant to help us with the following analysis:

1. Study pilot program farmers for KPI's mentioned above
2. Cost and Benefit analysis of different yields within agroforestry systems
3. Measurement of breadfruit carbon sequestration
4. Assessment of the ecosystemic interactions
5. Conservation and diversity effects of the systems
6. Comparison of non-management breadfruit trees vs. management RLT program breadfruit trees.

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Tech Package Project

We must improve our existing technical instructions behind our training program for the farmers to include the following information:

- Nutritional properties of breadfruit and other crops
- Guidelines on management of agroforestry and pest control
- Planting an agroforestry system
- Breadfruit growth development
- Nutrient uptake cycles
- Adaptive capacity to Climate Change
- Detection of pest and disease.

We will study, analyze and compile the topics mentioned above to create the technological package, that will become the base guidelines to transform farmers' lands. In order for this to happen, we will hire a consultant to help us research and generate a written Tech-Package and produce the script for key training videos. We will hire a professional to help us with the identification of pests and diseases, testing for agroecological control, and systematized description of each identified pest and recommended control. We will do lab studies to develop methodologies for preparation of inputs, types of materials and costs, and finalizing on a descriptive technical file (which will say what to combat, which actions to take, dose to apply, etc.).

We will hire a video editor that will help with these training videos and highlight stories of the farmers. Our goal is to create a model and set the standard for breadfruit agroforestry that can be replicated in the tropics.

Propagation Project

For breadfruit trees there are three primary methods of propagation: tissue culture, air-layering and root sucker extraction methods. During **phase 1**, We need to hire a consultant to help us evaluate these alternatives by exploring labs in Costa Rica we could partner with, the cost of creating our own lab, and import cost for tissue cultured trees. Also, we would like to explore root sucker extraction and air-layering methods of propagation for our farmers as an additional income. During **Phase 2**, we will identify a lab or partner to help us propagate through tissue culture. During **Phase 3**, we will have a proposal to build our co-own tissue culture lab. Our goal is to propagate over 600,000 breadfruit trees for the project and for other Central American tropical countries by 2030.

BIBLIOGRAPHY

[1] "Sustainable Development Goals" *United Nations*, https://www.un.org/sustainabledevelopment/. Accessed 30 May 2019.

[2] "Pomona AgTech" *Pomona Impact,* 2017. http://pomonaimpact.com/en/content/agtech-0. Accessed 30 May 2019.

[3] "Climate change and agriculture in Central America and the Andean Region" *International Food Policy Research Institute,* Timothy S. Thomas, Ana María Loboguerro R., Ana R. Rios, Deissy Martínez-Barón, Graciella Magrín, Vicente Barros, 2018. http://www.ifpri.org/publication/climate-change-and-agriculture-central-america-and-andean-region. Accessed 30 May 2019.

[4] "Climate change is contributing to the migration of Central American refugees" *Public Radio International,* Adam Wernick, July 15, 2018. https://www.pri.org/stories/2018-07-15/climate-change-contributing-migration-central-american-refugees. Accessed 30 May 2019.

[5] "United Nation Treaties." *United Nations*, CHAPTER XXVII ENVIRONMENT. 7. d Paris Agreement. 12 December 2015. https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg_no=XXVII-7-d&chapter=27&clang=_en Accessed 31 May 2019.

[6] "Countries in Central America Join Forces to Boost Climate Change Education in the Region." *Medium.* Sara Tchaparian. 20 April 2017. https://medium.com/unitar/countries-in-central-america-join-forces-to-boost-climate-change-education-in-the-region-b01f35ccd2bf Accessed 31 May 2019.

[7] "The Point of No Return: Climate Change Nightmares Are Already Here." *Rolling Stone*. Eric Holthaus. 05 Aug. 2015, https://www.rollingstone.com/politics/politics-news/the-point-of-no-return-climate-change-nightmares-are-already-here-37626/ Accessed 31 May 2019.