



Food and Agriculture
Organization of the
United Nations

Report on the Socio-Economic Study related to Protected Areas in Trinidad and Tobago

**Food and Agriculture Organization of the United Nations (FAO/UN)
GCP/TRI/003/GFF
Improving Forest and Protected Area Management in Trinidad and Tobago
2019**

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Citation:

Food and Agriculture Organization of the United Nations (FAO/UN) 2019. Report on the Socio-Economic Study related to Protected Areas in Trinidad and Tobago.

Acknowledgements

The Project Coordination Unit of the *“Improving Forest and Protected Area Management in Trinidad and Tobago”* project extends sincere thanks to members of the Technical Backstopping Team - Dr. Roger Hosein, Mr. Martin Franklin, Ms Laura Bigram and Mrs. Rebecca Gookool-Bosland - who contributed to the development of this report; and the staff of the Central Statistical Office (CSO), including supervisors and enumerators hired to undertake the Socio-Economic Study.

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List of Acronyms

CSO	Central Statistical Office
EDs	Enumeration Districts
ESA	Environmentally Sensitive Area
FAO	Food and Agricultural Organization
GEF	Global Environment Facility
GPS	Global Positioning System
IFPAMTT	Improving Forest and Protected Area Management in Trinidad and Tobago
IMF	International Monetary Fund
LED	Local Economic Development
LSMS	Living Standard Measurement Survey
PA	Protected Area
PPA	Pilot Protected Area
PSU	Primary Sampling Unit
T&T	Trinidad and Tobago
USU	Ultimate Sampling Unit
UWI	The University of the West Indies

Executive Summary

The project entitled, *Improving Forest and Protected Area Management in Trinidad and Tobago* (IFPAMTT) was the direct response of the Food and Agriculture Organization (FAO) to a request by the Government of Trinidad and Tobago to support the prevention of biodiversity loss in T&T and help in improving the governance of environmentally sensitive and protected areas. Although the government had begun to initiate changes in the legislative environment with the Forest Policy and the Protected Areas Policy in 2011 and the National Wildlife Policy in 2013, it requested support from the Global Environment Facility (GEF) to deepen the impact of its environmental thrusts. The FAO subsequently designed a 4-year project valued at US\$30.5mn to enhance the oversight and governance of protected areas in T&T. Six (6) Pilot Protected Areas (PPAs) were selected for focus in the IFPAMTT project as they represented issues that presented a range of challenges for local protected area management. The project ends in 2020.

In the final year of the project a Socio-Economic Survey was undertaken, aimed at providing an overview of the multiple roles of forests on the welfare and livelihood of households living in or around each of the six designated pilot Protected Areas (PAs). The general findings from the survey are listed below:

- Of the 973 households interviewed, 37.5% were located within 5 km of the PA, while 62.5% were located more than 5 km away from the PA
- The total number of household members, (from the 973 households that were surveyed) who were 18 years and over was 2,451 with 51% being female and 49% male.
- Accordingly, 74% of the members of the households surveyed received both primary and secondary training; this translates to approximately 10 years of formal education (excluding the first two years spent in pre-primary school).
- For the households surveyed, it was observed that on average 43% of the heads of households were employed while 57% were unemployed.
- Only 27% of the households surveyed were aware that there was a designated protected in the vicinity of their dwelling.
- Note that 72% of households surveyed indicated that the household head collected fruits from within and around the protected areas.
- It should be noted here that a small amount of processing in terms of charcoal, furniture construction and making wine was practiced by 5 households throughout the entire survey. The processing of forest products though, was not observed to generate significant revenues, as the majority of the processed products made were reserved for household use or to share with friends and family.
- Formal employment accounted for the largest proportion of household income followed by pensions.
- A total of 13 households from the entire survey derived income benefits from forest related employment in the form of tour guiding (4), turtle patrols (2), re-afforestation (5), fire trail maintenance (1) and beach maintenance (1).

- Only 12% (118 households) of the households interviewed for this study utilized firewood/coal for energy consumption.
- Forest fires and flooding accounted for the two most frequent natural disasters occurring in PAs.
- Of the households surveyed, 50 engaged in recreational hunting; 35 of which routinely hunted within the designated PA. Thirty-eight (38) households engaged in recreational fishing; 26 of which routinely fished within the PAs.
- Households surveyed indicated that the primary threats facing PAs include the over-exploitation of biodiversity, loss of ecosystems, increased pollution and flooding resulting from unsustainable agricultural practices.
- 69% of households surveyed indicated that they would be willing to pay a user fee to access the PA, the revenues from which can be used to maintain the trails and camp sites etc.

The socioeconomic study reiterated the requirement that as a resource, PAs must be comprehensively understood in order to identify the various linkages which exist with the rest of the country from social and economic perspectives.

The overall project validates that PAs represent a significant renewable resource in T&T which provides social and economic benefits in addition to environmental benefits. In fact, PAs contribute to some extent to livelihoods and household well-being. The research undertaken in this exercise and indeed, as part of the wider project, reveals that what is needed is a system by which continuous monitoring and measurement is undertaken. This is critical to effectively plan for and with this resource as it can support economic diversification if integrated into a local economic development strategy undertaken in a sustainable manner which supports the management of these areas.

1 Introduction

The project entitled, *Improving Forest and Protected Area Management in Trinidad and Tobago* (IFPAMTT) was the direct response of the FAO to a request by the Government of Trinidad and Tobago to support the prevention of biodiversity loss in T&T and help in improving the governance of environmentally sensitive and protected areas. Although the government had begun to initiate changes in the legislative environment with the Forest Policy and the Protected Areas Policy in 2011 and the National Wildlife Policy in 2013, it requested support from the Global Environment Facility to deepen the impact of its environmental thrusts (The timelines associated with the national thrust towards biodiversity conservation is provided in Appendix 1 to this report).

The FAO subsequently designed a 4-year project valued at US\$30.5mn to enhance the oversight and governance of protected areas in T&T (FAO/Global Environment Facility, 2014). The project will be completed in May 2020. The key aspects of the project include:

- 1) Develop and test new financial mechanisms needed to support Protected Areas,
- 2) Enhance management effectiveness through piloting management arrangements in six (6) pilot Protected Areas¹ which could be later replicated in other Protected Areas and,
- 3) Build the skills and expertise of staff with responsibility to manage protected areas in Trinidad and Tobago.

The project, using a participatory approach to integrate recommendations from all stakeholders, contributes to developing a modern, relevant Protected Area system. The participatory approach of this project was enhanced and endorsed by the creation of subcommittees which were formed for each of the pilot sites. The subcommittees comprised of representatives from Ministries and Government Agencies as well as non-governmental groups and civil society. The committees were involved in activities associated with demarcating boundaries, conservation and gathering, validating, and disseminating information for the pilot sites.

The expected project outputs include:

1. Draft National legislation for establishing and managing protected areas
2. Management plans for each of the six (6) pilot protected areas
3. A National Protected Area System Plan²
4. Protected area staff capacity and infrastructure for effective protected area management in each of the 6 pilot protected areas
5. A sustainable financing system for long term management of the Protected Areas System and a Forest and Protected Areas Fund established.

¹ For the project, the 6 designated pilot protected areas are Caroni Swamp, Nariva Swamp and coastal zone, Matura Forest and coastal zone, Trinity Hills and Eastern Extension. Main Ridge Forest Reserve and the North-East Tobago Marine Protected area.

² This plan will cover at least 214,000 hectares consolidated to ensure adequate coverage of all ecosystems.

6. Results-based management and effective communication to stakeholders that ensures effective delivery of the outputs and sustainability of project outcomes.

1.1 Involvement of Economics Team

The final phase of research was undertaken by Dr. Roger Hosein, Mr. Martin Franklin, Ms Laura Bigram and Ms Rebecca Gookool over the period June 2019 to December 2019 and focused on supporting the execution of the field exercise to collect the primary data using the instrument designed in the previous phase of the project. Over the course of the project, the team performed the quality control function as the Central Statistical Office (CSO) implemented the survey. The team undertook an analysis and summary of the primary data collected and submitted this report based on the observations of the survey.

1.2 Context of the Six Pilot Protected Areas

The six (6) Pilot Protected Areas (PPAs) were selected for focus in the IFPAMTT project as they represented issues that presented a range of challenges for local protected area management. The profiles of the six areas are presented below.

- **Caroni Swamp** – covers an area of 8,340 hectares and is a well-known nature tourism site. Largely composed of mangrove forests, it is located on the west coast of Trinidad and is at the outflow of the Caroni River which drains one-third of the population of Trinidad on the east-west corridor. Recreational fishing is confined to areas outside of key nesting sites of the Scarlet Ibis – a national bird and since 2018, an Environmentally Sensitive Species (ESS) - and there is also a fair amount of oyster and crab harvesting. Small areas of private lands and leased land are located on the eastern boundary alongside the Uriah Butler Highway.
- **Main Ridge Forest Reserve** – this site enjoys the accolade of being cited as the oldest declared forest reserve in the Western Hemisphere, having been protected by legal ordinance in 1776. Hunting is permitted in the open season. The site is home to several endemic species including the Environmentally Sensitive Species - the white-tailed sabre-wing hummingbird - and the forest reserve has gained many international awards as a leading ecotourism site over the years. Several individuals and groups conduct nature tours along trails within the Main Ridge Forest Reserve year-round and there is a growing demand for extraction of non-wood products, such as mud that is used in Carnival celebrations locally and further afield.
- **Matura Forest and Coastal Zone** – located in northeast Trinidad, the forest constitutes the Matura National Park Environmentally Sensitive Area (ESA); there are private landholdings within the ESA. The coastal zone hugs the east coastline at the villages of Fishing Pond, Vega de Oropouche and Matura which are predominantly agricultural areas. Hunting is not allowed in the ESA, however poaching takes place. In the village of Matelot to the north west of the ESA, agriculture is practised and may encroach into the ESA. Community groups engage in tour guiding in the forest and coastal areas, particularly along trails to the Rio Seco waterfall and tours/patrols on beaches which are seasonally prohibited areas during marine turtle nesting.
- **Nariva Swamp and Coastal Zone** – located south of central on the east coast of Trinidad, the Nariva Swamp spans 11,343 hectares and is the largest freshwater swamp in Trinidad, with an assemblage of six different forest types. This is also an Environmentally Sensitive Area and includes the Bush Bush

Wildlife Sanctuary where entry is by permit only. Agriculture is practised by tenanted farmers in the northern portion of the Nariva Swamp at Plum Mitan. Near the eastern coastal zone area there are private landholdings on which farming takes place (south) and at which the only known local habitat of the West Indian manatee is found (north). Nature tourism also takes place in the Swamp and agricultural squatting is known in the area.

- **NE Tobago marine area** – this site, which stretches around the eastern tip of Tobago from Castara in the north to Roxborough in the south is proposed for inclusion among the country’s protected areas. The site extends outwards from the coast by 6 nautical miles and includes offshore islets of St. Giles, Goat Island and Little Tobago which are critical seabird breeding colonies. Spectacular coral reefs are present offshore of the Speyside area and several dive shops operate at the village. There is a growing guest house industry in the village of Castara and thriving fishing communities at many of the coastal villages found within this site.
- **Trinity Hills and Eastern Extension** – The site comprises the Trinity Hills Game (Wildlife) Sanctuary and the area to the east of this known as the Victoria-Mayaro Forest Reserve. The Game Sanctuary has restricted access by permit only. Of the six sites, this is furthest from community settlements; Guayaguayare to the south-east is closest in distance. A 2017 knowledge, attitudes and practices survey undertaken by the IFPAMTT project revealed that only 45% of 1074 respondents were aware of the site. The Sanctuary contains representatives of all of the country’s local land mammals and several of its bat species. In the Forest Reserve, several land-based oilfields are located and it is a heavily hunted area in the open season.

1.3 Economic Background

The state of the economy of T&T is the contextual background against which the interaction between the PA and the wider host community must be considered. Figure 1 below shows that in the first instance, the T&T economy in 2018 was approximately 8.7% smaller than in 2015. Further note that the economy is not expected to grow in 2019 (IMF 2019).

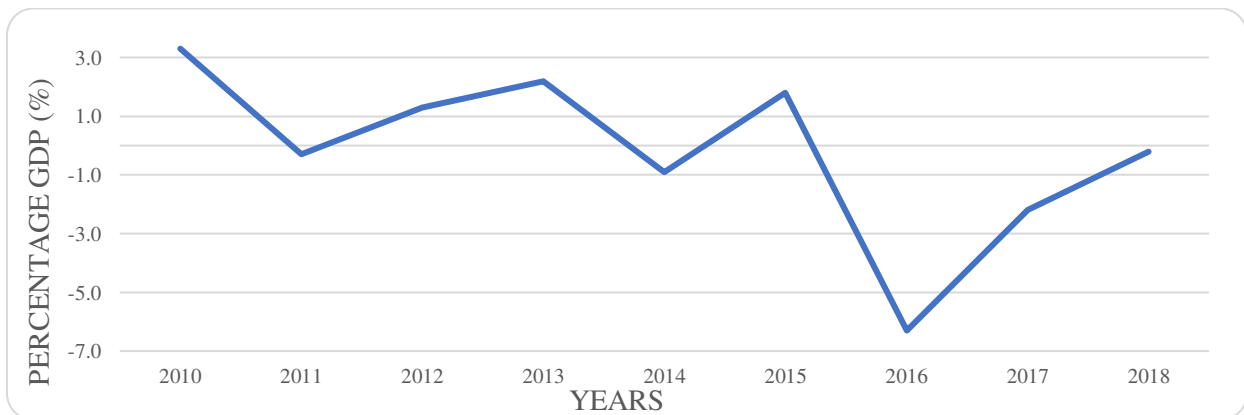


Figure 1. Percentage GDP growth for Trinidad and Tobago, 2010-2018

Note that this poor economic performance comes directly after a period of economic buoyancy. Between 1996 to around 2008, the economy experienced an economic boom motivated by an increase in the price of its main hydrocarbon exports. The resource reallocation mechanisms and the accompanying

government spending trends no doubt have had a negative impact on the traditional sectors in the economy, including agriculture, under which forestry resources are considered. The following macroeconomic issues must therefore be taken into consideration:

1. The T&T agricultural sector (as a whole, and associated subsectors, including forestry) has been de-agriculturalized in terms of both output and labor resources; on account of the Dutch Disease³. The agricultural sector in 2018 was 9.6% smaller than in 2015 in real terms additionally note that between 2012 and 2018, employment in the sector declined by 9.4%.
2. The agricultural sector as a whole (including its subsectors) suffers from policy neglect; there is a lack of strong institutional representation and oversight for agriculture and its subsectors. Stakeholders in this sector are varied (Daily Express 2019⁴).
3. “Make work” programmes in T&T continue to attract labor away from the traditional productive sectors such as those related to agriculture and forestry.
4. In the period of the boom (referenced above), anecdotal evidence suggests that the demand for forestry products such as wild game increased. This is most likely due to the spending effect associated with the Dutch Disease.
5. In the context of declining income and slow (or negative) economic growth, unemployment has been increasing since 2015; anecdotal evidence, such as an increase in illegal hunting was observed by the authorities which suggests that there has been some reversion to traditional agricultural activities in some areas⁵; indeed, these sectors have been shown to contribute to livelihoods and household income, the extent to which remains largely unknown.

It is against this background that the survey was undertaken, the details of which are discussed below.

³ The Dutch Disease refers to the negative resource reallocation consequences associated with a boom in a tradable resource. In the T&T case, the petroleum sector is the booming sector.

⁴https://trinidadexpress.com/opinion/editorials/neglected-agriculture/article_5173ae1a-4c31-11e9-96b8-eb73258c9ac6.html

⁵ <https://www.103fm.tt/news/rambharat-fines-increased-for-illegal-hunting-effective-2019/>

2 Survey Details

2.1 Survey Objective

The **FAO Socio-Economic Survey** aimed to provide an overview of the multiple roles of forests on the welfare and livelihood of households living in or around each of the six designated Pilot Protected Areas (PPAs).

2.2 Survey Instrument

The survey instrument used, was developed in a previous phase of the project and took the form of a structured questionnaire which included eight (8) modules⁶. These are listed in Table 1.

Table 1. Overview of Survey Instrument

Module #	Theme
1	Household Level Characteristics
2	Income from the collection and processing of forest and wild products from the Protected Areas (PAs)
3	Employment benefits from activities other than the collection and processing of forest related wild products from the PAs.
4	Income benefits derived from forest related employment in the PAs.
5	The use of wood from the forests as an energy source and as materials for construction/maintenance in the PAs.
6	External shocks and coping strategies in the PAs.
7	Income generated from recreational hunting and fishing in the PAs.
8	Threats facing the PAs, Awareness of PAs and the Project (IFPAMTT), Support for the introduction of an Access Fee

Source: Compiled

2.3 Target Population

The target population for this survey comprises members of private households living under non-institutionalized housing arrangements in and around the PAs.⁷ Table 2 identifies the municipalities within which each of the PAs are located.

⁶ A more detailed discussion of the survey methodology is submitted with this summary report and the key lessons learnt are included in Appendix 6 below.

⁷ A household comprises one or more persons living together, who occupy the whole or part of a dwelling unit and share at least one of the daily meals. Thus, persons living in hostels, boarding houses or institutions are excluded.

Table 2. Administrative Areas associated with six Pilot Protected Areas

Protected Area	Municipality / Administrative Area
Caroni Swamp	San Juan / Laventille Regional Corporation
Matura Forest and Coastal Zone	Sangre Grande Regional Corporation and occupies part of the ward of Matura
Nariva Swamp and Coastal Zone	Mayaro-Rio Claro and Sangre Grande Regional Corporations
Trinity Hills and Eastern Extension	Mayaro-Rio Claro Regional Corporation
Main Ridge Forest Reserve and North-East Tobago Marine Pilot Protected Area	Tobago
Source: Compiled	

2.4 Sample Design

In order to undertake the survey, a stratified multistage cluster sampling design was employed in which clusters of households or Enumeration Districts (EDs) constitute the Primary Sampling Units (PSUs) and the households within each ED constitute the Ultimate Sampling Units (USUs). An ED comprises approximately 150 - 200 households and is the smallest geographical unit used for the purposes of fieldwork activities in TT; it is created by the CSO utilizing data from the most recent national census.

The survey targeted the municipalities identified above. The process of selecting sampling units at the two stages was done independently within the various geographic strata⁸.

2.5 Sample Size

This survey can be categorized as a Living Standard Measurement Survey (LSMS) of the six pilot protected areas in Trinidad and Tobago⁹.

The administrative regions for the six (6) pilot protected areas account for 24% of the total households and as such the maximum size of the national sample size of 1200 for the LSMS was used. In a recently completed Livelihoods Assessment in Matura in 2016 (FAO 2018) it was observed that penetration rates range from 3.4% each for birds, medicinal plants and craft to 27.4% for hunting among households in one of the fence-line communities of the Matura Forest & Coastal Zone PPA. Accounting for the lower

⁸ Households were sampled using a two-stage selection process. In the first stage, EDs were sampled with probability proportional to size (PPS) using the available size estimates of households in the EDs. At the second stage, households within each selected ED were sampled with probability inversely proportional to size (PPS-1), the size estimate being the estimate that was used for selecting the ED.

⁹ Grosh, M. & Glewwe, P. A in their Guide to Living Standards Surveys and Their Data Sets published as LSMS Working Paper #120 by The World Bank in 1995 (updated on March 1, 1996) posits the following guideline for the sample size of an LSMS noting that "LSMS surveys tend to use small samples, often in the order of 1,600 to 3,200 households and rarely more than 5,000 households. Although larger samples would have smaller sampling error, it was judged by survey designers that non-sampling errors would increase more than concomitantly."

penetration rates observed from the previous assessment, the recommended subsample sizes for the administrative regions are listed in Table 3.

Table 3. Subsample sizes for the selected Administrative Regions

Administrative Region	Number of Households	Subsample Size	Confidence Interval	Error
Rio Claro/Mayaro	10351	200	95%	2.5%
San Juan/Laventille	49404	500	95%	1.6%
Sangre Grande	22706	250	95%	2.3%
Tobago	20125	250	95%	2.3%
Total	102586	1200		
Source: compiled				

The listing exercise completely covered all households within the boundaries of the ED selected for the Survey. It provided complete and recent information on the number of households for each ED, as well as the precise location of each household. The output of this exercise was used to identify the households which were targeted in the survey.

2.6 Sampling Frame and Selection of Enumeration Districts

The 2011 Population and Housing Census Household Frame was utilized for the selection of EDs and households to be sampled. Once the listing exercise was completed, attention was given to the selection of the 120 EDs which constitute the first stage. The number of EDs selected for each PA by Administrative Region is listed in Table 4.

Table 4. Sample Design Characteristics

Protected Areas (PAs) and corresponding Administrative Regions		Number of EDs
Protected Areas (PAs)	Administrative Region	
Nariva Swamp and Coastal Zone and Trinity Hills and Eastern Extension	Mayaro/Rio Claro Regional Corporation	20
Caroni Swamp	San Juan / Laventille Regional Corporation	50
Matura Forest and Coastal Zone	Sangre Grande Regional Corporation	25
Main Ridge Forest Reserve and North East Tobago Marine Pilot PA	Tobago	25
Total		120
Source: Compiled		

The second stage of selecting the sample frame consisted of the selection of households to inform the final sample size. For each of the selected 120 EDs, ten (10) households were selected using systematic sampling; these were highlighted on maps prepared during the listing exercise.

For the purposes of the survey, it was agreed that the preferred respondent was the head of household. The first and second stage selections essentially produced a final sample of 120 EDs x 10 households = 1200 households. The distribution of households in the final sample of 1200 is as shown in Table 5.

Table 5. Distribution of Households in the Final Sample

Protected Area ¹⁰	No of Households	%
Caroni Swamp	491	40.9
Nariva Swamp and Coastal Zone	219	18.3
Matura Forest and Coastal Zone	240	20.0
Main Ridge Forest Reserve	180	15.0
North East Tobago Marine Pilot Protected Area	70	5.8
Total	1200	100.0
Source: Compiled		

The CSO, in collaboration with the team of economists, provided training to potential enumerators using a manual prepared specifically for the survey¹¹. Twenty (20) field officers were selected at the end of the enumerator training for the pilot survey and field data collection phase. This team was comprised of 1 Coordinator, 4 Supervisors and 15 Enumerators assigned as follows:

- Sangre Grande - Supervisor and 5 Enumerators
- Mayaro/Rio Claro - Supervisor and 2 Enumerators
- San Juan - Supervisor and 4 Enumerators
- Tobago - Supervisor and 4 Enumerators

The EDs selected for the Caroni Swamp PA were completed via a collaborated effort of Sangre Grande, Mayaro/Rio Claro and San Juan teams.

2.7 Actual Completed Sample Size

The achieved sample size was 973 or 81.1% of the sample size. The distribution of the achieved sample size by PA is as shown in Table 6.

Table 6. Distribution of households in the final sample

Protected Area	Number of Households Selected	Actual number of Households Completed	% of Households Completed
Caroni Swamp	491	373	76
Nariva Swamp and Coastal Zone and Trinity Hills and Eastern Extension	219	201	92
Matura Forest and Coastal Zone	240	184	77

¹⁰ The sample follows the organization and distribution of EDs by the CSO. The areas listed in this table reflected the number of households where were to be surveyed as indicated in Table 5.

¹¹ The Enumerator's Manual will be submitted along with this report.

Main Ridge Forest Reserve	180	149	83
North East Tobago Marine Protected Zone	70	66	94
Total	1200	973	81
Source: Compiled			

The “missing 227” questionnaires represent 18.9% of the sample and are distributed among various categories listed in Table 7. It was determined that this “missing group” would not impact the integrity of the overall results. As such, the consultants proceeded to analyze the observations from the survey.

Table 7. Final questionnaire status

Questionnaire Status	Frequency	Percent	Valid Percent	Cumulative Percent
Completed	973	81.1	81.1	81.1
No Contact	66	5.5	5.5	86.6
Closed	26	2.2	2.2	88.8
Demolished	1	1	.1	88.9
Vacant	56	4.7	4.7	93.5
Refused	69	5.8	5.8	99.3
Other	9	.8	.8	100.0
Total	1200	100.0	100.0	

Source: Survey Solutions

- No Contacts - These are households that were visited at least 5 times in an attempt to get a household member to be interviewed before flagging as a No Contact;
- Vacant - These are dwellings which at the listing stage were deemed as a household but in the enumeration stage additional information was received that confirmed the dwelling as a vacant dwelling;
- Closed - These are dwellings which at the listing stage were deemed as a household but in the enumeration stage additional information was received that confirmed the dwelling as a closed dwelling;
- Refusals - These are households that were visited, and the respondent refused to give any information. This interview was immediately passed to the Supervisor in an attempt to get the household member to cooperate and be interviewed. Once this was not successful at this stage it would be flagging as a Refusal.
- Demolish – These are households where were present in the listing but not for the survey due to being knocked down.
- Other – This is the category in which includes buildings not listed as categorized above.

3 Survey Findings

GPS coordinates were captured for the 973 households surveyed. The GPS readings for households are accurate to < 15 meters. Figure 2 shows the distribution of GPS coordinates for households sampled in both Trinidad and Tobago.

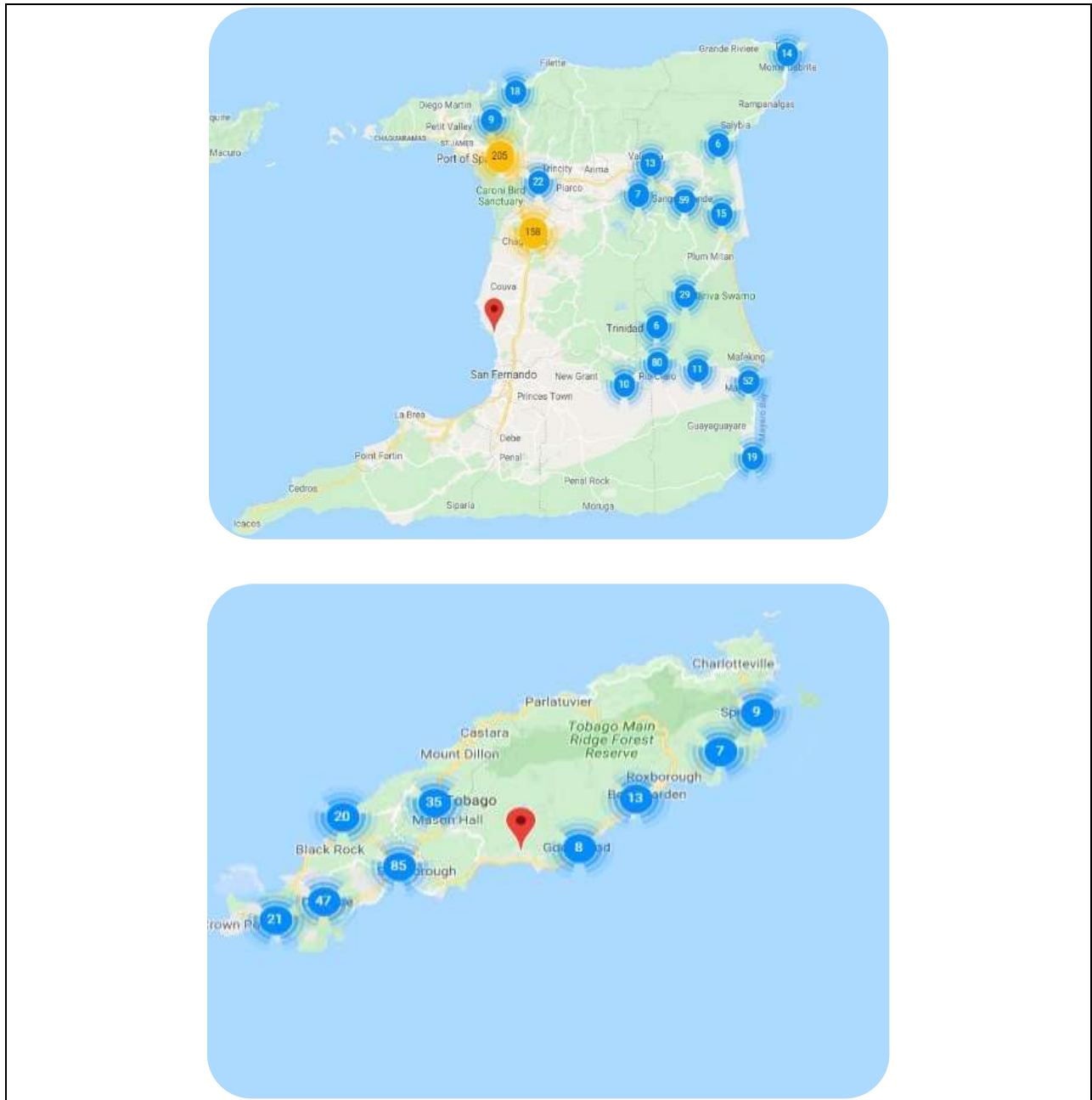


Figure 2. GPS coordinates for the clusters within the Administrative Areas for the Survey for (i) Trinidad and (ii) Tobago

An initial question in this survey was phrased as follows: “Are you aware that your community has been designated as a “Protected Area of Trinidad & Tobago?”. A map which shows the areas from which respondents to the survey originated with an overlay of the boundaries of the four pilot protected areas of focus in Trinidad and boundaries of Forest Reserves are provided in Figure 3.

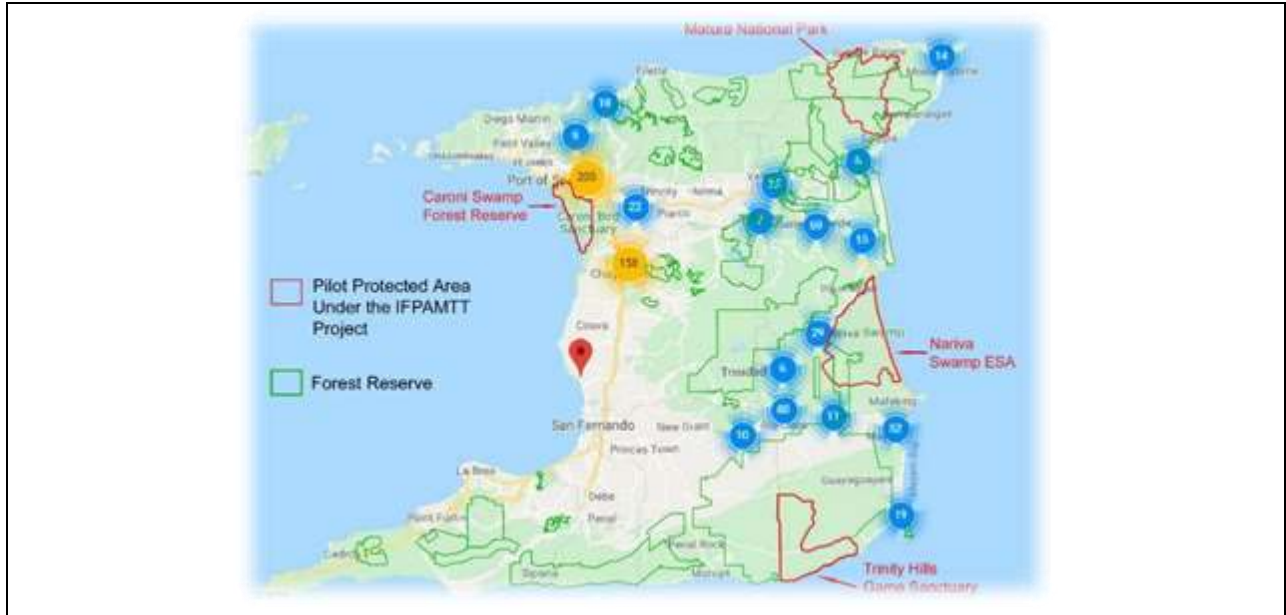


Figure 3. Map of Trinidad with overlay of survey respondent clusters and boundary delineations of six pilot protected areas and Forest Reserves.

A map which shows the areas from which respondents originated and boundaries of the Main Ridge Forest Reserve and NE Tobago Marine pilot protected area is provided in Figure 4.



Figure 4. Map of Tobago with overlay of survey respondent clusters and boundary delineations of two pilot protected areas.

In providing these maps, clarity is expressed about the relative location of respondents to the survey to the six (6) protected areas in focus. The map clusters indicate that in general, respondents to the survey did not live within the PAs and many of the households were in fact located in communities some distance away from the PAs. To provide more context, the number of surveyed households that were located near to (= within 5 km of) the PA and households that were located further distant in an overlap of the 5 km radius, these are outlined in Table 9, as determined from maps in Figure 5.

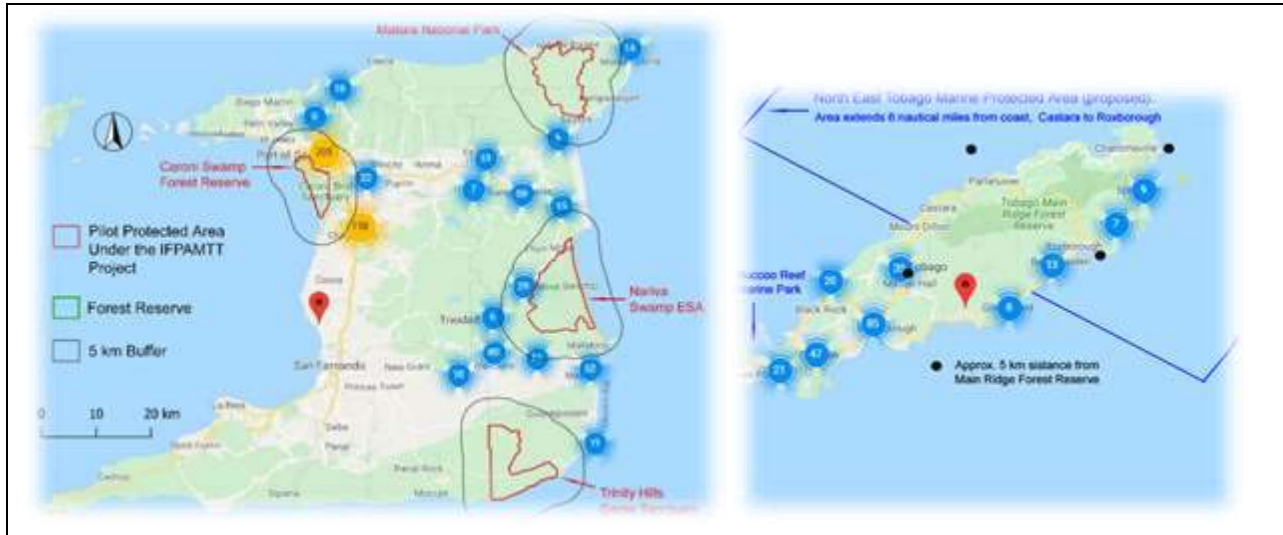


Figure 5. Map denoting household clusters and 5 km zone around the 6 protected areas

Table 8. Relative location of surveyed household clusters in relation to six (6) PAs

Protected Area	Number of respondents		
	living within 5 km of the PA boundary	living within overlap of the 5 km radius	Total in sample
Caroni Swamp	205	189	373
Main Ridge Forest Reserve	64	0	149
Matura Forest and Coastal Zone	6	14	184
Nariva Swamp and Coastal Zone	61	52	201
Trinity Hills and Eastern Extension	0	19	
NE Tobago Marine PPA	29	8	66
Source: Compiled			

It is important to add this detail to the discussion, as subsequent responses to the survey questions were made with an understanding that persons who participated in the survey believed that they lived in a PA when in fact they generally lived close to the PAs or further afield of them. Extractive and non-extractive use of the PAs mentioned in the survey therefore has to be placed in the context that respondents who had no awareness of the existence of PAs may either (i) not be living near to the PA and (ii) may or may not be performing the actions described ‘within’ these specific PAs.

As indicated in Table 1, the survey instrument included 8 Modules; as such, the summary of the findings is presented by Modules.

3.1 Module 1 - Household Demographics

Of the 973 households interviewed for this survey, 37.5% were located within 5 km of the PA¹², while 62.5% were located more than 5 km from the boundary of the PA.

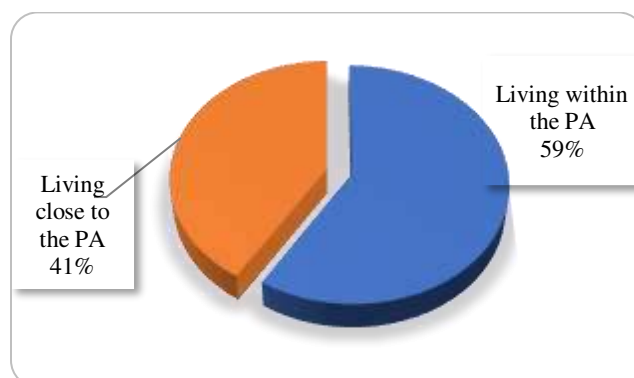


Figure 6. Proportion of respondents who stated that they live in or outside of the PAs

Sex and age of respondents

The total number of household members, (from the 973 households that were surveyed) who were 18 years and over was 2,451 with 51% being female and 49% male. The average age of the household members was 46 years, with the oldest household member interviewed being 97 years. The average age of persons surveyed from each of the administrative areas is shown in Table 9.

Table 9. Average age of persons surveyed

Administrative Region	PA	Age in Years
Mayaro/Rio Claro Regional Corporation	Nariva Swamp & Coastal Zone	46
	Trinity Hills & Eastern Extension	46
San Juan /Laventille Regional Corporation	Caroni Swamp	46
Sangre Grande Regional Corporation	Matura Forest & Coastal Zone	45
Tobago	Main Ridge Forest Reserve	48
	North East Tobago Marine Pilot PA	46
Source: Compiled		

Education level of respondents

In terms of highest education levels, 44% of the household members completed primary education, 12% attained a secondary level education up to Form 3 and 30% completed up to Form 5. Furthermore, 6% held diplomas or certificates, 2% were technically trained and 5% received tertiary level education (see

¹² The enumerators were trained to evaluate the locations of the households surveyed using digital maps which they were given. Based on the GPS mapping and the tools available from Survey Solutions the questionnaire automatically registered a household as being within or outside of the PA.

Figure 7). Accordingly, 74% of the members of the households surveyed received both primary and secondary training; this translates to approximately 10 years of formal education (excluding the first two years spent in pre-primary school)¹³.

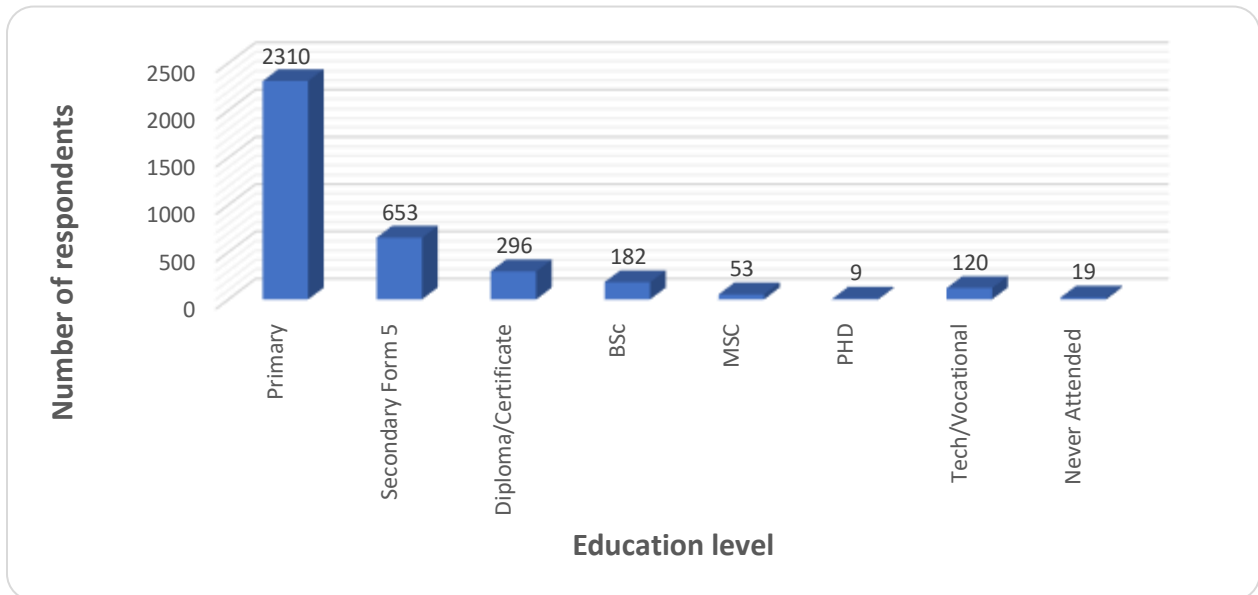


Figure 7. Highest education levels attained by respondents from all survey districts

Employment status

For the households surveyed, it was observed that on average 43% of the heads of households were employed while 57% were unemployed. Of those who were employed, on average 89% held full time positions and 11% worked part-time (see Figure 8).

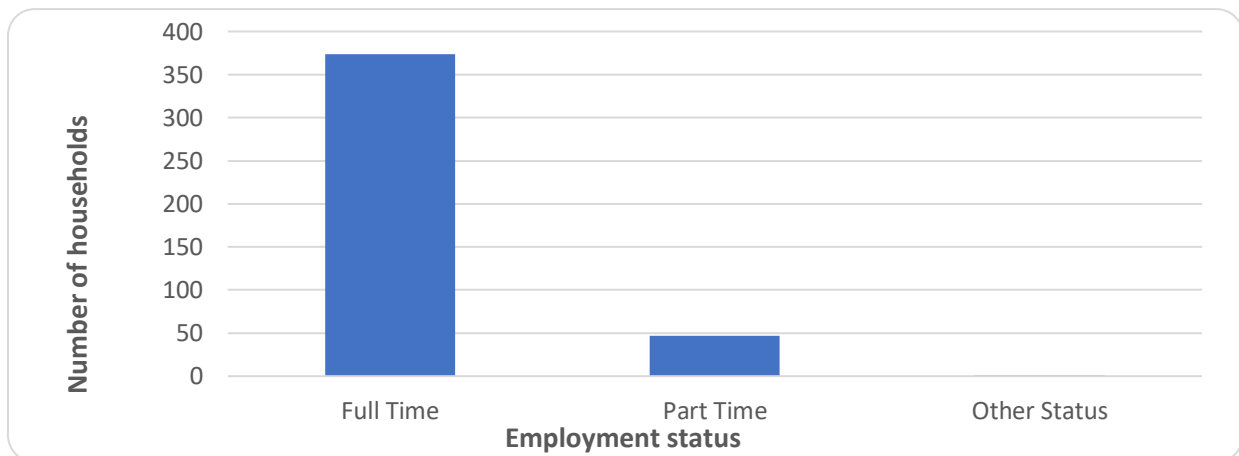


Figure 8. Employment status of all survey respondents

¹³ The survey of living conditions noted that in 2014 49.8% of the working age population had up to secondary school education. Only 8.2% held a diploma or equivalent certificate and 5.1% held a bachelor's degree or equivalent.

The distribution of type of employment of heads of households by PA is shown in Table 10.

Table 10. Type of employment of heads of households by Protected Area

Administrative Region	PA	Full-time	Part-time
Mayaro/Rio Claro Regional Corporation	Nariva Swamp & Coastal Zone	71	29
	Trinity Hills & Eastern Extension	75	25
San Juan/Laventille Regional Corporation	Caroni Swamp	93	7
Sangre Grande Regional Corporation	Matura Forest & Coastal Zone	82	18
Tobago	Main Ridge Forest Reserve	95	5
	North East Tobago Marine PPA	98	2
Source: Compiled			

Awareness of the protected area

Only 27% of the households surveyed were aware that there was a designated protected area in the vicinity of their dwelling. The awareness level varied across PAs as shown in the Table 11 below.

Table 11. Awareness of Protected Area status by percentage household respondents to survey

Administrative Region	Protected Area	% of Persons Surveyed who were aware of PA
Mayaro/Rio Claro Regional Corporation	Nariva Swamp & Coastal Zone	37
	Trinity Hills & Eastern Extension	27
San Juan/Laventille Regional Corporation	Caroni Swamp	16
Sangre Grande Regional Corporation	Matura Forest & Coastal Zone	36
Tobago	Main Ridge Forest Reserve	34
	North East Tobago Marine Area	32
Source: Compiled		

3.2 Module 2 - Income from Collection of Forest and Wild products from the PAs

Households collect a range of forest and wild products from within or around PAs. Table 12 provides some examples of the main products and animals collected within the last 12 months.

Table 12. Forest and wild products collected from within and around PAs within the last 12 months

Fruits	Game Meat	Vegetables	Roots and Tubers
Avocado	Deer	Cabbage	Cassava
Banana	Wild hog	Cauliflower	Sweet Potato
Coconut	Iguana	Cucumber	Yam
Lemon	Lappe	Bhaigan/Eggplant	Dasheen
Lime	Tattoo	Lettuce	Tumeric/Saffron
Mango	Agouti	Pepper (Pimento)	
Orange	Manicou	Pumpkin	
Papaya/Paw-Paw	Fish	Spinach	Medicinal Plants
Passion Fruit	Crayfish	Tomato	Chandler Bush

Pineapple	Mark (Fresh water	Gourd	Zepharan
Plantain	lobster)	Ochro	Bay-Leaf
Sour-Sop	Cascadu	Callaloo Bush	Zebbapeak
Watermelon	Wau-been	Parsley	
Caimate	Coskorob	Patchoi	
Mammy-Sepote	Conch	Pepper (Hot)	
Breadfruit	Crab		
Cocorite			
Grapefruit			
Portugal			
Balata			
Mandarine			
Pomerac			
Pewah			
Padoo			
Source: Compiled			

Table 13 provides some details as to the number of households collecting forest products. Note that 72% of households surveyed indicated that the household head collected fruits from within and around the protected areas¹⁴. The list of these fruits is provided above. Additionally, vegetables are also collected. Of the households surveyed, 22% indicated that vegetables were collected. It should be noted though that the majority of vegetables collected was said to be cultivated around the PAs¹⁵.

Table 13. Type of forest products collected by households within the last 12 months

Types of Forest Products Collected	Number of Households Collecting	Proportion of Households Collecting Forest Products (%)
Birds	3	0
Fish	13	1
Fruits	701	72
Game meats	38	4
Roots & Tubers	25	3
Vegetables	218	22
Medicinal Plants	13	1
Source: Compiled		

The number of households collecting fruits, vegetables, and game meats across each of the PAs is provided in Table 14 (see Appendix 3 for a detailed breakdown of Table 14).

¹⁴ It should be noted that distance from, and intensity of agricultural activities within or near the PA is a factor here. For example, for the Nariva Swamp site, there are areas of tenanted farming in the northern part of the swamp and there are areas of private lands on the coast where farming takes place. As such, the intensity of collection is likely to be higher in areas of denser agricultural activities.

¹⁵ A more detailed breakdown of the source details for Table 13 is included in Appendix 2 of this report.

Table 14. Number of household members collecting forest and wild products by PA

Protected Area	No of Households Surveyed	No. of Household Members Collecting Products		
		Fruits	Vegetables	Game Meats
Caroni Swamp	373	13	12	6
Nariva Swamp and Coastal Zone	201	551	164	2
Trinity Hills and Eastern Extension		136	40	
Matura Forest and Coastal Zone	184	1		18
Main Ridge Forest Reserve	149			8
North East Tobago Marine Area	66		2	4
Total	973	701	218	38
Source: Compiled				

Some households also noted that they collected birds, fish, game meats, roots and tubers and medicinal plants. While some of the forest and wild products collected were consumed by the household, bartered, or shared with friends and family, some produce was sold. Table 15 provides an overview of the revenues collected from the sale of fish, fruits, game meats, roots and tubers and vegetables within the last 12 months. Table 16 provides an overview of the distribution of revenues generated across each PA from fruits, vegetables, and game meats respectively.

Table 15. Net revenue generated from sale of forest and wild products (within the last 12 months)

Products	Revenue (TTD)
Fish	36,000
Fruits	4,738,475.14
Game meats	115,670
Roots and Tubers	26,700
Vegetables	14,065,300
Total	18,979,520.14
Source: Compiled	

Table 16. Distribution of net revenue generated from sale of forest and wild products across PAs

Protected Area	Revenue earned from sale (TTD)		
	Fruits	Vegetables	Game Meats
Caroni Swamp			2,100
Nariva Swamp and Coastal Zone	3,753,079.22	14,080,230	700
Trinity Hills and Eastern Extension	985,395.92	31,310	
Matura Forest and Coastal Zone			920
Main Ridge Forest Reserve			111,950
North East Tobago Marine PPA		3760	
Total	4,738,475.14	14,115,300	115,670
Source: Compiled			

It should be noted here that a small amount of processing in terms of charcoal, furniture construction and making wine was practiced by 5 households. The processing of forest products though, was not observed to generate significant revenues, as the majority of the processed products made were reserved for household use or to share with friends and family.

3.3 Module 3 – Sources of household income including collection and processing of forest products

Table 17 provides an overview of the distribution of household income from various sources including collecting and processing of forest products. Formal employment accounted for the largest proportion of household income followed by pensions¹⁶. A noteworthy statistic though is the proportion of household income generated by the collection (and less from the processing) of forest products; 21% when pensions are included and 26% when pensions are excluded from the overall totals. This is non-trivial and emphasizes the need to better track the interaction between PAs and host communities (See Appendix 4 for a detailed breakdown of the source information).

Table 17. Proportion of household income generated from various sources for all respondents

Economic Activity	% of Total household income excluding income from collection and processing of forest products		% of Total household income including income from collection and processing of forest products	
	% with Pensions	% without Pensions	% with Pensions	% without Pensions
Agriculture	0.79	1.08	0.63	0.80
“Make work” (CEPEP, URP etc.)	0.54	0.74	0.43	0.55
Self-Employment	12.18	16.71	9.67	12.32
Pensions	27.07		21.48	
Formal Employment	52.65	72.18	41.79	53.23
Informal Employment	5.08	6.97	4.03	5.14
Other Formal Employment	1.69	2.32	1.34	1.71
Collection and processing of forest and wild products			20.62	26.26
Source: Compiled				

In terms of the distribution of income generated from various sources across PAs, formal employment contributes the largest proportion to household income for all PAs except for Matura Forest and Coastal Zone and Nariva Swamp and Coastal Zone, where pensions account for the largest proportion (See Table 18).

¹⁶ This may suggest that the population in these PAs may be aging.

Table 18. Distribution of income from sources other than collection/processing of forest products

Economic Activity	Caroni Swamp	Matura Forest and Coastal Zone	Nariva Swamp and Coastal Zone	Trinity Hills and Eastern Extension	Main Ridge Forest Reserve NE Tobago Marine PPA
Agriculture	0.38	2.49	0.34	0.00	0.33
“Make work” (CEPEP, URP etc.)	0.22	1.83	0.00	0.00	0.38
Self-Employment	14.25	13.32	6.69	5.34	13.19
Pensions	23.93	38.57	40.76	17.87	25.42
Formal Employment	55.26	36.35	35.91	63.80	59.48
Informal Employment	4.84	3.89	13.73	12.34	0.00
Other Formal Employment	1.12	3.54	2.56	0.65	1.20
Source: Compiled					

3.4 Module 4 - Income benefits derived from forest-related employment in the PAs

A total of 13 households from the entire survey derived income benefits from forest related employment in the form of tour guiding (4), turtle patrols (2), re-afforestation (5), fire trail maintenance (1) and beach maintenance (1). These households are distributed according to the main type of activity undertaken in the given PAs. For example, turtle patrols are likely in Matura and Tour Guiding in Tobago. The two households which responded to this query earned a total of \$25,000 from tour guiding, \$6,120 from turtle patrols and \$172,302 from re-afforestation activities. In the case of tour guiding and turtle patrols, civil society was involved in generating employment for households.

Table 19. Income benefits derived from forest-related employment in the PAs within the last 12 months

Forest Related Income	Number of Households	Total Income Received (TT\$)	Institution making payment to Household
Tour Guiding	4	25000	NGO/Civil Society Tourists
Turtle Patrols	2	6,120	NGO/Civil Society MUST
Re-Afforestation	5	172,302	Government/NGOs
Fire Trail Maintenance	1		Government
Beach Maintenance	1		Government
Totals	13	203,422	
Source: Compiled			

3.5 Module 5 - The use of wood from the forest in the PAs

Households were asked to recall their utilization of wood gathered from the protected area for use as their primary energy source and as construction materials in the building and maintenance of their homes, sheds, furniture etc. Only 12% (118 households) of the households interviewed for this study utilized firewood/coal for energy consumption.

Furthermore, 15.3% did not use firewood/coal at all as their primary form of energy, 76.3% used firewood/coal on a very small basis, 2.5% used firewood/coal for energy about half the time and only 1 household in this survey used firewood/coal as its primary energy source¹⁷. Moreover, 96.3% of the households used firewood/coal for recreational events such as barbecues and cookouts but noted that they generally did not obtain the firewood from the PAs. In terms of construction and maintenance, only 19 out of the 118 households used forest wood for the construction and the maintenance of their homes with wood purchased from local sawmills and hardwares.

These figures are negligible in terms of the overall survey results and one can therefore conclude that interaction with the PAs as a source of wood for fuel or for construction is rare.

3.6 Module 6 – Coping with external shocks in the PAs

Forest fires and flooding accounted for the two most frequent natural disasters occurring in PAs. This result is in part due to the climate of Trinidad and Tobago, with two main seasons commonly referred to as the “dry season” and the “wet season”. Other shocks impacting these areas, as indicated by the respondents, include drought and crop disease.

Further, in the context of the economic contraction discussed in Section 1.3 above, households were asked if their dependence on PAs increased - evidenced by visits to the forest over a twelve-month period during the years 2016-2018 when compared to a similar twelve-month period during the years 2010-2015; 84% of respondents noted that they did not visit the forested areas in either time period that was identified, 8% noted that the number of visits remained fairly constant, 6% noted that in the latter period the number of visits declined and 2% noted that their number of visits increased over the two periods identified.

3.7 Module 7 - Recreational Hunting and Fishing in the PAs

Of the households surveyed, 50 engaged in recreational hunting¹⁸; 35 of which routinely hunted within the designated PA (Appendix 5 provides some additional details). This represents a mere 5% of the overall survey. Thirty-eight (38) households engaged in recreational fishing; 26 of which routinely fished within the PAs. This represents 4% of the overall survey. Generally, the majority of households that are engaged

¹⁷ The survey of living conditions indicated that 0.3% of the overall population depended on wood/charcoal as a fuel for cooking in 2014.

¹⁸ It should be noted that recreational fishing and hunting activities did not necessarily occur within or near the PA which was closest to the household.

in recreational hunting and fishing indicated that they observed a marked decline in game species and fish population respectively over the last 12 months (as shown in Figures 9 and 10 below).

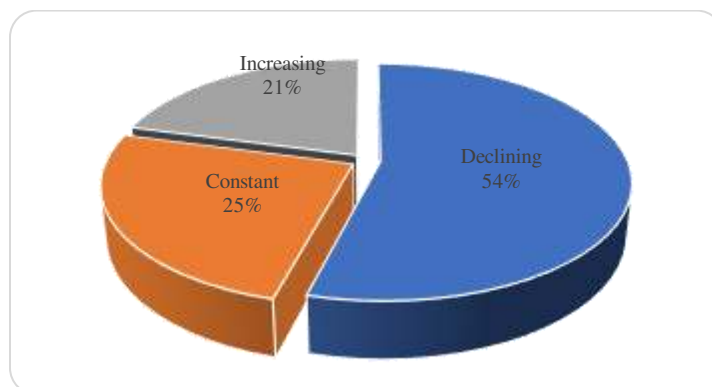


Figure 9. Viewpoint of respondents who hunt recreationally on the status of game species populations in the last 12 months

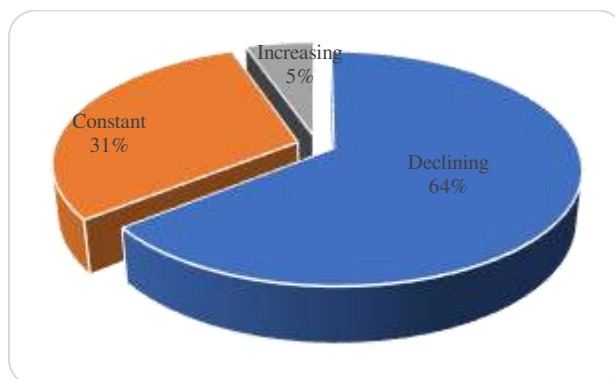


Figure 10. Viewpoint of respondents who fish recreationally on the status of fish populations in the last 12 months

3.8 Module 8 – PA awareness, IFPAMTT Project awareness and support for an access fee

Households surveyed indicated that the primary threats facing PAs include the over-exploitation of biodiversity, loss of ecosystems, increased pollution and flooding resulting from unsustainable agricultural practices. Additionally, the increased demand for land for housing was encroaching on forested areas.

Of the households surveyed, 64% indicated that they perceived that benefits can accrue to the local area being designated as a PA. Further, 91% of households indicated that this designation was beneficial to the wider economy. These benefits were listed as:

1. Access to agriculture support
2. Economic benefits derived from fishing
3. Economic benefits derived from hunting
4. Improved access to recreational areas

5. Development of tourism product
6. Development of indigenous culture
7. Protection of local ecosystems
8. Risk mitigation and reduction in cases of disaster
9. Climate change mitigation
10. Monitoring of timber extraction
11. Watershed protection
12. Improved environmental awareness
13. The opportunity to introduce a visitor fee

It should be noted that 69% of households surveyed indicated that they would be willing to pay a user fee to access the PA, the revenues from which can be used to maintain the trails and camp sites etc.

4 Discussion

Household Demographics

According to the demographic data collected from respondents, the average age of heads of households is 46 years and the person has attained at least a primary level of education. About 57% of these persons are employed and over 70% of these are full-time employed. This does provide some degree of anecdotal evidence of the low dependence on the PAs as a permanent source of income. As highlighted above, only a mere 27% of the households surveyed were aware that they lived in the vicinity of a designated protected area. This variable indicates that information about PAs may not be as widely disseminated or sufficiently targeted, and as such any initiative moving forward which is targeted to a localized area, must include a market relevant comprehensive communication strategy.

Income from Collection of Forest Products

Over seventy percent (70%) of households surveyed are collecting fruits from forests. This extractive use is highest among households that are in the vicinity of the Nariva Swamp, which is an area that includes tenanted farming in its northern portion and farming on private lands within its eastern boundary. This indicator is not surprising as it is next highest in the Trinity Hills area, which has overlap with household clusters with the Nariva Swamp area. Fruit extraction is the highest among type of product collected, followed by vegetables then game meat.

Among the other terrestrial PAs in focus for the survey, extraction of fruits was seen to be least in the Main Ridge Forest Reserve (for which respondent clusters were far afield) and the Matura Forest and Coastal Zone Area, which includes the Environmentally Sensitive Area, the Matura National Park ESA. Vegetable extraction from forest areas is practised by just under a quarter of households across all PAs and is again highest among households near to the Nariva Swamp, followed by the Trinity Hills area. Regarding the items that were relatively lower in extraction, root and tuber extraction was done by 25 households, while fish and medicinal plants were each extracted by 13 households. This type of agricultural activity benefits from the localized resources of the PAs, including soil quality and, in some cases, proximity to natural waterways for irrigation. This may suggest a closer cultural affinity with agricultural practices in these areas as compared to other communities.

The detail provided in Tables 15 and 16 as well as Appendix 2 indicates that the most revenue comes from the sale of vegetables, followed by fruit and game meat. The highest revenue is earned for sales of fruit and vegetables by respondents from households surveyed for Nariva Swamp and Trinity Hills and for game meat by respondents from households surveyed for the Main Ridge Forest Reserve. The suggestion is therefore, that persons surveyed in the sample for Nariva Swamp and Trinity Hills are using the extracted produce for personal consumption and income, while persons surveyed from the Main Ridge Forest Reserve are using extracted game for sale also.

Notably, while 18 households indicated they are extracting game meat in the Matura Forest (which is a 'no-take' area), 8 households indicated they are extracting game from the Main Ridge Forest Reserve,

where hunting is allowed in the Open Season. The revenue earned from the latter, though by fewer households, is 120 times greater than that earned from the larger group of household respondents from Matura Forest area. It may well be that the householders doing game extraction (illegal poaching) in Matura Forest are mainly doing so for their own consumption and less so for sale/income earning.

The south-eastern area of Trinidad, notably, the Victoria-Mayaro Forest Reserve within which lies the so-called “Eastern Extension” of the Trinity Hills area, is reportedly the most heavily hunted region in the country. It is surprising that only 2 households report extraction of game and only 700 TTD is realised from sale of game. Because data from two sites is merged, it is not possible to distinguish whether the data actually is derived from households associated with the Trinity Hills area or the Nariva Swamp area, the latter which is an ESA and therefore a “no take zone”.

Overall, it appears that respondents are aware of the sites from which game extraction is not allowed, given that these respondents are reporting low extraction of game and sale of game meat in comparison to the sites in which hunting is allowed in the open season.

The details in Table 16 offer policy makers a wealth of opportunities in terms of crafting an area specific development strategy. For example, for residents living within or near the Nariva Swamp and Coastal Zone, small business financing should be targeted to agriculture, in particular, with a focus on cultivating fruits and vegetables. Even more these areas can also be targeted for developing value added or light manufacturing industries such as cottage industries which leverage the produce collected for this area. Likewise, for residents within and around the Main Ridge Forest Reserve, small business opportunities can be encouraged using game meats.

The data in the Table 15 provides anecdotal evidence of informal sectors which offer economic benefits for households. The CSO can design interventions and instruments which better capture this type of economic activity in order to better plan for and with these localized resources. For example, for Caroni Swamp, if the area is upgraded in terms of infrastructure, with new management teams and small fees paid for research purposes etc. the income generated over time can be better tracked. For the Nariva Swamp area, a LED strategy could include farming programmes etc. which are monitored to determine impact of these activities on income generation over time.

Employment Benefits from Activities Other than the Collection of Forest Products

When compared with other sources of income for households, the extraction and sale of forest/wild products contributes to approximately one-quarter of overall household incomes. In households where pensions are not a source of income, the extraction and sale of forest/wild products makes up just over a fifth of overall household incomes.

In examining the overall data set, self-employment follows formal employment as the second largest contributor to household income when pensions are not considered, and third largest when pensions are considered. When the data is disaggregated by protected area however, pensions are a larger contributor

to household income among respondents from the Nariva Swamp sample than formal employment and the next highest contributor is informal employment. There is very little difference in the percentage contribution to income by pensions and formal employment of respondents from the Matura Forest and Coastal Zone area, and self-employment is the next largest contributor to income.

Interestingly, the percentage contribution from agriculture as noted by respondents from across all protected area sites, is very low; in Module 2, the data illustrated a large income derived from sale of fruit and vegetables extracted from the protected areas, yet Module 3 suggests that these persons are not engaged in formal agriculture and self-employment is low. This may indicate the extent of informality associated with agricultural cultivation. "Other formal employment" while low in all areas, contributes more to income of households in each area than agriculture and 'make work' programmes.

Income from forest-related employment in PAs

While only 13 of the households surveyed reported income derived from forest related employment, five of these households collectively derived over \$172,000 from reforestation activities in this category of employment, averaging at \$34,400 per household, with payment coming from Government. Six of the remaining eight households derived approximately \$31,000 from tour guiding or conducting turtle patrols.

While the data extrapolated information over a past 12-month period, turtle patrols occur only for a part of the year, during the marine turtle nesting and hatching season which takes place over an approximately six-month period from March to August. The National Reforestation Watershed and Rehabilitation Programme, which is administered by the Ministry of Agriculture, Land and Fisheries, provides an opportunity for individuals in community groups to earn an income, while assisting in the management of degraded forest and protected areas.

In the context of declining income and slow (or negative) economic growth, people may begin or increase their exploration of the use of PAs for opportunities for economic activity, either in sustainable or unsustainable ways and either through or without support from the State. PAs can be used as a foundation to catalyze economic activity through localized economic development. This trend should be encouraged as local institutions such as NGOs can be deliberately engaged to implement local economic development interventions. Even so, income generating activities which protect and preserve the environment can become the basis of an area specific strategy for sustainable development and management of these protected areas.

Use of wood from forests for fuel or construction

The majority of households involved in the survey were not reliant upon firewood/coal as a primary source of energy. Further, only about one-third of those who used firewood/coal as an energy source reported obtaining this fuel source from within or near protected areas. Respondents further indicated that wood used in construction or repair of homes generally were purchased commercially from sawmills and hardwares.

Coping with external shocks in protected areas

The data did not suggest that reliance on protected areas increased during times of external shocks. Only two percent of respondents indicated increased visits to protected areas at those times and six percent indicated that visits to protected areas actually declined during such periods. These findings suggest that households, during a time of economic decline, may have utilized austerity measures within the year, or they may have looked for employment in other areas, other than utilizing forest-related activities to supplement their household income.

Trends reported in recreational hunting and fishing in protected areas

Very few respondents to the survey reported being recreational hunters or fishers in the protected areas (5% or less). Of these few extractive users, the majority reported a decline in stocks over the past 12 months.

Threats to PAs, Awareness of PAs, Awareness of IFPAMTT project, Support for user/access fee

Over half the respondents to the survey see value in the designation of protected areas and just over 90% of respondents noted that PAs can generate value to the country's economy. This is supported by a 'willingness to pay' user fees by over two-third of the survey respondents, with these fees being utilized in management of the sites. This type of intervention can be integrated into a wider sustainable development plan for the localized area, as the fee could help maintain built infrastructure and provide employment.

5 Conclusion

The IFPAMTT project represents the culmination of an intervention to enhance the oversight and governance of six pilot protected areas in T&T. The initiative was implemented by the FAO in collaboration with national institutions such as the CSO, the UWI, Forestry Division and the Ministry of Planning and Development among other Government agencies and with the participation of representatives of civil society. The socioeconomic study reiterated the requirement that as a resource, PAs must be comprehensively understood in order to identify the various linkages which exist with the rest of the country from social and economic perspectives.

Local Economic Development is an approach to development which utilizes the localized resources including labor, to achieve sustainable economic outcomes in a given area. This approach brings policy makers together from local government as well as community leaders to address challenges and implement solutions in a participative way. This type of approach has underlined the IFPAMTT project's approach to the development of management plans for the six PAs and can be used to deepen the impact of these ecological resources given that:

1. Stakeholder committees which include local government and other civil society and community groups were formed.
2. The project has put established governance-related measures which can be applied to specific projects undertaken at the local level.
3. Interventions at the local level can benefit from the momentum of the IFPAMTT project.

The overall project validates that PAs represent a significant renewable resource in T&T which provides social and economic benefits in addition to environmental benefits. PAs contribute to some extent to livelihoods and household well-being. The research undertaken in this exercise as part of the wider project, reveals that what is needed is a system by which continuous monitoring and measurement is undertaken. This is critical to effectively plan for and with this resource, as it can support economic diversification if integrated into a local economic development strategy undertaken in a sustainable manner which supports the management of these areas.

The project measured the overall awareness and impact of these PAs on the livelihoods and well-being of persons living in the vicinity of these areas as well as the wider national community. In general, the survey respondents were unaware of the designation of "protected areas". This speaks to the need to disseminate targeted information about these PAs to different publics.

Households collected forest products on a regular basis; this included birds, fish, fruit, game meats, roots and tubers and medicinal plants. These were mainly used to supplement household consumption and in some cases household income. The extent to which this is so is greater in some protected areas than others, perhaps owing to the degree of protection which governs the protected area. The contribution of forest and wild products to household income, as discussed in Section 3.2 and 3.4 is non-trivial.

Only a small proportion of household income is related to formal forest-based activities. The data indicates that Government-supported forest management initiatives are a source of income for some persons who live near to protected areas and civil society forest and protected area initiatives are another source of seasonal income for households. The recreational benefit of PAs to the society should not be underestimated, however, this may need to be monitored and can possibly contribute information which is useful to management of these sites.

Climate change has impacted these areas over the last year, in terms of floods and drought, but the biggest impact has been driven by human activity in terms of clearing areas to construct homes. In times of external shocks, respondents did not increase their use of PAs as a coping mechanism. Most of the persons surveyed acknowledged the intrinsic economic, environmental and welfare benefits of protected areas and indicated willingness to pay user fees to enable maintenance and protection of these sites.

It is therefore the recommendation of this report, that the conclusion of the project serves as a platform for the creation of local economic development strategies and interventions driven by each PA Subcommittee in collaboration with the wider community. The results of the survey discussed above validate the potential economic gains of leveraging the PAs for households living in and around these designated areas while supporting sustainable management of these sites.

In moving forward, the launch of such a strategy can be a natural extension of the overall project, leveraging the instruments created and networks built.

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Appendix 1 Development of a System for Protected Area Management

The timeline for biodiversity conservation in T&T can be generally summarized by Figure A1 below.

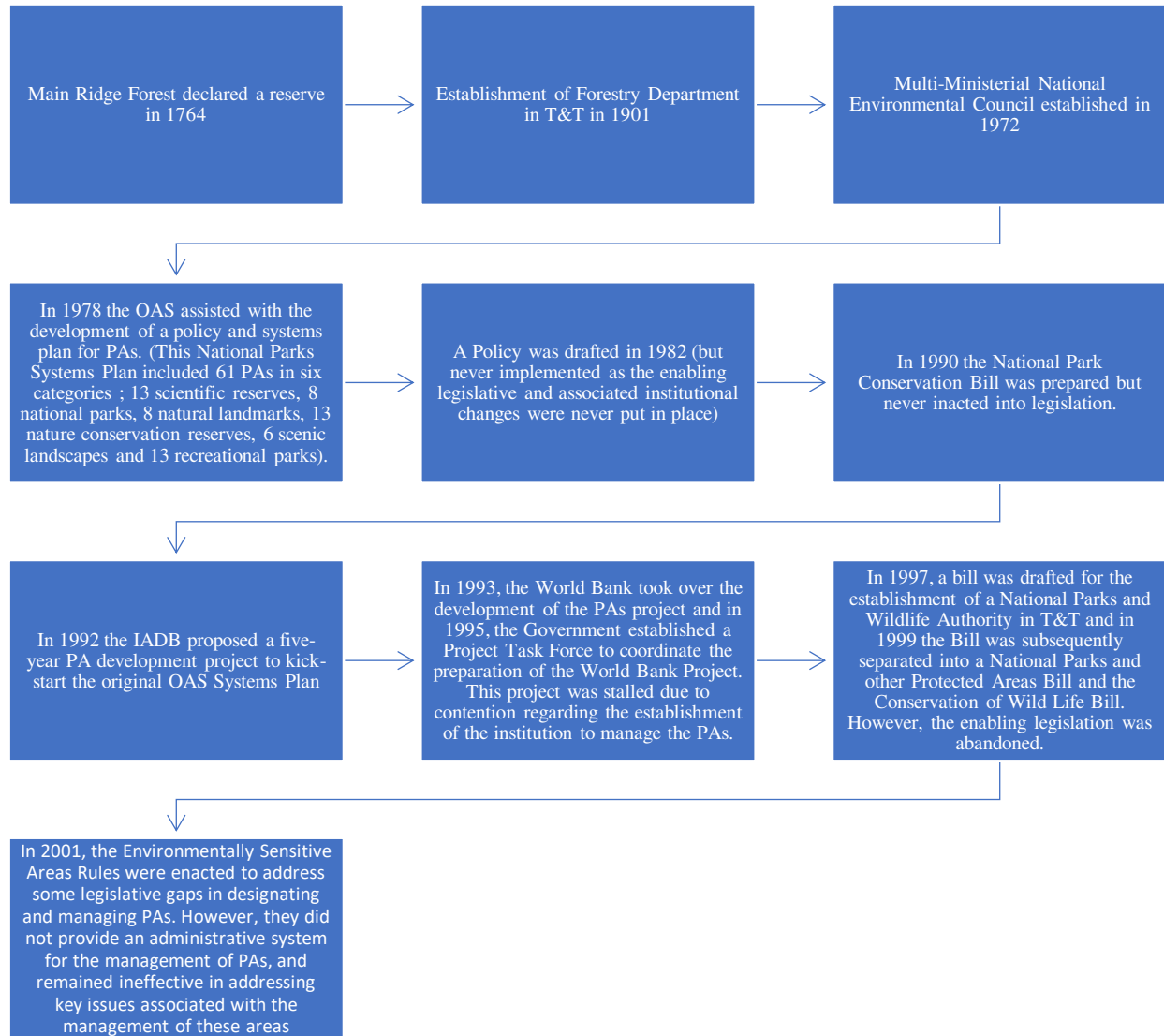


Figure A1. Policy Framework for Protected Areas

The timeline and the details contained in the above schema point to the conclusion that the various attempts by the governments of Trinidad and Tobago over the last few decades to create a system for the management and oversight of PAs have been hampered by the absence of an enabling environment. To this end, creating the enabling environment has also been challenging. In 2011, the Protected Areas and Forest Policies were adopted with a view towards consolidating a coherent system by which measures to increase management effectiveness of PAs can be implemented. These policies will be complemented by a Wildlife Policy which will harmonize the management of wildlife resources within the context of the Protected Areas and Forest Policies.

Appendix 2 Source Data for Table 15

Total Households Collection of Wild Forest Products within last 12 Months														
Products Collected	Household Members Collecting (HM)	Within PA	Outside PA	Weeks Collecting (Average Collection)	Days Collecting (Average)	Hours Collecting (Average)	Qty. Collected (lbs, Units, per bag, per bottle)	Consumed, Spoilt, Given as gift	Qty. Sold or Bartered	(Average) Current Price. \$\$	Gross Revenue (p x q) \$\$	Total Cost	Net Revenue	Total
Birds	3	1	2	5	4	18	9	6 (Gift)	3 (Barter)	N/A	N/A	N/A	N/A	0.00
Fish	13	8	5	125 (9.015)	26 (1.667)	67 (5.154)	2030 (lbs) (156.154)	930 (lbs)	1100 (lbs)	40	44,000	8000	36,000	36,000
Fruits	701	603	98	5520 (7.874)	1131 (1.616)	857 (1.223)	606,105 (lbs, Unit, per bag)	167,011 (lbs, Unit, per bag)	439,094 (lbs, per bag)	11.076	4,863,405.14	124,930	4,738,475.14	4,738,475.14
Game Meats	38	16	21	359 (9.447)	82 (2.158)	414 (10.895)	1225 (Units)	566 (Units)	659 (units)	175	115,325	2280	113,045	113,045
Roots & Tubers	25	20	5	108 (4.32)	26 (1.72)	51 (2.04)	7743 (lbs) (309.72)	1018 (lbs)	6725 (lbs)	4	26,900	200	26,700	26,700
Vegetables	218	183	35	2656 (12.183)	375 (1.72)	327 (1.5)	684,245 (lbs, per bag)	68,995 (lbs, per bag)	645,250 (lbs, per bag)	22	14,195,500	80,200	14,115,300	14,065,300
Medicinal Plants	13	11	2	113 (8.692)	23 (1.769)	13	128 (per bag)	128 (per bag)	N/a	N/a	N/a	N/a	N/a	0.00
Total	1011	871	197	8,886	1,667	1,747	Units = 1,234 lbs = 1,300,251	Units = 572 lbs = 238,082	Units = 662 lbs = 1,092,169	----- -	19,245,130.14	215,610	18,029,520.14	18,979,520.14
Products Processed	Total Households Processing Products from Wild Forest Products within last 12 Months													
Charcoal	1	0	1	0	0	0	7 (Bags)	1 (Bag)	8 (Bags)	50	400	0	400	400
Furniture	2	2	0	54	10	12	4 (Units)	4 (Units)	0	N/A	N/A	N/A	N/A	0.00
Wines	2	2	0	5	8	25	8 (Buckets)	4 (Buckets)	96 (Bottles)	40	3840.00	200.00	3640.00	3640.00
Total	5	4	1	59 (11.80)	18 (3.6)	37 (7.4)	19	5	104	-----	4240.00	200.00	4,040.00	4,040.00

Appendix 3 Source Data for Table 16

Collection of Wild Forest Products within the last 12 Months by Protected Area														
Products Collected	Household Members Collecting (HM)	Within PA	Outside PA	Weeks Collecting (Average Collection)	Days Collecting (Average)	Hours Collecting (Average)	Qty. Collected (lbs, Unit, per bag)	Consumed, Spoilt, Given as gift (lbs, Unit, per bag)	Qty. Sold or Barter (lbs, Unit, per bag)	(Average) Current Price. \$\$	Gross Revenue (p x q) \$\$	Total Cost	Net Revenue	Total
Fruits collected over the last 12 months in each Protected Area														
Caroni Swamp	13	1	12	127 (9.78)	31 (1.667)	13 (1.00)	1640	1640	0.00	11.076	000	000	000	000
Matura Forest & Coastal Zone	1	0	1	1	2	5	100	100	000	11.076	000	000	000	000
Nariva Swamp & Coastal Zone	551	501	50	4386 (7.96)	863 (1.57)	689 (1.25)	456,829	112,155	344,674	11.076	3,817,609.22	64,530	3,753,079.22	3,753,079.22
Trinity Hills & Eastern Extension	136	101	35	1006 (7.40)	235 (1.73)	150 (1.10)	147,536	53,116	94,420	11.076	1,045,795.92	60,400	985,395.92	985,395.92
TOTALS	701	610	91	5520 (7.874)	1131 (1.616)	857 (1.223)	606,105	167,011	439,094	11.076	4,863,405.14	124,930	4,738,475.14	4,738,475.14
Vegetables collected over the last 12 months in each Protected Area														
Caroni Swamp	12	3	9	167 (13.92)	23 (1.92)	12 (1.00)	2,280	2,280	000	22	000	000	000	000
Nariva Swamp & Coastal Zone	164	151	13	2,061 (12.57)	275 (1.68)	247 (1.50)	666,301	22,886	643,415	22	14,155,130	74,900	14,080,230	14,080,230
Trinity Hills & Eastern Extension	40	29	11	353 (8.83)	66 (1.65)	58 (1.45)	15,414	13,759	1655	22	36,410	5,100.00	31,310	31,310
NE Tobago Marine Area	2	0	2	75 (37.5)	11 (5.5)	10 (5.0)	250	70	180	22	3960	200	3760	3760
TOTALS	218	183	35	2656 (12.183)	375 (1.72)	327 (1.5)	684,245	38,995	645,250	22	14,195,500	80,200	14,115,300	14,115,300
Game meat collected over the last 12 months in each Protected Area														
Caroni Swamp	6	1	5	41 (6.83)	18 (3.00)	21 (3.5)	64 (Units)	52 (Units)	12 (Units)	175	2,100	000	2,100	2,100
Nariva Swamp & Coastal Zone	2	2	0	4 (2)	3 (1.5)	6 (3.00)	30 (Units)	26 (Units)	4 (Units)	175	700	000	700	700
Matura Forest & Coastal Zone	18	7	11	141 (7.83)	37 (2.06)	273 (15.16)	118 (Units)	110 (Units)	8 (Units)	175	1,400	480	1,400	920
Main Ridge Forest Reserve	8	5	3	162 (20.25)	15 (1.88)	85 (10.63)	970 (Units)	320 (Units)	650 (Units)	175	113,750	1800	111,950	111,950
NE Tobago Marine Area	4	2	2	11 (2.75)	9 (2.25)	29 (7.25)	43 (Units)	43 (Units)	00 (Units)	175	000	000	000	000
TOTALS	38	17	21	359 (9.48)	82 (2.16)	414 (10.89)	1225 (Units)	551 (Units)	674 (Units)	175	117,950	2280	115,670	115,670

Appendix 4 Source Data for Table 17

Economic Activity	Income from sources other than collection of forest and wild products						
	Caroni Swamp \$\$	Matura Forest & Coastal Zone \$\$	Nariva Swamp & Coastal Zone \$\$	Trinity Hills & Eastern Ext. \$\$	Main Ridge Forest Reserve \$\$	NE Tobago Marine Area \$\$	Totals \$\$
Agriculture	122,000	306,000	29,300	0	45,000	75,000	577,300
Make work (CEPEP, URP etc.)	71,600	225,180	0	0	52,400	46,800	395,980
Self-Employment	4,596,200	1,638,600	575,000	198,000	1,804,500	89,000	8,901,300
Pensions	7,718,200	4,744,398	3,502,350	662,308	3,479,000	1,043,000	19,773,758
Formal Employment	17,819,920	4,471,400	3,086,000	2,365,000	8,139,900	2,580,000	38,462,220
Informal Employment	1,560,000	478,800	1,180,200	457,600	0	36,000	3,712,600
Other Formal Employment	362,200	435,380	220,000	24,000	164,000	28,200	1,233,780
Totals	32,250,120	10,924,260	8,592,850	3,706,908	13,684,800	3,898,000	73,056,938
Average per Household	84,645.98	62,119.99	55,797.73	74,132	93,731.51	61,873.02	75,084.21

Appendix 5 Supporting details for Module 7

Recreational Hunting (Game Meat)						
Total No. of Households	Within PA	Outside PA	Weeks hunting (Average Collection)	Days per week hunting (Average days per week)	Hours per day Hunting (Average hours per day)	Qty. Collected (Units)
50	35	15	465 (9.3)	10 (2)	352 (7.04)	714 (14.28)
Recreational Fishing (Fish Caught)						
Total No. of Households	Within PA	Outside PA	Weeks fishing (Average Collection)	Days fishing per week (Average days per week)	Hours per day fishing (Average hours per day)	Qty. Collected (Units)
38	26	12	170 (4.474)	58 (1.526)	247 (6.5)	1992 (54.21)
Total No. of Households 88	61	27	635	68	599	714 (Units) 1992 (54.21)

Appendix 6: Lessons Learned

Survey Design and Upload

During the initial phases of preparing, designing and implementing the survey on Survey Solutions the following should be considered to ensure a smooth process:

1. Ensure the survey itself is well thought out and makes logical sense with respect to question skipping.
2. Have the survey reviewed by independent persons that are not working on the project to ensure that errors can be picked up from different perspectives.
3. When implementing the survey on Survey Solutions, consideration must be taken on how the questions are built and coded. Depending on how the questionnaire is coded on the application it can slow the survey significantly. Proper testing must be done to ensure the survey works as expected.
4. When purchasing devices ensure that the device meets the specifications of the survey application that it is required to run. It was observed that the tablets could have had higher specifications which would ensure that large surveys are executed properly with enough processing memory options.
5. To ensure that the survey application is compatible with the device, a pilot device should be purchased and tested. For instance, the device purchased for this project had a feature called “restricted profiles” which did not work as expected. This resulted in the team having to implement a workaround solution for the absence for this vital feature.

Pilot Test

During the pilot phase the following must be considered:

1. The surveyors play a pivotal role in the success of the project. It is very important that they are properly equipped (with devices as well as their approach to members of the population taking the survey).
2. A lot of unexpected things can happen on the field and it should be emphasized how to deal with erroneous situations, e.g. one person quarrelling with the surveyors as he misunderstood the purpose of the survey.
3. Field testing is very important since issues that may not have been thought of in the survey's design and implementation are discovered. For example, surveyors being assigned to houses. In one instance a surveyor was conducting an interview for almost 2 hours. This delayed their other assigned houses which delayed the entire team from moving into another area.

Enumerator Training

1. The exercise of traversing/navigating the conventional hard copy of the questionnaire by spending a lot of time on each module and entertaining every question posed by the enumerators and supervisors allowed for the enumerators to better understand what was the objective of the study in terms of use and sustainable management of natural forests. Moreover, the conventional approach allowed for a smoother transition to the electronic questionnaire. In fact, it was observed that the

enumerators and supervisors became very proficient in navigating the questionnaires on the tablets after a day's exposure to the tablet.

2. As mentioned earlier, during the training exercise and in particular, the discussion of the questionnaire by module, many questions were raised by the supervisors with respect to the wording or phrasing of parts of the questionnaire. The invaluable experience and tacit knowledge of the supervisors helped in the re-wording of some questions, making same a lot more user-friendly for both the interviewer and the respondent. This was well appreciated later, in both in the field exercise and the pilot exercise.
3. The modality of the fieldwork allowed for the entire team involved in this project to be on the field as one entire group working in synergy to achieve one goal. Hence, all the exercises that were initiated in the two weeks of training allowed for this synergy. In fact, this was also achieved within the UWI and CSO IT teams in the context of simulating the retrieval of files comprised of completed questionnaires and converting same to the required dataset in SPSS for analysis.
4. Following the pilot study, all teams dealt with all issues and concerns raised in the field when the team met on Thursday 29th August 2019 at Plaza 47. Quarrying and Logging were added as possible shocks based on feedback from the pilot.
5. In the field exercises, challenges were faced with respect to the GPS coordinates and arithmetic calculations. It was suggested that calculators should be provided to the enumerators. While GPS coordinates continued to be an issue to be grappled with, some enumerators did in fact receive GPS coordinates on their tablets in various locations on the field. Therefore, in order to deal with the issue of GPS coordinates, laminated hard copies of maps would be provided to the enumerators. With respect to the arithmetic calculations, it was observed by the UWI team that the CSO IT Team took the cautious decision to not allow enumerators to switch from the questionnaire screen to the calculator screen nor work with split screens on their tablets while in the field, thus maintaining the integrity of the data due to non-sampling errors.
6. The dynamics of interviews completed or in progress by a team of enumerators on a given day, during the pilot exercise, suggested that the approach to workload assignment by IT be revisited. This was done by IT and the Supervisors and resulted in a mutually acceptable approach which will not compromise the control reserved for the supervisors. With respect to cue cards, IT recommended that the respondent be shown the tablet and allowed to read the multiple choices/options on the screen. This eliminates the requirement to add to the weight of the field package carried by enumerators in the field.
7. From the field exercise, and for future exercises of this nature, it is recommended by the UWI Team that certain questionnaire measurement scales and rules of thumb be operationalized. For example, it was observed that 3 pigtail buckets equaled one feedbag in the case of cucumbers, while 40-50 pounds of sorrel equaled one feedbag of sorrel. Reference is made to the terms: Formal Employment, Informal Employment and Self Employment; for example, a respondent plying his/her taxi for income can be considered as self-employment versus another plying his/her "private car for hire" (PH) which can be considered as informal employment. CSO may wish to consider the formal operationalization of such terms.

This document was produced under the project
“Improving Forest and Protected Area Management in Trinidad and Tobago”.

Funding was provided by
the Government of the Republic of Trinidad and Tobago (GORTT),
the Food and Agriculture Organization of the United Nations (FAO/UN),
the European Union (EU)
and the Global Environment Facility (GEF).

