



Climate Smart Agriculture in the Eastern Caribbean States

Implementing an integrated approach to reduce the effects of drought on farming in the New River area

*New River Farmers' Co-operative Society,
New River Estate, St. James, Nevis*











Contributions to Climate Smart Agriculture



Diversification, integration, and innovative technologies that enable production under extreme and unpredictable climate conditions, have increased the resilience of the farming system to climate risks.



Farmers were able to diversify their crops which in turn allowed for increased productivity and food security for the area. By making water available to producers during the dry season, farmers were able to expand production to multiple crops and varieties, thus increasing productivity and food security.

Climate change signals:	Climate smart practices and technologies:
 <p>Changes in precipitation patterns</p>	 <p>Water management</p>
 <p>Increased climate variability</p>	 <p>Soil Management</p>
 <p>Increased temperatures</p>	 <p>Diversification</p>
 <p>Sea level rise</p>	 <p>Landscape management</p>

The challenges posed by climate change

The New River Farmers' Cooperative Society operates on government owned lands on the eastern side of the island. The New River Estate extends from sea level on the east and rises to nearly 800 feet at the western extremities. Comprised of 790 acres, approximately 300 are pasture, 10 are irrigated cropland, 25 are rain-fed cropland, and the remaining acreage is covered by scrub woodland and forest at higher elevations.

New River, once a thriving agricultural community, has experienced great setbacks as a result of changing climatic conditions. The issue of water has been a growing concern for the farmers in the area for decades due to the ongoing reduction in precipitation that has limited their ability to produce. A Devere, Inc. study of precipitation over 47 years revealed that droughts extending three to four months are relatively common in Nevis. Even during the wet season (July through December), extended periods of two or three weeks with no rainfall now occur.

Over the past 20 years, increasing water scarcity has been a growing concern for the New River area farmers. Changes in rainfall patterns and a noticeable decline in precipitation, as well as more intense and frequent drought conditions have been experienced by farmers. As rainfall patterns became less predictable, farmers experienced substantial losses in yield, and witnessing the unprecedented deformation of fruits, dropping of blossoms, reduced fruit set and deteriorating plant health. This has been particularly apparent in traditionally rain-fed crops such as sweet potato, peanuts, yam, cassava, and corn. Increasing temperatures and a lack of water led to a faster rate of soil moisture loss, and resulted in soil cracking and reduced soil fertility. Farmers lost income and some were forced to abandon planting. Some farmers turned to hand watering and using water stored in drums on their land. Innovative solutions were needed to ensure farmers' livelihoods and restore thriving agricultural systems. The increase in sea levels, coupled with more windy conditions, caused salt spray to be blown on plants leaves, thus causing further damage to farmer's crops and a reduction in crop yield.



Overhead view of the New River Estate ruins with a view of a farm with plastic mulch.

The solution

The farmers decided to investigate the harvesting and storage of water from the New River Spring. With support from the British Development Division,¹ the New River irrigation project was established to supply the farmers with irrigation water to be used- for year-round crop production.



Design and construction of an irrigation and water storage system: Ten acres of irrigation area were surveyed by an engineering firm to determine an appropriate design of the irrigation system that will enable farmers to have a constant supply of water. A water supply and irrigation system were then installed by the Department of Agriculture on Nevis to allocate water to 17 farmer's plots, ranging from 0.25-2 acres in size. A 25,200-gallon storage reservoir, made of reinforced concrete blocks, holds water from the spring so farmers can access water during dry periods or drought. The reservoir, with two outflow pipes, was placed 100 feet west of the high point of the farming area, thus allowing water to be gravity fed to the farmers' plots. Another reservoir and two additional Ferro-cement tanks were also constructed in the New River Estate area at different locations to further increase the storage capacity of water for the New River farmers. Using technology from Germany, the Ferro-cement tanks were designed similar to an egg, with a thin, reinforced shell, able to withstand the evenly distributed pressure of the water inside without bursting at any point.



Mulching: In an effort to reduce water usage, farmers began to use a dried grass mulch in the mid 1980's as a water saving technique that was introduced by the Nevis Agriculture Department. The mulch is applied in a matted form over the land surface prior to the establishment of their crops with the aim of protecting the roots from drying out and the plant from moisture stress. Plastic mulch is now being used as a more modern technique to further reduce soil moisture loss. Farmers place the white surface of the mulch facing the sun which help to reflect the heat and keep soils cool.



Drip-irrigation: Drip irrigation systems were introduced by the Nevis Agriculture Department in order to allow farmers to conserve water in the catchment reservoirs and to produce crops during periods of drought. All farmers in the New River farming area now use drip irrigation as the best technique to conserve water while providing for the crops' needs. More recently, the New River Farmers' Cooperative Society secured funding from the Global Environmental Facility (GEF) to upgrade and improve the pipe system to transport water to various farms because of the increase in the number of farmers who operate in the New River Estate area. The upgrade and improvement was necessary to enable farmers to become more competitive in terms of the quantity, quality and consistency of produce demanded by the market place.

¹ BDD is a group of collaborators from around the world who generate ideas and actions for social change through research and identify and implement alternative approaches to promote sustainable social change.



Greater variety of crops: Additional commodities such as limes, passion fruit, mango, plantain and bananas were planted to increase production and enhance the quality of produce from the area. Farmers are now producing commodities such as onions, yams, sweet potato, carrots, water melon, honey dew, cantaloupe, peanuts, tomatoes, sweet pepper, string beans and pumpkins on a wider scale, which they were unable to do before.



Landscape management: Planting fruit trees such as mangos and limes, as windbreaks and for erosion control, has also expanded the availability of additional products to sell.

Funding for the implementation of the project at New River Estate was provide by the British Development Division but, as recent as February 2015, improvements have been funded through a US\$50,000 grant from the Global Environmental Facility

(GEF). A total of 6,810 feet of pipeline was installed to take water to farmers' plots and old leaky valves were replaced. Each farm was connected using one-inch lines in order to ensure there was a better supply of water for farmers.



Backhoe dropping fill material to cover pipe line in the trench.



One of the Co-operative's female farmers Ms. Alana Leitch busy levelling off fill material along the trench.

Results and contributions to the 3 pillars of climate smart agriculture

The technology and climate smart practices implemented have provided benefits not only for the farmers who were directly involved, but also for their families and the wider community.

- Over 30 crop farmers, 10 livestock (sheep, goats, cows, pigs) farmers, and over 10 women farmers benefited from the implementation of this technology.
- Increased water storage capacity and increased agricultural production through innovative technologies has had a lasting impact on the New River farming community, which currently encompasses over 40 farmers. Farmers are now able to effectively irrigate not only their short cycle crops (for example,



Installing a valve to ensure good control of water system.

watermelons, cucumbers, sweet pepper etc.), but also their perennials (for example, mango, avocado, banana, limes), which had been suffering from high fruit drop due to drought conditions.

- Efficiency measures such as drip irrigation systems, which were introduced to farmers by the Nevis Agricultural Department, combined with mulching, have been integrated by farmers in the New River community to reduce evapotranspiration and soil temperatures, improve soil moisture, and to use the water supply more sustainably. As a result of workshops and farmers' meetings that were hosted by the Agriculture Department, farmers are much more aware of the importance of water conservation and efficient use.
- Due to the availability of supplemental irrigation, farmers have been able to increase their production (for example, an increase in the production of watermelons from 10,000 pounds per acre to 15,000 pounds), enhance quality, and extend their planting seasons into the dry season. This has raised their incomes, making them more consistent throughout the year and enabling these farming families to decrease their dependence on the savings generated during the wet season. Farmers reported that their current income far exceeds what they were earning before. Other farmers commented on how satisfied they were in being able to put more food on their family table.
- Diversification to a wider array of crops than those traditionally grown by the crop farmers has contributed to food and livelihood security, as well as self-sufficiency. By capitalizing on the water now available during the dry season, farmers are able to produce a wide variety of fruits and vegetables to reliably supply local markets as well as a new

hotel, which offered gave the New River farmers a year-round contract. Having a wider variety of crops to sell has mitigated the risks of dramatic income loss in the case of failure of one crop, and higher quality produce means that the price commanded is also higher. This has helped to increase the food security of the farming families, and of the island as a whole. Farmers were also able to take produce to the marketing division; it was then distributed to hotels and restaurants around the island.

- Impacts such as unhealthy crops, blossoms dropping, plant stress and fruit deformation have been minimized.
- A farmers' co-operative was formed to facilitate knowledge exchange and improve access to innovations. Enhanced co-operation between

farmers has enabled progress towards the common goal of a consistent, well-maintained, clean water supply. This also helped to instill a sense of pride in their work, resulting in the organization of a farmer's day at New River Estate where they showcased their produce to the public and were able to generate many sales. Bonded together as a group, the 40 farmers in New River continue to build on their strategies to develop a vibrant farming industry in the area. They even secured a USD 50,000 from the Global Environmental Facility to upgrade their water distribution line from the storage tanks to the farming area.

- Farmers are now more receptive to new innovations and are more aware of the effect that changes in climate can have on agriculture, as well as what they can do to respond.



Flushing of pipe line to remove any debris before releasing water to farmers.

Lessons Learned

There are many lessons learned from implementing practices to improve water use efficiency and distribution, and to reduce climate risks to production. The adaptation of new technology is a difficult and often daunting task, especially for farmers who are traditionally accustomed to employing particular methods of production, and who depend on farming for their livelihood. Farmers must be open-minded and receptive to testing new technologies, as innovations can make an important contribution to combatting the climate risks being faced by farmers. Integrated approaches using multiple technologies are important. In this case, farmers have successfully employed methods that continue to have significant positive impacts on their farms and farming livelihoods by developing and expanding their farms while becoming more competitive and capitalizing on new markets when

they become available. Farmers were able to supply the Four Seasons Hotel, through the marketing division, with produce such as honey dew, water melon, tomatoes and cabbage, among other fruits and vegetables.

Participating in co-operatives and better coordination can increase the chances of acquiring funding and technical support to assist farmers to manage the impacts of climate change. These networks allow for information, knowledge, and adaptation techniques to be shared, and help some farmers to learn from the errors or successes of others. Climate change is real and farmers need to arm themselves with the necessary information to understand and anticipate what is happening, identify the climate risks and take action to place themselves in a better position to manage those risks.

My fruit trees can now be well watered which will help them to have better fruit set. I am very grateful and heartened that the New River Farmers' Co-operative bonded together and pulled off such a project. I will be able to produce more quality produce that will help me to be more competitive in the market place.

Mrs. Coreena Liburd, farmer

We are truly grateful for the flow and adequate supply of water coming to our farm now. My plants are fully watered in a shorter time and much needed time is saved. Special thanks to the New River Farmers' Co-operative Society for this innovative project.

Travis and Grace Leitch, farmers

I have been struggling with the issue of a good supply of water for a long time now. The struggles are over as this project proved to have really made a difference in not only how I plant now, but also what I plant. Increased water supply means an increase in my farm output, which will ultimately lead to an increase in my earnings.

Clive Maynard, farmer

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