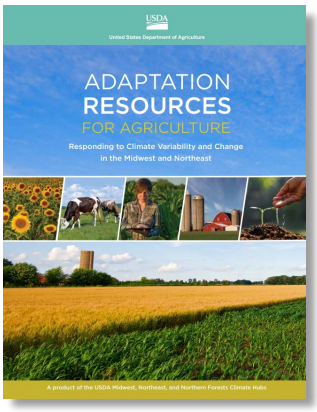
United States Department of Agriculture
Caribbean Climate Hub

Adaptation Resources for Agriculture
A Case Study: Siembra Tres Vidas Farm, Aibonito, PR

Eva Holupchinski, Coordinator, William Gould, Director USDA Caribbean Climate Hub



The Adaptation Resources for Agriculture Workbook was jointly developed by USDA Climate Hubs and NRCS to support producers, service providers, and educators to manage climate change. The workbook helps producers consider both short-term adaptive management actions (<5 yrs) and long-range strategic plans (5 to 20 yrs, subject to farm type). This workbook promotes adaptation through multiple resources including a "menu" of adaptation strategies/ approaches and example tactics for cropping and forages, confined livestock, grazing, orchards and small fruit and vegetable production systems. Recent efforts by USDA Climate Hub NRCS Liaisons work to increase the number of examples, and have been documented as Case Studies. These Case Studies are of producers utilizing the 5-step process in the workbook or similar mechanisms to document their management choices to ameliorate climate change effects on their operations.

Siembra Tres Vidas Farm

Siembra Tres Vidas is a farm located on the southern side of the central mountains of Puerto Rico in the town of Aibonito where Daniella Rodriguez grows a variety of vegetables, lettuce, edible flowers, and aromatic herbs. The farm is situated at 2000 asl on the leeward side of the mountain range where the rain shadow effect causes a relatively dry climate. Daniella Rodriguez reported the need to adapt the farmland to rainfall extremes after experiencing periods of extreme drought followed by heavy rainfall events.

1 **DEFINE:** The overall goal of Siembra Tres Vidas was to create stability in increasingly unstable rainfall conditions. They managed the land, crops, and water resources to maintain a sustainable operation in the face of climate change. The farm did not have a reliable year-round water supply and they wanted to reduce the risk associated with drought, implement soil health management principles, and protect the soil resource for sustainable agricultural production.

2 **ASSESS:** Shifting rainfall patterns, precipitation extremes, increasing temperatures, more frequent dry days, increased drought risk, more frequent extreme rainfall events and more intense tropical storms and hurricanes are expected in the Caribbean region (Hayhoe 2013). Possible impacts to these changes: Difficulty planning farm calendar; Not having enough water to sustain crops; Crop losses during drought; and Extreme rainfall events causing soil erosion and nutrient loss.

Farmer Daniella Rodriguez showing where she planted vetiver for erosion control. Photo credit: USDA Caribbean Climate Hub.

Siembra Tres Vidas Farm in Aibonito, Puerto Rico. Photo credit: USDA Caribbean Climate Hub

The Caribbean region is becoming hotter and drier due to climate change. Climatic projections indicate that temperatures in the region will continue to rise, with some studies projecting a 1.5°F to 4°F increase in average annual temperatures for the U.S. Caribbean by 2050 (Henareh et al. 2016). Rainfall patterns will change, making more extreme rain events occur in the rainy season and the dry season more extensive.

For more information on the Caribbean Climate Hub, please visit:
https://www.climatehubs.usda.gov/hubs/caribbean

3 **EVALUATE:** What management challenges/opportunities may occur as a result of climate change? In the table below, management challenges/opportunities that may occur as a result of climate change are recorded with the feasibility of meeting management objectives under current farm management listed.

Step 3: EVALUATE Management Objectives Given Projected Impacts and Vulnerabilities			
Land Unit	**Objective**	**Challenges to Meeting Objective with Climate Change**	**Opportunities for Meeting Objective with Climate Change**
Entire Farm	Increase drought adaptation	Lack of natural water sources on farmland	Plant drought-tolerant pigeon peas
Entire Farm	Improve water access	Lack of natural water sources on farmland	Create water retention pond
Entire Farm	Maintain and build soil nutrients	Heavy rainfall events and resulting erosion	Slow-terracing, composting, mulch to retain and build nutrients. Plant vetiver for erosion control on steep slopes.

4 **IDENTIFY:** The fourth step of the process is brainstorming tactics farmers can implement to enhance a farm's ability to adapt to climate change and meet management goals. Siembra Tres Vidas Farm applied three approaches and tactics: **Approach:** Expand or improve water systems to match water demand and supply. **Tactic:** Construct retention pond to maintain water on the landscape. **Approach**: Diversify crops to accommodate expected future conditions. **Tactic**: Plant drought-tolerant pigeon peas. **Approach**: Manage crops to cope with warmer and drier conditions. **Tactic**: Increase soil cover with mulch and cover crops.

5 **MONITOR:** As the climate changes in Aibonito, Puerto Rico, Finca Siembra Tres Vidas will continually monitor their management decisions and how this impacts challenges and opportunities in production agriculture and farm health. They are continuing their process of slow-terracing and composting to accumulate nutrients in the soil.

NRCS Civil Engineer and Farmer Daniella Rodriguez viewing water retention pond. Photo credit: USDA Caribbean Climate Hub.

More about climate adaptation and Siembra Tres Vidas Farm

To learn more about the adaptation practices applied by Siembra Tres Vidas Farm, check out the video Permaculture, Soil & Water Conservation for Climate Change Adaptation on the Caribbean Climate Hub YouTube channel. The video is also available for Spanish speakers. The Adaptation Resources for Agriculture Workbook can be a valuable process for any agricultural producer to undertake in helping identify these challenges and opportunities.

For more information:

Caribbean Climate Hub
caribbeanclimatehub@gmail.com

USDA CARIBBEAN CLIMATE HUB for Tropical Forestry and Agriculture