Knowledge, Attitudes and Practices (KAP) of a Vulnerable Coastal Community in Trinidad about Ecosystem-based Approaches for Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA): A Validation Study

Research Paper

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ABSTRACT: Coastal communities are highly vulnerable to climate-related disasters. Ecosystem-based approaches are crucial to adapting to climate change. It is paramount to foster social inclusion to assess people's perception of nature as a tool for adaptation. KAPs are essential to gather baseline information that evaluate these perceptions. To date, for Trinidad and Tobago, there is no validated instrument to evaluate coastal communities' KAP in relation to Ecosystem-based Approaches, DRR and CCA and as such, this study aims to develop and validate this instrument. A literature review was executed to identify KAPs conducted globally that addressed this research. Using those existing questionnaires as a baseline, a specific KAP was designed with 4 domains being Demographics, Knowledge, Attitudes and Practices. This KAP was evaluated by 7 experts from diverse sectors to assess content validity. Face validity was assessed via face-to-face interviews with 32 residents of St. Margaret's Claxton Bay. Cronbach's alpha was employed to determine the reliability of the instrument. The item content validity indices (I-CVI) and the scale content validity indices (S-CVI) which used both approaches of universal agreement (S-CVI/UA) and the average of all items (S-CVI/Ave) were evaluated as low to good (0.36–1.00). Low values could be advocated due to the number of experts. The KAP domains had Cronbach's alphas of ($\alpha = 0.79$, $\alpha = 0.55$, $\alpha = 0.61$) respectively. Both Knowledge and Practice domains were interpreted as having an acceptable internal consistency. The Attitude domain was considered low and could be due to a weak intercorrelation amongst them. Altogether, the domains had an acceptable alpha of 0.77. Overall, the instrument was considered content valid and reliable but given the small sample size due to time constraints, conclusive statements should not be made. Rather this preliminary research can be used as a foundation for future research to be later rolled out in other coastal communities.

Keywords: Ecosystem-based Approaches, Disaster Risk Reduction (DRR), Climate Change Adaptation (CCA), coastal, ecosystems, vulnerable communities

1.0 INTRODUCTION

The Caribbean region encompasses a myriad of marine and coastal ecosystems such as seagrass beds (66,000km^2) coral reefs (26,000km^2) and mangroves (11,560km^2) [1]. These ecosystems provide benefits to humans known as ecosystem services and can be broadly classified as four main types: provisioning, supporting, cultural and regulating services [2]. Provisioning services provide products from an ecosystem (e.g., timbre and food), supporting services provide support for the production of other ecosystem services (e.g., pollination), cultural services are intangible benefits obtained from the ecosystem (e.g., recreation and spiritual enrichment) and, regulating services are derived from ecosystem regulation (e.g., regulating the impacts brought about by climate change) [3-4].

Global Climate Change affects coastal communities as they are low lying areas making them vulnerable to a suite of effects such as accelerated sea level rise, increased flooding, tidal inundation, saltwater intrusion, and rising water tables [5]. The factors that can contribute to the worsening of these effects are dependent on people's exposure, their sensitivity, or the extent to which they are dependent on affected resources and their ability to adapt [6]. The actions needed to circumvent these risks are often explored in two broad categories (i) adaptation, i.e., adjusting to expected climate stressors by reducing vulnerability and by extension increasing resiliency and, (ii) mitigation, i.e., measures solely focused on reducing or offsetting the levels of greenhouse gas emissions (GHGs). Climate adaptation strategies can take the form of flood risk control and coastal defences utilizing coastal ecosystems, sustainable forest management, and soil and water conservation while common climate mitigation strategies are centred around clean energy and renewable technologies, carbon capture and storage, bioenergy production, afforestation, and decarbonizing electricity generation [7]. It is widely known that vulnerable communities are the most at risk of climate change impacts, not only because of their location or settlement but their capabilities to take on additional stressors which translate into their adaptive capacity.

One adaptive measure being increasingly used to combat climate-related disasters are Ecosystem-based Approaches. The Convention on Biological Diversity defines Ecosystem-based Approaches as "a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way" [8]. It has become commonplace to use these approaches for disaster risk reduction and climate change adaptation (Eco-DRR/EbA) as protective buffers, in addition to providing additional ecosystem services. For example, a mangrove ecosystem can provide coastal protection from a storm surge and also provide ecosystem services such as carbon sequestration and food security [9-10].

Knowledge, Attitudes and Practices (KAP) questionnaires originated in the 1950s and have long been a tool utilised to assess knowledge, perception, and behaviours in relation to the topic of interest [11]. The questionnaire bears many benefits in that it is easy to design, execute and analyse. There are many steps to perform a KAP which is inclusive of but not limited to, selecting a target population preparing the questionnaire and validating the questionnaire before its intended use. What is important to note is that KAPs are an effective tool to gather baseline information and should ideally precede an awareness program [11]. Given that social inclusion should be nurtured from the onset of project deliberations, it is justifiable that a community is engaged in public information and awareness initiatives such as KAPs [12].

In Trinidad and Tobago, coastal communities are vulnerable to climate change and disaster [13]. Most of the country lies within the coastal zone and as such underscores the importance of coastal resilience as it is tied to the country's economic and social resilience [14]. The following coastal communities were identified as being vulnerable to climate change, "Salybia/Balandra, Blanchisseuse, Claxton Bay, Charlotteville and other coastal and low-lying areas" [13]. To date there have been no studies done in Trinidad and Tobago that assess people's perception of Ecosystem-based approaches for DRR and CCA in vulnerable coastal communities. Rather, there have been studies undertaken on people's KAP on natural disasters (e.g., tsunamis) and climate change with an intersectionality such as health [15-17]; and a regionwide KAP survey done by the Caribbean Community Climate Change Centre [18].

The most successful projects require the buy-in of the community involved to meet their needs. People's perception of nature, risk and place is not extensively researched and as such this can result in misalignment of their expectations if not effectively explored. To foster meaningful engagement and empowerment, it is critical that the community is involved at the earliest stages [12]. Given that Ecosystem-based Approaches has increasingly become a popular approach to reduce risk of climate-related disasters whilst providing high valued co-benefits, it is important that public acceptance and input is a part of any project implementation moving forward. This is particularly crucial as these projects are heavily reliant on local collaboration for its implementation, management and long-term monitoring and protection [19-20]. This study aims to validate a Knowledge, Attitudes and Practice instrument on Ecosystem-based Approaches for Disaster Risk Reduction and Climate Change Adaptation in a vulnerable coastal community in Trinidad.

2.0 METHODOLOGY

2.1 Instrument development

2.1.1 Variable selection

This process focused on selecting variables that were the best representation of person's KAP in relation to the topic at hand. A literature search was performed on three journal databases including, Multidisciplinary Digital Publishing Institute, CrossMark and Frontiers using several terms and phrases such as 'Ecosystem-based Approaches', 'Climate Change', 'Natural disasters', 'CCA', 'Eco-DRR, 'EbA', coastal community and Ecosystem-based Approaches', 'KAP on DRR and CCA', 'climate change and Ecosystem-based Approaches', 'building community resilience with Ecosystem-based Approaches', 'Public acceptance/attitude of Ecosystem-based approaches'.

Electronic searches of KAPs on this topic was executed as well as a manual search of the reference list of articles that met the search criteria to identify studies and documents containing information to be included in the instrument [21-23,20, 24-30]. Additionally, an existing KAP study on climate change, natural disasters, and Nature-based Solutions (NbS) was sourced from the Caribbean Disaster Risk Management Reference Centre (CADRIM) and utilized as a foundation for the KAP for research purposes only. The retrieved information was included in knowledge, attitude, and practice domains. Overall, this systematic search found five peer reviewed articles, three KAP surveys and three authoritative technical documents that identified variables that were constructed into simplistic statements to be understood by prospective respondents.

2.1.2 Item generation and description

The variables that were used generated a questionnaire comprised of four domains. These four domains were demographic, knowledge, attitudes, and practices. The demographic domain comprised of four demographic items, knowledge comprised of thirteen items, attitude comprised of ten items and practice comprised of six items. The demographic section required information on respondents such as their gender, age, level of education and occupation. The knowledge domain addressed the phenomenon of climate change, frequency of disasters, vulnerability of coastal communities and ecosystem services provided by coastal ecosystems. The thirteen knowledge items were assessed using (i). multi-option questions: scored as 1 for correct responses and 0 for incorrect responses, (ii). open-ended questions: these were not assigned any scoring but used to collect descriptive data from respondents and (iii). three options questions: which were 'yes', 'no' or 'I don't know' and scored as 1, 0, 0 respectively. Thirty-seven was the highest knowledge score that could be achieved. The attitude domain addressed the respondent's belief in coastal ecosystems to provide protection against disasters and climate change. The ten attitude items were assessed using (i). open ended questions: these were not assigned any scoring but used to collect descriptive data and (ii). Likert scale questions: 'strongly disagree', 'disagree', 'neutral', 'agree', 'strongly agree' scored as 1, 2, 3, 4, 5 respectively. Forty was the highest attitude score that could be achieved. Negatively keyed

questions had reverse scoring for the attitude domain. The practice domain sought to decipher the respondent's pro-environmental behaviour as it relates to various coastal ecosystems and their willingness to learn more. The seven practice items were assessed using (i). multi-option questions: scored as 1 for pro-environmental practice and 0 for negative environmental practice, (ii). Binary questions: which were 'yes' and 'no' and scored as 1 or 0 respectively and (iii). three option questions: which were 'yes', 'no' or 'I don't know' and scored as 1, 0, 0 respectively. Five was the highest practice score that could be achieved.

2.2 Content Validity

The content validity index or CVI is empirical in nature and estimates the content validity of an instrument [31] ensuring that relevant items were included and that there was a balance of items to avoid some of them being under or over-represented [32]. CVI were calculated for the item content validity (I-CVI) in addition to the scale content validity (S-CVI) [33]. I-CVI for both relevance and clarity of each item, is calculated by the number of experts that rated an item '3 or 4' divided by total experts (n =7) [34]. S-CVI, can be assessed in two approaches; the average and universal agreement are expressed by either averaging all the I-CVIs then dividing by total items or adding all items receiving I-CVIs of 1 and dividing by total number of items respectively [34]. The results of ratings were interpreted using the Davis, 1992 [35] approach.

Table 1: I-CVIs Interpretation

< 0.70	Delete
0.70 – 0.79	Revise
> 0.79	Appropriate

According to Lynn, 1986 [36], 3-10 experts are recommended to perform content validity and a minimum of six experts is needed to control over the chance agreement [37]. This questionnaire was sent out to fourteen experts in the disciplines of Climate Change, Ecosystem-based Approaches, and Disaster Risk Management and Reduction in the private and public sector, non-governmental organizations, and academia to make qualitative and quantitative judgements. These experts were chosen given that they had at least five years of experience and attained at least a bachelor's degree in the biological or environmental sciences. A heterogeneous panel of ten of the fourteen experts voluntarily agreed and subsequently reviewed and participated in the validity exercise as four individuals did not respond. Only seven of the ten experts completed the required ratings, *see Appendix Table #1*. The experts rated the items based on relevance and clarity on a 1-4 Likert scale. The scoring method is as follows: 1 = not relevant, 2 = somewhat relevant, 3 = relevant and 4 = highly relevant; 1 = not clear, 2 = items need some revision, 3 = items clear but needs minor revision, 4 = highly relevant. Additionally, the experts were asked to provide feedback on the phrasing and item structure.

2.3 Ethics and consent approval

The study met ethics approval from the Campus Research Ethics Committee (Ref CREC-SA.1879/11/2022) and was exempt from review with no more than minimal risk to human subjects. A description of the study's purpose was recited to respondents, they were provided with the relevant individuals of whom they could contact if any issues arose, informed that the questionnaire was voluntary and that they would remain anonymous. Interviewers obtained informed consent by ticking a section to specify the respondent consented and no vulnerable populations were targeted. Respondents were required to be over the age of 18.

2.4 Study design and location

Convenience sampling was conducted where residents were targeted at home and interviewed. This study aimed to develop and assess the validity and reliability of the questionnaire on the KAP of residents of St. Margaret's, Claxton Bay. The inclusion criteria for respondents were all genders, individuals ages 18 and over, individuals with varying levels of education and those who were both employed and unemployed. Whereas the exclusion criteria were individuals under the age of 18 and persons not living in St. Margaret's Claxton Bay.

2.5 Face Validity

Face validity was assessed in the field with the sample population for readability, feasibility as well as general formatting of the questionnaire [38]. Respondents who met the inclusion criteria were asked for general comments on how best they understood the items. The duration of time taken to complete the questionnaire was also recorded. Comments from both content and face validity informed iterations of the questionnaire as items were edited, removed, or remain unchanged with logical reasoning.

2.6 Reliability

Reliability estimates depict how much measurement error occurs in the instrument and as such it is the correlation of the instrument with itself. Moreover, Cronbach's alpha determines if the items measure the same construct. [39]. An acceptable coefficient is 0.6 or greater [40].

2.7 Statistical Analysis

The data was inputted and cleaned before data analysis. Microsoft excel was used to determine content validity from the expert's evaluations and SPSS version 29.0 (IBMM SPSS Statistics) was used to calculate descriptive and frequency statistics as well as Cronbach's alpha for reliability.

2.8 Sampling size

2.8.1 Pilot test

The community of St. Margaret's Claxton Bay was assessed as the pilot site. Perneger et al, 2015 [41] computed the minimum sample size needed to detect a high probability of prevalence of problem at a power of 80% rendering thirty or more participants. Considering time and resource constraints, a minimum of thirty-two participants were targeted. Interviewers were trained to spot problems of the questionnaire signalled by a respondent's behaviour; asking for clarity, interviewers needing to reword/repeat questions, facial expressions [32].

2.8.2 Conducting a final questionnaire in targeted communities

Vulnerable coastal populations in Trinidad were identified to be "Claxton Bay, Salybia, Balandra, Blanchisseuse, Charlotteville and other coastal and low-lying areas [13]." If a questionnaire were to be conducted in these communities, the following are the sample sizes that should be achieved:

Table 2: Sample size to be achieved for targeted vulnerable coastal communities according to Krejcie and Morgan equation, 1970 [42].

Name of community	Population size	Sample size
Salybia Village	246	152
Balandra	122	97
Blanchisseuse	1375	302
Charlotteville	863	269

NB: Census data used from the Central Statistical Office of T&T 2011 [43].

"Using Eq. (1), s = X2NP (1 - P) ƒ CP (N - 1) + X2P (1 - P), where;
s = required sample size.
X = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).
N = the population size.
P = the population proportion (assumed to be .50 since this would provide the maximum sample size).
d = the degree of accuracy expressed as a proportion (.05)."

3.0 RESULTS

3.1 Demographics

The pilot test was conducted on 32 residents with a mean age of 34.12 ± 13.81. Respondents took an average time of 16 minutes to complete the questionnaire and most respondents were female (62.5%) and in the age range of 23-38 (50%; millennials).

Table 3: Demographic characteristics of respondents in St Margaret's Claxton Bay (n= 32)

Demographic characteristic	No.	Percentage (%)
Gender		
Male	12	37.5
Female	20	62.5
Age Range (years)		
18-22	4	12.5
23-38	16	50.0
39-54	10	31.3
55 and over	2	6.3
Education		
None	1	3.1
Primary	1	3.1
Secondary	9	28.1
Tertiary	21	65.6
Occupation		
Education	1	3.1
Student	4	12.5
Business & Sales	4	12.5
Homemaker	3	9.4
Unemployed	4	12.5

Management	3	9.4
Engineering & Construction	4	12.5
Maintenance	3	9.4
Law	1	3.1
Administrative	2	6.3
Food Services	2	6.3
Health & Safety	1	3.1

Table 4: Mean and standard deviations of the ages of respondents, Individual domains and Total KAP scores

	M ± SD
Age	34.12 ± 13.81
Knowledge domain	26.13 ± 5.12
Attitude domain	30. 22 ± 4.01
Practice domain	4.06 ± 0.91
Total KAP score	60.41 ± 8.01

KAP: Knowledge, Attitudes, Practices; M: mean; SD: standard deviation

NB: Maximum *expected* score for KAP domains are 37, 40 and 5. Maximum *actual* score for KAP domains were 37, 39, 5 and Minimum *actual* score was 17, 23 and 2 respectively.

3.2 Content validity

Seven experts successfully completed the exercise by rating each item as well as advised on the structure, responding options, and rephrasing of items. Some experts suggested additional items that was considered for inclusion into the instrument whereas some items were merged, overall improving the content and structure of the instrument. All items scored an I-CVI above .70 for relevance and one item scored an I-CVI below 0.70 for clarity. Item #4, "Do you think disasters happen more frequently?" scored 0.57 for clarity but simultaneously scored 1 for relevance and was not considered for deletion but rather revised. Additionally, item #8, "Do you know of any places along the coast where there are plants and animals living?" was deleted on expert advice and was not considered for revision. The S-CVI/Ave and S-CVI/UA values had a range of 0.36 to 1 for relevance and clarity of each KAP domain. Before questions were revised, the KAP domains each had fourteen, eight and 7 questions respectively. After iterations, the KAP domains had thirteen, ten and 6 items; 2 sets of merged items and 2 additional items in the Knowledge domain; 2 additional items in the Attitude domain and 1 merged item and 1 additional item in the Practice domain as seen in Table 7 below.

Table 5: I-CVI ratings of the KAP items.

Item	I-CVI	
Knowledge domain: Knowledge level on climate change, frequency of disasters, vulnerability of coastal communities and ecosystem services of coastal ecosystems		
	Relevance	**Clarity**
1. Have you heard about climate change?	1.0 ‡	0.86 ‡
2. Is climate change caused by human activity	0.71 ‡	0.71 ‡
3. Is climate change a natural phenomenon?	0.71 ‡	0.71 ‡
4. Do you think disasters happen more frequently?	1.0 ‡	0.57 ‡
5. Does climate change cause more intense and frequent disasters?	0.86 ‡	0.71 ‡
6. Are coastal communities vulnerable to climate change and disasters?	1.0	1.0 ‡
7. In the community where I live there are methods to reduce risk to climate change and disasters	1.0 ‡	0.86 ‡
8. Do you know of any places along the coast where there are plants and animals living?	0.71 †	0.71 †
9. Can you name some coastal ecosystems in Trinidad and Tobago?	0.71 ‡	0.71 ‡
10. Are you familiar with the following approaches?	1.0 ‡	1.0 ‡
11. Do coastal ecosystems reduce impacts of climate change and disasters?	1.0 ‡	1.0 ‡
12. Do such ecosystems provide protection to the coast?	1.0 ‡	1.0 ‡
13. Can coastal ecosystems slow water runoff during intense rainfall?	1.0 ‡	1.0 ‡
14. Do you know of any other benefits of coastal ecosystems?	0.86 ‡	0.86 ‡
Attitude domain: Attitude level towards belief in coastal ecosystems to provide protection against disasters and climate change		
15. Actions that I take as an individual that protect coastal ecosystems does not matter	1.0 ‡	0.86 ‡
16. I need evidence that coastal ecosystems reduce my risk to disasters and climate change	1.0 ‡	0.71 ‡
17. I believe that when storms come in the future, coastal ecosystems can reduce my community's risk to disaster	1.0	1.0 ‡
18. I will encourage the use of coastal ecosystems to reduce my risk to climate change and disaster	1.0	1.0 ‡

19. Hard infrastructure such as seawalls are more important than coastal ecosystems for my community's protection and to reduce risk	1.0 ‡	0.86 ‡
20. My community should be involved in measures geared towards reducing our risk to climate change and disaster	1.0	0.86 ‡
21. I believe that restoring mangroves and corals can reduce my community's risk to disaster and climate change	1.0	1.0 ‡
22. I prefer to engage in more important community issues than conserving coastal ecosystems	1.0	1.0 ‡

Practice domain: Practice level of pro-environmental behaviour as it relates to various coastal ecosystems and willingness to learn more

23. Have you ever engaged in cutting down mangroves?	1.0 ‡	1.0 ‡
24. Have you engaged in removing seagrasses?	1.0 ‡	1.0 ‡
25. Have you ever engaged in removing coral fragments from coral reefs?	1.0 ‡	1.0 ‡
26. Have you ever engaged in planting or restoring of coastal ecosystems?	1.0 ‡	0.86
27. Will you avoid engaging in activities that cause destruction to coastal ecosystems?	0.86 ‡	1.0 ‡
28. If you were made aware of the importance of coastal ecosystems, would you engage in the planting and restoring of these ecosystems	0.86 ‡	0.86
29. If an awareness workshop on the importance of coastal ecosystems for reducing your risk to disaster and climate change was held in your community, would you attend?	0.86 ‡	0.86

Note: Few revised items refer to the rephrasing and/or merging of questions as advised by the experts regardless of interpretation

† deleted ‡ revised

Table 6: Summary of S-CVI/Ave and S-CVI/UA for KAP items

	Relevance		Clarity	
	S-CVI/Ave	**S-CVI/UA**	**S-CVI/Ave**	**S-CVI/UA**
Knowledge	0.9	0.57*	0.84	0.36*
Attitude	1.0	1.0	0.91	0.5*
Practice	0.94	0.5*	0.94	0.5*

KAP, Knowledge, Attitude, Practice; S-CVI, average of all I-CVIs; S-CVI/UA, total agreements.

* = Scores below 0.70

Table 7: Items revised after content validity

Item	Response Options
Knowledge Domain	
1. Are you aware of climate change?	Yes
	No
2. What do you think is the main cause of climate change?	Human activity
	A sign of the end times
	Cutting down forests
	It's a natural process
	None
	I don't know
3. Do you think hazards such as floods happen more frequently compared to 10 years ago?	Yes
	No
	I don't know
4. Do you think that climate change …	increases flooding
	increases the power of storms
	causes more hurricanes

5. Are coastal communities vulnerable to climate change and disasters?

<div align="right">Yes
No
I don't know</div>

6. What makes coastal communities vulnerable to climate change?

<div align="right">Flooding
Storm surge
Coastal erosion
Saltwater intrusion
Sea level rise
Other</div>

7. In your community, are there methods to reduce your vulnerability to climate change and disasters such as seawalls or natural solutions?

<div align="right">Yes
No
I don't know</div>

8. Can you identify more methods like these?

<div align="right">(open-ended)</div>

9. Which of these do you consider coastal ecosystems in Trinidad and Tobago

<div align="right">Beach
Mangroves
Seagrass beds
Marsh forests
Coral reefs
Ocean/sea
Lagoons
Mudflats
Rocky cliffs
Estuaries
Other</div>

10. Which of these approaches do you think are helpful in reducing the impacts of climate change and disaster?

<div align="right">Protection of ecosystems
Ecosystem restoration
Sustainable management of ecosystems and resources</div>

	Conservation of ecosystems
11. Do you think coastal ecosystems reduce impacts to climate change and disasters?	Yes
	No
	I don't know
12. How might coastal ecosystems provide protection to coastal areas?	Absorbs floodwaters
	Reduces wave energy
	Prevents coastal erosion
	Other
13. Which of these are considered benefits of coastal ecosystems?	Provision of food
	Protection of roads/buildings
	A source of income
	Protection of personal assets
	Other

Attitude Domain

14. "Actions that I take on my own for the protection of coastal ecosystems do not matter"	Strongly Agree
	Agree
	Neutral
	Disagree
	Strongly Disagree
15. "I am unsure of the importance of coastal ecosystems in reducing my risk to disasters and climate change"	Strongly Agree
	Agree
	Neutral
	Disagree
	Strongly Disagree
16. "I believe that when storms come in the future, coastal ecosystems can reduce my community's risk to disaster"	Strongly Agree
	Agree
	Neutral
	Disagree

17. "I will encourage the use of coastal ecosystems to reduce my risk to climate change and disaster"

Strongly Disagree
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

18. "Artificial structures such as seawalls are more important than coastal ecosystems for my community's protection and to reduce risk"

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

19. In your opinion, which measures do you think your community should be involved in?

(open-ended)

20. "I believe that rehabilitating coastal ecosystems can reduce my community's risk to disaster and climate change"

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

21. "I prefer to engage in more important community issues than restoring coastal ecosystems"

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

22. In your opinion, which community issues do you think are more important?

(open-ended)

Practice Domain

23. Have you ever engaged in activities that resulted in the...

Removal of mangrove trees
Removal of seagrasses
Removal of coral reefs
I am not sure
None of the above

24. Have you ever engaged in ecosystem rehabilitation efforts e.g., planting of mangroves?

Yes
No

25. Will you avoid engaging in activities that you know cause destruction to coastal ecosystems?

Yes
No
I don't know

26. If you were aware that coastal ecosystems can help reduce risk from disasters and climate change, would you engage in rehabilitating these ecosystems?

Yes
No
I don't know

27. Have you ever attended a seminar or workshop or read/viewed any informational content on coastal ecosystems, climate change or disasters?

Yes
No

3.3 Face validity

Face validity was conducted on 32 residents of St. Margaret's Claxton Bay in Trinidad to evaluate their understanding of the instrument, their responses given with respect to each item and an open discussion at the end to provide feedback on any items that were unclear or vague in how it was presented. According to the feedback given by respondents, only three items in the Knowledge domain were revised in regard to minor rephrasing of questions and multi-response options for improved readability.

Table 8: Items and its associated multi-response options revised based on feedback from respondents

Original item	Revised item
Item #8 - Do you think that climate change …	Which weather events are influenced by climate change?
Item #10 - What makes coastal communities vulnerable to climate change?	Which of these events make coastal communities vulnerable to climate change?
Item #13 – Which of these do you consider coastal ecosystems in Trinidad and Tobago	Which of the following are coastal ecosystems in Trinidad and Tobago?
Mo - 'increases flooding', 'increases power of storms', 'causes more hurricanes'	increased flooding', 'increased power of storms', 'more hurricanes'
Mo - 'marsh forest', 'estuary'	'swamp', 'bay'

Mo - multi-response option

After iterations were made to the aforementioned items, this then produced a finalized questionnaire that can be further used to assess the KAP of individuals in other coastal communities across the twin-island nation. Overall, the questionnaire was well received by respondents and was praised for its timeliness given the current state of the weather and climate.

3.4 Descriptive results from open ended questions

There were four open ended questions that addressed if residents, (i) were aware of measures in their community such as man-made or natural solutions to reduce their impact to disasters and climate change; (ii) measures they deemed their community should be involved in to reduce their risk to impacts; (iii) what community issues they view as more important than engaging in rehabilitation efforts of coastal ecosystems and (iv) why they would avoid causing destruction to coastal ecosystems. Of the four open ended questions, only three were answered.

Table 9: Open-ended questions and its associated responses by no. of respondents

Open ended question	No. of respondents	Responses
Measures they deemed their community should be involved in to reduce their risk to impacts	22	'awareness building', 'stopping pollution via laws and clean-ups', 'mangrove restoration'
What community issues they view as more important than engaging in rehabilitation efforts of coastal ecosystems and	8	'youth development', 'low unemployment rates', 'crime', 'bad roadways', 'pollution', 'lack of education', 'climate change', 'flooding'
Why they would avoid causing destruction to coastal ecosystems	25	'future generations', 'good for community', 'role of ecosystems', 'harmful to ecosystems'

These results provide insights into persons, KAP as it relates to coastal ecosystems and their involvement in protecting themselves and reducing risks posed by climate change and disaster.

3.5 Reliability

The internal consistency of the 29-item instrument and its individual domains were measured and obtained using Cronbach's alpha coefficient. The Knowledge, Attitude and Practice domains had alphas of (0.79), (0.55) and (0.61) respectively. The Knowledge and Practice domain fell within a good level of internal consistency as recommended by Ursachi et al, 2015 [40]. Whereas the Attitude domain was considered low. Overall, the questionnaire had an alpha of 0.77 which indicated an acceptable reliability.

Table 10: Cronbach's alpha of each individual domain and Overall KAP

Domains	Cronbach's alpha
Knowledge	0.79
Attitude	0.55
Practice	0.61
Overall KAP	0.77

4.0 DISCUSSION

To date, this is the first study that evaluates a development and validation approach with satisfactory content and face validity and reliability that examines the Knowledge, Attitudes and Practices of a Vulnerable coastal community in Trinidad about Ecosystem-based approaches for Disaster Risk Reduction and Climate Change Adaptation. The strength of the study was bolstered by the fact that respondents were from an identified vulnerable coastal community that has and is currently facing the impacts brought about by climate-related disasters.

An extensive literature review was executed to develop an initial questionnaire. A content validity analysis was then executed by a number of experts (n=7) which is considered adequate for validation [44]. This process was crucial to reduce an inflated estimate of validity and garner feedback and additional items from the experts [34]. Additionally, face validity was conducted through a pilot test with targeted residents of St. Margaret's Claxton Bay as the layman's perspective is pertinent to inform amendments of the questionnaire [38]. Lasty, Cronbach's alpha was calculated to assess reliability. Reliability assumes tau equivalence; therefore, all items are measured by one trait and the instrument is unidimensional [39]. This confirms the internal consistency amongst the items and overall, the instrument's reliability.

The most common approach to calculate content validity is using I-CVI but there is also the S-CVI which is known to be an alternative and unacknowledged approach to measuring content validity. Many papers do not report both approaches but in this paper, both were employed given that the average approach can be skewed by outliers [45]. Further, S-CVI can be measured via two approaches S-CVI/Ave or S-CVI/UA [46].

The I-CVI's of the Knowledge domain was between 0.71 to 1 for relevance and 0.57 to 1 for clarity; for the Attitude domain, all 1's for relevance and a range of 0.71 to 1 for clarity and for the Practice domain, all 1's for relevance and a range of 0.86 to 1.00 for clarity. On the authority of the expert advice given, items interpreted to be deleted or revised were either kept or deleted as seen with item #4 and #8 from Table 5. The S-CVI/UA for the relevance of the KAP domains were (K- 0.57), (A- 1.0), (P- 0.5) while for clarity it was (K- 0.36), (A- 0.5), (P- 0.5) respectively. However, the S-CVI/Ave for relevance of the KAP domains were (K- 0.9), (A- 1.00) and (P- 0.94) respectively while for clarity the values were (K- A0.84), (A- 0.91) and (P- 0.94) respectively.

Although the S-CVI/UA approach is more conservative in that it requires that all items receive an I-CVI of 1.00, this can underestimate content validity as the ability to achieve 100% for the entire instrument reduces as the number of experts increase [45]. Additionally, more experts are preferred given that an increase in experts reduces the probability of chance agreement [46]. In contrast, the S-CVI/Ave is the less restrictive approach and can sometimes overestimate content validity given that the numerator will always be more in comparison to S-CVI/UA as all I-CVIs will not necessarily be equal to 1.00. Hence, both approaches are recommended to assess overall content validity to assess a middle ground [45]. The argument can be made that with an increase in the number of experts, consensus can be made difficult on S-CVI/UA but

overall content validity constitutes an appropriate level for the individual domains with the average approach [34].

The face validity process revealed that minor revisions were needed given the feedback from respondents. This process was necessary to gauge respondent's readability and understandability level of each question to inform final iterations of the questionnaire for future use. Moreover, the questionnaire completion time in minutes was recorded [47]. Once this was assessed, the reliability of the questionnaire was then performed.

The Knowledge, Attitude and Practice domains had Cronbach's alphas of (K- 0.79), (A- 0.55) and (P- 0.61) respectively. Both Knowledge and Practice domains were interpreted as having an acceptable internal consistency as an acceptable reliability coefficient is considered ($\alpha => 0.6$). The Attitude domain was considered low and could be advocated by a weak intercorrelation amongst these items. Further, given that there is plausibly a weak intercorrelation of items in the Attitude domain, this can reveal that there are more than one underlying trait or constructs assessed amongst these items. Overall, all the domains together had an alpha of 0.77 which was considered a good reliability estimate.

Though this study was solely intended to validate KAP for future use, there are some important insights that can be drawn from the responses obtained although a small sample size. Individuals were well aware of climate change and its main causes (human activity; n = 28, cutting down forests; n = 22, natural process; n = 13). All respondents knew that coastal communities were vulnerable to climate change (n = 32) and could identify ecosystem-based approaches of coastal ecosystems in reducing their risk to climate-related disasters (protection of ecosystems; n = 27, ecosystem restoration; n = 26, sustainable management of ecosystems and resources; n = 26, conservation of ecosystems; n = 28). On the other hand, some individuals were split on whether artificial structures were more important than coastal ecosystems in providing protection against climate-related disasters (Strongly disagree; n = 1, Disagree; n = 12, Neutral; n = 4, Agree; n = 12, Strongly Agree; n = 3). Moreover, most respondents have attended an informational session in the past that addressed coastal ecosystems, climate change or disasters (n = 24).

There are a few limitations that should be considered when interpreting the results of this research. Firstly, due to time and resource constraints the sample size used for validation was small and may not be an appropriate representative sample of the targeted population. Secondly, content validity is often a rigorous and iterative process, due to time constraints, this evaluation was performed once. Thus, for future reference, multiple revisions are recommended that can help to improve on content validity indices to achieve saturation and to ensure the relevant content is included that addresses the rationale of the research [45, 33]. Additionally, content validity can be a subjective process influenced by the experiential and educational backgrounds of the selected experts. As such it is important that the researcher make objective decisions as it relates to the inclusion and exclusion of items guided by the I-CVIs and the aim of their research [33,48]. Moreover, Cronbach's alpha must meet the assumption that the items are consistent with one trait and will not reveal any underlying factors if multiple that can influence the overall reliability [39]. To this, an exploratory factor analysis is recommended to identify the various factors that underly a construct [31] and assumes a

sample size of minimum 200+ individuals [49]. Hence, this study did not satisfy these assumptions due to time and resource constraints but can be further employed in the future.

This study focused on reporting the steps taken to achieve an overall satisfactory validation for the finalized 33-item questionnaire. This research underscores the importance of validating an instrument before it enters the field. Several facets can emerge that influence the conclusions drawn from the data and as such validation bolsters the quality and credibility of the data being collected for comparability [50,48]. The average time taken to complete the questionnaire was sixteen minutes. This could advocate for the warm reception of respondents given that there was not a long list of questions which tend to deter respondents from participating. Overall, the instrument was considered content valid and reliable but given the small sample size due to time constraints, conclusive statements should not be made. Rather this preliminary research can be used as a foundation for future research to be later rolled out in other coastal communities.

5.0 CONCLUSION

In this study a newly developed questionnaire was validated to assess people's KAP on Ecosystem-based Approaches for DRR and CCA. The demographics domain had 4 items, knowledge (13), attitudes (10) and practices (6). This instrument was quantifiably demonstrated to be overall content valid and should be used as a foundation for future research to be later rolled out in other coastal communities.

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7.0 APPENDIX

Participatory Response Consent Form

COMPLETION OF THIS SECTION SHOULD BE DONE BEFORE INITIATING THE INTERVIEW WITH THE INTERVIEWEE.

Title: Knowledge, Attitudes and Practices of a Vulnerable Coastal Community in Trinidad about Ecosystem-Based Approaches for Disaster Risk Reduction and Climate Change Adaptation

Principal Student Investigator: Sweelan Renaud (sweelan.renaud@my.uwi.edu)
Project Supervisor: La Daana Kanhai (LaDaana.Kanhai@sta.uwi.edu)
Campus Research Ethics Committee: (campusethics@sta.uwi.edu)

This research is being conducted in partial fulfilment of my MSc degree at the University of the West Indies, St Augustine. Potential risks of taking part in this study are minimal but can include discomfort if you feel that you may be painted in a negative light due to your responses to the questions asked. Additionally, there can be risks with the privacy and confidentiality of your data, but you are ensured that the appropriate measures will be taken to secure and encrypt your data.

*(For interviewer: **please tick based on whether or not the interviewee agrees with the following statement**)*

Confirming consent

"I confirm that the purpose of the research, the study procedures, and any possible risks or discomforts, as well as the possible benefits that I may receive by taking part in the study, have been explained to me. Alternatives to my taking part have also been discussed and all my questions have been answered. I further confirm that I have been provided with the telephone number(s) of the Principal Investigator for contact in the case of an emergency. I confirm that I am willing to take part in this study."

Responded ☐

Refused ☐

Interviewer and questionnaire no.:

Location of survey:

Date:

Completion time:

For interviewer- NB: Take note of facial expressions and body language to questions asked and jot down in 3rd column. Additionally, make note of questions that were asked and required repetition, clarification and if the respondent rephrases the question.		

DEMOGRAPHICS		
Questions	*Interviewee's responses*	*Guidelines for interviewers*
1. Which gender do you identify with?	Male ☐ Female ☐ Non-binary ☐ Prefer not to say ☐	
2. What is your age?		**Write down age**
3. What is your highest level of education?	Tertiary ☐ Secondary ☐ Primary ☐ None ☐	
4. What do you do for a living?		**Write down occupation**
KNOWLEDGE (13 Q.)		
5. Are you aware of climate change?	Yes ☐ No ☐	**(If no, skip to question 7)**
6. What do you think is the main cause of climate change?	Human activity ☐ A sign of the end times ☐ Cutting down forests ☐ It's a natural process ☐ None ☐ I don't know ☐ Other -------------------------------	**(List out options and tick off what respondent says)**
7. Do you think hazards such as floods happen more frequently compared to 10 years ago?	Yes ☐ No ☐ I don't know ☐	
8. Which weather events are influenced by climate change?	increased flooding ☐ increased power of storms ☐ more hurricanes ☐	**(Read out options and select all that apply)**

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9. Are coastal communities vulnerable to climate change and disasters?	Yes ☐ No ☐ I don't know ☐	**(If no or I don't know skip to q11.)**
10. Which of these events make coastal communities vulnerable to climate change?	Flooding ☐ Storm surge ☐ Coastal erosion ☐ Saltwater intrusion ☐ Sea level rise ☐ Other ------------------------------	**(Read out options and select all that apply)**
11. In your community, are there methods to reduce your vulnerability to climate change and disasters such as seawalls or natural solutions?	Yes ☐ No ☐ I don't know ☐	**(If they answer no or I don't know skip to 13.)**
12. Can you identify more methods like these?		**(Jot down responses)**
Interviewer please read: **Let us now talk about coastal ecosystems.** *A coastal ecosystem is where water meets the land.*		
13. Which of these do you consider coastal ecosystems in Trinidad and Tobago	Beach ☐ Mangroves ☐ Seagrass beds ☐ Swamp ☐ Coral reefs ☐ Ocean/sea ☐ Lagoons ☐ Mudflats ☐ Rocky cliffs ☐ Bay ☐ Other -------------------------------	**(Read out options and select all that apply)**
14. Which of these approaches do you think are helpful in reducing the impacts of	Protection of ecosystems ☐ Ecosystem restoration ☐	**(Read out options Tick all that apply)**

climate change and disaster?	Sustainable management of ecosystems and resources ☐ Conservation of ecosystems ☐	
15. Do you think coastal ecosystems reduce impacts to climate change and disasters?	Yes ☐ No ☐ I don't know ☐	**(If no, skip to 17)**
16. How might coastal ecosystems provide protection to coastal areas?	Absorbs floodwaters ☐ Reduces wave energy ☐ Prevents coastal erosion ☐ Other -----------------------------	**(List options and tick all that apply)**
17. Which of these are considered benefits of coastal ecosystems?	Provision of food ☐ Protection of roads/buildings ☐ A source of income ☐ Protection of personal assets ☐ Other -----------------------------------	**(List options and tick all that apply)**
ATTITUDE (10 Q.) **Read to respondent:** *To what extent do you agree with the following statements where 1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly agree*		
18. "Actions that I take on my own for the protection of coastal ecosystems do not matter"	Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree ☐	
19. "I am unsure of the importance of coastal ecosystems in reducing my risk to disasters and climate change"	Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree ☐	
20. "I believe that when storms come in the future, coastal ecosystems can reduce my community's risk to disaster"	Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree ☐	
21. "I will encourage the use of coastal ecosystems to reduce	Strongly Agree ☐ Agree ☐	

my risk to climate change and disaster"	Neutral ☐ Disagree ☐ Strongly Disagree ☐	
22. "Artificial structures such as seawalls are more important than coastal ecosystems for my community's protection and to reduce risk"	Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree ☐	
23. "My community should be involved in measures geared towards reducing our risk to climate change and disaster"	Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree ☐	
24. In your opinion, which measures do you think your community should be involved in?		**Jot down responses**
25. "I believe that rehabilitating coastal ecosystems can reduce my community's risk to disaster and climate change"	Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree ☐	
26. "I prefer to engage in more important community issues than restoring coastal ecosystems" If participant disagrees/strongly disagrees move to q28.	Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree ☐	
27. In your opinion, which community issues do you think are more important?		**Jot down responses**
PRACTICE (6 Q.)		
28. Have you ever engaged in activities that resulted in the...	Removal of mangrove trees ☐ Removal of seagrasses ☐	**Read out options and tick all that applies**

	Removal of coral reefs ☐ I am not sure ☐ None of the above ☐	
29. Have you ever engaged in ecosystem rehabilitation efforts e.g., planting of mangroves?	Yes ☐ No ☐	
30. Will you avoid engaging in activities that you know cause destruction to coastal ecosystems?	Yes ☐ No ☐ I don't know ☐	
31. Why would you avoid engaging in these activities?		**Jot down response**
32. If you were aware that coastal ecosystems can help reduce risk from disasters and climate change, would you engage in rehabilitating these ecosystems?	Yes ☐ No ☐ I don't know ☐	
33. Have you ever attended a seminar or workshop or read/viewed any informational content on coastal ecosystems, climate change or disasters?	Yes ☐ No ☐	

Table #1: Names, sector, organization, and disciplines of expert panel for content validity (n = 7).

Name	Sector	Organization	Discipline
Ryan Assiu	Private	Advisors Next Door	Climate Change
Christal Benjamin	Intergovernmental	Association of Caribbean States (ACS-AEC)	Disasters
Katrina Khan	NGO	Caribbean Climate Network	Climate Change, Ecosystem-based approaches
Dr. Catherine Jadot	Private	Elemental Solutions Caribbean	Ecosystem-based approaches, Climate Change
Ahmad Khan	NGO	Caribbean Disaster Risk Management Reference Centre (CADRIM)	Disasters, Ecosystem-based approaches, Climate Change
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Table #2: Iterative summary of expert comments and justification of amended questions during content validity

Original Question	Summary expert comments	Relevance Score	Clarity Score	Justification for Amending Question/Rephrasing	Final Question
KNOWLEDGE DOMAIN					
K1. Have you heard about climate change	If responses were 'no' or 'I don't know', other questions may be irrelevant, and a different meaning can be useful for data analysis.	1.00	0.86	'Are you aware of climate change?' was suggested.	K1. Are you aware of climate change?
K2 . Is climate change caused by human activity?	K2 and K3 were suggested to be merged as the respondent could be led into a response from the previous question. The word phenomenon should be changed based on target population.	0.71	0.71	Language was softened for target population and merged to incorporate more than one multi-response option (causes of climate change and a public opinion such as a sign of the end times or an Act of God)	K2. What do you think is the main cause of climate change? merged
K3. Is climate change a natural phenomenon?		0.71	0.71		
K4. Do you think disasters happen more frequently?	Specify a disaster and provide a timeframe to elicit comparison. Disasters and hazards are two different definitions and should be considered however hazards may not be widely known	1	0.57	K4 was rated highly relevant and as such was not deleted given its clarity score. A timeframe of '10 years ago' was incorporated into this question to provide respondents with a reference point. Additionally, a 'hazard' was specified as suggested. The word disaster remained given that respondents may not associate a flood with a hazard but rather disaster.	K3. Do you think hazards such as floods happen more frequently compared to 10 years ago?

K5. Does climate change cause more intense and frequent disasters?	Frequency part covered by previous question. Leading question and should provide options.	0.86	0.71	Multi-response options provided as suggested.	K4. Do you think that climate change …
K6. Are coastal communities vulnerable to climate change and disasters?	Good question. Additional question suggested to elicit from respondents what ecological effects they know about that affects coastal communities	1	1	No comments on K6. Additional question suggested and incorporated.	K5. Question remain unchanged
					K6. What makes coastal communities vulnerable to climate change? (*additional*)
K7. In the community where I live there are methods to reduce risk to climate change and disasters	Additional question suggested to elicit from respondents what other methods are employed in the community. Specify an example of a risk reduction method.	1	0.86	Additional question added and rephrasing with specific method incorporated as suggested.	K7. In your community, are there methods to reduce your vulnerability to climate change and disasters such as seawalls or natural solutions?
					K8. Can you identify more methods like these? (*additional and open-ended*)
K8. Do you know of any places along the coast where there are plants and animals living?	Question does not provide a purpose to the content and should be considered for removal.	0.71	0.71	Question removed on authority of expert comments.	Question removed
K9. Can you name some coastal ecosystems in Trinidad and Tobago?	Consider rephrasing. Confusion on if options would be listed or self-administered.	0.71	0.71	Question rephrased to allow for options to be listed and respondents to select all that applies.	K9. Which of these do you consider to be coastal ecosystems in Trinidad and Tobago

K10. Are you familiar with the following approaches?	Good question but can be rephrased to elicit if they think these options are helpful in reducing impacts to climate-related disasters.	1	1	Suggestion accepted and rephrased to gather more insight from the question.	K10. Which of these approaches do you think are helpful in reducing the impacts of climate change and disaster?
K11. Do coastal ecosystems reduce impacts of climate change and disasters?	Good question but can be merged with K12 and K13 and rephrased. Consider adding additional question with options as it can be leading questions.	1	1	K11, K12 and K13 merged as suggested and additional question added with suggestions.	K11. Do you think coastal ecosystems reduce impacts to climate change and disasters? K12. How might coastal ecosystems provide protection to coastal areas? *(additional and merged)*
K12. Do such ecosystems provide protection to the coast?	Merge with K11 and K13.	1	1		
K13. Can coastal ecosystems slow water runoff during intense rainfall?	Merge with K11 and K12.	1	1		
K14. Do you know of any other benefits of coastal ecosystems?	Good but assumes respondent says yes to above.	0.86	0.86	The word other was moved and question rephrased.	K13. Which of these are considered benefits of coastal ecosystems?
ATTITUDE DOMAIN					
A1. Actions that I take as an individual that protect coastal ecosystems does not matter	Wordy, unclear. Rephrase.	1	0.86	'Actions that I take on my own for the protection of coastal ecosystems do not matter' was suggested.	A1. Actions that I take on my own for the protection of coastal ecosystems do not matter
A2. I need evidence that coastal ecosystems reduce my risk to disasters and climate change	Unclear	1	0.71	'I am unsure of the importance of coastal ecosystems in reducing my risk of climate change and disasters' was suggested	A2. I am unsure of the importance of coastal ecosystems in reducing my risk to disasters and climate change

A3. I believe that when storms come in the future, coastal ecosystems can reduce my community's risk to disaster	NA	1	1	NA	A3. Question remains unchanged
A4. I will encourage the use of coastal ecosystems to reduce my risk to climate change and disaster	NA	1	1	NA	A4. Question remains unchanged
A5. Hard infrastructure such as seawalls are more important than coastal ecosystems for my community's protection and to reduce risk	Consider artificial structures or human built solutions.	1	0.86	Artificial structures was incorporated taking into consideration the target audience.	A5. Artificial structures such as seawalls are more important than coastal ecosystems for my community's protection and to reduce risk
A6. My community should be involved in measures geared towards reducing our risk to climate change and disaster	Add additional question to elicit information.	1	0.86	Additional question added as suggested.	A6. Questions remains unchanged
					A7. In your opinion, which measures do you think your community should be involved in? *(additional and open-ended question)*
A7. I believe that restoring mangroves and corals can reduce my community's risk to disaster and climate change	Mangroves and corals should be applicable to study area	1	1	Though this study was conducted in Claxton Bay only known for its mangroves, it is intended to be rolled out in other coastal communities across the country. As such and with the comment given, mangroves and corals were defined under the umbrella term 'coastal ecosystems.'	A8. I believe that rehabilitating coastal ecosystems can reduce my community's risk to disaster and climate change

A8. I prefer to engage in more important community issues than conserving coastal ecosystems	Good but add additional question to elicit further data on what these issues might be.	1	1	Additional question added as suggested.	A9. I prefer to engage in more important community issues than restoring coastal ecosystems
					A10. In your opinion, which community issues do you think are more important? *(open-ended)*
PRACTICE DOMAIN					
P1. Have you ever engaged in cutting down mangroves?	Merge with P2 and P3. Add the term 'engaged in activities' to soften statement as respondents may not answer honestly	1	1	Questions P1, P2 and P3 were merged, and suggestion incorporated.	P1. Have you ever engaged in activities that resulted in the...
P2. Have you ever engaged in removing seagrasses?	Merge with P1 and P3	1	1		
P3. Have you ever engaged in removing coral fragments from coral reefs?	Merge with P1 and P2	1	1		
P4. Have you ever engaged in planting or restoring of coastal ecosystems?	Rephrase	1	0.86	'Have you ever engaged in ecosystem rehabilitation efforts e.g., planting of mangroves?' was suggested	P2. Have you ever engaged in ecosystem rehabilitation efforts e.g., planting of mangroves?
P5. Will you avoid engaging in activities that cause destruction to coastal ecosystems?	Rephrase and add additional question to elicit why	0.86	1	Suggestion accepted.	P3. Will you avoid engaging in activities that you know cause destruction to coastal ecosystems?

					P4. Why would you avoid engaging in these activities? *(additional question and open-ended)*
P6. If you were made aware of the importance of coastal ecosystems, would you engage in the planting and restoring of these ecosystems	Rephrase	0.86	0.86	'If you were aware that coastal ecosystems can help reduce risk from disasters and climate change, would you engage in rehabilitating these ecosystems?' was suggested	P5. If you were aware that coastal ecosystems can help reduce risk from disasters and climate change, would you engage in rehabilitating these ecosystems?
P7. If an awareness workshop on the importance of coastal ecosystems for reducing your risk to disaster and climate change was held in your community, would you attend?	Good question. Leading and instead ask about past practices.	0.86	0.86	'Have you ever attended a seminar or workshop or read/viewed any informational content on coastal ecosystems, climate change or disasters?' was suggested	P6. Have you ever attended a seminar or workshop or read/viewed any informational content on coastal ecosystems, climate change or disasters?

Table #3: Interpretation of the I-CVI for relevancy and clarity for each item

Item	I-CVI (Relevance)	Interpretation	I-CVI (Clarity)	Interpretation
K1	1	Appropriate	0.86	Appropriate
K2	0.71	Need for revision	0.71	Need for revision
K3	0.71	Need for revision	0.71	Need for revision
K4	1	Appropriate	0.57	Eliminated
K5	0.86	Appropriate	0.71	Need for revision
K6	1	Appropriate	1	Appropriate
K7	1	Appropriate	0.86	Appropriate
K8	0.71	Need for revision	0.71	Need for revision
K9	0.71	Need for revision	0.71	Need for revision
K10	1	Appropriate	1	Appropriate
K11	1	Appropriate	1	Appropriate
K12	1	Appropriate	1	Appropriate
K13	1	Appropriate	1	Appropriate
K14	0.86	Appropriate	0.86	Appropriate
A1	1	Appropriate	0.86	Appropriate
A2	1	Appropriate	0.71	Need for revision
A3	1	Appropriate	1	Appropriate
A4	1	Appropriate	1	Appropriate
A5	1	Appropriate	0.86	Appropriate
A6	1	Appropriate	0.86	Appropriate
A7	1	Appropriate	1	Appropriate
A8	1	Appropriate	1	Appropriate
P1	1	Appropriate	1	Appropriate
P2	1	Appropriate	1	Appropriate
P3	1	Appropriate	1	Appropriate
P4	1	Appropriate	0.86	Appropriate
P5	0.86	Appropriate	1	Appropriate
P6	0.86	Appropriate	0.86	Appropriate
P7	0.86	Appropriate	0.86	Appropriate

Table #4: Frequency of K1

	Frequency	Percent
Yes	32	100.0
No	0	0.0
Total	32	100.0

Table #5: Frequency of K2HA

	Frequency	Percent
Yes	4	12.5
No	28	87.5
Total	32	100.0

Table #6: Frequency of K2ST

	Frequency	Percent
Yes	22	68.8
No	10	31.3
Total	32	100.0

Table #7: Frequency of K2CF

	Frequency	Percent
Yes	10	31.3
No	22	68.8
Total	32	100.0

Table #8: Frequency of K2NP

	Frequency	Percent
Yes	19	59.4
No	13	40.6
Total	32	100.0

Table #9: Frequency of K3

	Frequency	Percent
Yes	2	6.3
No	30	93.8
Total	32	100.0

Table #10: Frequency of K4IF

	Frequency	Percent
Yes	32	100.0
No	0	0.0
Total	32	100.0

Table #11: Frequency of K4PS

	Frequency	Percent
Yes	6	18.8
No	26	81.3
Total	32	100.0

Table #12: Frequency of K4CH

	Frequency	Percent
Yes	7	21.9
No	25	78.1
Total	32	100.0

Table #13: Frequency of K5

	Frequency	Percent
Yes	32	100.0
No	0	0.0
Total	32	100.0

Table #14: Frequency of K6FL

	Frequency	Percent
Yes	6	18.8
No	26	81.3
Total	32	100.0

Table #15: Frequency of K6SS

	Frequency	Percent
Yes	20	62.5
No	12	37.5
Total	32	100.0

Table #16: Frequency of K6CE

	Frequency	Percent
Yes	7	21.8
No	25	78.1
Total	32	100.0

Table #17: Frequency of K6SI

	Frequency	Percent
Yes	6	18.8
No	26	81.3
Total	32	100.0

Table #18: Frequency of K6SL

	Frequency	Percent
Yes	3	9.4
No	29	90.6
Total	32	100.0

Table #19: Frequency of K7

	Frequency	Percent
Yes	22	68.8
No	10	31.3
Total	32	100.0

Table #20: Frequency of K9BE

	Frequency	Percent
Yes	3	9.4
No	29	90.6
Total	32	100.0

Table #21: Frequency of K9MA

	Frequency	Percent
Yes	1	3.1
No	31	96.9
Total	32	100.0

Table #22: Frequency of K9SB

	Frequency	Percent
Yes	14	43.8
No	18	56.3
Total	32	100.0

Table #23: Frequency of K9MF

	Frequency	Percent
Yes	16	50.0
No	16	50.0
Total	32	100.0

Table #24: Frequency of K9CR

	Frequency	Percent
Yes	13	40.6
No	19	59.4
Total	32	100.0

Table #25: Frequency of K9OS

	Frequency	Percent
Yes	6	18.8
No	26	81.3
Total	32	100.0

Table #26: Frequency of K9LA

	Frequency	Percent
Yes	8	25.0
No	24	75.0
Total	32	100.0

Table #27: Frequency of K9MU

	Frequency	Percent
Yes	19	59.4
No	13	40.6
Total	32	100.0

Table #28: Frequency of K9RC

	Frequency	Percent
Yes	22	68.8
No	10	31.3
Total	32	100.0

Table #29: Frequency of K9ES

	Frequency	Percent
Yes	22	68.8
No	10	31.3
Total	32	100.0

Table #30: Frequency of K10PE

	Frequency	Percent
Yes	5	15.6
No	27	84.4
Total	32	100.0

Table #31: Frequency of K10ER

	Frequency	Percent
Yes	6	18.8
No	26	81.3
Total	32	100.0

Table #32: Frequency of K10SR

	Frequency	Percent
Yes	6	18.8
No	26	81.3
Total	32	100.0

Table #33: Frequency of K10CE

	Frequency	Percent
Yes	4	12.5
No	28	87.5
Total	32	100.0

Table #34: Frequency of K11

	Frequency	Percent
Yes	6	18.8
No	26	81.3
Total	32	100.0

Table #35: Frequency of K12AF

	Frequency	Percent
Yes	14	43.8
No	18	56.3
Total	32	100.0

Table #36: Frequency of K12RE

	Frequency	Percent
Yes	11	34.4
No	21	65.6
Total	32	100.0

Table #37: Frequency of K12PE

	Frequency	Percent
Yes	8	25.0
No	24	75.0
Total	32	100.0

Table #38: Frequency of K13PF

	Frequency	Percent
Yes	3	9.4
No	29	90.6
Total	32	100.0

Table #39: Frequency of K13PR

	Frequency	Percent
Yes	11	34.4
No	21	65.6
Total	32	100.0

Table #40: Frequency of K13SI

	Frequency	Percent
Yes	11	34.4
No	21	65.6
Total	32	100.0

Table #41: Frequency of K13PA

	Frequency	Percent
Yes	15	46.9
No	17	53.1
Total	32	100.0

Table #42: Frequency of A1_R

	Frequency	Percent
Strongly agree	2	6.3
Agree	6	18.8
Neutral	5	15.6
Disagree	8	25.0
Strongly disagree	11	34.4
Total	32	100.0

Table #43: Frequency of A2_R

	Frequency	Percent
Strongly agree	2	6.3
Agree	5	15.6
Neutral	3	9.4
Disagree	11	34.4
Strongly disagree	11	34.4
Total	32	100.0

Table #44: Frequency of A3

	Frequency	Percent
Strongly disagree	1	3.1
Disagree	2	6.3
Neutral	3	9.4
Agree	17	53.1
Strongly agree	9	28.1
Total	32	100.0

Table #45: Frequency of A4

	Frequency	Percent
Strongly disagree	0	0.0
Disagree	0	0.0
Neutral	5	15.6
Agree	19	59.4
Strongly agree	8	25.0
Total	32	100.0

Table #46: Frequency of A5_R

	Frequency	Percent
Strongly agree	3	9.4
Agree	12	37.5
Neutral	4	12.5
Disagree	12	37.5
Strongly disagree	1	3.1
Total	32	100.0

Table #47: Frequency of A6

	Frequency	Percent
Strongly disagree	2	6.3
Disagree	1	3.1
Neutral	1	3.1
Agree	14	43.8
Strongly agree	14	43.8
Total	32	100.0

Table #48: Frequency of A8

	Frequency	Percent
Strongly disagree	0	0.0
Disagree	0	0.0
Neutral	4	12.5
Agree	18	56.3
Strongly agree	10	31.3
Total	32	100.0

Table #49: Frequency of A9_R

	Frequency	Percent
Strongly agree	1	3.1
Agree	7	21.9
Neutral	4	12.5
Disagree	13	40.6
Strongly disagree	7	21.9
Total	32	100.0

Table #50: Frequency of P1RM

	Frequency	Percent
Yes	0	0.0
No	32	100.0
Total	32	100.0

Table #51: Frequency of P1RS

	Frequency	Percent
Yes	0	0.0
No	32	100.0
Total	32	100.0

Table #52: Frequency of P1RC

	Frequency	Percent
Yes	0	0.0
No	32	100.0
Total	32	100.0

Table #53: Frequency of P1NA

	Frequency	Percent
Yes	0	0.0
No	32	100.0
Total	32	100.0

Table #54: Frequency of P2

	Frequency	Percent
Yes	20	62.5
No	12	37.5
Total	32	100.0

Table #55: Frequency of P3

	Frequency	Percent
Yes	32	100.0
No	0	0
Total	32	100.0

Table #56: Frequency of P5

	Frequency	Percent
Yes	2	6.3
No	30	93.8
Total	32	100.0

Table #57: Frequency of P6

	Frequency	Percent
Yes	8	25.0
No	24	75.0
Total	32	100.0

-END-