Progress Report: Shade Coffee Roundtable Initiative in the Río Loco/Guánica Bay Watershed

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1 INTRODUCTION

The Green Revolution was a period of time beginning in the early 1940s that encouraged efficient production, monocultures, commercial fertilizers and pesticides, an increase in planting density, and the use of heavy machinery. The practice has continued and was widespread in Puerto Rico from the 40s through the present. This form of agricultural production was applied to coffee farming in the majority of coffee producing countries and the island of Puerto Rico was not an exception. In Puerto Rico, the indiscriminate clearing of farms was done often without proper protection of water bodies. The consequences of this approach led to: soil erosion and acidification, loss of soil fertility, loss of habitat and biodiversity, sedimentation of water reservoirs and has caused the loss of scenic beauty. In order to deal with the many environmental problems associated to these practices and to further support sound economic alternatives of production, a multidisciplinary group established the Shade Coffee Roundtable Initiative in Puerto Rico in 2011. Furthermore, the development of sustainable coffee farming practices was also identified as a priority following the Río Loco/Guánica Bay Watershed (RLGBW) Restoration Project and watershed plan led by the US Coral Reef Task Force (USCRTF). The rationale was to promote shade coffee farming as a practice that integrates various methods to achieve adequate and sustainable coffee production levels, to sustain the socio-economic wellbeing of coffee farmers and simultaneously help create habitat for biodiversity and wildlife conservation.

The initiative was instigated by Protectores de Cuencas in March 2011. The first meeting's objective was to introduce the initiative and get feedback from various interested partners and local stakeholders. The past and current participating partners include: the US Fish and Wildlife Service (USFWS), the Natural Resources Conservation Service (NRCS), the Puerto Rico Department of Agriculture, Puerto Rico Department of Natural and Environmental Resources (DNER), US Forest Service (USFS), the National Oceanic and Atmospheric Administration (NOAA), the University of Puerto Rico, Utuado Campus (UPR-Utuado), Experiment Station Agricultural Extension Service of University of Puerto Rico,

Mayagüez Campus (UPR-Mayagüez), the Municipality of Yauco, the non-profit organizations of Cafiesencia, Inc., Ridge to Reefs, Inc., Envirosurvey, Inc., Centro para la Conservación del Paisaje, Casa Pueblo, Protectores de Cuencas, Inc., and independent farmers.

The Shade Coffee Roundtable was created with the purpose to develop criteria for shade coffee certification for Puerto Rico; identify incentives for motivating coffee producers to continue to use historical agricultural practices that are sustainable and environmentally friendly; help create economic niches for the coffee produced in the shade that can be marketed separately and that results in greater profits for producers. Some of the most significant benefits of shade coffee are: carbon sequestration, reduction of local temperatures and climate change resilience; increased organic matter in the soil; recycling of nutrients into deeper parts of the soil into the uppermost part of the soil; reduction of soil erosion; and forage habitat for wildlife. In addition, shade polyculture provides other sources of food and raw materials, the coffee fruit grows healthier and it regulates photosynthesis and plant respiration. Furthermore, some studies suggest better quality of coffee taste, improved grain density, increased longevity of the plant, improved infiltration (90% vs 40%); slower ripeness process; reduced overproduction; and reduced reliance on chemical fertilizer as some shade tree species can fix nitrogen.

The Roundtable partner group identified the need to create a process to certify farmers, intermediaries, roasters and to improve marketing strategies. In addition the group recognized the need to create an inventory of farmers that are currently growing shade coffee to integrate and organize these individuals into the initiative. Since 2011 the group of interested partners has organized a set of meetings to this date with the purpose of developing the criteria to be used for the certification process. In order to achieve this endeavor the various partners mentioned above started the process to create the set of criteria for farm certification. After various meetings, the group developed the document entitled, '*Criteria for Shade Coffee Farming*'. The criteria was completed and has been

approved by the group. The next step will be to define the certification process, establish the necessary committees for farm evaluation, create a Certification Board, and identify marketing opportunities and alternatives to spearhead the certification efforts. It is essential to ensure that conservation efforts included in this initiative result in improved economics for individual farmers who adopt these beneficial practices. We believe that a sustainable coffee economy will contribute to the protection of coral reefs, biodiversity and drinking water resources, as well as it will help preserve the history and culture of coffee farming areas in Puerto Rico.

This report will provide a description of the RLGBW, the focus areas for the initiative, the criteria developed for the certification process and the progress achieved in the process so far. We would like to thank all of the participating partners for their ongoing support and contributions to this initiative.

2 SITE DESCRIPTION

There are six climatic life zones present in Puerto Rico. These life zones range from dry desert like conditions through rain forest in the basal or sea level belt, and wet with rain forest in the lower montane altitudinal belt (Ewel and Whitmore, 1972). The RLGBW covers three life zones. Subtropical moist forest and subtropical wet forest are present in the northernmost part of the basin, while the southernmost part is exclusively dominated by subtropical dry forest. Thus, the rainfall regime varies significantly with elevation throughout the catchment area, from less than 30 inches at sea-level in the coastal Guánica Forest to over 80 inches at around 3,000 feet at the highest point in the watershed (Warne et al., 2005). Based on orthophotography, by 2010 land use in the watershed was approximately 48% forested, 43% agriculture and 9% urban totaling roughly 57,000 acres (CWP 2010). However the drainage area of the RLGBW increases by approximately 39,883 acres with the addition of the Southwest Water Project (Ortiz-Zayas & Terrasa-Soler, 2001) which allow an exchange of waters through the Lajas agricultural valley. This irrigation system has greatly expanded the total area of the RLGBW and likely increased the supply of fine clay sediment and nutrients to the receiving waters in the Guánica Bay. However, this initiative focuses on the northernmost part of the basin.

The RLGBW is one of the most complex watersheds in Puerto Rico. It has the peculiarity of being a highly manipulated system as a result of human intervention artificially increasing its drainage area by a series of subterranean inter-basin water transfers from the central cordillera to the lower areas. The system consists of five smaller basins of lakes: Yahuecas, Guayo, Prieto, Lucchetti and Loco. On the steep slopes of the upper watershed, loss of highly erodible soils is a major issue. Lopez-Soler (2001) pointed out that the reservoirs in this watershed are among the most affected by sedimentation in Puerto Rico losing high percentages of their storage capacity. Agriculture is the main economic activity in this region. However, government policies in the 70s pushed the traditional shade-grown coffee to change to sun-grown coffee which triggered huge deforestation in these farmlands. According to the Center for Watershed Protection (2008), clearing activities for coffee and

other agricultural crops showed little evidence of conservation practices. Further, it has been estimated that erosion associated with sun-grown coffee is 3.5 times higher than that of shade-grown coffee (Hartemink, 2006). Massive land clearings for agricultural activities and unpaved road networks has resulted in extensive areas with bare soil, and very limited natural re-colonization by native vegetation due to the high clay content (Humatas Clay). Thus, through an agreement between the US Fish & Wildlife Service and the USDA Natural Resources Conservation Service, coffee farmers have been enrolled into the restoration program with a primary goal of converting the sun-grown coffee to shade-grown coffee. The NRCS Environmental Quality Incentives Program (EQIP) is a voluntary program that provides financial and technical assistance to agricultural producers through contracts up to a maximum term of ten years in length. These contracts provide financial assistance to help plan and implement conservation practices that address natural resource concerns and for opportunities to improve soil, water, plant, animal, air and related resources on agricultural land and non-industrial private forestland. This program is an important element for the success of the Shade Coffee Roundtable. In addition the US Fish and Wildlife Service Partners Program is also an initiative that provides technical and financial assistance to private landowners who are willing to work with them and other partners on a voluntary basis to help meet the habitat needs of Federal Trust Species. The Shade Coffee Roundtable seeks to integrate these efforts as well.

3 THE CRITERIA FOR SHADE COFFEE FARMING

This initiative focuses in four critical areas that are necessary to complete a holistic approach to improving both the economic and ecological aspects of coffee farming and to help preserve coffee culture in Puerto Rico. The reality of our Island is that many factors threaten the coffee industry in Puerto Rico. These threats include climate change, increased frequency and duration of droughts and more variable weather patterns. Other external factors include lower cost of coffee production in other countries without strong labor and environmental standards, substitution and mixing of Puerto Rican coffee with lower cost or lower standard imported beans and increased fertilizer and labor costs. Shade coffee and an attention to higher quality coffee, represents a way to provide communities in Puerto Rico with food and economic security while restoring natural functions of the forest and the health of streams, rivers and nearshore coastal habitats.

The four aspects of advancing the shade coffee industry in Puerto Rico include:

1) ***Better trained coffee picking professionals that maintain and harvest coffee to maximize its value.***
2) ***Shade coffee criteria that are supported by government cost-share management practices and funding.***
3) ***Training for coffee growers and those in government institutions that support the "coffee economy".***
4) ***Development of coffee markets supported by advertising both domestically in PR and the US as well as in the greater Caribbean and international markets.***

Together these four aspects make up the critical building blocks to effectively stabilize and grow the sustainable coffee market in Puerto Rico while advancing critical wildlife habitat rehabilitation.

Development

Throughout the development of this initiative we have identified other activities that need to be addressed in order to ensure success and consensus.

1) Education and outreach
2) Obtain government support
3) Public policy
4) Market studies
5) Funding sources
6) Formalizing certification
7) Relevant NGOs alliance

To address these needs, we have arranged a set of meetings with relevant partners and NGOs to establish strategies for advancing the Roundtable's goals and objectives. This set of meetings has led to a formal acknowledgement of the initiative in the recently created Model Forest of Puerto Rico.

The Criteria

a. Farm History

i. The operator of the farm needs to know the history of the farm in terms of past uses. For this it is necessary to obtain the history of all parcels within the whole farm.

ii. Another factor to consider is the state of conservation of the parcels in terms of past crops and conservation practices applied and its actual conditions.

iii. The farmer will need to complete a form of the history of the farm.

b. Management Plan (MP)

i. All farms, new and in existence will need to have a MP for the farm.

ii. The MP must be made before carrying out the clearing of the property.

iii. The MP must be prepared by the owner or operator of the property, representatives of relevant agencies (to be determined by the group) and representation of the Certification Board.

iv. The MP should include:

1. History Form of the Farm
2. Inventory of the estate or "lay out" of the farm.
3. Plan for the clearing of the farm (for new farm)
4. The plan of planting shade trees
5. Plan for planting coffee trees. The planting of coffee trees must be done following the contour lines of the slope.
6. New and existing roads. The development of roads within the farm should be constructed in a way that least impacts in terms of preventing erosion and sedimentation and should protect existing roads.
7. Incorporation of appropriate practices for sediment and erosion control.
8. Identify water bodies on the farm, both permanent and intermittent and include in the inventory of the farm.
9. Include the buffer zone to be maintained for water bodies identified on farms, both permanent and intermittent.
10. Proper management of existing plants and trees during clearing when planting or replacing new coffee trees.
11. The Plan will include a soil study of the land to be cultivated.

c. Deforestation/Shade Coffee Establishment Criteria

i. This criterion should be applied with special emphasis on new farms and all farms (abandoned etc.) that are in secondary forest as partial deforestation is unavoidable.

ii. Prior to the selection of the site there should be a study of soil in order to determine whether it is appropriate to grow coffee according to their fertility, cation exchange capacity, moisture retention, texture, drainage, external, slope, etc.

iii. Clearing should be done by hand without the use of heavy machinery and selectively to avoid high risks of erosion and water pollution of the environment in the area.

iv. The time for this practice has to coincide with the dry season, so that it can facilitate tasks and reduce the risk of accidents to workers as well as to prevent erosion.

v. The clearing or cleaning of the property must begin by removing weeds, bushes and then finally the trees by size.

vi. Do not use burning as a tool for deforestation. Do not burn leaves, branches or other plant material. These should be left on the ground to decompose and become part of the soil, protect and preserve. If possible, timber can be made for sale.

vii. The result of the dismantling plant material must be handled properly (crushed, compost, etc.). Must be maintained on-farm plant material by placing the coarse material and piling barriers against the slope of the land (the contour).

viii. It is very important to leave a buffer zone (see criteria below buffer zone) between the planting of coffee and water bodies to protect them from leaching of contaminants. This can be done by establishing or leaving a strip of vegetation with no clearing or grading.

ix. It is important to harness the waters of the premises to prevent excessive erosion caused by water currents created by rains. This can be done by building contour ditches according to standards established by the Natural Resources Conservation Service (NRCS).

x. The planting of coffee bushes should be carried out as recommended by the University of Puerto Rico. Agricultural Extension Service Experiment Station.

xi. During the process of renewal pruning or planting of coffee should start by pruning the branches or rods and then the stems or trunks.

d. Restoration Criteria

i. This criteria refers to areas on farms that are identified as critical for restoration because if they are not restored they may cause severe damage to the environment.

ii. Places to restore may include highly pronounced slopes that are devoid of vegetation, buffer zones, water bodies that are not forested, roads with serious problems of erosion and sedimentation, etc.

iii. The restoration must be addressed with appropriate conservation practices for each particular problem.

e. Wildlife Criteria

i. This criteria encourages the farmer promote biodiversity on farms and protect the wildlife that inhabits them.

ii. The operator of the farm and the workers should be aware of protected species and endangered species that live on farms in order not infer with them or impact them negatively.

f. Criteria for Buffer Zones

i. It refers to the buffer zone that should exist in all water bodies identified on farms, both permanent and intermittent.

ii. The buffer area should be forested with trees and shrubs, preferably native.

iii. In the case of permanent water bodies minimum distance of the buffer zone should extend at least 32 feet on each side of the body of water.

iv. In the case of intermittent water bodies minimum distance of the buffer zone should extend at least 16 feet on each side of the body of water.

g. Shade Criteria

i. It refers to all the key elements required to establish a coffee plantation under shade.

ii. The percentage of shade must be between 20% and 40% taking into account that each site may have differences in both its geographical position and inclination and altitude from sea level, which may be decisive factors in the percentage of shadow to establish.

iii. For properties that are proposed to convert to shade coffee, planting of trees should be established in an effective planting plan embodied in the Management Plan (establish distance between trees, type of pruning, maintenance etc.).

iv. The design of the shade coffee planting plan must be made in advance between the operator of the farm and the agencies involved (to be determined) and the Certification Board.

v. Trees should be handled and pruned during the growing period to reach the desired percentage of shade.

vi. For farms that have already reached the desired shade percent; pruning and trimming trees to keep the percentage of shade must be

done right at the end of the harvest and before flowering (October to January) or when needed when the percentage exceeds the desired shade. It should be noted that the most active time for breeding and nesting of most birds is during the months of February through summer. It is recommended that pruning be carried out annually to be less damaging to the coffee trees when plant material is pruned from the trees to maintain proper shade levels.

vii. The branches of shade trees should not be less than 6 feet above the coffee bushes.

viii. The plant material resulting from pruning must be kept on farms. It should be left on the ground to decompose and become part of the soil to protect and preserve it.

ix. Layers of shade

1. Partial shade
    a. During the planting of coffee bushes pruning new or renovation of shade coffee the farmer can incorporate planting bananas to protect the soil and planting during the first two years and in turn get an income during the process of establishing the coffee plantation.
2. Lower Strata.
    a. May include muses, citrus and avocados.
3. Principal Strata.
    a. It should be composed mostly of native species.
4. Higher Strata.
    a. It should be composed mostly of native species.

x. Higher and Principal strata are required while the lower layer and Partial shade are optional.

xi. Farmer must maintain species diversity with a minimum of four native species between the Superior and Principal Strata.

h. Habitat Criteria

i. This criteria includes practices that promote and maintain habitat for wildlife on the farm.
ii. Native epiphytes on trees should be maintained as this practice does not affect the planting of coffee or shade.
iii. Keep trees and fallen branches and those that are pruned on the grounds of the farm.

i. Soil Conservation Criteria

i. It is essential to care for and maintain soil fertility and soil conservation.
ii. The soil should be covered all year, either in litter or cover crops.
iii. The base of coffee trees should be clean for the application of fertilizers and pesticides when needed if they are not applied directly to the subsoil.
iv. Maintain a small contour in a half moon around the base of the coffee bushes into the slope to avoid washing away the chemicals applied to the tree.
v. There must be a plan to establish and expand the ground cover and minimize the use of herbicides.
vi. There should be a program to reduce erosion and sedimentation to minimize the risk under the conditions of each site within the farm.
vii. This program should be incorporated into the management plan to prevent erosion of soils, including soil conservation practices such as vegetative barriers, dead trees and shrubs barriers,

ground covers, stabilized ditches, roads and sidewalks on the contour, proper planting distances, the use of temporary and permanent shade, liming, the incorporation of organic matter and the proper use and application of fertilizers.

j. Fertility Management Criteria

i. There must be a fertilization plan based on: soil properties, soil analysis and expert opinion.
ii. The farmer must conduct annual soil and foliage nutrient analysis.
iii. Fertilizer applications should be based on the results of these analyses.
iv. Priority should be given to fertilizers made with natural materials of the farm and /or organic fertilizers.
v. Fertilizer should be applied directly in contact with the ground or subsoil.
vi. Fertilizer should be applied as required for each crop and soil properties, without runoff to water bodies.
vii. Farmer must maintain records of all fertilizer applied and provide an appropriate storage area for them.
viii. The use of nitrogen fixing trees (legumes) for shade is recommended.
ix. Material from pruning should be left on the farm.

k. Water Conservation Criteria

i. Buffer zones of vegetation should be established for water bodies on the property as discussed in this document.
ii. Farms must have a water conservation program that includes: map of surface water and discharge of waste into water bodies

l. Criteria for Pest Management

i. Farm must maintain a record of applications and types of pesticides used.

ii. The use of organic-based pesticides is recommended.

iii. There should be an integrated pest management for the farm that includes maintaining records of applications.

iv. Do not use pesticides known as the Dirty Dozen.

v. Farm must apply all regulations and rules in force in Puerto Rico for the use of pesticides.

m. Social criteria

i. In general farm should include programs that promote occupational health and safety, training, fair pay, etc.

n. Traceability Criteria

i. There must be a record of all farm operations for each field including:

1. Record of operations
2. Crops record
3. Production record
4. Record of management practices implemented

4 NEXT STEPS

This initiative is a step forward in innovation to create a win-win scenario for the benefit of the economy and the environment in Puerto Rico. These initial efforts are essential to achieve the ultimate goal of establishing and fully implementing a certification program in Puerto Rico to enroll and certify farms as environmentally friendly shade coffee areas. It is an advantage that Protectores de Cuencas, Inc. is actively participating in the various working groups developed by the office of the Model Forest, an initiative that aims at the integration of communities and conservation activities throughout a conservation district that connects various natural protected areas from the North coast to the Southwest. The Model Forest initiative would facilitate closer collaboration among farmers and producers to promote their products and provide support and training in this process. The Roundtable will continue working towards the institutionalization of these practices and programs working together with PR Department of Agriculture, NRCS, Agricultural Extension Service of UPR Mayagüez, UPR Utuado, PR College of Agronomists and the Department of State.

Protectores de Cuencas has completed the construction of a large-scale nursery that will help expand and strengthen our conservation projects around Puerto Rico including the Shade Coffee Roundtable Initiative. Due to Protectores de Cuencas' good relations already established with farmers in the region and with the Mayor of Yauco, who donated the space for establishing the nursery/greenhouse, we will be able to host group visits at our facilities to conduct Roundtable meetings to continue moving forward the process. The ultimate goal of these efforts aims at reducing nutrients and sediment yields derived from coffee production as well as less chemical fertilizer and herbicides that may runoff as well. We will reduce the impact of unsustainable agricultural practices in the Guánica Bay marine ecosystems and adjacent coral reef communities. As mentioned before, PDC strongly believes this outcome is achievable as the certification would allow a win-win scenario in which farmers who get certified can receive a direct economic benefit and long-term conservation goals such as reduction of nutrients and sediment yields to coral reef

ecosystems in Guánica. As a byproduct, biodiversity in the upper Río Loco Watershed region will increase as well.

We expect to conduct the next Roundtable meeting in October 2015 in order to identify more farmers interested in the certification process and develop a strategy to complete the certification process and implementation across the Watershed. One of the expected outcomes of this next meeting will be to present an finalize the approval of the Shade Coffee Logo (Figure 1) that will be stamped on coffee bags with coffee produced from certified farms and coffee producers.

Figure 1. Shade Coffee Certification Logo.