

ORIGINAL ARTICLE

Conservation of Mangroves in Guyana: A Study of Teachers' Perceptions, Knowledge, Attitudes and Practices

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ABSTRACT

Teachers play a major role in the process of change to improve the knowledge, attitudes and skills of future generations for enhanced conservation of mangroves. A Knowledge Attitude and Practice (KAP) survey was conducted among teachers in two administrative regions in Guyana to determine their knowledge, attitudes, practices and willingness to participate in the management and conservation of mangroves in Guyana. The results showed that teachers had good knowledge of mangroves and mangrove conservation, a positive attitude towards mangroves and the conservation of mangroves and were willing to incorporate these aspects of mangroves in their teaching. It was recommended that continuous professional development about Education for Sustainable Development (ESD) and the conservation of mangroves be supported as a means of motivating teachers to improve their efforts and strategies, maintain sustainability and further promote the conservation and management of mangroves in the country.

Key words: Mangroves, teachers' knowledge, conservation, perception, attitudes, practices, Guyana.

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INTRODUCTION

Teachers fulfill essential roles in communities one of which is to help bring about changes that will improve the knowledge, skills and capacity of future generations. Education about specific issues often contributes to the realization of a more sustainable future and is therefore pivotal for agents of change to transform their communities and societies. Education can also serve the purpose of increasing the level of awareness of and about the environment while providing individuals with enhanced skills and knowledge to make informed decisions about caring for the environment and the resources therein. While there are instances where some teachers may not demonstrate an adequate understanding of the strategies and tools available for sharing information about the environment, environmental issues and environmental sustainability, there are some instances where teachers may not have sufficient knowledge and awareness about specific issues. In the case of mangroves and the conservation of mangroves in Guyana, such a scenario was recognized by the Guyana Mangrove Restoration Programme (GMRP). This fact has prompted the GMRP to concentrate much of their efforts on their education and awareness programme.

It is therefore imperative for the education system in Guyana to either orient or reorient its teacher education programme to promote Education for Sustainable Development (ESD) and to help address issues of sustainability and mangrove management and conservation. This will not only be beneficial to students in classrooms but also for the wider population and the country if teachers are aware and knowledgeable of fundamental developmental issues such as the conservation of mangroves and climate change. In this regard it will be very beneficial if teachers in Guyana are knowledgeable about local initiatives such as the GMRP and the Low Carbon Development Strategy (LCDS) if Guyana is to be successful at mangrove management and conservation while at the same time combat the challenges of climate change.

Statement of the problem

There is growing concern in Guyana about environment and development issues and this has prompted calls for increased participation of teachers in efforts to disseminate knowledge and information about environmental sustainability, conservation of mangroves and climate change. During professional development workshop sessions on mangrove management, conservation and climate change that involved teachers it was observed that many individuals demonstrated shortcomings and challenges in

understanding and presenting information about mangroves, the environment and sustainable development. Further, some teachers demonstrated shortcomings in their knowledge and information base and in their ability to infuse relevant information about the environment, mangroves and sustainability in their teaching. There was therefore a need to examine the perceptions, level of awareness and knowledge of teachers and their ability to instill skills and infuse information about the conservation of mangroves into their teaching so that they can produce students with adequate knowledge and awareness of mangrove conservation to be good and effective environmental and mangrove conservation stakeholders in the wider society.

Purpose of the study

This study sought to ascertain:

- the extent of teachers' awareness of the importance of mangroves as an important ecosystem in Guyana;
- whether teachers incorporated issues and concerns of the conservation of mangroves in their teaching;
- the extent of teachers' awareness of the Guyana Mangrove Restoration Programme; and
- the willingness of teachers to include aspects of mangroves and the conservation of mangroves in the subject matter that they teach.

Significance of the study

The significance of this study resided in its potential to:

- provide information regarding teachers conception of the conservation of mangroves and their willingness to infuse this topic in their teaching;
- provide answers to the issue of perceptions and abilities to make the education provided to students relevant to the current thrust in Guyana regarding sustainable development and key environmental issues such as mangrove management, conservation and climate change;
- help in the formulation of policies regarding reorienting teacher education to address the teaching about the conservation of mangroves and climate change.

Delimitation and scope of the study

The delimitation and scope of this study are:

- The study was confined to a convenient sample of teachers from two Administrative Regions in the country (Region 4 and Region 6) and therefore generalizations on teachers' conception of mangrove conservation may not accurately reflect the situation of all teachers in Guyana.
- The study makes no specific distinction between teachers of different subject areas or disciplines.
- The study was confined to specific groups who were identified to participate in mangrove conservation training workshops and as such may not represent or reflect the situation of all teachers in Guyana.
- It was assumed that the necessary consent and permissions would have been granted by participants for their involvement in this study.

Research questions

The research questions for this study were:

- i) Research Question 1
 - To what extent does teachers' perception of mangroves reflect their awareness, knowledge and understanding of mangroves and the conservation of mangroves in Guyana?
- ii) Research Question 2
 - What are the current and preferred sources of information for teachers about mangroves in Guyana?
- iii) Research Question 3
 - What are teachers' perception about who are the stakeholders and what are their roles in the management and conservation of mangroves in Guyana?

Review of some literature

The Guyana national report on education recognized the need for every level of the education system to include some aspect of sustainable development within subjects in the curriculum [1] and education is an integral ingredient for changing people's attitudes towards the environment so that they can critically assess and address issues related to sustainable development and sustainability [2]. Agenda 21, addresses the issue of education, raising public awareness and training to help individuals develop attitudes and behaviours that can reduce the negative impacts on the environment.

When examining education and sustainability it is important to distinguish between education about sustainable development and education for sustainable development [2] and environmental education (EE) seeks to help citizens acquire knowledge about their biophysical environment [3]. It has been

shown by others that education is an effective vehicle that society possesses for confronting the challenges of the future and for fostering greater respect for the needs of the environment [4]. It is also evident that the aim of ESD is to promote education as a basis for a more sustainable society and to integrate sustainable development into education at all levels [5].

If teacher training and education are to be reoriented there is need to reexamine and transform the programmes offered as well as operational practices and policies [6]. Further, there are a number of initiatives and innovations that have sought to reorient education and training to address ESD in higher education and in teacher education [7,8]. The findings of [8] showed that it would be difficult to have an ESD conscious generation of teachers if teachers were not trained in such a way that skills, knowledge, attitudes and values that enhanced sustainability were inculcated during training and that these be transmitted to the students and consequently the society at large.

Both male and female teachers associated with arts and science streams have equal environmental values and attitude towards sustainable development [9] and it was also found that EE and ESD may also be helpful for the generation of environmental values and positive attitude towards sustainable development and are pertinent for environmental and sustainable development components in respect of teacher education [9].

The issues surrounding the conservation of mangroves in Guyana are complex and involve poorly understood relationships between knowledge of and about the different local species of mangroves, the ecological, economic and social benefits. Anthropogenic impacts have often been cited as a major factor in the loss of mangrove stands. Having recognized the huge costs that could be incurred by replacing groynes and sea walls and the consequences of climate change, the current Sea and River Defence Policy called for alternative solutions to the engineered structural means for effective flood defence and to protect environmental resources. Recently, the relationship between climate change and mangrove ecosystems has become one of the most topical issues for Guyana and the LCDS. The conservation and rehabilitation of mangroves is therefore an important pillar in both the national sea defence policy and national climate change strategy.

The GMRP is an intervention implemented under the European Union Sustainable Coastal Zone Protection project. The executing agency is the National Agriculture Research and Extension Institute (NAREI) representing the Ministry of Agriculture of the Co-operative Republic of Guyana. The overall objective of the GMRP is to implement the National Mangrove Management Action Plan (NMMAP) and its aim is to mitigate the effects of climate change through mangrove reforestation and preservation. Some education and awareness activities undertaken by the GMRP since its implementation include:

- Development of a mangrove teachers' manual for secondary schools;
- Training of teachers to use the manual to support mangrove management concepts in the school curricula for grades 1- 6;
- Training of teachers for mangrove outreach programmes in ways how to integrate mangroves into their science and social studies curriculum;
- Conduct of school field tours and camps to Mangrove Reserves;
- Conduct schools debating, essay and quiz competitions on mangroves; and
- Give talk to schools on mangrove ecology, conservation and management.

However, inspite of the work done, there appears to be a lack of literature and research in the area of awareness and perspectives of teachers regarding conservation of mangroves. The literature review has served to accentuate the paucity of relevant literature and has also underscored the need for greater education, public awareness and community involvement in the long-term management of mangroves. Given the importance of mangroves as an ecosystem and the importance of managing and conserving mangroves in Guyana, the paucity of such literature has also revealed that teachers in Guyana may need to be made more aware of the existing and potential threats to this ecosystem. This is crucial if they are expected to make a meaningful contribution to educating the children they teach about mangroves and the conservation of mangroves in Guyana.

METHODOLOGY

This study was part of a larger one that examined teachers' perception and attitudes towards ESD and mangrove conservation. The variables which were studied included gender, teacher status, teacher experience, highest level of formal education completed and the individual perceptions of teachers. Participants consisted of teachers from two coastal geographical administrative regions in Guyana who were identified by their schools to participate in teacher training workshops on the management and conservation of mangroves conducted by the GMRP. The population for this study comprised of one hundred and twenty (120) teachers and questionnaires were distributed to all 120 teachers. Paper format questionnaires were used since this was more convenient as the participating teachers were all

present at the venues of the training workshops. One hundred (100) questionnaires or (83%) were returned. The questions were all close ended, using a modified Likert scale, dichotomous (yes/no) and rating scale format. The questionnaire was pre-tested and designed for self reporting with little intrusion by the researcher. The value of Cronbach's alpha calculated for this research instrument was 0.918. After administering and collecting the returned questionnaires, the data were entered in the Statistical Package for the Social Sciences (SPSS) programme to be analyzed using descriptive statistics. The frequency, percentage, mean and standard deviation were computed and tables and charts were generated and the results were analysed. Further, cross-tabulation and the Chi Square test of independence at the 0.05 level of significance were used to investigate any relationship that existed between variables. A measure of significance, using the student t-test at the 5% level and the Kendall's coefficient of concordance for ranking the factors and testing of significance at the 1% level were also conducted.

RESULTS

Biodata of respondents

Of the 100 respondents, 75 (75 %) were females and 25 (25%) were males and the majority of respondents (61%) had greater than ten years of teaching experience (Table 1). Females had greater teaching experience than males in all categories except for the 1-3 years category. The data showed a higher percentage of individuals (69%) with between seven and ten years experience than those with less than seven years teaching experience (31%).

Table 1 . Teaching experience of respondents based on gender

Gender	Teaching Experience					Cumulative percentage
	< 1 Year	1-3 Years	4-6 Years	7-10 Years	>10 Years	
Female Count	3	4	13	8	47	
Percentage	3%	4%	13%	8%	47%	75%
Male Count	1	7	3	0	14	
Percentage	1%	7%	3%	0%	14%	25%
Total	4%	11%	16%	8%	61%	100%

Forty-eight percent (48%) of all respondents had a qualification of a Bachelors' Degree or higher whereas 45% were teachers with a trained teachers' certificate and 7% had only a CSEC/CAPE level qualification (Figure 1).

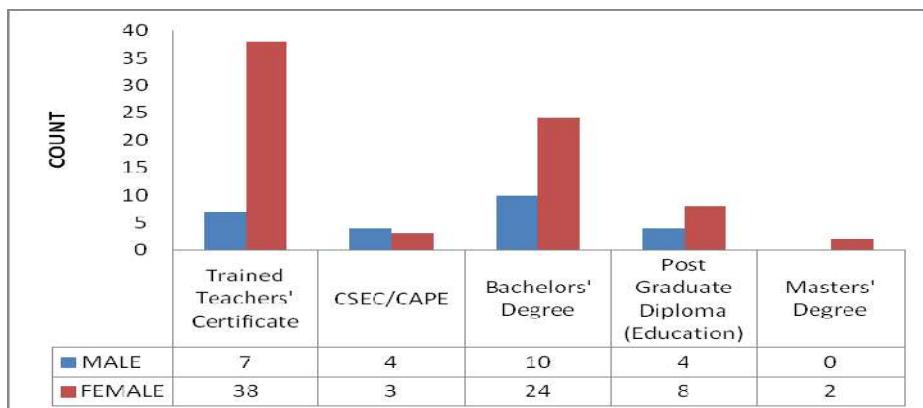


Figure 1 Highest educational level attained by respondents based on gender

In terms of teacher status (Figure 2) most of the respondents, forty-five, (45%) were trained teachers, seven, (7%) were untrained, twenty, (20%) were graduate teachers and twenty-eight (28%) were trained graduate teachers. The gender distribution (Figure 2) also shows that most of the respondents were females.

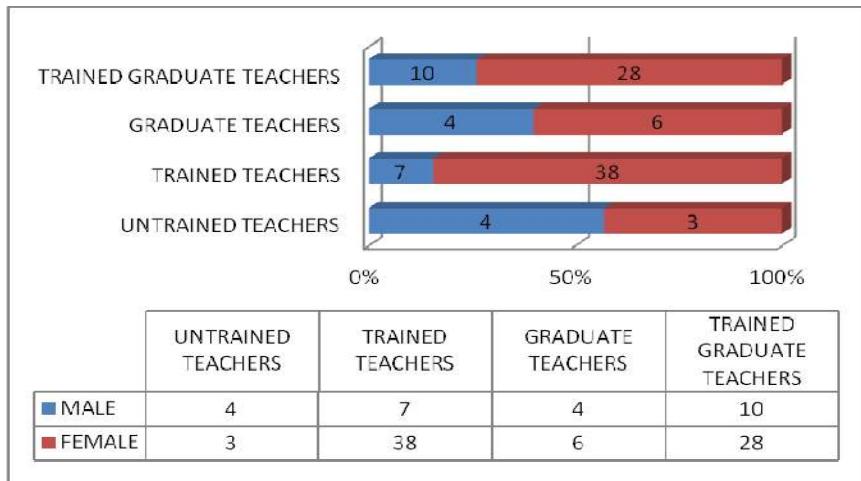


Figure 2Profile of respondents based on gender and teacher status

Extent of teachers' perception, awareness and knowledge of mangroves

In seeking to answer the question of the extent to which teachers' perception of mangroves reflect their awareness, knowledge and understanding of mangroves and the conservation of mangroves in Guyana, this research question was supported by sub-questions which sought to determine if there were differences in the knowledge bases of teachers about mangroves and the conservation of mangroves in Guyana. Descriptive statistics for this research question (Table 2) showed that the teachers displayed a positive attitude towards all of the items for this research question ($M = 2.779$; $SD = 1.0344$).

Table 2 : Descriptive Statistics for Research Question 1

Item	Mean	Standard Deviation
1. There are different types/species of mangroves in Guyana.	3.30	.835
2. Mangroves are found in all of the administrative regions in Guyana.	2.59	.877
3. I can identify different types/species of mangroves.	2.24	1.006
4. Information about mangroves and the management and conservation of mangroves in Guyana is adequate and easily available?	2.62	.885
5. I usually discuss issues related to mangroves in my class with my students.	2.32	.863
6. I know about the Guyana Mangrove Restoration Project (GMRP) and what it does.	2.75	.903
7. The conservation of mangroves is a passing issue that will in time become irrelevant?	1.83	.985
8. I am willing to infuse issues related to mangroves and the conservation of mangroves in the curriculum/syllabus/subject that I teach?	2.95	.869
9. I have previously attended a teacher training workshop/lecture that addressed issues related to mangroves and conservation of mangroves?	1.86	1.015
10. I would like more information so that I can learn more about mangroves.	3.26	.747
11. Enough is being done in Guyana to adequately address issues related to management and conservation of mangroves?	2.09	.780
12. The GMRP is aimed at protecting and enhancing Guyana's sea defenses through the replanting mangroves.	3.35	.730
13. I have taken my students out in the field to visit places where mangroves are present.	1.97	.989
14. The GMRP has provided information to my school about mangroves of Guyana.	2.21	.902
15. Removal of mangroves will create problems for Guyana.	3.57	.769
16. I need help in identifying the different species of mangroves.	3.18	.881
17. Mangroves are important in the effort to reduce the impacts of climate change.	3.39	.790
18. Promoting the Low Carbon Development Strategy (LCDS) can help in the effort to reduce the impacts of climate change.	3.41	.712
19. Mangroves are important for the LCDS.	3.37	.734
20. I would like to learn more about climate change and the LCDS.	3.31	.787
Number of respondents (N) for each item: 100	Grand Mean	Grand Standard Deviation
	2.779	1.0344

Teachers displayed positive knowledge ($M = 1.778$; $SD = 0.503$) regarding the basic functions and importance of mangroves (Table 3) and the major problems ($M = 3.26$; $SD = 0.865$) of mangroves in Guyana (Table 4).

Table 3. Teachers' perceptions of the basic functions of mangroves in Guyana

Item	Not at all Important	Slightly Important	Very Important	Mean	Standard deviation
1. Sea defence	1%	5%	94%	1.93	.293
2. Food source	11%	19%	70%	1.59	.683
3. Nursery	2%	26%	72%	1.70	.503
4. Habitat	5%	16%	79%	1.74	.543
5. Prevention of erosion	1%	5%	94%	1.93	.293
				Grand Mean	Grand Standard Deviation
				1.778	0.50321

Number of respondents (N) for each item: 100

Table 4 Teachers' perceptions of the major problems facing mangroves in Guyana

Item	Mean	Standard Deviation
1. Coastal Erosion	3.29	.868
2. Climate change	3.11	.898
3. Insects and pests	2.75	.880
4. Cutting of mangroves	3.49	.810
5. Burning of mangroves	3.45	.821
6. Mooring of boats among mangroves	3.25	.833
7. Grazing of animals in mangrove ecosystems	3.16	.896
8. Dumping of garbage in mangrove ecosystems	3.33	.933
9. Low level of public interest about mangroves	3.36	.772
10. Limited enforcement of management and conservation policies	3.34	.768
11. Limited information, knowledge awareness of the benefits of mangroves	3.29	.820
Number of respondents (N) for each item: 100	Grand Mean	Grand Standard Deviation
	3.26	0.865

Current and preferred sources of information about mangroves in Guyana

In seeking to answer the question about the current and preferred sources of information for teachers about mangroves in Guyana (Figure 3) provides a summary of the responses.

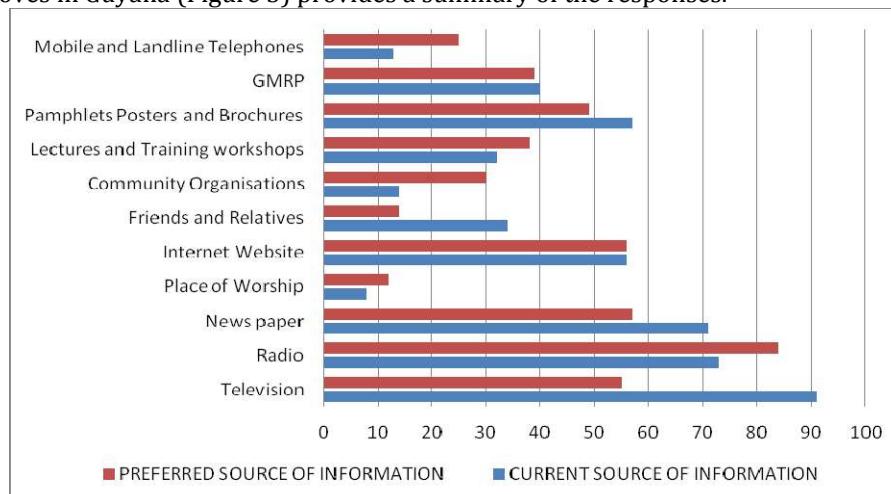


Figure 3 Current and preferred sources of information about mangroves

The results showed that the top five current sources of information for teachers about mangroves were television (91%), radio (73%), newspapers (71%), pamphlets, posters and brochures (57%) and the internet websites (56%). The least popular current sources were place of worship (8%), telephones (13%) and community organizations (14%). Likewise, the top five preferred sources of information about mangroves were radio (85%), newspapers (57%), internet websites (56%), television (55%) and pamphlets, posters and brochures (49%). The least popular sources where teachers preferred to obtain information about mangroves were place of worship (11%), friends and relatives (14%), telephones (25%) and community organizations (30%).

Teachers' perceptions of stakeholders' roles in the conservation of mangroves

The results indicated that teachers felt that every citizen has a role and responsibility to play in the management and conservation of mangroves, ($M = 3.58$; $SD = .819$) the results also suggested that teachers, students and researchers, ($M = 3.54$; $SD = .702$), the Environmental Protection Agency, ($M = 3.67$; $SD = .652$) and the Government, ($M = 3.67$; $SD = .649$) also have major roles and responsibilities to play in the conservation and management of mangroves. Respondents also strongly agreed that donor agencies ($M = 3.38$; $SD = .749$) and developed countries ($M = 3.36$; $SD = .759$) should be involved.

DISCUSSION AND CONCLUSIONS

Success in the teaching about conservation and management of mangroves to schoolchildren is largely dependent on teachers who are knowledgeable the local ecology, conservation and management issues and who also have positive attitudes toward mangroves and the conservation of mangroves. The results of this study suggest that teachers from the two administrative regions studied are knowledgeable about the basic aspects of mangroves in Guyana and have favorable attitudes toward the conservation and management of mangroves.

Inspite of this, the study found that more should and could be done to adequately address relevant issues related to management and conservation of mangroves in Guyana. There is a need for more teachers to create and use available opportunities to take their students out in the field to visit places where mangroves are present. This view may be supported by [10, 11] who noted the importance of teachers, life experiences and informal education as important factors in developing environmental sensitivity. Further, there is also a need for more teachers to be involved in local training workshops and lectures that address issues related to mangroves and the conservation of mangroves. This will be very important in ensuring that the conservation of mangroves will not be treated as a passing fantasy that will in time become irrelevant. In addition one may find support for this in what was referred to by [12] who indicated that favorable attitudes toward the environment are very likely result of life experiences rather than formal educational programs.

Closer examination of the results shows that teachers had favorable knowledge and awareness of the functions of mangroves. This may be attributed to either direct experiences of these teachers or their exposure and access to the relevant information about mangroves. This may also be attributed to the fact that most of the teachers were trained graduates and graduate teachers who most likely would have had greater exposure to information when reading for their formal degrees. Further, it is important to note that most of the teachers were females and research has shown that females tend to express great concern about the environment [13,14,15,16].

From the study it may be concluded that not only did teachers have a positive attitude towards mangroves and the conservation of mangroves but that they were also willing to incorporate aspects of mangroves and the conservation of mangroves in their teaching. Their willingness should therefore be fully utilized to engage children and reinforce the importance of mangroves in Guyana while serving as effective links between the classroom, communities and the GMRP. It may also be concluded that continuous professional development about education for sustainable development, mangroves and the conservation of mangroves could help to motivate teachers while maintaining sustainability of education and awareness efforts of the GMRP.

Donor agencies and developed countries as stakeholders may be in a position to offer support in terms of financial and human resources which may be limited locally. Such support could help to promote recognition of the environmental, social and economic impacts associated with the decline and degradation of mangrove ecosystems and so further engage support for legislative, management, conservation and rehabilitation efforts [17].

This study is important because it provides a basis for improved understanding of how teachers perceive mangroves and the conservation of mangroves in Guyana and can have implications which can be useful in terms of further promoting the work of the GMRP. Such an understanding could go a far way in influencing policy makers at the GMRP and the Ministry of Education to recognize the strengths and weaknesses associated with the development and delivery of education and awareness initiatives to influence the development of appropriate supporting professional development programmes aimed at improving teachers and student competencies in the conservation of mangroves.

This study is important for change at the school level because it has resulted in increased interest, awareness and knowledge about the conservation of mangroves among teachers in some of schools in the country. The results could allow for some interventions and so guide the development of courses of action to be taken in the future. Further, if teacher education is to be effective, knowledge of environmental problems and sustainable development, theories of teaching and learning, and practical knowledge of teaching skills or experience should be integrated [18]. In addition, student engagement

and understanding through multidisciplinary, experiential and intergenerational learning could not only be relevant but also has the potential to contribute to the well-being of community life [19].

RECOMMENDATIONS

Based on the findings of this research, the following recommendations are made:

- i. The GMRP should endeavor to continue expanding its training workshops for teachers in all schools in all of the Administrative Regions in Guyana.
- ii. The Ministry of Education in collaboration with the GMRP should engage in continuous professional development sessions for teachers on ESD and mangrove management and conservation.
- iii. Research should be conducted on the effectiveness of the training given to teachers about mangroves and the conservation of mangroves in Guyana by the GMRP.
- iv. The GMRP should seek to utilize the preferred sources for the continuous dissemination of information about mangroves and the conservation of mangroves in Guyana.

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