

COMPARISON OF SOCIO-ECONOMIC CONDITIONS AND ENVIRONMENTAL AWARENESS IN THE GRENADINE ISLANDS BETWEEN 2005 AND 2010

K. BLACKMAN



Centre for Resource Management and Environmental Studies (CERMES)
University of the West Indies, Faculty of Science and Technology,
Cave Hill Campus, Barbados
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ABSTRACT

This paper presents the findings of a comparative analysis on any changes in the environmental awareness and socio-economic conditions of people in the Grenadines between 2005 and 2010 (the execution period of the Sustainable Grenadines Project). Two identical surveys were conducted and revealed significant changes in important sources of income, perception of resource conditions, issue of concern and awareness in rules and regulations regarding mangroves. While persons were aware of many environmental issues, there were increases in their knowledge of biodiversity and sustainable development. The perception of the severity of the issue of pollution has decreased. Though not significant, there were changes in community problems which mainly focus on unemployment and poor environmental conditions. Furthermore the exploitation of fisheries has become a marine resource problem. Education appears to be the key solution to many of the community and resources problems experienced in the Grenadines. Overall these results have several management implications, particularly for developing more effective management strategies within the Grenadines. While the Sustainable Grenadines Project has done considerable work in promoting sustainable development and environmental awareness, their transition to the Sustainable Grenadines Inc. will allow for the continuation of their efforts.

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Cover Photos: (1)Fish landing site at Paget Farm, Bequia, (2)Marine biodiversity in Mayreau gardens, (3) Beach erosion in Tibeau, Carriacou and (4) Landfill in Clifton, Union Island

1 INTRODUCTION

1.1 About the Grenadines

The transboundary Grenadine island chain lies on the Grenada Bank extending between the two sovereign nations of St. Vincent and the Grenadines and Grenada. There are over 20 islands, of which 9 have permanent settlements. Palm Island and Petit St. Vincent are the two resort islands. The other inhabited islands include Bequia, Mustique, Canouan, Mayreau, Union Island (belonging to St. Vincent and the Grenadines), Carriacou and Petit Martinique (belonging to Grenada). These islands have towns and communities with public and private supporting infrastructure. Most other islands are visited by yachters, and fishers.

Much of the bank area occupied by the Grenadine Islands (about 1,500km²) is shallower than 50m and supports the most extensive coral reefs and related habitats in the south-eastern Caribbean (Mahon *et al.* 2004). The most extensive and well developed reefs in the Grenadines occur on the shallow shelves on the windward side of Mayreau, Union Island and the Tobago Cays. Horseshoe Reef and World's End Reef are the best known and most extensive reef system in the central Grenadines (Caribbean Conservation Association 1991). These reefs have been famous for underwater sceneries.

1.2 Grenadines' livelihoods and resources

Coral reefs are extremely important for the Grenadine islands. The inhabitants highly depend on the marine environment for their livelihoods. Marine-based activities such as fishing and tourism are economic mainstays of these islands and these activities heavily depend on healthy coral reef ecosystems. Fishing has provided a source of income and food for the majority of the Grenadines islands like Bequia, Canouan and Union island (SENJAN Associates and Consultants 1992; Staskiewicz and Mahon 2007). A survey by Caribbean Conservation Association in 1991 indicated that 85-95% of adult males in the Grenadines were fishers.

Another study by Gill *et al.* 2007 later revealed that 75% of fishers relied on fishing as their livelihood with Bequia, Union Island and Petit Martinique heavily relying on fishing.



Figure 1.1 Fishers of Bequia



Figure 1.2: Tyrell Bay is a yachting destination in Carriacou

On the other hand, tourism, particularly yachting tourism, contributes significantly to Grenadines communities such as Bequia and Union Island by providing direct and indirect employment (UNECLAC 2002). The Tobago Cays is also a focal point for marine tourism by attracting yachts, cruise ships and divers. A study by French Mission in Corporation in 1995 indicated that 10,000 cruise ship passengers, 14,000 yachts and

25,000 day charters had visited the Cays annually.

The Grenadines are highly vulnerable to coastal and marine degradation because of the heavy reliance on marine resources. Over the years, these small island communities have suffered from detrimental anthropogenic activities such as recreational abuse of coral reefs, habitat degradation, uninformed coastal development (Price and Price 1998 and Goreau and Sammons 2003), pollution by sewage and solid waste (Berwick 1986), overfishing and use of destructive fishing practices (Burke and Maidens 2004). All of these activities have long-term implications for sustainability in the Grenadines. In an effort to reverse the trend of unregulated exploitation, resource users need to be oriented towards sustainable use of resources, both aquatic and terrestrial. This orientation must involve full participation of stakeholders, the strengthening of their capacity in planning and decision-making, as well as in the implementation of plans and policies.

1.3 The way forward

The Sustainable Grenadines Project (SusGren) was developed to address these aforementioned issues in two phases. The first phase, focused on stakeholder assessment, mobilization and participatory project development while the second phase comprised a Core Program, along with a suite of associated projects. As a result, there have been six sector planning workshops, 12 training workshops, 16 mini-projects, 17 persons involved in attachment and/or exchanges and 11 institutional self-assessments over the lifetime of the SusGren Project from 2004 to 2010 (CERMES 2010).



Figure 1.3: Fishers working on a training programme

The associated projects had emphasis on ensuring sustainable livelihoods, habitat restoration, marine protected areas management, litter management, strengthening of fisherfolk, amongst other activities which ensured biodiversity conservation.

Because of the expected outcome of the SusGren project, a baseline study was conducted in 2005 by Lee *et al.* 2007 to ascertain the extent of the people's awareness and knowledge about the environment within the seven selected Grenadine Islands. This current study provides a comparative analysis between the survey conducted in 2005 and a re-survey conducted in 2010 to evaluate any changes in the socio-economic conditions and environmental awareness that had taken place during SusGren.

2 METHODS

Socio-economic and environmental awareness data were collected from the Grenadines Islands in 2010 to determine if there were any changes from the baseline data collected in 2005. The survey was based on the report by Lee *et al.* 2007 which was designed based on guidelines detailed in the Socioeconomic Monitoring Guidelines for Coastal Managers in the Caribbean (Bunce and Pomeroy 2003) and the Socioeconomic Manual for Coral Reef Management (Bunce *et al.* 2000).

The surveys were conducted from July to October 2010. A total of 137 persons were surveyed: Carriacou (53), Petit Martinique (10), Union Island (16), Canouan (14),

Mayreau (4), Mustique (10) and Bequia (32). The survey focused on variables such as household demographics, level of awareness of environmental issues, issues of concern, source of information, perceived community and marine resource problems and solutions, awareness of rules and material style of life.

The number of questionnaires per island was determined based on the relative proportion of the specific island population to the combined population of the seven islands (Table 2.1). Questionnaires were administered by locally engaged interviewers who firstly identified the major residential community and then selected the main street running through that community. A respondent above the age of 15 from every other house on a selected side of the street was then interviewed. All data were entered into SPSS and analysed.

Table 2.1: Questionnaire allocation

Island	Population	% of Total Population	# of questionnaires administered	# of completed questionnaires
Carriacou	6000	43	64	53
Petite Martinique	1000	7	10	8
Union I.	1500	11	16	16
Canouan	1200	9	14	14
Mayreau	300	2	4	4
Mustique	1000	7	10	10
Bequia	3000	21	32	32
Total	14000	100	150	137

Responses from the two time periods were compared using Chi-square tests (using a 0.05 significance level) in Microsoft Excel to determine if there were any significant differences in data between 2005 and 2010. The Chi-square test was only used for data that (i) satisfied the assumptions of this test and (ii) were key to the project objectives of the SusGren project (i.e. the variables - source of income, females in income generating activities, awareness of issues, main issue of concern, perception of marine resources and awareness of rules/regulations).

3 RESULTS/DISCUSSION

3.1 Household demographics

3.1.1 Age, Gender and Education

Household demographics were obtained from across the Grenadines islands. Of those surveyed during the two periods, the majority of the respondents were female (76% in 2005 and 71% in 2010). There was a shift in the age range surveyed in 2010 as a significant portion of the respondents were between the ages of 31-40 years old compared to ages 21-30 in 2005. In addition the majority of respondents (71.5%) in 2005 and (43.1%) in 2010 had completed secondary level education. As in 2005 the majority of the respondents resided on the island of Carriacou (42.1% in 2005 and 53% in 2010).

3.1.2 Sources of income

Respondents were questioned about their sources of income and these were organised into nine categories as shown in Figure 3.1. Statistical analysis revealed that there was a significant difference between the largest source of income for 2005 and 2010 ($\chi^2 = 19.72$, $p < 0.05$). In 2010 the two main sources of income by respondents included tradespersons and professionals (Table 3.1). This was a shift from service workers being one of the two main sources of income in 2005. Furthermore while tradespersons (e.g. carpenter, mason, plumber, construction and labourer) provided the largest source of income as stated by 22.4% respondents in 2005, professional jobs currently provide households with the largest source of income as stated by 23.6%.

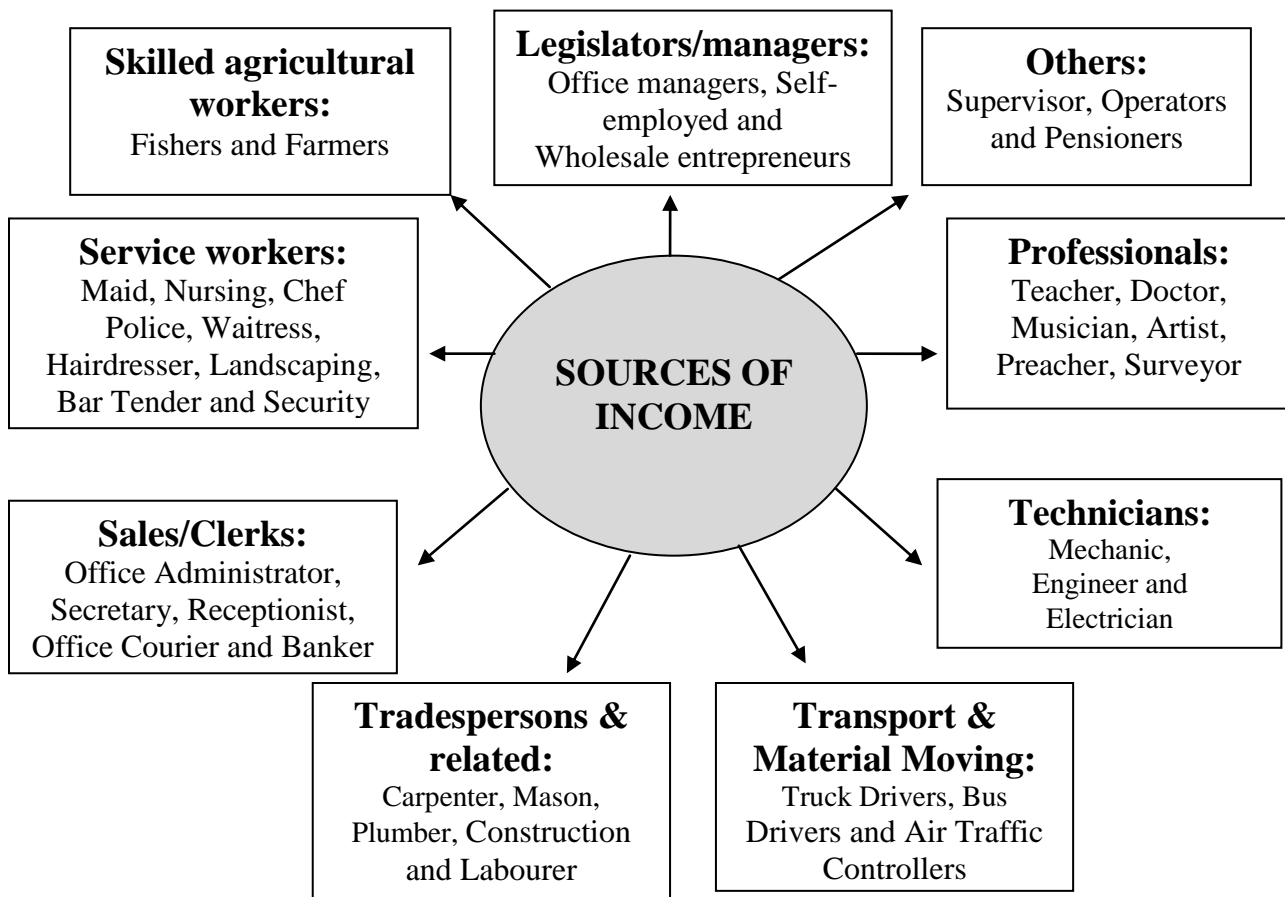


Figure 3.1: Diagram showing the various sources of income by persons in the Grenadines

Table 3.1: Source of income in 2005 and 2010

Occupation	Largest source of income		Secondary source of income		Total percent of community members dependent on this occupation	
	2005	2010	2005	2010	2005	2010
Skilled agricultural workers	13.4%	17.1%	6.4%	8.5%	19.8%	25.6%
Legislators/managers	10.4%	7.3%	6.4%	4.3%	16.8%	11.6%
Professional	13.4%	23.6%	12.8%	13.7%	26.2%	37.3%
Technician	6.0%	1.6%	2.4%	3.4%	8.4%	5.0%
Sales/clerk	7.5%	4.9%	16.8%	4.3%	24.3%	9.2%
Service workers	13.4%	13.0%	16%	21.4%	29.4%	34.4%
Tradespersons and related	22.4%	20.3%	5.6%	17.1%	28.0%	37.4%
Transport & material moving	11.9%	4.1%	0.8%	2.6%	12.7%	6.6%
Other	1.5%	8.1%	2.4%	1.7%	3.9%	9.8%
Total	100.0%	100.0%	69.6%	76.9%	169.6%	176.9%

3.1.3 Females in income generating activities

In both surveys the majority of the females in the household were involved in income generating activities. However there was no significant difference between females in income generating activities between 2005 and 2010 ($\chi^2 = 23.81$, $p=0.98$) nor any difference in the type of income generating activities ($\chi^2=6.22$, $p=0.28$). In 2005, 50.6% of those females worked as service workers (e.g. maids, housekeepers, chefs and waitresses) (Figure 3.2). The majority of them resided in Carriacou. Since 2010 the proportion of females working as service workers has decreased to 41% but there has been an increase in females working as professionals from 21.2% to 33.8% (Figure 3.2). The majority of these female professionals (50%) also resided in Carriacou.

3.1.4 Membership in organisations

While only a small percentage of persons were involved in organisations, the majority of those belonged to youth organisations in both 2005 and 2010. Notably no one from Mayreau or Mustique had a relative that was involved in a youth organisation. Other organisations included those related to agriculture (incl. of fishing), sports, church, environment, service, women, cultural, transport, unions and integrated organisations (incl. of various activities, sports, environment etc.).

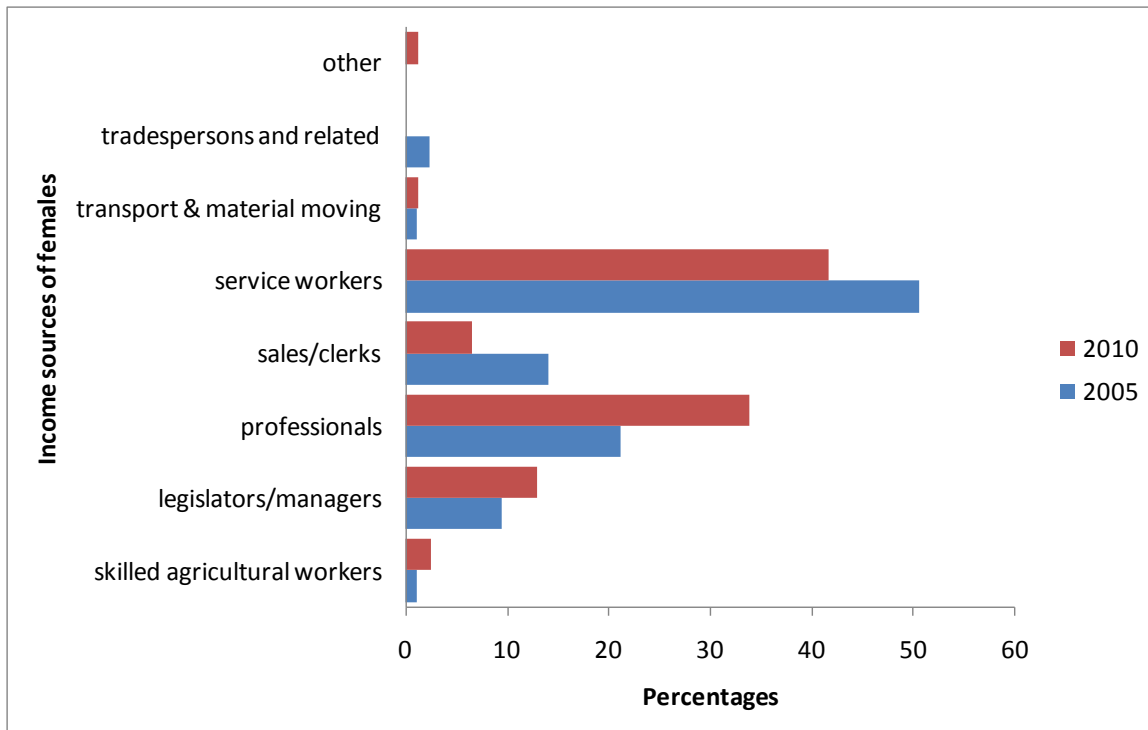


Figure 3.2: Females engaged in income generating activities in 2005 and 2010

3.2 Level of awareness and concerns

3.2.1 Awareness of issues

Statistical analyses indicated that there were no significant differences between awareness of issues between years. Respondents were questioned about the definition of the term ‘environment’. Most persons indicated that the term meant ‘our surroundings and where we live’. Survey results revealed that many respondents were aware of several key environmental issues. More than 60% of respondents were aware of eleven environmental issues (Figure 3.3). There was also a noticeable 15% increase in knowledge of biodiversity (45% in 2005 to 60% in 2010) and sustainable development (64% in 2005 to 79% in 2010).

In 2010 there was an increase in awareness of sustainable development, overfishing, ozone depletion, biodiversity, sea level rise and global warming. However there was a decrease in awareness of habitat degradation, beach degradation and deforestation.

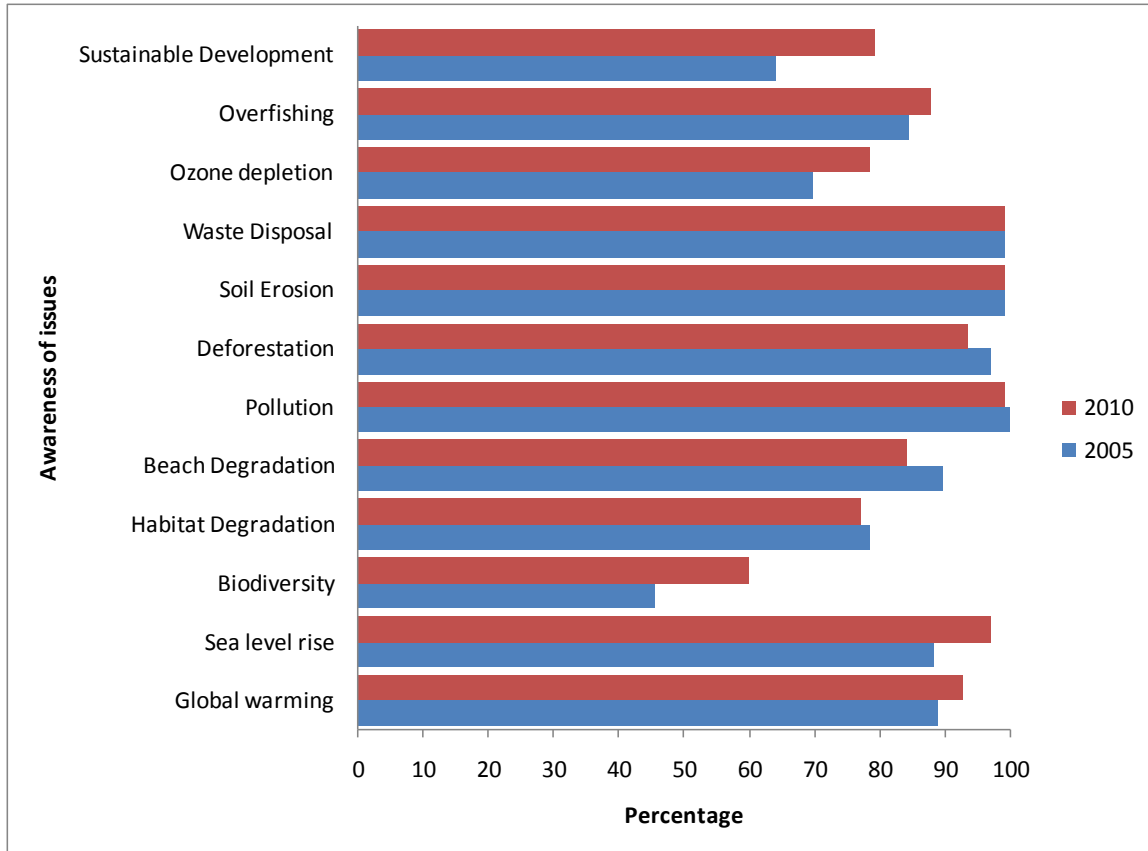


Figure 3.3: Awareness of issues in 2005 and 2010

3.2.2 Issues of concern

Statistical analysis revealed that there was a significant difference between the years and what was perceived as the most important issue of concern stated by respondents ($\chi^2 = 23.81, p < 0.05$). In 2005 the major issue of concern was pollution as 30.1% (Figure 3.4) and 27.3% of respondents cited this as the first and second major issue of concern, respectively. However by 2010, global warming had become the major issue of concern by 46.1% (Figure 3.4) compared to only 23.3% as stated by persons in 2005. In 2005 soil erosion was noted as the least most important issue; however in 2010 waste disposal was cited as the least important.

3.2.3 Sources of information

The respondents obtained information about various environmental issues via many sources with the television and radio being the two primary sources in 2005 and 2010 (Figure 3.5). For Mayreau, these media are the only sources of information. Other sources include newspapers, school, books, liming and work.

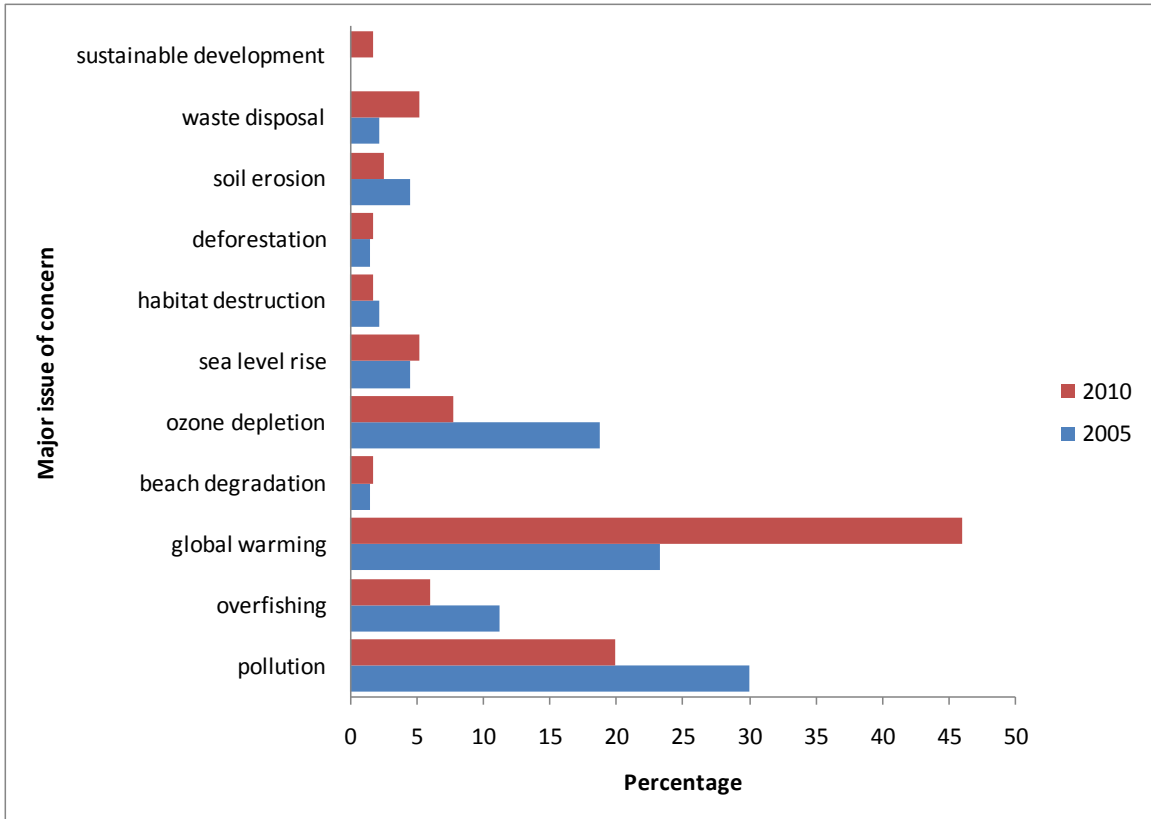


Figure 3.4: Most important issue of concern for 2005 and 2010

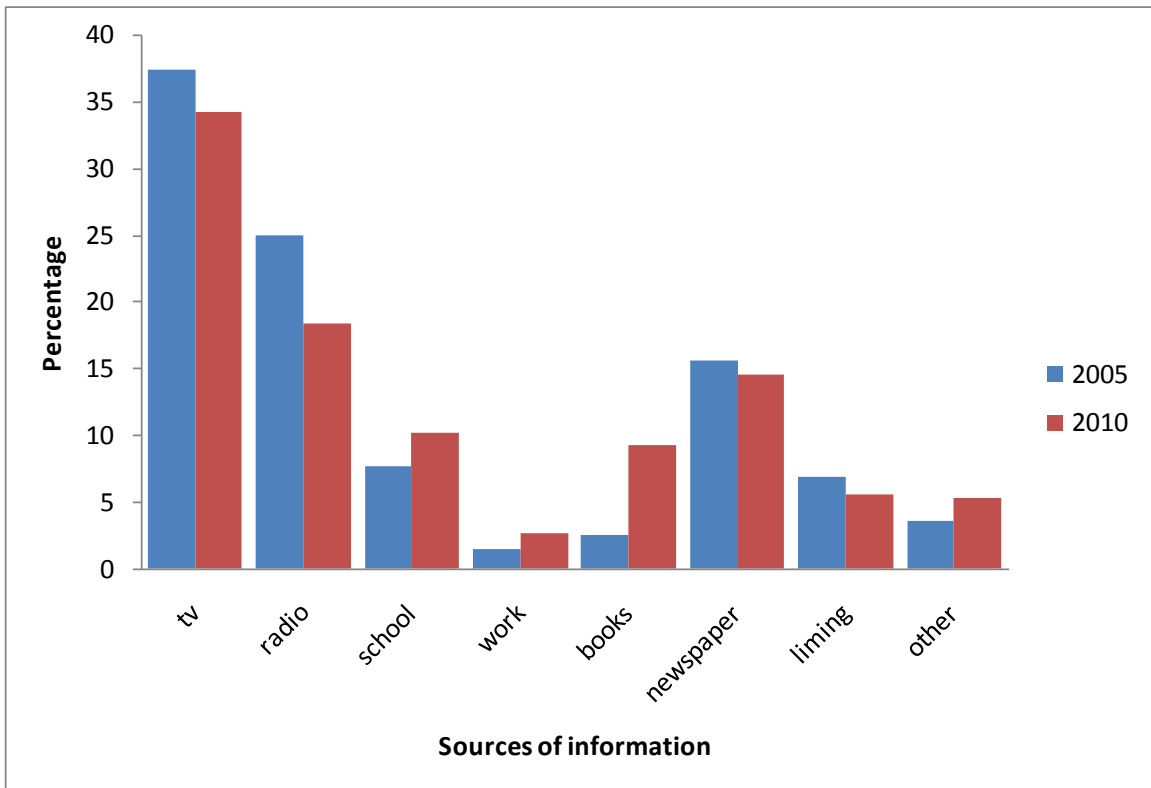


Figure 3.5: Sources of information on the environment in 2005 and 2010

3.3 Major marine recreational activities

Results from both 2005 and 2010 indicated that most persons (~70%) were involved in marine recreational activities. In 2010, all respondents from Canouan and Union Island stated that they were involved in marine recreational activities.

In 2005 fishing (23.2%) and going to the beach (33.1%) were the two major recreational activities (Figure 3.7). Of those who partook in fishing, the majority came from Bequia. In 2010, going to the beach was not quite as popular as it was only indicated by 4.1%. However there was an increase in those who participate in fishing (38.4%). Swimming has grown to be a popular recreational activity as indicated by 35.1%.

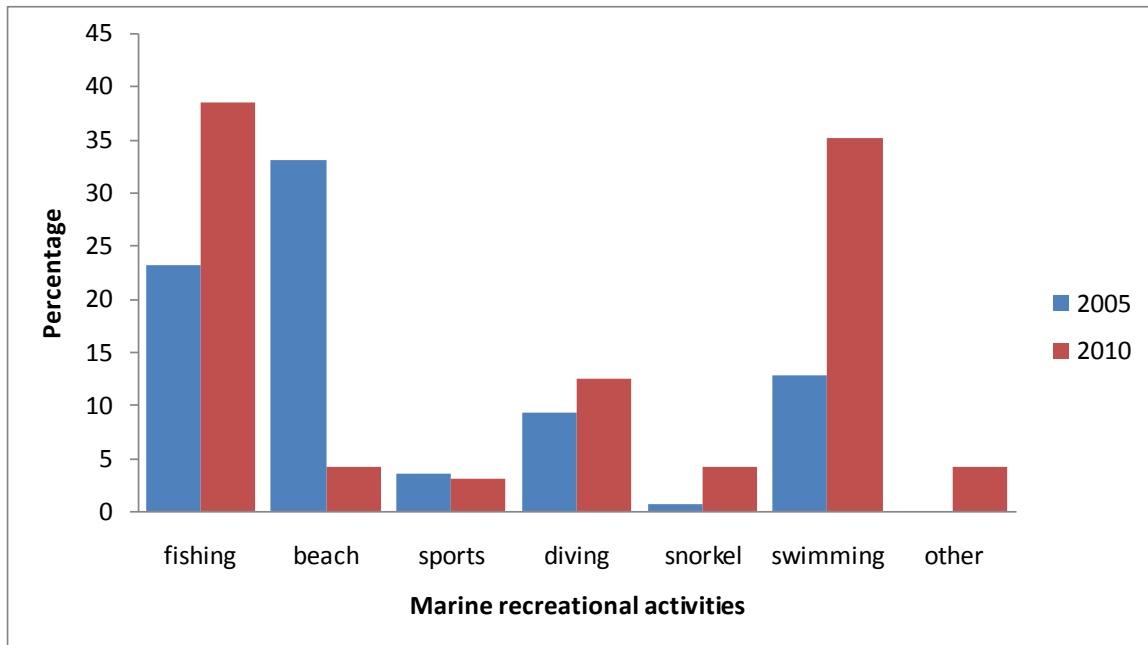


Figure 3.6: Marine recreational activities identified by respondents in 2005 and 2010

3.4 Perceptions

3.4.1 Perception of marine resources

Statistical analysis revealed that there was a significant change in the perception of marine resources from 2005 to 2010 ($\chi^2 = 17.17$, $p < 0.05$). The respondents' perception of marine resources has worsened as there was a 19% increase in persons perceiving the resources to be in a "not good, not bad" condition and a 20% decrease in persons perceiving the conditions to be good (Figure 3.7).

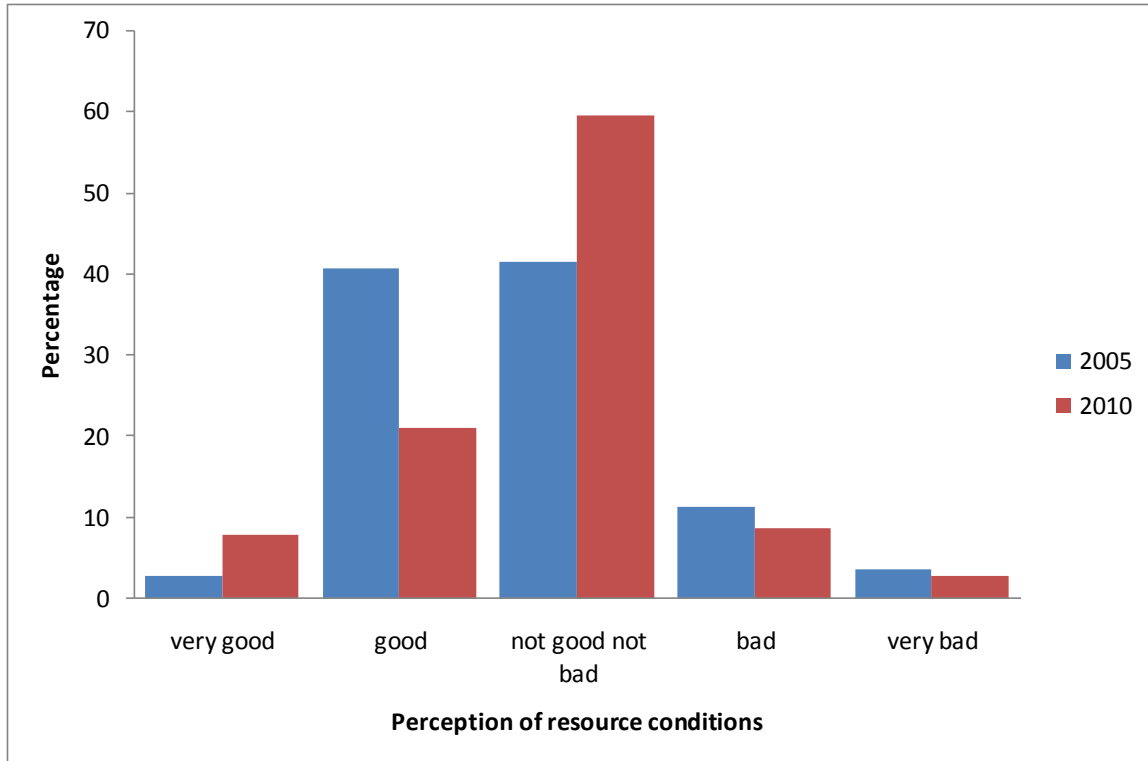


Figure 3.7: Perception of resource conditions in 2005 and 2010

3.4.2 Perceived community problems and suggested solutions

From 2005 to 2010 there had been a noticeable shift in the major community problems identified by respondents (Figure 3.8). In 2005 the top three major community problems identified by respondents were problem behaviours e.g. teenage pregnancy and drug abuse (24.5%), poor basic services e.g. poor water supply, poor garbage/waste disposal (17%) and poor environmental conditions e.g. pollution, poor drainage, beach degradation (16.6%). Problem behaviours were a major issue in most of the islands except for Mustique, Carriacou and Petit Martinique.

In 2010 the respondents stated that they were experiencing problems employment (15.9%) along with issues of poor environmental conditions (17.7%), poor basic services (15.3%) and problem behaviours (13.3%). While there has been a decrease in problem behaviours, it was still prominent in Bequia and Union Island. Also important to note was the increase in crime/violence by 9.3% from 2005 to 2010. This crime has been observed by respondents as major problems in Mustique and Union Island.

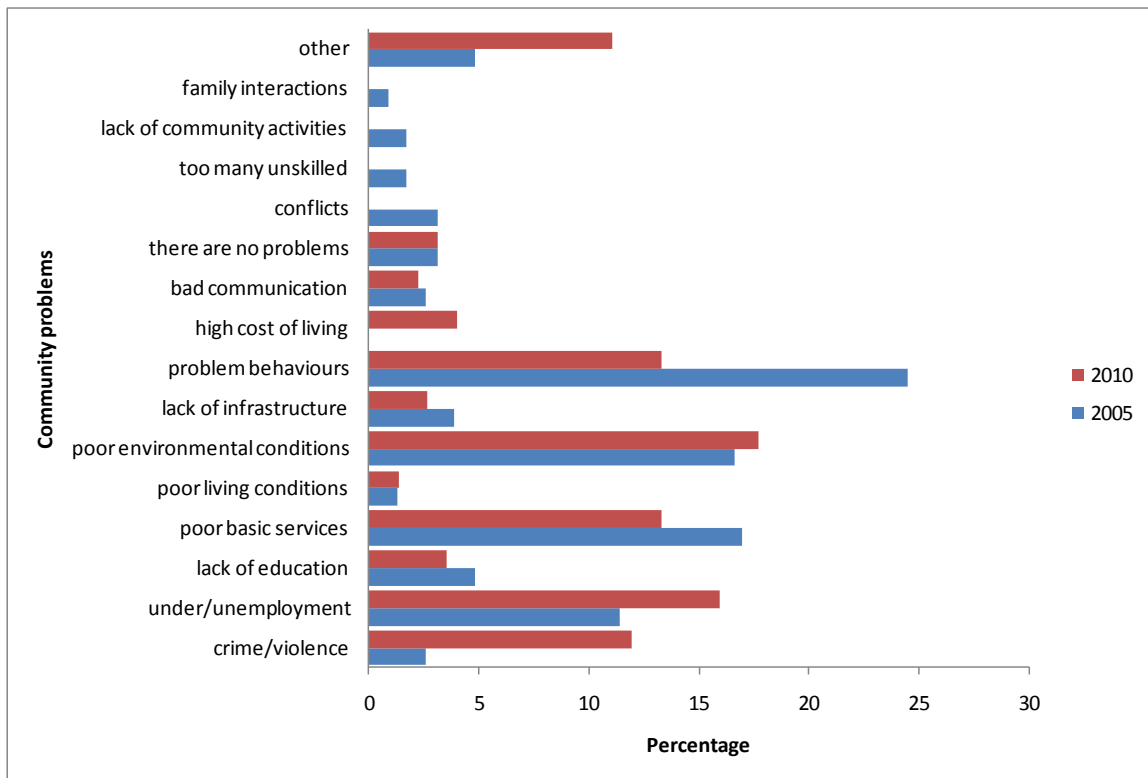


Figure 3.8: Community problems identified by respondents in 2005 and 2010

Currently respondents offered an array of solutions for the major problems cited. These included education and training (17.3%), job creation (16.2%) and implementation and enforcement of laws e.g. more vigilant police, laws and penalties related to alcoholic use, littering and drug use (13.4%). Education and training remains the prime solution throughout 2005 and 2010. This would involve the development of more adult programmes, women empowerment and vocational training. As under- and unemployment was a main problem, the creation of jobs was a much needed solution and could be achieved through building of industries, soliciting investors and more local investment.

3.4.3 Perceived marine resources problems and solutions

The exploitation of fisheries has become the major resource problem for persons in the Grenadines as stated by 36.3% of respondents (Figure 3.9). This was a 15.5% increase from 2005 where exploitation was one of the three top marine resource problems along with pollution e.g. water pollution and improper waste disposal (32.7%) and resource harvesting and destruction e.g. damage and removal of coral and sand mining (25.2%) (Figure 3.9). Pollution and resource harvesting were still major resource problems but have decreased according to respondents. The exploitation of fisheries was a major issue for Bequia, Union Island, Canouan Mayreau and Canouan. Resource harvesting continues to be a major issue for Carriacou.

According to respondents awareness campaigns are still needed throughout the Grenadines. This would include educating fishermen of the importance of resources, installing beach signage and visiting schools. According to 27.8% stricter regulations and

enforcement were required (Table 3.2). These regulations would be related to selected fishing methods, catching of undersized fish, damaging of reefs and out of season fishing.

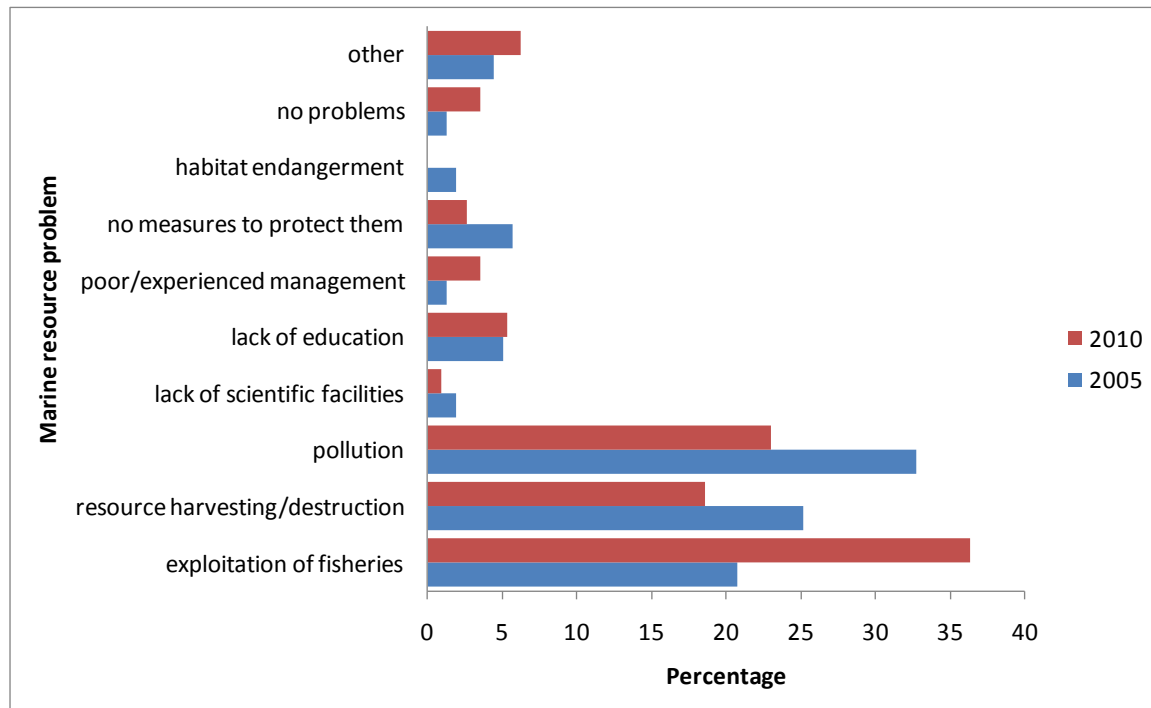


Figure 3.9: Perceived marine resource problems in 2005 and 2010

Table 3.2: Suggested solutions to marine resource problems

Solutions	2005	2010
Stricter regulations and enforcement	31.7%	27.8%
Improved waste disposal	11.7%	6.1%
Improved management structure	5.5%	5.2%
Policing waters/beach patrol	6.9%	4.3%
Zoning/fixed fishing area	6.2%	2.6%
Awareness campaigns	29.0%	33.0%
Set up fisherfolk cooperative	0.0%	6.1%
Government intervention	0.0%	6.1%
Greater responsibility	3.4%	0.9%
Complementary employment for fishermen	0.0%	0.9%
Other	5.5%	7.0%

3.5 Awareness of rules

Statistical analysis revealed that there were no significant difference in awareness of most regulations in 2005 and 2010. There was only a significant difference in knowledge of rules related to mangroves ($\chi^2 = 13.40$, $p < 0.05$). Most persons were aware of regulations regarding coastal and marine resources. The majority of the respondents (over 90%) were aware of fishing regulations in relation to other regulations. Also there has been an increase in awareness of regulations related to marine transport and mangroves, hotel development and water sports compared to 2005 (Table 3.3). More specifically a 20.1% increase in respondents who were aware of regulations related to mangroves.

Table 3.3: Awareness of regulations in 2005 and 2010

Regulations	2005		2010	
	Yes (%)	No (%)	Yes (%)	No (%)
Fishing	90.3	9.7	91.4	8.6
Mangroves	30.6	69.4	50.7	49.3
Coral Damage	70.1	29.9	72.7	27.3
Marine Transport	49.3	50.7	56.1	43.9
Hotel Development	60.4	39.6	67.6	32.4
Watersports	53.5	46.5	60.9	39.1

3.6 Material style of life

As a measure of wealth, the respondents were questioned related to their household items and construction materials of their homes. The majority of households owned their land and home (Figure 3.10). Less than 50% from Mustique and Petit Martinique did not own their own home. The results indicated that all respondents from Mayreau owned their own home. A significant portion had electricity, television, telephone, stereo and fridge. Less than 30% owned a vehicle. Most persons had galvanised roofs, outside wall structures made of concrete and tiled floors (Table 3.4).

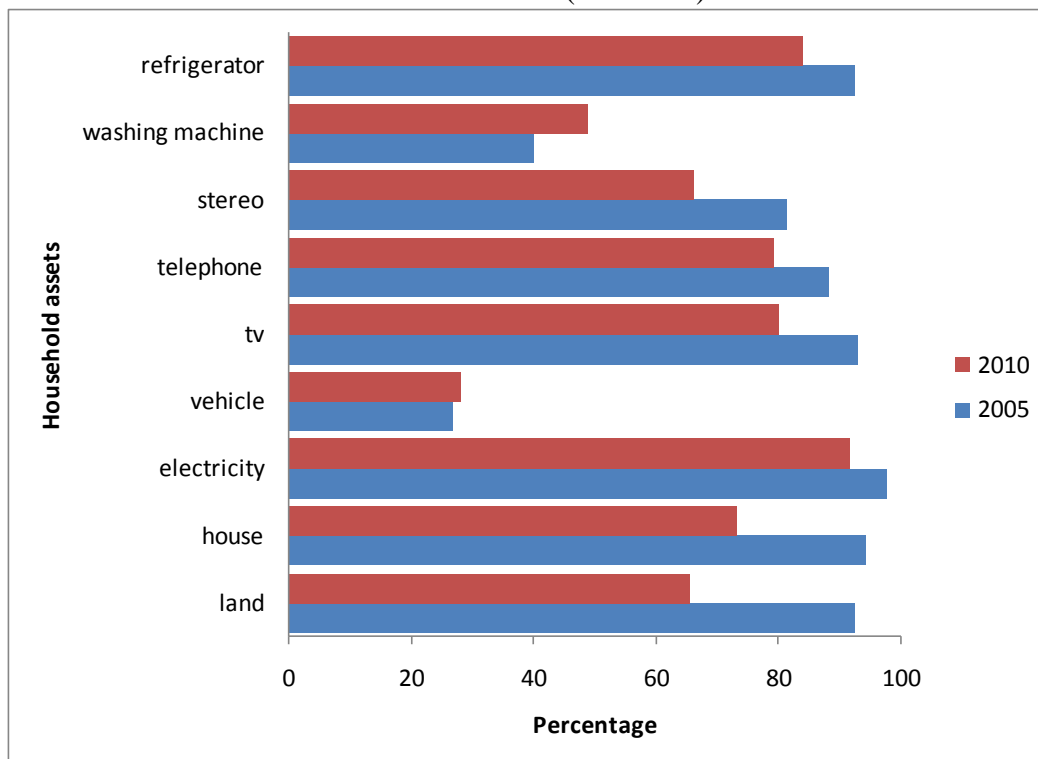


Figure 3.10: Household assets of persons in the Grenadines for 2005 and 2010

Table 3.4: Construction materials for homes in 2005

	2005	2010
Roof type		
galvanise	96	93
Shingle	5	2
Sealed plywood	0	1
Wall type		
Concrete	83	83
Wood	15	17
plywood	16	12
Floor type		
Tile	47	51
Wood	33	34
Dirt	0	0
Vinyl	31	7
carpet	22	18

4 CONCLUSIONS AND RECOMMENDATIONS

This comparative analysis has shown a shift in socio-economic conditions and an increase in environmental awareness throughout the Grenadines. The Grenadines community still rely on marine resources for their livelihood and recreation. A significant portion are skilled agricultural workers (fishermen), despite that the majority of them are involved in other occupations, such as professionals and trade persons. For some fishing remains a major recreational activity in the Grenadines.

Membership in youth organisations is quite popular and may be a key mechanism to spread further awareness about the environment. In addition, media that are frequently used to access information such as TV and radio should be used to share information with the communities in the Grenadines, specifically in Mustique and Mayreau which only rely on these two methods.

There is a significant shift in persons' perception of the condition of resources. This knowledge along with knowledge from scientific studies will help to determine the best approach forward for developing awareness programmes. While the community is aware of laws related to fishing, the over-exploitation of fisheries seems to be a major threat to marine resources. This could be a result of poor management or unwillingness of such persons to protect this valuable resource.

With this knowledge, further activities tailoring to these needs should be implemented until best practices become the fabric of society. Meanwhile organisations such as the Sustainable Grenadines Inc. and other non-governmental organisations should continue to awareness campaigns and workshops to sensitise the communities and schools.

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6 APPENDIX 1

6.1 Questionnaire

ENVIRONMENTAL AWARENESS AND SOCIO-ECONOMIC SURVEY

As part of the Sustainable Grenadines Project this survey is being conducted to obtain views on the environment and living conditions in the Grenadines. I would therefore appreciate if you could answer a few questions. All responses will be considered confidential for compiling reports on the project. You will not be identified.

N.B.: Write DK (do not know) and NR (no response) as appropriate by the question where necessary.

Date _____

Interviewer _____

Name of Island _____

Questionnaire code # _____

General Level of Awareness

1. ENVIRONMENT is a word that means different things to different people. What does it mean to you?

2. Have you ever heard of:-

Global warming	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Sea-level rise	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Biodiversity	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Habitat Destruction	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Beach degradation	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Pollution	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Deforestation	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Soil erosion	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Waste disposal	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Ozone Depletion	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Over fishing	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Sustainable Development	<input type="checkbox"/> Yes	<input type="checkbox"/> No

3. Which of those below is the main source of information on these issues?

Television Radio School Work Books/Magazines
 Newspapers Liming (informal social discussion)
 Other (please state) _____

4. Which 5 issues are of most concern to you? (Starting with the most important to the least important)

Household Demographics

5. Number of persons in household: _____

6. What type of work generates the largest income in your household?

7. What type of work generates the second largest income in your household?

8. Are females involved in an income generating activity in your household?

Yes, What activity? _____

No

9. How would you describe the conditions of the marine resources (e.g. fisheries, coral reefs etc) today?

Very good Good Not good not bad Bad Very bad

10. What marine recreational activities are the members of your household involved in?

11. Is someone from your household a member of a group/organization e.g. Fisher folk cooperative, youth group etc?

Yes, Name of organization _____

No

Perceived Problems

12. What are the top two major problems for your community?

a. _____

b. _____

What do you think can be done to solve these problems?

a. _____

b. _____

13. What are the top two problems for marine resources on this island?

a. _____

b. _____

14. What do you think can be done to solve these problems?

a. _____

b. _____

Awareness of Rules

15. Have you ever heard of rules and regulations related to:

- | | | |
|--------------------------|------------------------------|-----------------------------|
| Fishing | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Mangrove use | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Coral damage | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Marine transport | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Hotel development | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Water sports | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Residential development. | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

Material Style of Life

16. Does the household have:

land____ house __ electricity ____ vehicle _____ tv _____
telephone _____ stereo _____ washing machine _____ refrigerator _____

17. Type of roof:

galvanized____shingle _____

18. Type of outside structural walls:

concrete _____ wood _____ plywood _____

19. Type of Floor:

tile: __ wood _____ dirt _____ vinyl _____ carpet _____

Demographics

20. Age of respondent:

15 -20 21-30 31-40 41-50 >60

21. Gender of respondent:

male female

22. The level of school you have completed:

primary secondary University polytechnic/vocational training