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# Case Study: Climate Effects Influence the Growth of Perth Mahaicony Farmers' Association

Arnold De Mendonca

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## Abstract

*The effects of climate change, irregular rainfall patterns, flooding and market forces, are collective challenges faced by the farmers in Perth Mahaicony Village Region 5 Guyana. To overcome these climate effects, rural farmers have been desperately seeking to diversify their production bases in multiple areas in order to spread their risk. One diversification effort, pig farming, despite initially showing low profitability from primary production sales, is now evolving into a profitable value added activity through the improvement of the value chain for the production of pork products namely hams and sausages.*

*The Perth Mahaicony Pig Farmers have benefited from financial and technical assistance training interventions of organisational strengthening, agro-processing and marketing. The Ministry of Agriculture, IFAD and IICA in addition to other developmental institutions, have collaborated in targeting through different interventions the promotion of sustainable improvement to the value chain for pork production. These actions have afforded farmers the continual ability to produce and market pork products in an excellent way, while generating added income from the realization of larger profits, compared to previous profits gained from sales of fresh pork meat previously sold.*

*Keywords - Climate Change, Diversification, Pork Products, Value Added, Prices*

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## Introduction:

This case study focuses on the members of Perth Mahaicony Farmers' Associations who have over the years encountered many internal and external challenges yet their viability remains. Innovative and proactive measures from membership of the group and developmental agencies interventions have contributed to the sustainability of this community based farmers' agricultural production association.

As rural farmers they have been traditionally dependent upon the seasonal rainfall patterns. With Climate change, their operational management of farming in sync with the rainfall patterns has been challenged. Normal rainfall patterns in Guyana have shifted, the former rainfall trend has shifted with high intense rainfall. The irrigation and drainage infrastructure on the coast was constructed to accommodate normal, traditional rainfall patterns. However with climate change with higher and more intense precipitation levels, run off, storage and disposal of excess water from the watershed results since the drainage and irrigation infrastructure was not initially constructed to handle these higher volumes of water. These extreme changes have resulted in flooding at Mahaicony contributing to economic losses due to crop failures.



**Background:****Mahaicony Community:**

The Perth Mahaicony Farmers Association is found in Mahaicony, a community that is made up of several villages on the East Coast of Guyana in the County of Demerara and Region 5 Mahaica Berbice. It is located between the coordinates of 06°33'N and 57°48'W. In other words, Mahaicony's boundary on the coast is from the village of De Hoop on the west and village of Calcutta on the east. These communities follow a pattern of linear settlements of homesteads along the east coast roadway with associated farmlands in close proximity to some extent. The economic activities in these rural communities comprise of fishing, farming and hunting. It must be noted that residents produce a diversity of agricultural products including both livestock and crops. Livestock comprise of poultry, swine and bovine species. Crop production comprise of fruit, vegetable and root crop produce. The community is also involved in the production of rice, producing approximately 15,000 metric tons of paddy rice each year.



**Figure 1: Map of Guyana's Sea Coast showing the location of Mahaicony.**

**Agricultural Institutions in Guyana that have provided support interventions to the Pert Mahaicony Village Farmers Association**

There are a number of key agricultural institutions, agencies and individuals that have contributed to the sustainability of the Pert Mahaicony Farmers association, in various capacities. Notable mention for developmental interventions are;

- The Ministry of Agriculture
- Rural Enterprise Agricultural Development Programme (IFAD /GoG Funded)
- Food for the Poor
- Institute for Private Enterprise Development (IPED)
- Guyana School of Agriculture (GSA)
- Inter-American Institute for Cooperation on Agriculture (IICA)

Small farmer support and interventions, play a major role within the objectives of the above listed in agricultural developmental institutions. In the case of the Ministry of Agriculture, this Government entity as to fostered the link between research and extension, has removed the Crop Extension Service from under the authority of the Crops and Livestock Department and created a separate unit called the Crop Development Support Services under NAREI meanwhile for livestock production, has created the Guyana Livestock Development Authority thus the agricultural extension system continues through NAREI and the GLDA providing the needed agricultural extension education support to small farmers. This support is critical for small farmers adopting new methods of agricultural production allowing to increase production.

Additionally, the extension system has also provided small farmers with other inputs like seeds and small tools and even improved genic material in the form of superior breeding stock. Livestock production training sessions have also been organised through the extension system targeting small farmers through programmes like "Grow More Food Campaign". These initiatives focus on ensuring Guyana's food security. Other programmes and projects under the Ministry for instance, Agriculture Support Services Project (ASSP) targeted drainage and Irrigation, farmer education, construction of seed processing facilities for rice. There has been the establishment of the National Drainage and Irrigation Board functioning as Guyana's apex organization dealing with all public matters pertaining to management, improvement, extension and provision of drainage, irrigation and flood control infrastructure and services in declared areas of the country<sup>1</sup>.

Further, the Ministry has also delegated of authority to the Water Users Association to assist with the maintenance of secondary drainage and irrigation systems in key farming areas. Another intervention by the Ministry of Agriculture has been the Rural Enterprise and Development Project (READ) which strengthened the operations of intermediary service providers and institutions and small farmers groups whose services add value to primary agricultural products. The Project also provided training in marketing which improved the marketing strategies for value added of the targeted recipients, mainly small farmers and other producer groups. The Guyana School of Agriculture an agency of the Ministry of Agriculture also features as an institution of importance to small farmers and farming communities, the institution's program has in collaboration with the school system has raise the awareness and educated students from both rural and urban communities on aspects of agriculture. The Ministry of Agriculture has provided numerous scholarships to students to attend the GSA.

The Food for the Poor (FFP) organization has given twenty-five (25) years of service to Guyana. FFP Projects have apart from overseeing the Housing Projects for the impoverished, are also engaged many other self-sustainable projects inclusive of Wells and Water Projects, Animal Husbandry, Tilapia Farming, Livestock Rearing, Skills Training, Shade Houses and Solar Electrification Projects among others.

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<sup>1</sup> <http://agriculture.gov.gy/ndia-2-2/>

Another important stakeholder in agriculture with an interest in small farmers is the Institute for Private Enterprise Development (IPED) which has a mission “to facilitate enterprise development for wealth creation and poverty reduction whilst remaining financially viable”. IPED’s work has sought to develop a culture of entrepreneurship among its clients through training and the provision of timely financing to Micro, Small and Medium enterprises to enhance their production potential and capacity for both local and overseas markets. This institution has networked with others to provide complementary support services to agro-based communities to effectively develop entrepreneurs.

The Inter-American Institute for Cooperation on Agriculture (IICA) a technical cooperation agency has through its country strategy and work programme has provided its technical services in rural development as like IPED, complementary to the work of the Ministry of Agriculture and other developmental institutions. Assistance in the organizational strengthening and procedural management of community groups, process management in agro-processing and assistance in networking of agricultural groups are some among others of this internationally funded organization.

### Literature Review:

#### Climate Threats to Small Farmers Food and Nutrition Security

Over the years global weather pattern changes have been noticed. According to NASA ‘most precipitation occurs in short bursts over small areas’<sup>2</sup>, further ‘scientific studies indicate that extreme weather event such as heat waves and large storms are likely to become more frequent’<sup>3</sup> Climate change has induced disruptions to natural systems (ICD Strategy) Guyana rainfall patterns have shown some deviation from the normal with a significant change in the rainfall.

Precipitation in 2004/2005 was the highest level recorded since 1888 - resulted in the worst flooding in the country’s history<sup>4</sup>. These rains were not associated with the usual weather systems affecting Guyana, but rather with influences from the southern hemisphere. The magnitude of the damages caused by the floods was estimated to be equivalent to 59% of the country’s Gross Domestic Product (GDP) for the year 2004<sup>5</sup>

Agricultural activity in Guyana is concentrated on the coastal plains, which represents less than ten percent (10%) of the country’s total land area. There is a predominance of small farms less than 15 acres in size accounting for 23% of the available land. Evidence from the Rural Farm Household Survey indicate that smaller farms are more active than the larger ones as the survey indicates that the larger farms appeared to be more idle. The coast, which is at a level of 0.5m to 1.0m below sea level at high tide, is protected from the intrusion of saline water by mangroves, dikes, sluices and concrete walls, known collectively as sea defences. With the extensive drainage, irrigation and flood control network, the sea defences serve to make the coast habitable and cultivable<sup>6</sup>.

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<sup>2</sup> National Aeronautics and Space Administration, Goddard Institute for Space Studies, Science Briefs *Precipitation Trends in the 20<sup>th</sup> Century* by Anthony Del Geno, Aiguo Dai, and Inez Fung – December 1997.

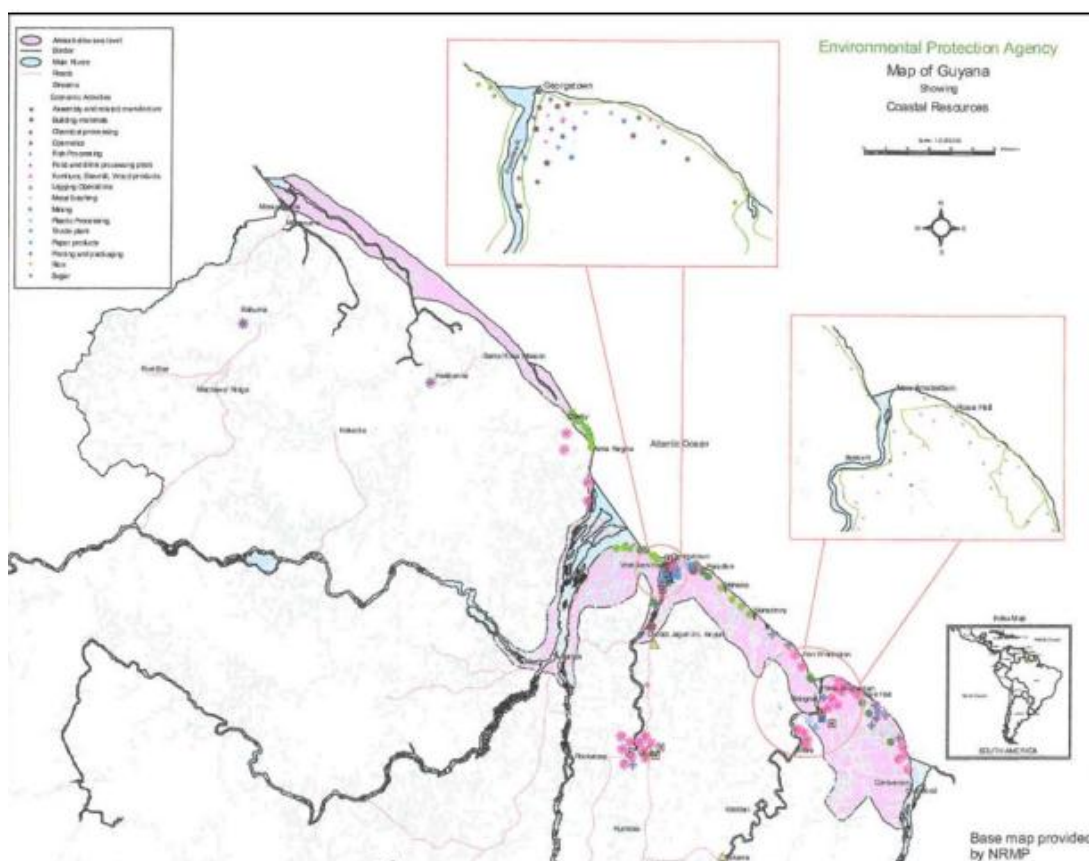
<sup>3</sup> United States Environmental Protection Agency, Climate Change indicators, <http://www.epa.gov/climate-indicators/weather-climate>

<sup>4</sup> Gitanjail Chandarpal Climate Change Impacts on Guyana and Current Initiatives, Office of the President - May 2014.

<sup>5</sup> Understanding Climate Change Part 2 – Impacts of Climate Change on Guyana and the World at large.

<sup>6</sup> National Development Strategy, Chapter 25, Basic features of the Sector.

Coastal Guyana is more predisposed to flooding and can be considered vulnerable as this flat coastal plain favours rapid build-up of rainfall runoff. The Coast relies on natural drainage into the Atlantic Ocean during low tides. Vulnerability to flooding is heightened when there is excessive rainfall especially during periods of high tides. In a number of areas along the coast the lands are below sea level at high tides. Thus, during periods of high rainfall and high tides there lies the risks of flooding and the economic losses particularly affecting food production due to flooding where there are not the prerequisite infrastructure to alleviate impact of the inundation of water.



*Map of Guyana showing the areas below sea-level on the coast in pink (Source: Environmental Protection Agency of Guyana)*

**Figure 2: Map of Guyana Sea Coast.**

Coastal flooding in farming communities contribute greatly to economic losses. This presents a major challenge as water logging of lands and associated pests and disease problems contribute negatively towards food production through pre and post-harvest losses which challenge food security.

Any limitation towards food production can influence food security. Food security can be chronic, seasonal or transitory. The FAO definition of Food Security is as follows:



*“Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”. (World Food Summit, 1996).*

This Food Security definition has the four dimensions; Food availability, Food Accessibility, Food Utilization and Stability of food Supplies. Flooding is a vulnerability that challenges food security as it can limit food production as every dimension as cited in the definition.

The effects of flooding is more catastrophic for the smaller farmers who populate coastal farming communities as these farmers are more dependent on their investments on their farms. IICA/IFAD, 1994 Survey of four rural coastal communities revealed that about sixty-eight percent (68%) of the households in these communities live below the poverty line. The Survey also revealed that poverty levels was more pronounced among the small farming sector<sup>7</sup>.

**Table 1: Flood Events in Guyana, 1990-2012 (EM-DAT, 2009)**

Date	Number affected	Population affected (%)	Number killed	Economic damage US\$ '000	Percentage of GDP
July 1996	38,000	Not Available	Not Available	200	Not Available
July 1997	21,000	Not Available	Not Available	1,000	Not Available
15 January 2005	274,774	37	34	465,000	60%
8 January 2006	35,000	4.7	Not Available	169,000	Not Available
8 December 2008	100,000	13.3	Not Available	Not Available	Not Available

Source: Disaster Risk Management Plan for the Agricultural Sector 2013-2018.

The Disaster Risk Management Plan for Agriculture Sector 2013-2018 mentions five (5) major incidence of coastal flooding between July 1997 and December 2008. A socio-economic assessment of the damage and loss caused by the January to February 2005 flood revealed major impacts to the agriculture sector, particularly in the regions of West Demerara/Essequibo Islands, Demerara/Mahaica and Mahaica/West Berbice (ECLAC and UNDP, 2005). Region 4 was most severely affected, equivalent to 55 percent of total damage, followed by Regions 2 (23.2 percent) and Region 5 (18.8 percent).

### **Sustainability**

There is no universally agreed definition on what sustainability means. There are many different views on what it is and how it can be achieved. As stated by Murdoch *et al* (1994:262)

*‘Sustainability has a broader meaning encompassing the viability of localities and communities on which the maintenance of both the environment and economic activity ultimately depends’<sup>8</sup>*

The idea of sustainability stems from the concept of sustainable development which became common language at the World's first Earth Summit in Rio in 1992. However, the Brundtland Report for the World Commission on Environment and Development (1992) indicated that the original definition of sustainability focused on “Development which meets the needs of the present without compromising the ability of future generations to meet their own needs”. It must be also noted

<sup>7</sup> IICA/IFAD 1997, Agriculture in Guyana, 1991-1995 and Beyond

<sup>8</sup> Chapter 2 Sustainability and Rural Development, Roberta Sonnino, Yoko Kanemasu and Terry Marsden.

that according to the "Forum for the Future" *Sustainable development is a dynamic process which enables people to realise their potential and improve their quality of life in ways which simultaneously protect and enhance the earth's life support systems*"<sup>9</sup> However in the case of this Case study, this view has merit as it encompasses the dynamic processes of intrinsic and extrinsic factors within the environment that collectively ensure compatibility of membership. Firstly, with reference to the intrinsic motivation, the rural farmer (adult) is in it for the immediate benefits since as a person matures his/her time perspective changes from one of postponed application of knowledge to immediacy of application (Knowles.1984).

Knowles further posited the following four (4) principles of Andragogy with respect to adult learning as adults need to be involved in the planning and evaluation of their instruction, the need to experience situations (including mistakes) which provides the basis for the learning activities and it must be additionally to be noted is that adults are most interested in learning subjects that have immediate relevance and impact to their job or personal life. Kearsley in 2010 showed that adult learning is problem-centered rather than content-oriented. Thus individuals in groups having common problems will unite as groups as they all have common challenges that they need to overcome. Further without a purpose or common goal a team will eventually fragment into separate factions as to their own agendas and not together as a team. Thus it is necessary to keep a rural group always engrossed in activities to their benefit.

It is also necessary to observe the dynamics of group formation. A group according to the Merriam-Webster Dictionary is defined as "a number of individuals assembled together or having some unifying relationship". However a successful and sustainable group does not form overnight but starts as a collection of persons that morph into a group. Group dynamics refers to the attitudinal and behavioural characteristics of a group. Tuckman's theory indicates there are five stages of group development: forming, storming, norming, performing, and adjourning. During these stages group members must address several issues and the way in which these issues are resolved which determines whether the group will succeed in accomplishing its tasks. For Groups to come together and stay together there must be cohesive forces.

According to Bollen and Hoyle (1979), cohesion is the degree of attraction members feel toward one another and the team; "it is a feeling of deep loyalty, of esprit de corps, the degree to which each individual has made the team's goal his or her own, a sense of belonging, and a feeling of morale" (as cited in Beebe & Masterson, 2000, p. 122). Though cohesion is rooted in the feelings team members have for one another as well as a common goal, creating, shaping, and strengthening those feelings relies on the use of effective communication. Communication scholars have long agreed that group or team cohesion is as much about the relationships created as the task at hand, and success in both fosters the development of team cohesion. (Bormann, 1990). Persons from primary groups have better cohesion of inter-personal trust (Carron *et al* 2000)

## Discussion

### Mahaicony Farmers' Resilience to climate and Economic Challenges

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<sup>9</sup> Chambers. Tom, Jonathon Proffitt & Peter Price-Thomas ((March 2008), *Sustainable Wealth Creation within Environmental Limits*, Forum for the Future action for a sustainable world.

Over the years farmers have become accustomed to the seasonality of the rainfall patterns and have been scheduling their activities to suit. In December 2004 and January 2005, an unusual weather system produced heavy rains which led to major flooding resulting in severe physical damage and economic loss to the country, leading to the worst flooding event ever recorded in Guyana's history (ECLAC/UNDP, 2005). The effects of the flood caused great distress in agriculture and farmers were perplexed as to how to grapple with their losses of both livestock and crops. In a country where there is no agricultural crop insurance.

### **Individual and Group Challenges:**

The widespread perplexity of the situation was overwhelming to many, individually farmers in Mahaicony realised that the losses were almost overwhelming and needed help. Increased precipitation at that time necessitated a decision by the National Drainage and Irrigation Board to release water into the Mahaicony Creek so as to take pressure off of the East Demerara Water Conservancy (EDWC). This decision to ease the pressure on the conservancy dams resulted in the release of excess water into the Mahaicony River. The fact that there was also high tides, the increased water in the river caused it to swell and caused flooding in the Mahaicony river districts because of inadequate flood control mechanisms at that time.

The commonality of the losses from the flood resulted in the grouping of almost 50 farmers since they were seeking the intervention of the Ministry of Agriculture as a support mechanism. About seven farmers initially pioneered the formation of the group as a result of a visit to the then Minister of Agriculture who advised a grouping which initiated the formation of the association.

### **Technical and Technological issues and the Business Climate:**

Over the years of existence The group comprising presently of 25 women and 10 men farmers ages ranging from 27 to 67 years of age operate individual businesses comprising of a diversity of agricultural activities. Their involvement focus on both crops and livestock production. Their diversity include the production of cash crops and fruit, poultry meat and eggs, mutton, and chevon from sheep and goats, and pork. Few farmers own cattle. Most farmers have backyard farming operations and are engaged in two or more activities with initially low levels of technology operating just above subsistence levels. Much of the production is for the primary market and products are sold on market days or as a result of negotiations on special orders. Farmers have in the past relied on middle men to purchase their products and have been price takers rather than price setters.

Over the years these farmers have been at the mercy their target markets who exhibited the power of buyers especially in the case of pork, the Chinese restaurateurs have been controlling the pork market. Initially in the case of Mahaicony farmers, their produce were basic primary products for example vegetable crops and fruit, chicken meat and eggs and pork. In the case of pork, this product was sold directly to the Chinese restaurateurs who were the main purchasers. However, the market situation changed and when collectively the Chinese were able to import pork at cheaper prices. Thus locally produced pork had then to compete with the imported pork products. Many farmers including those engaged in pork production in Mahaicony were affected. It became as uneconomical to sell the pork to the Chinese as the cost of product did not permit any profit at the market price.

### **Concerns**

The fact that many farmers had animals at slaughter weight ready for the market that was not attractive was of major concern to farmers. Farmers realised that if they succumbed to the market they were operating at a loss. Many farmers were forced to accept these losses and they needed some income to purchase feed of the remaining animals. Also they faced the dilemma that if they kept the animals longer they had to spend more money for feeding, if they slaughtered they would get a poor price and many did not have the facilities of cold storage. Their operations were not managed in the way that permitted storage and the few who had freezers did not want to risk spoilage as a result of unreliable electricity supply from the electrical company.

### **Value Chain Development Strategies:**

Evidently, there was a vision of the original seven members. This vision has also been perpetuated by Ms. Gloria Adams and Ms. Halley who were a part of the original outreach programme to garner membership. The inadequate market conditions pushed the executive of the group to secure help. On advice from IICA's Rural Development Specialist farmers were encouraged to secure alternative actions of value addition to their primary product, Thus, they refocused on the pork and prepared pickled pork for the interior hinterland areas where miners utilised the product. Another strategy for diversification of the product base was the production of hams and sausages.

### **Quality and Standards Issues:**

Initially farmers were primary producers of pigs which were sold on hoof, but with value added slaughtering and other agricultural health issues emerged. Sanitation of the environment, the animals, the pens, the slaughter area, storage and even the processing areas became important. The farmers even realised that they needed improved breeds of the animals to get better cuts of meat. Thus there was a revolutionising processes of change in the Association resulting from a multi- agency approach targeting the Association. It must be mentioned that the executive were proactive in seeking out the assistance they needed.

### **Market Development and Access:**

The situation for the Association changed as they now had at least two new products for sale. The Association lead by Gloria Adams experimented with flavours and presented the market with different flavours of ham and sausages. These local rural products found themselves appearing at almost all the agricultural exhibitions around Region 4 and 5. Direct purchases were made at these events and villagers in Mahaicony demanded the product. Association through the READ Project was able to develop a labelled product with bar codes that appeared in the supermarkets with the ability to compete with that of imported brands.

### ***Supportive Developmental Interventions / Approaches taken***

The developmental process of moving from primary producers to value added producers involved many actors and actions. One major action of the executive that indicates it the Association was serious and aimed to survive the challenges of the market forces was the fact that they sought institutional support.

- Seeking Institutional Support;

The vision of the group enabled them to move forward through the innovative thinking of the founders and exposure by the executive members the group has been able to attract institutional support from developmental, donor and technical cooperation agencies. This



action can have been critical to the sustainability of the group. Opportunities of interaction and knowledge sharing have benefited this rural group.

○ Agriculture production training

Institutional support apart from having overall benefits, critical actions of actual training activities done by the Ministry of Agriculture and its agencies (GLDA, NAREI, GSA) as also benefited the group. The Ministry has provided an opportunity for providing several training programmes at GSA Mon Repos for members of the association. These training activities include farming techniques designed to realise higher crop and livestock yields. Some of the activities taught were general animal husbandry, feed formulation and farm sanitation.

Two students from the community with links to the Association were given opportunities to attend the Guyana School of Agriculture (GSA). Through an agreement with the Ministry of Agriculture a scholarship arrangement was organised. These students upon completing their studies are back in the community contributing to rendering technical support back to the association.

○ Organisational strengthening training

The READ Programme was instrumental and targeted the association. It was felt at the time if that Association was strengthened with in it governance the training will create a basis for success. Membership of the association (Gloria Adams) was invited to attend a number of training workshops. Concept note and proposal writing skills were taught providing the membership with tools to seek out funding sources. Other aspects of organisational strengthening was done under the READ Project and again the membership was exposed to critical areas of operational management. Record keeping, financial management and planning and management and execution of association's meetings were also conducted. Short sessions were also done on conflict management and group dynamics as to empower the group, coaching them to understand team efforts.

○ Accessing a revolving fund

Under the READ Programme funding became available. Another window of opportunity was presented to members of the association in the form of a revolving fund. The fund was in the form of a loan that has been under the management of the Institute for Private Enterprise Development. IPED also became interested in the Association progress, and to ensure compliance with the requirements of the fund scheduled business development training sessions for them. A number of members of the association have been able to access this fund.

○ Accessing equipment as donations

The Association is now in possession of a number of pieces of equipment all geared to assist their productive enterprises. This is a direct result of them registering with the Food for the Poor Organisation which has been generous it is donations of processing equipment, coolers and freezers in addition to field implements. Each piece of equipment is accessible to all members through internal management regulations within the association.

- Training in value added production

The action to facilitate value added products came in the form of a value added workshop. Five members of the Association under the sponsorship of the READ Programme were able to benefit from a five-day Value added Pork Products Workshop. The main objective of the training activity was to provide technical assistance to pig farmers in Guyana through value added training. The activity specifically sought to train farmers in basic processing practices that allowed them the skill of producing hams and various types of flavoured pork sausages. The aim of which was to enable them to remain in the swine industry through the extension of the value chain of activities for pork, allowing them to remain competitive. Apart from the READ programme, training content was supplied by Dr. Aubrey Mendonca, Associate Professor, Food Safety and Microbiology from Iowa State University, while the business acumen was provided by Ms. Annette De Mendonca who focused her training actions on small business start-up mechanisms, project management and Market support actions. Mr. Arnold De Mendonca, Sustainable Rural Development Specialist at the Inter-American Institute for Cooperation on Agriculture, conducted the logistics of the training, and was also involved in facilitating training in sanitation and personal hygiene among other areas. This multi-agency approach benefited 25 pig farmers including five (5) members from the Perth Mahaicony Farmers Association.

The training in value added production was done at the same standard as is done at the Iowa State University Food Science Department. Each participant received certificates of merit from the Iowa State University.

- Establishment of a produce/product outlet

With the new found skills in value added production the association saw the need to upgrade their processing operations. Food for the Poor donated equipment while the group with their project writing skills was able to secure grant funding for the purchase and renovations of a building to be used as a produce/product outlet. They have worked with IICA and aim to secure certification of the building for processing.

These multiple interventions involved multiple institutions that the Association networked with, the major ones are as follows:

- **Agencies and actors involved**

- Ministry of Agriculture
- Rural Enterprise Agricultural Development Programme (IFAD /GoG Funded)
- Food for the Poor
- IPED
- Guyana School of Agriculture
- The Mendonca Siblings
- IICA

The Ministry of Agriculture and the READ projects utilized Government of Guyana funds along with Grant funds supplied by IFAD, the Food for the Poor Organization provided equipment in the form of freezers and field equipment and assisted in the funding of the rehabilitating of the processing area. Institute of Private Enterprise Development and IICA utilized their internal funds for training in Business Management and Organizational Strengthening.

The interventions provided by the Mendonca's siblings were there form of giving back to their country. Expenses incurred as a result of air and ground transportation to and around Guyana in addition to Hotel Accommodation were funded by the family team. However, the entire training activity's costs inclusive of cost of venue, transportation of participants and input material for the five-day work shop were funded by the Government of Guyana and the READ project.

### **Conclusion:**

This association has shown that rural community groups if managed correctly can succeed.

It is critical that a governance structure be initially be set up as to allow members to know their roles in the group. A focused group with a shared vision has more potential to perform and obtain success as opposed to one where there is much conflict and distrust. This case study illustrates a group working together as a team over coming challenges of climate change and market access, price fluctuations and other issues. It shows that when individuals understand the benefits of team actions and that their individual contributions can strengthen the Association owing to the strong primary and secondary bonds that a group can be sustainable. On the other hand, it also shows that it makes much sense for developmental partners to pool their resources and work with winning groups. The success and lessons learnt can be then transferred to other groups allowing for economical rural development.

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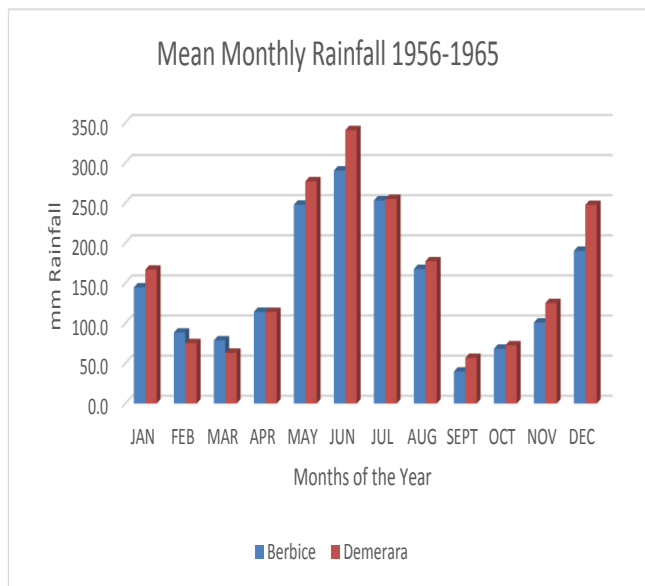
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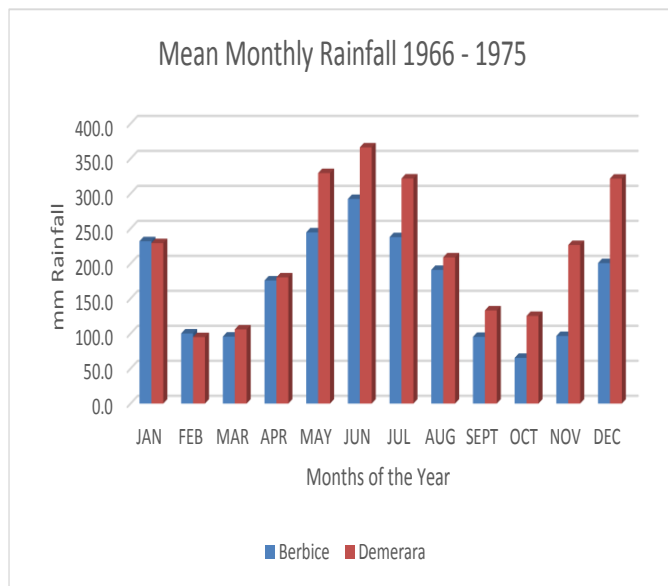
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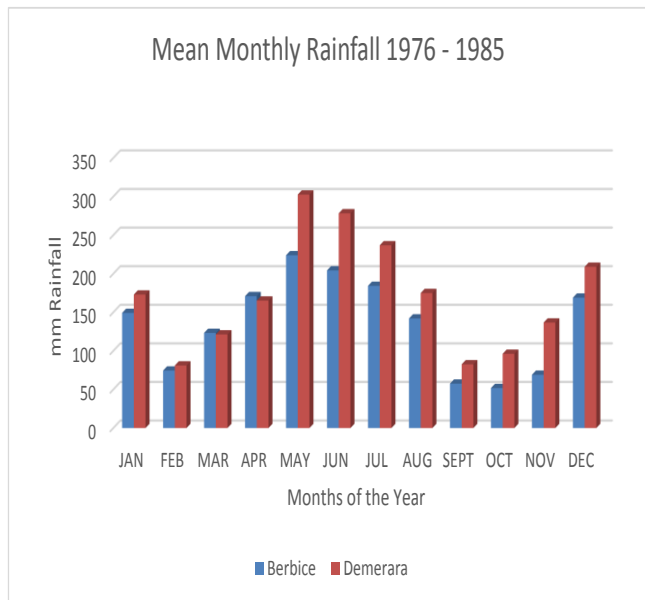
### Appendix 1: A



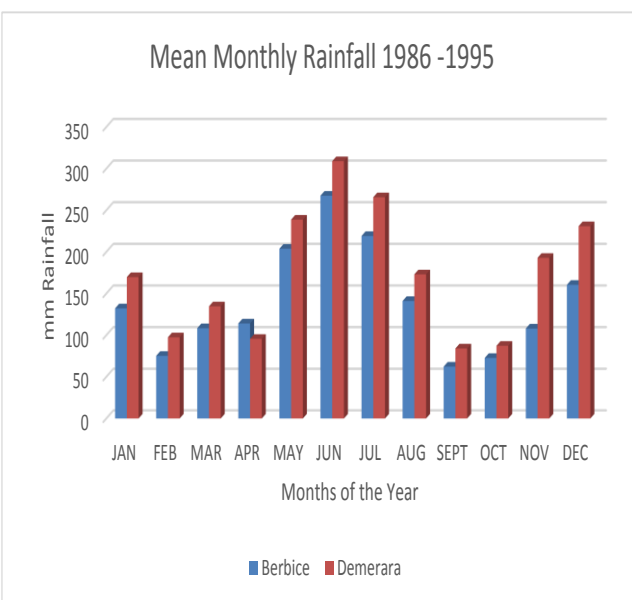
**A: Mean Monthly Rainfall 1956 – 1965**



**B: Mean Monthly Rainfall 1966 - 1975**

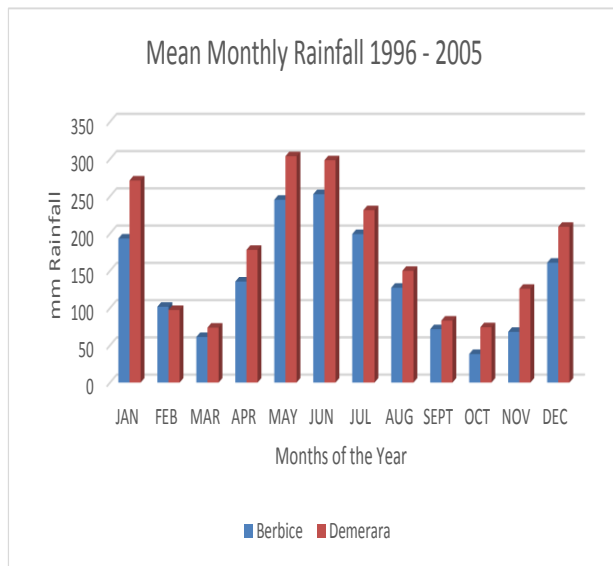


**C: Mean Monthly Rainfall 1976 – 1985**

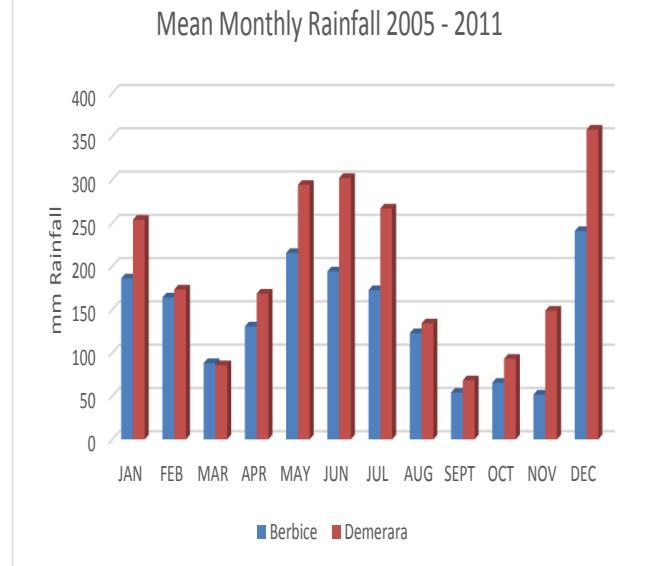


**D: Mean Monthly Rainfall 1986 - 1995**

**Appendix 1: B**



**E: Mean Monthly Rainfall 1996 – 2005**



**F: Mean Monthly Rainfall 2006 - 2011**

