Open Access Research Journal of
Science and Technology
Journals home page: https://oarjst.com/
ISSN: 2782-9960 (Online)

OARJ OPEN ACCESS RESEARCH JOURNALS

(RESEARCH ARTICLE)

Recreational fishing in rural coastal communities in Guyana: Motivational factors and catch composition

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Open Access Research Journal of Science and Technology, 2025, 14(02), 117-129

Publication history: Received on 24 June 2025; revised on 02 August 2025; accepted on 05 August 2025

Article DOI: https://doi.org/10.53022/oarjst.2025.14.2.0103

Abstract

Recreational fishing is fast becoming a popular activity in Guyana and there is growing concern about the likely impacts of this activity. This study investigates recreational fishing in select rural coastal villages, in Administrative Region 6, East Berbice, Corentyne, to ascertain the species caught, the motivational factors that either push or pull individuals to participate in this activity, and perceptions about regulating recreational fishing. One hundred (100) randomly identified individuals from ten (10) villages, who engaged in recreational fishing, participated in this study. A pre-tested questionnaire was used to elicit responses about recreational fishing. The results revealed that "fishing to supplement food", "relaxation", and "enjoyment and thrill of catching fish" were major non-catch motivating factors. Major catch related motivational factors were "the size of the fish caught", "the number of fishes caught" and "the fishing location". There was some correlation between motivational factors and selected demographic variables. A total of twenty-four (24) species comprised the collective catch reported. Some respondents opined that regulations are needed for recreational fishing in Guyana, but this could be problematic if stakeholders are not informed and made aware of why regulation is needed, what this entails, and if they are not involved in decision making processes regarding the kinds of regulation to be implemented.

Keywords: Recreational Fishing; Motivation; Catch Composition; Regulation; Guyana

1. Introduction

Globally, recreational fishing is very popular [9, 5]. The term primarily connotes fishing either for fun, or for the challenge [42] and the fish caught is neither sold nor used as a primary source of protein for the fisher [25]. However, while recreational fishers neither sell the catch nor use it as a primary source of nutrition, consumption of the caught fish is becoming more and more important to those who engage in this activity [6, 17, 19]. Recreational fishing occurs in both marine and freshwater environments, and is socially and economically important for the revenue it generates through the creation of jobs and at times the heavy spending of those who engage in it [6, 5] as they travel to different locations and purchase fishing gear. While there are obviously different opinions about recreational fishing, many of these are often rooted in cultural contexts [52].

Impacts from recreational fishing have been reported on target and non-target species, and habitats, and this has brought focus on wider ecological and socioeconomic impacts from this activity [23, 32]. Issues with monitoring of the activity [45], environmental impacts, limited regulations and their effective implementation [33], are often cited as being responsible for the observed impacts on the species caught, habitats, and conservation efforts for aquatic ecosystems [11, 20].

Guyana has a rich fish species diversity, partly attributed to a very diverse river system that divides the country into different watersheds [35] and also because of its geological history and the dispersal of fishes between the Guiana Shield

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and Amazon systems [12, 40]. With such an array of aquatic ecosystems, there are many options for recreational fishing in freshwater, coastal and marine environments. Likewise, with such a rich fish diversity, good and relatively easy access to fishing locations and unique species, Guyana has a good resource base to support its rising popularity as a destination for recreational and sport fishing as part of tourism attraction packages [29].

This study investigates recreational fishing in ten rural coastal villages in Administrative Region 6, to determine the species caught, the motivational factors for engaging in this activity and participants' views on regulation of the activity.

Given the paucity of information regarding recreational fishing in Guyana, it is anticipated that the results of this study could provide a baseline of information for future research in Guyana on this topic, and contribute to fisheries management and conservation in Guyana, in the context of recreational fishing.

2. Methodology

2.1. Experimental Design

A non-experimental research design, which allowed the researcher to gather data on perceptions of individuals who engaged in recreational fishing, was used to conduct this study. The descriptive (survey) method was used to solicit the views and perceptions of respondents by means of a questionnaire [28] that was administered by the researcher.

2.2. Study location

This study was conducted in Region 6, East Berbice, Corentyne. There are approximately fifty villages in the entire study area and a decision was taken to sample 20% of the total number of villages, which meant that ten (10) villages were to be included in the study. Random sampling was used to select the villages to be included in the study.

2.3. Instrumentation and Implementation

A pilot study was conducted to assess the feasibility of conducting the study, to refine questions and identify and correct any potential problems. Respondents from the pilot study were from a village in region 6 that was not included in the final study and participants from the pilot study were not included in the final study.

The pre-tested questionnaire was divided into five sections, with a varied number of items in each section. A total of one hundred (100) respondents participated in this study, with ten (10) participants surveyed from each randomly selected village. Responses to items on the questionnaire were measured using a modified Likert scale.

2.4. Data analysis

The data collected, was entered in the Statistical Package for the Social Sciences (SPSS) programme (Version 23) and analyzed using descriptive statistics of frequency, percentage, mean and standard deviation. Tables and charts were generated to present the results.

3. Results and Discussion

3.1. Demographic Characteristics

Table 1 summarizes the demographic characteristics of the pilot study and the final study. With respect to the fulltime occupation of respondents, individuals who were estate workers, farmers and fishermen were noted as those who mostly participated in recreational fishing. This is not too surprising, since these represent the areas where most employment is available in this Administrative Region. Sugar cane cultivation is the greatest employer of labour in the Region and cash crop farming is also among the highest user of labour, given that the area is a predominantly farming area. Many males in the area are also fishermen by profession, operating in the coastal and marine waters.

The results show that while recreational fishing, attracts participants from a broad age range, the 35 - 44 years' age group and the > 44 years' age group had the greatest percentage (28% each) of respondents who participated in this activity. Further, as the average age of participants increased, the number of participants engaged in recreational fishing also increased. This observation is also supported by the work of Cooke and Cowx (2004) [17], Herfaut *et al*. (2013) [30], and Pita *et al.* (2018) [44], where it was reported that the majority of recreational fishers were middle-aged or older.

Table 1 Demographic Characteristics of Respondents from Pilot and Final Studies

Demographics		**Pilot study (N = 12)**		**Final study (N = 100)**	
		Number	**Percentage**	**Number**	**Percentage**
Gender	Male	12	100	96	96
	Female	0	0	4	4
Marital status	Married	4	33.3	44	44
	Single	6	50	41	41
	Common Law	2	16.7	15	15
Age distribution	< 17 Years	0	0	0	0
	17 – 25 Years	3	25	21	21
	26 – 34 Years	7	58.3	23	23
	35 – 44 Years	2	16.7	28	28
	>44 Years	0	0	28	28
Occupation	Self-employed	1	8.3	6	6
	Student	2	16.7	15	15
	Private sector	2	16.7	5	5
	Public sector	2	16.7	8	8
	Estate worker	3	25	18	18
	Farmer	2	16.7	14	14
	Fisherman	0	0	17	17
	Unemployed	0	0	15	15
	Home maker	0	0	2	2
Total (N)		12	12	100	100

Unal *et al*. (2010) [52] reported that the mean age of participants in recreational fishing was between 25 and 49 years and Vitale *et al*. 2021 [53] reported that the average age of recreational fishers in their study was 41 years. This is within the age range observed in this current study of 35 - > 44 years. One might wish to assume that as one gets older, they have more time for leisure activities [30, 44] and recreational fishing therefore may be attracting individuals who are more advanced in age. Maybe the younger individuals either are still trying to determine whether they are interested in outdoor activities such as recreational fishing, or older participants may have families and use recreational fishing to catch fish for family consumption.

3.2. General Fishing Profile of Recreational Fishers

The results for the general characteristics of recreational fishers who participated in this study (Table 2) revealed that 30% fished weekly, 62% of respondents fished alone, and 55% stated that most of their fishing takes place in freshwater ecosystems in back-dam canals and trenches.

Table 2 General Characteristics of Recreational Fishers

Frequency of fishing by respondents	**Frequency**	**Percent**
Daily	24	24.0
Weekly	30	30.0
1-3 times per month	28	28.0
4-6 times per month	14	14.0
7-10 times per month	2	2.0
Greater than 10 times per month	2	2.0
Fishing partners of respondents		
Alone	62	62.0
With friends	18	18.0
With family	11	11.0
With a group	9	9.0
Fishing areas where respondents fished		
Coastal and marine environment	28	28.0
Back-dam canals and trenches	55	55.0
Both coastal and marine environment and back-dam canals and trenches	17	17.0
Total	100	100.0

Reasons given for the preference for freshwater locations included ease of access, safer when compared to coastal and marine locations, require less expensive fishing equipment, and these locations were close to homes and farms, thus increasing the possibility of fishing after working on their farms and reducing the time to get to fishing locations.

Freshwater habitats have also been reported to be important fishing areas [27, 49] and important contributors towards food security [34]. This is consistent with the fact that subsistence fishery for local consumption, as well as ornamental fish for export, is usually undertaken mainly in freshwater rivers, lakes, creeks, canals and flood plains in savannah areas [7, 50].

Another characteristic of recreational fishers that was investigated was whether they engaged in the activity alone, with partners or family or friends. Most participants (62%) reported that they fished alone. The choice to fish alone may be a personal one, where individuals just wish to enjoy the solitude that fishing alone offers. Further, there might also be greater flexibility in decision making when one chooses to fish alone. The individual can decide when and where they will fish, without having to consider the preference or schedules of others. With respect to schedules, the decision to fish may be a spontaneous one and so eliminating the need to coordinate with others, may appeal to individuals who prefer to fish alone. Overall, the expectations and outcomes of recreational fishing varies depending on cultural perceptions [1] when considering preferences of recreational fishers to either fish alone or with other persons.

The results also revealed that 18% of all respondents reported that they fished with friends and 11% stated that they fished with family. Recreational fishing with family and friends provides opportunities to strengthen relationships and social bonds among participants, spend quality time together, enjoy an outdoor activity, transfer knowledge and teach life skills [39, 43].

3.3. Species Caught During Fishing Trips

Taxonomic information of the species caught during recreational fishing in the communities studied, is given in Table 3 and Figure 1. Twenty-four species were caught by recreational fishers: nine species were from inland freshwater trenches and canals and fifteen species were from saline coastal and marine waters. The variety of species caught were

from the very diverse coastal waters (62.5% of species caught) and freshwater habitats (37.5% of species) with a variety of species in both habitats.

Table 3 Species Caught by Recreational Fishermen in the Study Area

Common name	**Scientific name**	**Family**	**Area of fishing**
Black Acara / Black Patwa	*Cichlasoma bimaculatum*	Cichlidae	Inland trenches and canals
Lukanani	*Cichla ocellaris*	Cichlidae	Inland trenches and canals
Flying Cichlid	*Mesonauta guyanae*	Cichlidae	Inland trenches and canals
Tilapia	*Oreochromis aureus*	Cichlidae	Inland trenches and canals
Big Eye Cichlid	*Acaronia nassa*	Cichlidae	Inland trenches and canals
Sunfish	*Saxatilia saxatilis*	Cichlidae	Inland trenches and canals
Hassar	*Hoplosternum littorale*	Callichthyidae	Inland trenches and canals
Huri	*Hoplias malabaricus*	Erythrinidae	Inland trenches and canals
Silver tetra	*Ctenobrycon Spilurus*	Characidae	Inland trenches and canals
Snook	*Centropomus undecimalis*	Centropomidae	Coastal and marine waters
Tarpon	*Megalops atlanticus*	Megalopidae	Coastal and marine waters
Flat Head Mullet	*Mugil cephalus*	Mugilidae	Coastal and marine waters
Coco Sea Catfish	*Bagre bagre*	Ariidae	Coastal and marine waters
Crucifix Sea Catfish	*Sciades proops*	Ariidae	Coastal and marine waters
Pemecou Sea Catfish	*Sciades parkeri*	Ariidae	Coastal and marine waters
Snapper	*Lutjanus griseus*	Lutjanidae	Coastal and marine waters
Bull shark	*Carcharhinus leucas*	Carcharhinidae	Coastal and marine waters
Butterfish	*Nebris microps*	Sciaenidae	Coastal and marine waters
Drum	*Plagioscion squamosissimus*	Sciaenidae	Coastal and marine waters
King Weakfish	*Macrodon ancylodon*	Sciaenidae	Coastal and marine waters
Whitemouth Croaker	*Micropogonias furnieri*	Sciaenidae	Coastal and marine waters
Toadfish	*Batrachoides surinamensis*	Batrachoididae	Coastal and marine waters
Blue crab	*Callinectes sapidus*	Portunidae	Coastal and marine waters
Sheriga crab	*Portunus rufiremus*	Portunidae	Coastal and marine waters

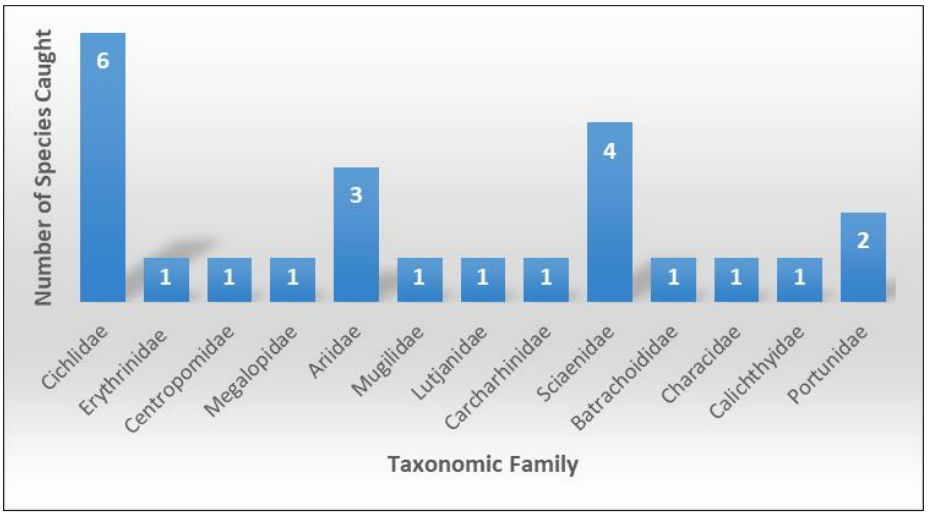


Figure 1 Taxonomic Families of Species Caught

Most of the species caught were from the Cichlidae family, all of which were caught in freshwater inland trenches and canals, which provide a variety of habitats for the different species. This was followed by the Sciaenidae family, a very common family in the coastal and marine environment and two were from the Portunidae, a family of crabs.

The results from this study show that the recreational fishery may be seen as a multispecies fishery because multiple fish species can be targeted directly or multiple species can be caught while fishing within a single fishing location or in multiple locations as reported during the conduct of this study.

The species caught are all edible and respondents stated that the catch is normally taken home to be used as food. This supports what was reported by others that recreational fishing plays a role in supplementing the food source of fishers and their families [6, 19].

The fact that this activity is proving to be important as a supplementary source of food for fishers in local communities, may cause one to ask about the existence and adequacy of regulations to monitor the activity, so as to reduce or avoid the emerging negative impacts of recreational fishing on species and habitats. The importance of regulations cannot be overlooked because more and more, recreational fishers catch, and keep their catch for food [6] and given that the number of persons engaging in this activity is increasing, the need for monitoring is becoming more and more necessary, especially when one considers the harm that can result to habitats and fish populations.

3.4. Likely benefits from regulating recreational fishing in Guyana

Respondents were asked about their perceptions of recreational fishing being regulated and the benefits that can accrue as a result of such regulation. Responses were based on a three-point modified Likert scale and the results are given in Table 4.

Table 4 Descriptive Statistics Pertaining to Benefits of Regulating Recreational Fishing

Confident that regulating recreational fishing will help	Mean (M)	Standard Deviation (SD)
Maintain healthy sustainable fisheries.	1.31	0.647
Regulate the number of persons engaging in recreational fishing.	0.75	0.512
Ensure large sizes of fish to catch	1.38	0.722
Ensure there is a lot of fish to be caught.	1.48	0.530
Ensure protection of the area where fishing takes place.	1.20	0.532
Regulate the fishing effort.	0.95	0.577
Regulate the number of fish caught by each person.	0.65	0.510

Grand Mean and Grand SD	1.10	0.576

Key: A mean of <1 = Not confident, 1 – < 2 = Somewhat confident, 2 - 3 = Confident

Recreational fishing regulations help prevent overfishing and is one of the most common objectives of implementing any type of regulation for this activity [47]. Respondents in this current study did not display a very positive attitude towards the idea of regulations and the benefits that may accrue from regulating the activity. Overall, respondents were only somewhat confident (M=1.10; SD =.576) that regulating recreational fishing could deliver on the promises expressed. Noteworthy is the fact that the results show that respondents had very similar perceptions (M=1.10; SD =.576) about the ability of regulations to deliver the identified benefits.

Upon closer examination of the results, one may surmise that the individuals who were surveyed probably, had little knowledge or awareness of fishing regulations, their importance and how they can safeguard habitats and fisheries for long-term sustainability of fish stocks. In addition, respondents may not have linked the importance of regulations to the long-term ability to catch fish from the regular habitats if left unregulated. Maybe respondents were not too aware or familiar with regulations, given that they always fish the resource as an open, unregulated resource and are able to catch fish, so they did not worry about anything going wrong. It should be noted that fishery regulations provide a basis for managing social issues while at the same time trying to avoid overfishing [46].

3.5. The case for regulating recreational fishing in Guyana

The importance of regulations in recreational fishing was highlighted by Arostegui *et al*. (2021) [10] who stated that while recreational fishing may have minimal ecological impacts, a number of recreational fisheries have started to experience a decrease in fish catches and some have even collapsed in the absence of effective regulatory measures.

Knowledge of regulations and compliance with these regulations are important [14, 16] and if regulatory measures are in place, then it will be necessary for participants to comply with the regulations, otherwise, noncompliance could lead to negative consequences for the recreational fishery [14, 16]. Non-compliance is "any action that is in direct contravention of the laws set forth by fisheries managers, whether accidental or deliberate" [15], but compliance will necessitate that individuals should first be made aware of the specific regulations, their role and their benefits.

Given that there is no active system in place for regulating recreational fisheries in Guyana, there is need for research on this aspect of recreational fishing in Guyana, especially in the wake of the emerging effects of recreational fishing [8, 36]. This issue of implications of regulations for recreational fishing in other destinations was previously reported on by researchers such as Arlinghaus and Cooke (2009) [8] and Lewin *et al*. (2019) [37], who stated that the full extent of the implications is not visible because of the scarcity of research on regulations and compliance within the recreational fishing sector.

Any implementation of regulations in the recreational fishing sector in Guyana should be considered in the context of local knowledge and practices, community and cultural considerations, research data on the willingness of participants to accept the implementation of such regulations.

Recognizing the need for such regulation, and with the emergence of recreational and sport fishing as a potential economic growth pathway via ecotourism, a collaborative workshop, supported by the Food and Agriculture Organization (FAO), the Ministry of Agriculture, and the Sustainable Wildlife Management (SWM) Programme, was recently conducted to examine best practices to develop a policy for recreational and sport fishing in Guyana. If this is to progress further, then stakeholders and managing agencies need to embrace the need for clear guidelines, strong partnerships, and continuous monitoring.

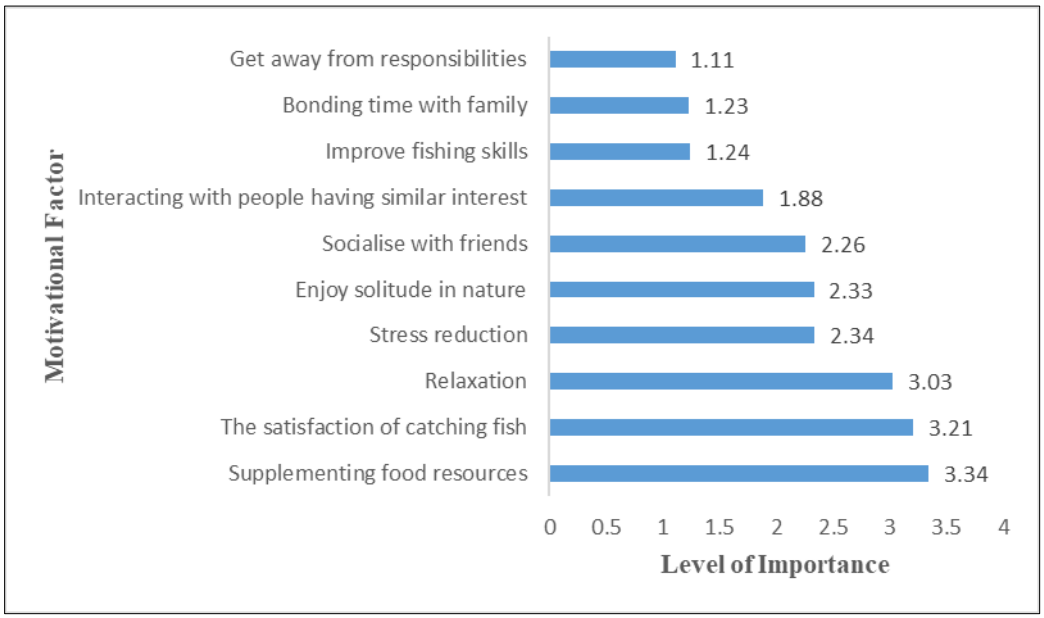
3.6. Non-catch and Catch Related Motivational Factors

The factors that motivate individuals to participate in recreational fishing are multifaceted [26] and fall into two main groups, activity-general or non-catch related and activity-specific or catch related [3, 4].

Fedler and Ditton (1994) [24] reported that a general pattern emerges when investigating motivations of recreational fishers, in that, recreational fishing is not merely a recreational activity, but one that is also considered an experience that recognizes cultural, social and naturalistic aspects. According to Ardahan and Turgut (2013) [2], there is a correlation between demographic factors, motivational factors and the benefits derived from recreational fishing [2].

Among the social benefits are opportunities for family bonding [31], stress release [51], nature enjoyment [22] and enjoying solitude [24].

The importance that respondents in this study attributed to non-catch related motivational factors is presented in Figure 2. The level of importance that respondents assigned to identified motivational factors was measured on a four-point modified Likert scale.



Key: 1= Not important, 2 = Somewhat important, 3 = Important, 4 = Very important

Figure 2 Level of importance of activity-general or non-catch related motivational factors for recreational fishing (Mean scores based on four points modified Likert Scale)

Fishing to supplement food resources ranked number 1 (Mean = 3.34) and was identified as very important by 87% of respondents who felt that this was a very important motivating factor. This observation is in line with that made by Cooke *et al*. (2017) [19] who acknowledged that it is not unusual for individuals to catch fish for personal consumption or to supplement their food source and Ardahan and Turgut (2013) [2] who alluded to social benefits derived from recreational fishing. The two other top motivating factors were the satisfaction of catching fish (Mean = 3.21) and relaxation (Mean = 3.03).

Motivational factors that influence decisions to participate in recreational fishing can change over time [48] because what may motivate someone at a particular time, may not motivate them at another time. Also, the social and economic contexts may also play a role in how a factor influences the decision to engage in recreational fishing.

One demographic characteristic that was examined together with motivational factors was the age of fishers. When the age group of recreational fishers was cross-referenced with the motivational factors, it was observed that three age categories (26 – 34, 35 – 44 and > 44 years) appeared to be more motivated to catch fish for food. This probably could have been because persons in these age groups either have families of their own or are fishing for their parents.

Fishers in the < 16 years and 17 – 25 years' age groups rated relaxation, being outdoors, communing with nature and being with friends as their main motivations, so these factors were deemed to be of greater importance for these age groups. This result is consistent with Lyle *et al*. (2002) [38] who noted that the younger age groups are more inclined to use recreational fishing for relaxation and interacting with nature.

Perceptions were also solicited about catch-related or activity-specific and motivational factors and these results are presented in Figure 3.

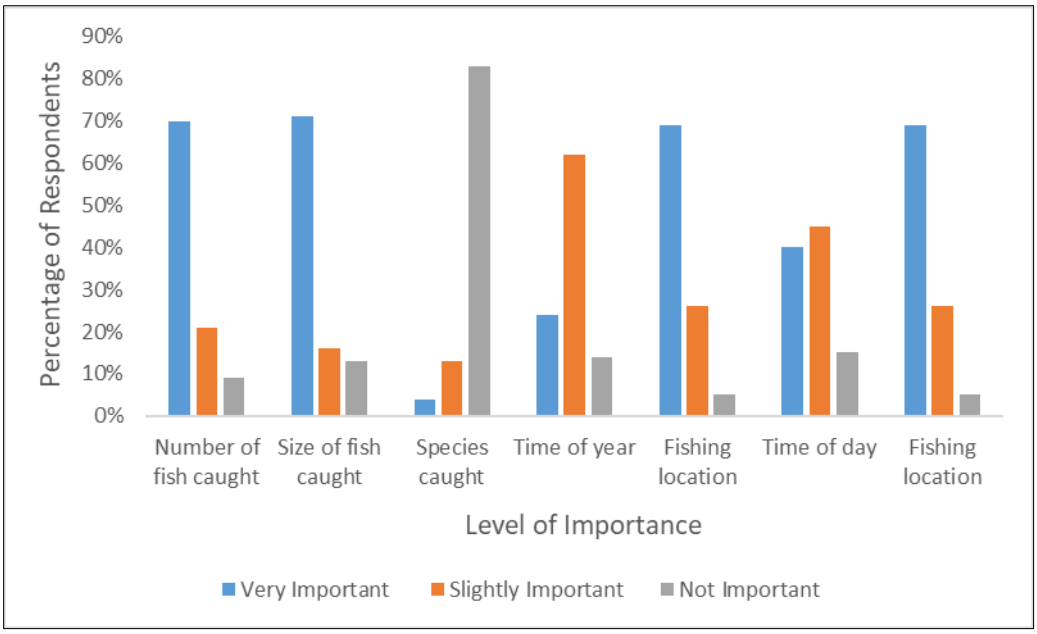


Figure 3 Level of importance of activity-specific or catch related factors motivational factors for recreational fishing

The size of the fish caught (71%; M = 1.58; SD = .713), the number of fishes caught (70%; M = 1.61; SD = .650), and the fishing location (69%, M=1.31; SD=.563) were identified as being very important factors considered when deciding to participate in recreational fishing. The results also showed that there was some amount of similarity in the responses.

Regarding the importance of the species of fish caught, 83% of respondents indicated that this was not important. One might assume that the majority of respondents may not have been too concerned with the species, but only whether the fish caught was edible, since it is taken home and consumed, while a smaller percentage of respondents (4%) who indicated that it was a very important factor maybe were true recreational fishers who targeted specific species.

3.7. Fishing for Personal Consumption

While recreational fishing is mainly seen as a leisure activity, it is not unheard of for individuals to catch fish for personal consumption. Cooke *et al*. (2017) [18] recognized the role by noting that there was a misconception, that because this activity is done during non-work or leisure time, nutritional motivation was not important. Further, it has been reported that recreational fishing provides an accessible, affordable and sustainable food source [18], plays an increasing role in supporting the food security of participants in of this activity [21, 13, 18], while fulfilling its main role of being a leisure activity [41, 18].

In this study, respondents rated supplementing of food resources with fish caught during recreational fishing as one of the most important reasons for fishing (Figure 2). This observation is consistent with the views of Ardahan and Turgut (2013) [2] and Cooke *et al*. (2017) [18] who alluded to recreational fishermen catching fish for personal consumption.

Further, respondents reported that there is no sale of their catch. This is also consistent with the views of Cooke and Cowx (2004) [17] who stated that in recreational fishing nothing is sold or traded, since making a profit is not a part of the activity. However, they also reported that provision of food and domestic consumption are deliverables of recreational fishing.

It has been observed from other studies, that recreational fishing has been gradually shifting towards becoming a consumption-oriented activity [13] because, increasingly, participants engaged in recreational fishing, consume the fish that they catch [41]. This was also evident in the current study, since supplementing food resources, and the size and number of the fish caught were identified as important considerations when participating in recreational fishing.

Although recreational fishing has the potential to contribute to food security of those who participate in this activity, there still needs to be a serious conversation in terms of how this potential can best be realized. It would be necessary to prioritize sustainable practices, develop appropriate regulations where there is none, respect local regulations that

exist and engage with communities to better understand their needs and priorities. By doing so, recreational fishing can be positioned to play a crucial role in coastal rural communities.

4. Conclusion

This study investigated demographic characteristics, motivational factors and perceptions about recreational fishing among recreational fishers in ten coastal villages on the Corentyne coast in Guyana. The results showed that there was some correlation between demographic characteristics and motivational factors.

In the absence of a system for regulating recreational fisheries in Guyana, there is need for more focused research on recreational fishing and the implications of this activity for habitats and fish populations. Such research can provide relevant information about the current status of recreational fishing in Guyana, catch composition, as well any existing and emerging environmental impacts. More information on catch composition would be very useful if and when the time comes to address the biological characteristics of species caught, since such information would be needed for developing appropriate regulations for monitoring the activity.

Regulating recreational fishing in Guyana could be problematic if stakeholders are not involved in decision making and if they do not understand why there is a need for regulation of the activity. As this activity expands, it would be necessary to prioritize sustainable practices, engage with local communities and other stakeholders, to understand their needs and priorities. This will make it easier to regulate recreational fishing, once fishers are aware of what regulation entails and how it will affect an activity they have indulged in freely and their potential to catch fish for their own personal and family consumption.

Compliance with ethical standards

Acknowledgments

The author would like to thank the University of Guyana, Institute for Marine and Riverine Ecologies and Economies for providing the opportunity to successfully complete this research. The author expresses gratitude to all recreational fishermen who willingly participated in this study and who provided honest responses to the questions posed to them.

Disclosure of conflict of interest

The author certifies that this submission is original work and is not under review at any other publication. The author hereby declares that this manuscript does not have any conflict of interest.

Statement of informed consent

The author declares that informed consent was obtained from all individual participants included in the study. All work utilized in this study was fully cited and referenced so authors of prior researches are given their due credentials for their work.

Declaration of competing interest

The author declares that there is no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. Data availability – Data will be made available on request.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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