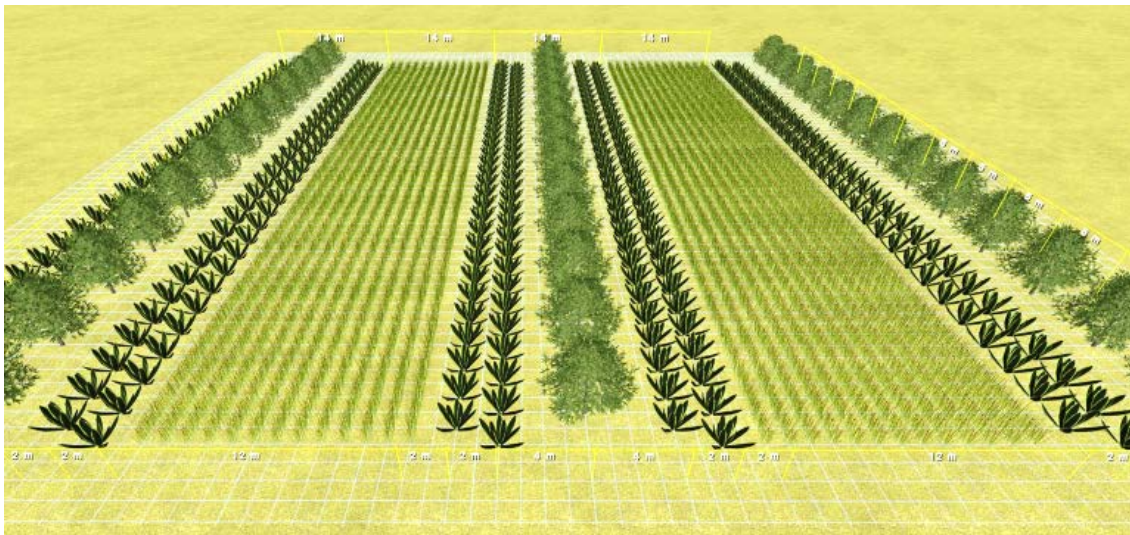


AGROFORESTRY PROPOSAL FOR THE PRODUCTIVE AND AGROECOLOGICAL  
RECONVERSION OF CORNFIELD PLOTS IN THE NATURAL PROTECTED AREA AND  
SACRED LAND OF WIRIKUTA

SAN LUIS POTOSI, MEXICO



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## **Geographic and Cultural Context:**

Wirikuta is located in the high plateau of San Luis Potosi in northcentral Mexico and is part of the Chihuahuan Desert. It is recognized as a Natural Protected Area and Sacred Natural Site by Mexico's federal government of the state of San Luis Potosi. Wirikuta is one of the most important sacred and ecological places for the indigenous Wixarika people, as it is here where the Sun was born to illuminate the world. Since time immemorial, the Wixarika people carry out annual pilgrimages to Wirikuta as part of their agricultural and spiritual cycle, recreating the path taken by their Ancestors and collecting the sacred peyote cactus or hikuri. Wirikuta is one Mexico's living biocultural treasures and, according to the World Wildlife Fund, it is one of three of the planet's most biodiverse desert ecosystems.

The region's ecosystem is under severe desertification, evidenced by bare soils, compaction, and clear signs of soil erosion. This desertification has deteriorated the ecosystem processes and the quality of life of the region's inhabitants. Some of the principal effects that can be observed in this area are: low fertility of agricultural lands, low production of grasses and foraging species, a reduction in the capacity of the soil to absorb and retain humidity, and the loss of biodiversity of flora and fauna.

The negative effects of climate change as a global process, which has modified the pattern of rainfall, is intensified in Wirikuta by continual overgrazing of cattle and by intensive agricultural practices such as yearly mechanical tillage, the continuous extraction of all crop residues to be used as animal feed, and the application of agrochemicals.

This situation has direct consequences for local inhabitants as it significantly reduces the productivity and profitability of agricultural and grazing lands, placing at risk the food security and the sources of income for small farmer families who live in the region. Additionally, a hydric imbalance is created that further aggravates the scarcity of water and generates a negative impact on the health of the native fauna with the reduction of their food in the form of grasses and foraging plants. These processes, in combination with industrial development and peyote overharvesting, have led to a decline in the Wixarika peoples' sacramental cactus, a deterioration of the sacred water holes and a general decline in Wirikuta's biodiversity all of which are of grave concern for Wixarika communities who have advocated for multipronged strategies to protect Wirikuta. This initiative focuses on the first phase of a broader biocultural project that looks to bring grounded solutions for the protection of Wirikuta that incorporate the area's most important stakeholders: local small farmers and the Wixarika people.

## **Justification:**

Agriculture depends in large part on biodiversity and ecosystem services, making the generation of strategies of this semi-arid region of vital importance and permitting an

adequate management of grazing and the integration of agroecological practices that reverse the processes of desertification and reestablish ecosystem functions, while increasing productive capacity and the profitability of these farming systems.

Agroforestry systems allow for the strategic introduction of trees, shrubs and other multifunctional perennial plants to the agricultural lands. These systems can be integrated to the cornfield (milpa) plots that already exist in the region through a technique called alley cropping, where rows of trees and perennial plants are alternated with wide strips of annual crops such as corn, beans and squash. The presence of perennial trees and plants increases the resilience and adaptive capacity to climate change because they are able to stop soil erosion, increase the natural fertility of the soil, protect crops from climate extremes, improve the infiltration of rainwater in the soil, increase biodiversity and sequester atmospheric carbon dioxide as a strategy for climate change mitigation.

Additionally, it is possible to integrate perennial tree crops with economic value that generate additional products such as food, medicine, firewood, and foraging material for animals. This brings direct benefits to the local population and reduces the pressure on non-cultivated land that is sacred to the Wixarika people.

### **General Objective:**

Develop and test an agroforestry and business model that foment the integral and agroecological management of cultivated land and of the natural landscape, allowing for ecosystem regeneration, an increase in productivity, and the improvement of socioeconomic conditions for the region's inhabitants.

This first phase consists on the establishment of an agroforestry cornfield model for the cultivation of corn in between rows of mesquite (*Prosopis laevigata*), maguey (*Agave Salmiana* and *Agave Americana*) and nopal cactus (*Opuntia ficus-indica*). The design of this alley cropping system will be based on the topography of the land in order to increase rainwater harvesting and soil retention. As a key complement to this demonstrative plot, agroforestry training for local ejidatarios (communal-based small farmers) and Wixárika participants will be conducted in order to explain the benefits of this agroecological system and to demonstrate its productive potential through the integral use of maguey, nopal cactus and mesquite.

The demonstrative cornfield plot will be located on a section of land in the Las Margaritas ejido, in the municipality of Catorce, San Luis Potosi. This plot has special importance because it is located in Bernalejo, beside the sacred Wixarika place known as the home of Tamatsi Kauyumarie, Our Elder Brother Deer of the Sun.

This initiative seeks to promote the development of projects that foment the participation and exchange of knowledge between two groups of people with the

deepest history of this geography: the native small farmers and the Wixarika people. The activities that are part of this project's first phase will be carried out with the participation of local residents and small farmers, and with Wixarika university students specializing in agroforestry and natural resource management. We project that this model can also be implemented in the Wixárika communities in the Sierra Madre Occidental with few adjustments to better match the climatic context

### **Specific Objectives:**

- ☐ Design and implement a demonstrative and educational agroforestry cornfield plot adequate to the region's context.
- ☐ Carry out practical training with small farmers and Wixarika university students that address the following themes: agroecological planning and management of agroforestry plots following key water harvesting principles, holistic management of grazing areas, and integral use of mesquite, maguey and nopal cactus as sources of nutrition, foraging and firewood.
- ☐ Improve the productivity of grazing systems in the region by promoting an innovative technique of silage from maguey leaves for the production of high nutritional quality and low-cost foraging materials, thus reducing the overgrazing in natural grasslands. For more information about this novel technology, read the article [El Poder del Agave](#) (The Power of Agave).
- ☐ Carry out a first harvest and grinding of mesquite pods for the rescue of this indigenous staple food that has a high nutritional and economic value.
- ☐ Promote the restoration and caretaking of the sacred Wixárika territory with special attention to Wirikuta.

### **Methodology:**

- ☐ Map, design and plan an agroforestry system in an existing plot of two hectares.
- ☐ Purchase and transport mesquite, agave and nopal cactus plants.
- ☐ Carry out the necessary preparation of the soil.
- ☐ Plant agroforestry rows prior to the cultivation of the cornfield.
- ☐ Planting of the cornfield in between the agroforestry rows once the rains begin.
- ☐ Coordinate the harvest of the sweet mesquite pod for processing and elaboration of recipes during the training.

- ☐ Organize and facilitate training for a group of 30-40 small farmers. The practical component of the workshops will be the conclusion of the planting of the maguey and mesquite with the participants, carry out on site the grinding of the maguey leaves for their silage and use as animal feed, and elaborate food with mesquite flour for a tasting.
- ☐ Invite Wixarika university students to participate in the training and in the establishment of the plot to share space and dialogue with the region's residents.
- ☐ Continue to provide monitoring, maintenance and follow up to the agroforestry system.
- ☐ Document the process.
- ☐ Initiate a second phase for the project: development of a business plan for the commercialization of agroforestry products such as those made with mesquite, the purchase of communal equipment for the processing of the mesquite pod and the maguey leaf, and creation of a plan for the implementation of agroforestry cornfield plots in other land belonging to the ejido or small farmer commons and in conjunction with Wixarika participants that will include students and pilgrims.

### **Timeline for the First Phase:**

Activities	Time Frame
1. Map, plan and implement the agroforestry rows in the demonstrative plot	First week of May 2021
2. Plant the cornfield in between the agroforestry rows in the demonstrative plot	End of May, beginning of June 2021
3. Harvest the mesquite pod to carry out grinding tests	Mid June
4. Train small farmers for the demonstrative plot	Mid July

## **Budget for Phase I**

Item	Unit	Cost per unit	Subtotal (MX pesos)
Laboratory soil analyses	1	\$1,600	\$1,600
Drone mapping, design and planning of the agroforestry system	-	-	\$18,000
Agave plants (30-40 cm)	400	\$35	\$14,000
Mesquite trees (80- 120 cm)	90	\$120	\$10,800
Nopal Cactus	200	\$15	\$3,000
Mineral and biological amendments for the soil			\$3,500
Marking and preparation of the land with deep tillage ripper for soil decompaction.			\$8,500
Honorarium for days of work planting the agroforestry rows	40	\$300	\$12,000
Protection for the mesquite trees	90	\$20	\$1,800
Plan, organize and facilitate an 8-hour training workshop for 30-40 small farmers and Wixárika students.			\$25,000
Cost of transportation of plants and materials			\$4,000
Costs of transportation for the Wixarika participants from the Sierra Madre Occidental in the state of Jalisco to Las Margaritas, San Luis Potosí	4	\$2,400	\$9,600
Honoraria for Wixarika students	4	\$1,000	\$4,000
Cost of transport for organizers			\$2,400
Cost for the maintenance and irrigation support for the first year of the agroforestry system			\$4,000
Vehicle maintenance			\$6,800
Project management and oversight			\$10,000
Unforeseen expenses			\$6,000
<b>Total</b>			<b>\$145,000</b>

Note: USD Equivalent on May 21, 2021 = \$ 7,264.50

## **Project Team:**

**Eduardo Guzmán Chávez**—Sociologist, poet and community activist, for the past 29 years he has developed several productive projects focused on culture, alternative traditional medicine, and permaculture in the Wixárika highlands and in the sacred land of Wirikuta. He is member of the (ejido) communal landholding system in Las Margaritas and participates in the proposal “Agreement for life in Wirikuta” that seeks to integrate local knowledge and alternative technologies to honor life in this sacred territory.

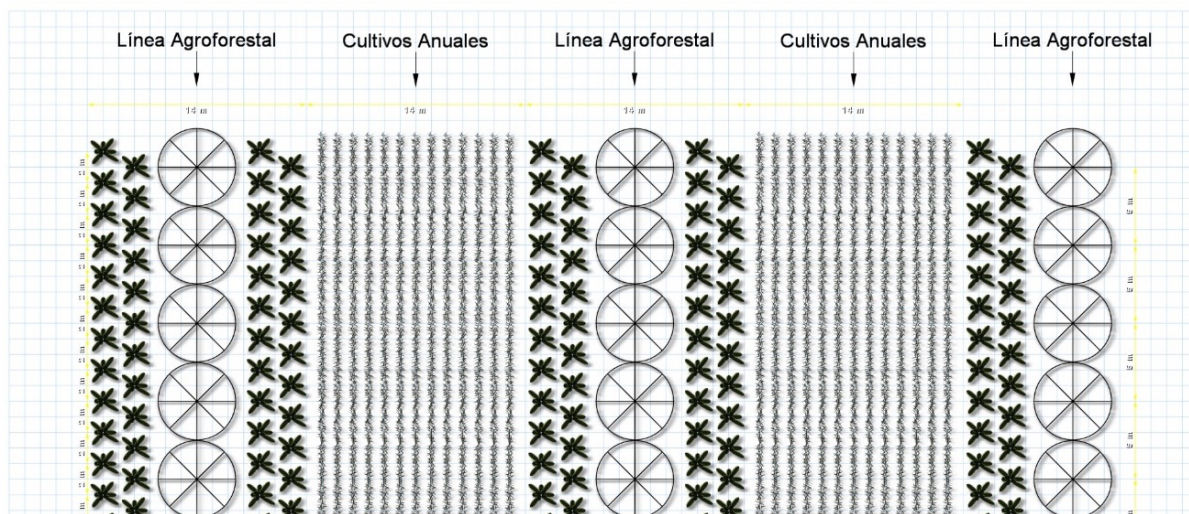
**Diana Negrín**—Writer and curator with a PhD in geography from the University of California, Berkeley. She is the president of the board of directors of the Wixárika Research Center. Currently Negrín is a research fellow with the Center for Advanced Studies in Latin America (CALAS) with the University of Guadalajara and an adjunct professor at UC Berkeley and the University of San Francisco.

**Yvonne Negrín**— Director of the non-profit foundation, the Wixárika Research Center, founded in 2001 to promote the study and defense of Wixarika culture and territory. She has 50 years of experience working in Wixarika communities on initiatives that range from art and design, health, and the ecology through various productive projects in several localities of the Western Sierra Madre Occidental.

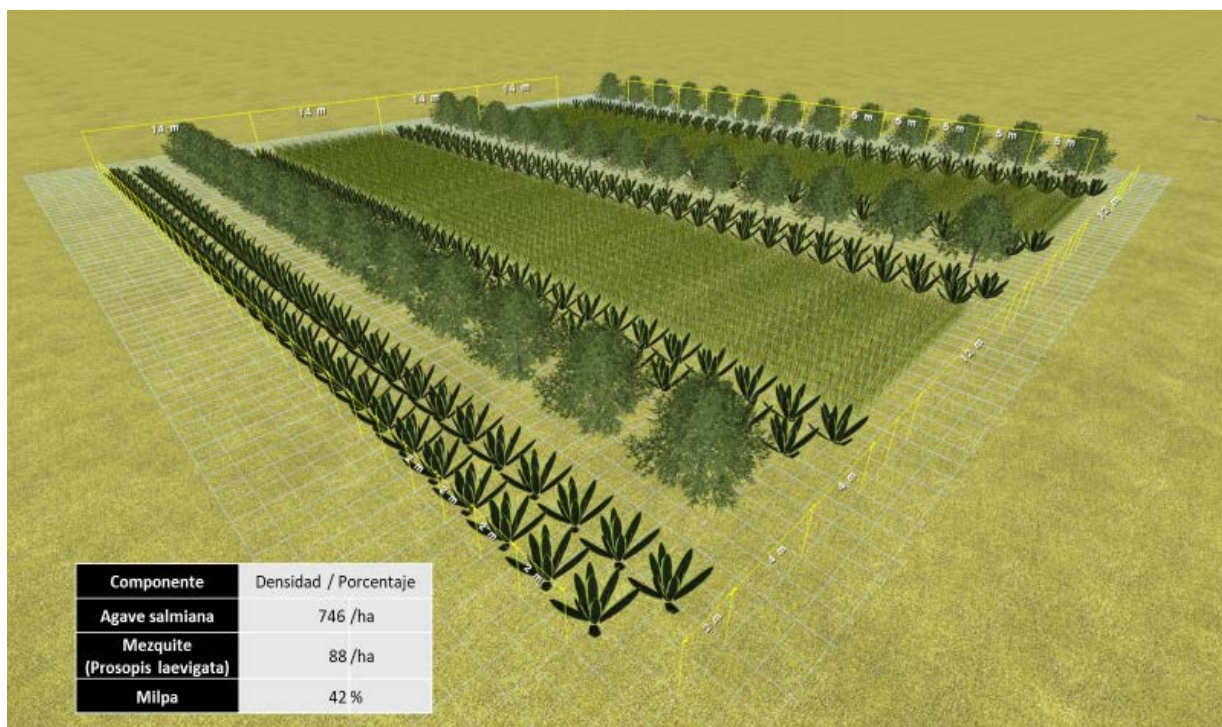
**Gerardo Ruiz Smith**—Consultant in the planning, design and management of agroecological landscapes resilient to climate change and that permit a regeneration of ecosystem processes, the production of healthy foods, and the revitalization of local economies. During the past six years, he has worked on the propagation, planting, harvesting, processing and promotion of the mesquite tree as a strategic plant for dry climates, in addition to its integration into agroforestry poli-cultivations in combination with agave, cacti, perennial grasslands and planned grazing systems.

## Anexes

Sample of the layout and design of alternating cornfields with agroforestry rows



Render of agroforestry layout with agave, mesquite and cornfields



Goats and sheep feeding from the fermented forage of the maguey leaf in Rancho Zamarripa, Guanajuato.



Brands of mesquite flour commercialized in the United States and other countries



Products made with mesquite flour as a base (waffles, cookies, breads, coffee substitute, etc.)



Mesquite and other desert plant recipes published by the non-profit organization Desert Harvesters in Tucson, Arizona.



**FOR MORE INFORMATION OR TO MAKE A DONATION:**

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[www.wixarika.org](http://www.wixarika.org)



*Wirikuta*

By Juan Ríos Martínez, 1973, .81 x 1.22 m., wool yarn on beeswax and plywood  
George and Laurie Howell Collection