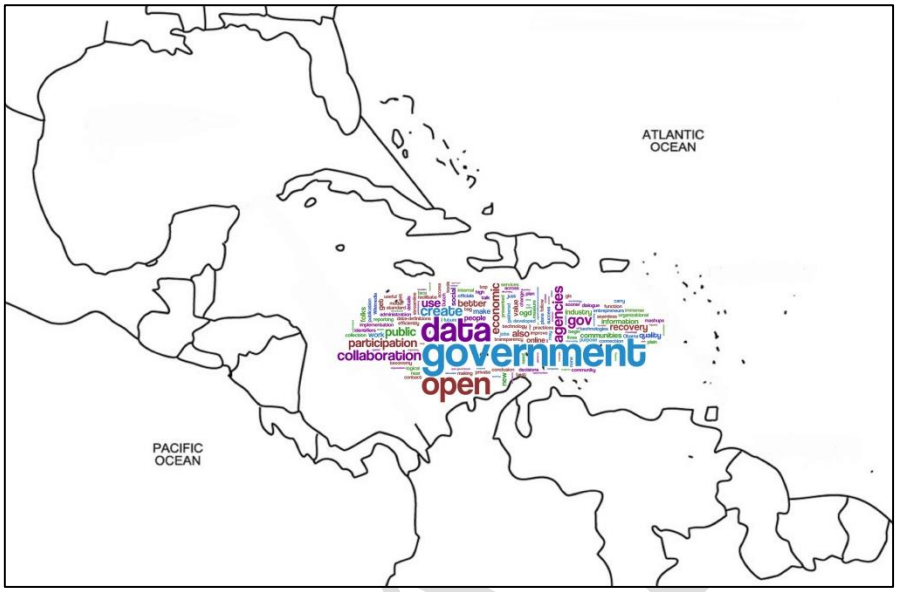
OPEN DATA AND THE CARIBBEAN GATEWAY: TOWARDS IMPROVED GOVERNANCE AND DECISION MAKING OF THE CARIBBEAN'S PROTECTED AREAS



Final Report

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Acronyms

ACP	Africa, Caribbean & Pacific group of countries
BIOPAMA	Biodiversity and Protected Areas Management Programme
CaMPAM	Caribbean Marine Protected Areas Network and Forum
CBO	Community Based Organisation
CERMES	Centre for Resource Management and Environmental Studies
COI	Caribbean Open Institute
CRFM	Caribbean Regional Fisheries Mechanism
CSO	Central Statistical Office
EAG	Environmental Awareness Group of Antigua & Barbuda
EDF	European Development fund
IDRC	International Development Research Centre
IUCN	International Union for the Conservation of Nature
JRC	Joint Research Centre (European Commission)
MPA	Marine Protected Area
NGO	Non-Governmental Organisation
OD4D	Open Data for Developing Countries
OECS	Organization of Eastern Caribbean States
OMM	Outcome Mapping Methodology
OPAAL	OECS Protected Areas and Associated Livelihoods
PA	Protected Area
SIDS	Small Island Developing States
TNC	The Nature Conservancy
UWI	University of the West Indies

Executive Summary

Open data— Open data is data that can be freely used, re-used and redistributed by anyone. This is considered a major public resource for government, citizens, the scientific research community, and the private sector, as it can aid in better decision making. Governments can use data to assess the state of various Marine Protected Areas (MPAs) and how development may affect the PA or how changes can be made to improve the socioeconomic state of the population.

This initiative, through the Caribbean Open Institute, BIOPAMA and the Caribbean Gateway aims to promote open data as a way to potentially improve governance and decision making regarding Marine Protected Areas (MPAs). This was done using two main objectives:

1. To elucidate the potential benefits to be derived, from the sharing of crucial MPA data, regarding governance and decision making
2. To promote the development and adoption of emerging open standards within the Caribbean MPA sector to stimulate innovation in planning, management and communications.

Outcome Mapping Methodology (OMM) was used in the aim of improving governance and decision making. OMM is an approach that focuses on behavioural change among groups and individuals. Five countries were selected using agreed selection criterion. For this initiative, a number of boundary partner, who directly influence the decision-making process and strategic partners, who provide support but are not part of the decision-making process were identified. These partners were contacted thorough a series of telephone/ skype calls and email correspondence. Their attitudes and responses were then monitored to assess the degree of behavioural change.

Throughout the duration of this initiative two written blogs and one video blog was produced. A research paper was also presented at the Open Data Research Symposium held in Madrid, Spain. This initiative also hopes to produce mobile application to reach the wider population in the near future. This initiative demonstrates the need for open data in the Caribbean region and also makes recommendations to help speed up the move towards open data as a means of improving governance and decision making regarding Marine Protected Areas (MPAs)/fishing communities in the Caribbean.

1 Background and Objectives

Open data is defined as data that can be freely used, re-used and redistributed by anyone - subject only, at most, to the requirement to attribute and share alike. Releasing open data is not an end in and of itself, but becomes the cornerstone of an ecosystem of actors, institutions and information flows that has the potential to create value. As reported by Noveck (2012) "The institutional players have to be prepared to collaborate with the innovators; those outside government have to know how to collaborate; civil society activists have to ensure that innovators know the problems that need solving; and research is needed to figure out what works."

This initiative was borne through collaboration between the Caribbean Open Institute (COI; http://caribbeanopeninstitute.org/) and the Caribbean Protected Areas Gateway (Caribbean Gateway; http://caribbean-rris.biopama.org/). The COI is a regional coalition of individuals and organisations that promotes open development approaches to inclusion, participation and innovation within the Caribbean, using open data as a catalyst. The Caribbean Gateway, one of four observatories that have been set up across the Africa, Caribbean and Pacific (ACP) countries, is a resource hub for facilitating and promoting viable decisions and policies by decision makers and resource managers for effective and sustainable management of protected areas and biodiversity.

The initiative explored the possibility of using open data to potentially improve governance and decision making regarding Marine Protected Areas (MPAs)/fishing communities in the Caribbean. Specifically, it sought to mobilise and visualise socio-economic data, associated with MPAs/fishing communities, via the Caribbean Gateway. In addition, it aimed to determine the attributes, value-opportunities, enablers and constraints of a potential open data ecosystem in the MPA/fisheries sector in the Caribbean.

Objectives:

- To improve understanding of the demand and use of Open Data for development in the Caribbean
- To promote the development and adoption of emerging open standards that enable open data initiatives to scale up

Vision:

Stakeholder groups associated with PAs are contributing to the sharing and openness of data that leads to the sustainable development of PAs. They make use of and benefit from data that is being used as indicators in determining the health of PAs. With that information, better decisions and policies are being made. As a result, protected areas (marine and terrestrial) and their surrounding communities throughout the Caribbean region are deriving significant benefits in all components (i.e. biodiversity, governance & management and socio-economic & livelihoods).

Mission:

The project will engage in a five-country case study which will demonstrate the value of bringing diverse datasets together to enhance innovation in planning, management and communications and investigate the social component associated with protected areas. Specific aspects of the mission include:

Noveck, B. 2012 Open data: The democratic imperative. *Crooked timber*.

• The augmenting of the Caribbean Protected Areas Gateway by identifying and obtaining additional datasets, via consultations with key stakeholders and data custodians, which address current data gaps.
• The identification of appropriate open access licensing mechanisms that will facilitate incorporation of these datasets into the Gateway.
• The development of a communication strategy, case study or mobile App to promote or demonstrate the use of open data"

2 Methodological Framework

2.1 Overview/Definitions – Outcome Mapping Methodology

Outcome Mapping Methodology (OMM), developed by the International Development Research Centre (IDRC) in Canada, is an approach to planning, monitoring, and evaluating social change initiatives. The methodology focuses on outcomes as behavioural changes, where outcomes are defined as changes in the behaviour, relationships, activities, or actions of the people, groups, and organizations with whom a program works directly (Earl *et al*. 2001). The aforementioned entities being worked directly with, for whom there is an anticipated opportunity for influence are referred to as boundary partners, those without are referred to as strategic partners.

2.2 Summary of OMM Intentional Design

The boundary and strategic partners, along with the outcome challenge/ progress reports identified for this initiative are presented in Tables 1 and 2 respectively.

Table 1 Boundary Partners

PA policy makers	Heads of Government Departments, Ministers, Parliamentary Representatives
Government agencies (data custodians)	National Statistics office, Fisheries Department, Environmental Department,
PA administration and management	Those responsible for the overall maintenance of the PA (Board, managers, data collectors)
NGOs and CBOs active in the area or working on PA-relevant topics	Environmental groups that possess data for the relevant PA or wish to see the sustainable use of the PA (EAG, OPAAL, CaMPAM, TNC)

Table 2 Outcome Challenges / Progress Markers

OUTCOME CHALLENGE: **PA POLICY MAKERS** The project intends to see PA policy makers recognising the benefits of having open data and increased data sharing (to PAs and surrounding communities nationally, regionally and internationally), the role of the Caribbean Gateway in facilitating this and thus an overall working towards developing the necessary policies and frameworks.	
EXPECT TO SEE	
1	development of policies for the sustainable use of resources to promote livelihoods
2	Active interest and support for the program initiatives
3	
LIKE TO SEE	
4	Encourage and promote open data
5	Strengthen the capacity of PA administration by serving as a vehicle for networking
6	Increase investment in protected areas, by persuading public and corporate donors of their value
7	
8	
LOVE TO SEE	
9	Implementation of open data and data sharing policies
10	development of tourism guidelines
11	Promotion of open data and the Caribbean Gateway

OUTCOME CHALLENGE: **GOVERNMENT AGENCIES (DATA CUSTODIANS)** The project intends to see Government agencies exhibiting greater data sharing, networking and collaborating among themselves and with PA stakeholders (policy makers, administration & management, NGOs, CBOs, researchers, students, residents and general public) and influencing PA policy makers.	
EXPECT TO SEE	
1	Government agencies attend meeting to be made aware of the concerns of stakeholders
2	Respond positively to the request for sharing Data
3	
LIKE TO SEE	
5	Influence policy makers
6	Give support to PA administration
7	
8	
LOVE TO SEE	
9	Implementation of open data and data sharing policies
10	Promotion of open data and the Caribbean Gateway

OUTCOME CHALLENGE: **PA ADMINISTRATION AND MANAGEMENT** The project intends to see PA administration and management collecting relevant data, utilising improved data handling, storage and analysis techniques and displaying increased sharing, networking and collaborating among PAs at the national, regional and international levels via the Caribbean Gateway.	
EXPECT TO SEE	
1	Hold meetings with stakeholders
2	Be responsible for the overall management of the PA with the help of stakeholders
3	Respond positively to the request for sharing Data
LIKE TO SEE	
4	Share knowledge/ educate persons about the issues faced and importance of PA
6	Improved PA data collection
7	Lobbying for policies that will contribute to significant benefits for biodiversity, governance & management
8	
LOVE TO SEE	
9	Work with other PA within the region (lessons learned)
10	Promotion of open data and the Caribbean Gateway

OUTCOME CHALLENGE: **NGOS AND CBOS** The project intends to see NGOs and CBOs more involved in raising awareness about the openness of data sharing as it relates to PA and influence stakeholders and policy makers.	
EXPECT TO SEE	
1	Attend and participate in stakeholder function
2	Involved in data gathering
3	Respond positively to the request for sharing Data
LIKE TO SEE	
4	Influence policy makers and stakeholders
5	If possible, assist with funding for the collection of data
6	
7	
LOVE TO SEE	
8	Greater networking and collaboration with the PA and the Caribbean Gateway
9	Promotion of open data and the Caribbean Gateway

Earl, S., Carden, F. and Smutylo, T. 2001. Outcome mapping. Build. Learn. Reflect. into Dev. programs. Ottawa Int. Dev. Res. Cent.

Table 3 Strategic partners

Strategic Partners		Description	Supporting Role
1	Funding agency	Provides grants and other forms of support to the program and related projects	Funding agency is key in getting the program started. The agency will monitor the progress of the program and request reports to ensure the objectives of the program are being met.
2	Media	Includes social media, newspaper articles, television and radio broadcasts.	Media will support the program by building awareness and highlighting the benefits
3	Member of Parliament	Members of Parliament are elected political representative for various constituencies.	The Member of Parliament who has oversight for the community will be informed about the project and its objectives; Where possible, active participation, presence in activities will be encouraged and help push policies.
4	Joint Research Centre (JRC)	The European Commission's in-house science service which supports EU Member States in implementing environmental policies and participates in international efforts to promote the sustainable use of resources and improve land-use management.	Provide technical assistance with the understanding of and the uploading of datasets to the Caribbean Gateway and GeoNode platforms.
5	Software Developers	Software developers will be contracted to build and test computer systems that help the program wok more effectively and meet set goals.	Create the technical platforms that allow the uploading of additional sources of data to the Gateway. Create visualizations that demonstrate the utility of the Gateway in a way that can be understood by policy makers for governance & decision-making

2.3 Summary of OMM Monitoring Plan

The data collection strategies, methods and monitoring tools (i.e. journals) are outlined in Table 7 (see Annex IV).

Table 4 OMM monitoring plan

Monitoring Priority	Who Will Use the Info.?	Purpose of the Info.?	When is the Info. Needed?	Who Will Collect the Info.?	How Often Will it be Collected?	How will it be Collected	Proposed Monitoring Tool
Program's Strategy:	Project Coordinator	Assess effectiveness of interventions (strategies)	Weekly Review	Research Assistant	Weekly	Logging responses to intervention s; consulting with BP's	**Strategy Journal**
Program's Organizational Practices: #2	Technical officer / Research Assistant	Assess the level of data openness	ASAP	Research Assistant	annually	surveys, interviews, secondary data	**Performance Journal**
Boundary Partner's Achievement of Outcomes: Government Agencies	Project Coordinator / Technical officer / Research Assistant	Assess the quality of data collection and how best data collected can be used by the Caribbean Gateway	ASAP	Research Assistant	annually	surveys, interviews, secondary data	**Outcome Journal**

3 Methodology

A Five country (i.e. Antigua & Barbuda, Belize, Grenada, Jamaica and St. Lucia) case study was developed and executed, June-October 2016, utilising English-speaking, ACP countries. Countries were selected via the development and administering of a selection criterion (Annex I). Key contact persons identified for each country (Annex II) were contacted via email and subsequently by either telephone or Skype calls. Open data ecosystems were subsequently assessed, via a series of questions (Annex III), and socio-economic data leveraged for inclusion and visualisation within the Caribbean Gateway. To facilitate mobilisation of the data into the Caribbean Gateway a data harvester system (http://padata.caribbeanopeninstitute.org/#/home) was developed to act as intermediary system which will function as a means for data extraction and sanitization for the Caribbean Gateway. The system will facilitate the automated extraction of data from certain electronic sources such as APIs or websites that have existing data in a programmatically useful format, while also facilitating the uploading of Excel and CSV documents for harvesting.

3.1 Program Strategies

Table 5 Strategy map

PA POLICY MAKERS			
STRATEGY	**CAUSAL**	**PERSUASIVE**	**SUPPORTIVE**
STRATEGIES AND ACTIVITIES AIMED AT A SPECIFIC INDIVIDUAL OR GROUP	• Produce a Narrative statement that describes the rationale, goals and benefits of this initiative • Write to each target Policy Maker highlighting the benefits of the program and their specific support role	• Planned workshops/ meetings (virtual) for target PA administrators to be able to utilize the Gateway and data collection mechanisms being developed	• BIOPAMA technical officer keeping contact with policy makers to give advice on what policies will be best for the PA and the Caribbean Gateway
STRATEGIES AND ACTIVITIES AIMED AT INDIVIDUAL OR GROUP'S ENVIRONMENT	• Creation of an open data policy and licensing agreements	• Inform stakeholders and the general public about planned policies and implementation phase via social media, radio and television shows. • Show how beneficial an open data policy can be	Networking among • regional and international PA the Caribbean Gateway • Between government agencies and PA administration

GOVERNMENT AGENCIES (DATA CUSTODIANS)

STRATEGY	CAUSAL	PERSUASIVE	SUPPORTIVE
STRATEGIES AND ACTIVITIES AIMED AT A SPECIFIC INDIVIDUAL OR GROUP	• Produce a Narrative statement that describes the rationale, goals and benefits of this initiative • Write to each target Policy Maker highlighting the benefits of the program and their specific support role • Request research don't that could benefit the initiative	• Planned workshops/meetings (virtual) for data custodians to be able to utilize the Gateway and data collection mechanisms being developed	• Technical officers within the Caribbean Gateway may advise the data custodians on the best practices for the collection and representation of data • Create a Data Collection platform to facilitate the collection , storage and use of data from various data owners
STRATEGIES AND ACTIVITIES AIMED AT INDIVIDUAL OR GROUP'S ENVIRONMENT	• Creation of an open data licensing agreement for data requests	• Inform stakeholders and the general public about the necessary procedures needed to obtain data via social media, radio and television shows.	Collaboration between PA management and data custodians so data can be up to date.

PA ADMINISTRATION AND MANAGEMENT			
STRATEGY	**CAUSAL**	**PERSUASIVE**	**SUPPORTIVE**
STRATEGIES AND ACTIVITIES AIMED AT A SPECIFIC INDIVIDUAL OR GROUP	• Produce a Narrative statement that describes the rationale, goals and benefits of this initiative • Write to each target Policy Maker highlighting the benefits of the program and their specific support role	• Planned workshops/ meetings(virtual) for PA Admin to be able to utilize the Gateway and data collection mechanisms being developed	Caribbean Gateway officer in regular contact with the PA Admin to provide guidance (if necessary) on pest practices in data collection
STRATEGIES AND ACTIVITIES AIMED AT INDIVIDUAL OR GROUP'S ENVIRONMENT	• Creation of an open data licensing agreement for data requests	• Inform stakeholders and the general public about PA policies, ways to access data and protection of PA via webpage, social media, radio and television shows. • Show how beneficial an open data policy can be	Networking among • regional and international PA the Caribbean Gateway • Between government agencies and PA administration

NGOs and CBOs			
Strategy	**Causal**	**Persuasive**	**Supportive**
Strategies and Activities Aimed at a Specific Individual or Group	• Produce a Narrative statement that describes the rationale, goals and benefits of this initiative • Write to each target Policy Maker highlighting the benefits of the program and their specific support role	• Planned workshops/ meetings(virtual) for NGOs and CBOs to be able to utilize the Gateway and data collection mechanisms being developed	• Caribbean Gateway officer in regular contact with the PA Admin to provide guidance (if necessary) on pest practices in data collection
Strategies and Activities Aimed at Individual or Group's Environment	• Creation of an open data licensing agreement for data requests	• Inform stakeholders and the general public about PA policies, ways to access data and protection of PA via webpage, social media, radio and television shows. • Show how beneficial an open data policy can be	Networking among • Between environmental NGOs and CBOs • Regional and international PA the Caribbean Gateway • Between government agencies and PA administration

3.2 Organizational Practices

Table 6 Organisational practices

	Key Actions
1. PROSPECTING FOR NEW IDEAS, OPPORTUNITIES, & RESOURCES	This initiative will create apps and upload information to the gateway to make information accessible. During the course of obtaining data, connections will be made with sources so that any change in data can be updated.
2. SEEKING FEEDBACK FROM KEY INFORMANTS	This initiative will seek feedback from persons or groups involved within the PA's.
3. OBTAINING THE SUPPORT OF YOUR NEXT HIGHEST POWER	This initiative holds weekly meeting with program director and technical officers to present progress reports and discuss any issues at hand.
4. ASSESSING AND (RE)DESIGNING PRODUCTS, SERVICES, SYSTEMS, AND PROCEDURES	Directors and technical officers, along with boundary and strategic partners meet regularly to discuss changes in the output of the initiative and the ability to data.
5. CHECKING UP ON THOSE ALREADY SERVED TO ADD VALUE	The initiative provides assistance to organizations who are willing to make data open.
6. SHARING YOUR BEST WISDOM WITH THE WORLD	The initiative identifies conferences relating to open data and MPAs to present its findings.
7. EXPERIMENTING TO REMAIN INNOVATIVE	
8. ENGAGING IN ORGANIZATIONAL REFLECTION	The initiative meets to discuss work being done with various partners such as environment organizations, policy makers and PA administration. Staff assessment is conducted to ensure that there are adequate human resources.

4 Boundary Partner Outcomes

4.1 Government Agencies

The project intends to see Government agencies exhibiting greater data sharing, networking and collaborating among themselves and with PA stakeholders (policy makers, administration & management, NGOs, CBOs, researchers, students, residents and general public) and influencing PA policy makers.

The initiative expected to see various Government agencies respond positively to data request which wasn't the case when first contacted but after much discussion they decided to fulfil the data request. The change in attitude was as a result of allowing them to understand the purpose of the initiatives and its benefits.

4.2 PA Policy Makers

The project intends to see PA policy makers recognising the benefits of having open data and increased data sharing (to PAs and surrounding communities nationally, regionally and internationally), the role of the Caribbean Gateway in facilitating this and thus an overall working towards developing the necessary policies and frameworks.

Acquiring data and discussing openness of data with PA policy makers proved much easier than other boundary partners. They understood clearly the benefits of having good quality data that can be made open.

4.3 NGOs and CBOs

The project intends to see NGOs and CBOs more involved in raising awareness about the openness of data sharing as it relates to PA and influence stakeholders and policy makers.

The initiative has not been able to address this challenge due to time restraint. More focus was given to acquiring data. But in the future this challenge will definitely be addressed.

4.4 PA Administration and Management

The project intends to see PA administration and management collecting relevant data, utilising improved data handling, storage and analysis techniques and displaying increased sharing, networking and collaborating among PAs at the national, regional and international levels via the Caribbean Gateway.

Most PA administration and management faced a challenge in collecting, handling and storing data due to the fact that they are short staffed. As this initiative is not in a position to provide hands on assistance, they were provided with solutions to these challenges. One of which was the inclusion of higher learning institutions by allowing students to community service or internships.

5 Project Outputs and Dissemination

5.1 Blogs

Three blogs, two written (see Annex V) and one video blog, have been produced throughout this initiative. The blogs served as interim reports, tracking the progress of the initiative, and a means for dissemination of information. The blogs have been primarily disseminated through the COI website (http://caribbeanopeninstitute.org) and via periodic newsletters produced by the Centre for Resource Management and Environmental Studies (CERMES). The blogs have also been shared via various social media webpages (i.e. Twitter and Facebook).

One of the blogs was also featured as an article (see section 8.5.2) on the Biodiversity and Protected Areas Management (BIOPAMA) Programme website (http://www.biopama.org/learn_more/build-it-and-they-will-come-open-data-fallacy). The article provides an insight in the work of the Caribbean Gateway and how it engaged stakeholders for data sharing.

BIOPAMA is a four year-initiative (2012-2016) of the ACP Secretariat funded by the European Union which aims to address threats to biodiversity in ACP countries (via regional observatories such as the Caribbean Gateway), while reducing poverty in communities in and around protected areas.

5.2 Research Symposium paper

A synthesis paper focusing on open data initiatives within three sectors (i.e. tourism, agriculture and PAs) was produced and presented at the Open Data Research Symposium held in Madrid, Spain in October 2016. The abstract for the paper entitled 'Open Data as a Catalyst for Problem Solving: Empirical Evidence from a Small Island Developing States (SIDS) Context' is presented in Annex VI.

5.3 Visualisations via the Caribbean Gateway

The data harvesting system (http://padata.caribbeanopeninstitute.org/#/home) is currently still in development stage but has been configured to harvest CSV and Excel format data, with potential expansion to other data formats. Application Program Interfaces (APIs) are automatically generated which allow communications and harvesting by the Caribbean Protected Areas Gateway, thus making visualisation of the data possible.

5.4 Potential outputs

A future potential output is that of a mobile application that can be used by average citizens, students, researchers, and decision makers. The creation of this mobile would display PA data in a digestible format that could be understood by all and serve to direct more traffic to the Caribbean Gateway, thus increasing its usage.

6 Effectiveness in Program Delivery

6.1 Program Strategies

A narrative statement was produced that describes the rationale, goals and benefits of this initiative that would better help data custodians understand the need for open data. Meetings were also planned for PA administrators and data custodians to be able to utilize the Gateway and assist with ways in which data can be collected within the PA.

In terms of publicizing the Gateway, partners were encouraged to circulate a flyer within their various departments. They were further encouraged to suggest ways in which the Gateway can be further improved and provide data the will allow that.

6.2 Organizational Practices

Bi monthly meetings were held to update those involved on progress made. Issues at hand were dealt with and steps were made to resolve them if possible. Log responses from questions posed to partners and informants were kept. The information stored in the log was used to follow up on data request. For those willing to provide data, licensing agreement was drafted and forwarded. They were also informed as to how data will be used.

6.3 Strategic Partners

After the collection of data, it was handed over to specific Strategy partners (Software Developers) as they are responsible for the creation of technical platforms that allow the uploading of additional sources of data to the Gateway. This strategic partner was also charged with creating visualizations that demonstrate the utility of the Gateway in a way that can be understood by policy makers for governance & decision-making.

7 Overall Conclusions and Recommendations

7.1 Mission Outcome & Progress towards Vision

The initiative has been relatively successful, given the limited time period for which it has been executed, in raising awareness about the much needed open data movement within the Caribbean Region. The limited time period simply facilitated initial steps to be taken but unfortunately did not allow for significant advancements in innovation planning, management and communications development. The selected countries, chosen in part because of their advancement in open data readiness, highlighted the significant distance still to be travelled to become a region realizing the full potential of the data sets possessed.

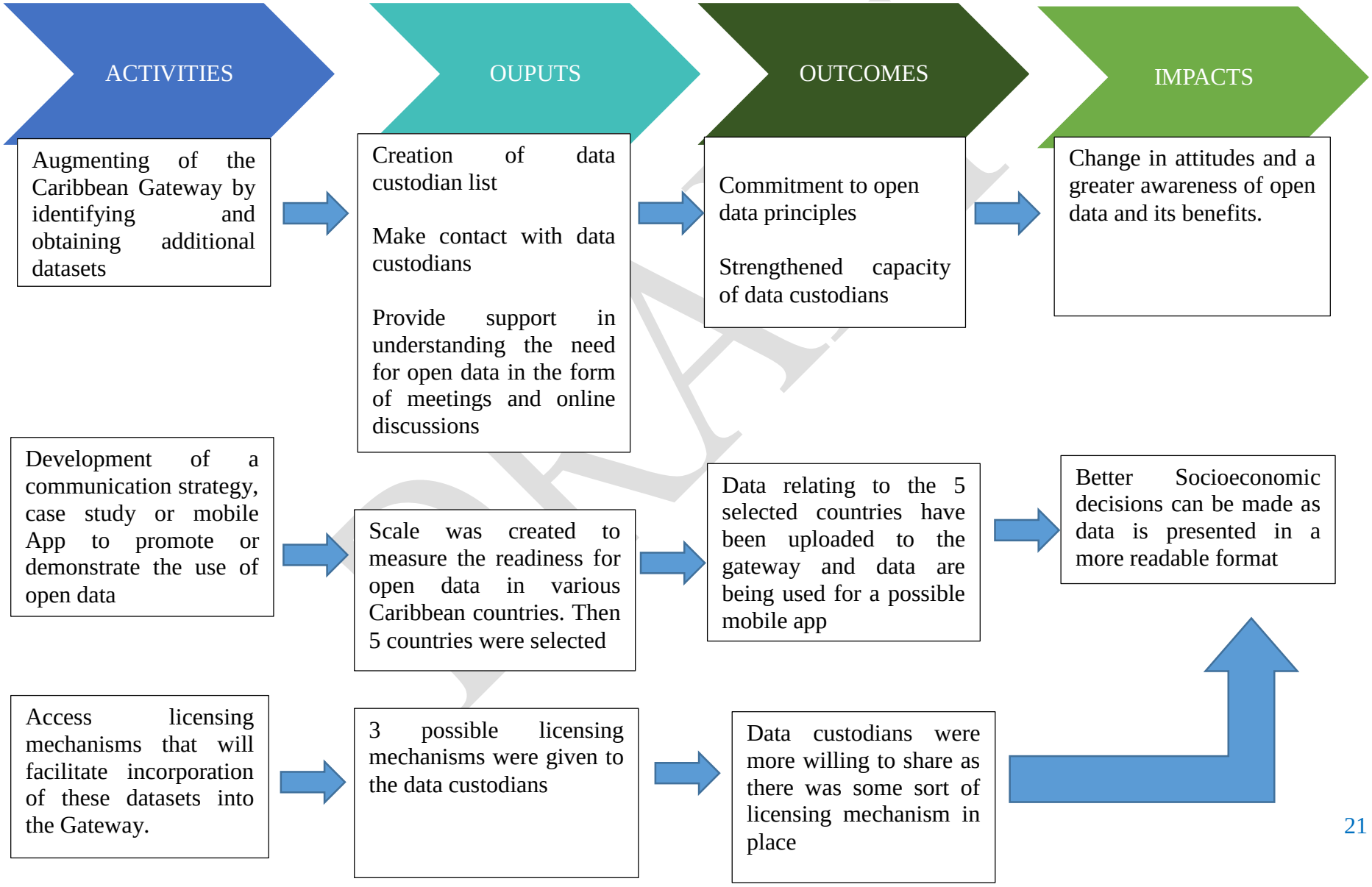
The initiative has facilitated the augmenting of the Caribbean Protected Areas Gateway via the identification of and obtaining of primarily socioeconomic datasets. Throughout that process, key stakeholders and data custodians were identified and crucial partnerships and linkages were born.

The vision outlined previously for open data as it relates to the protected areas sector within the Caribbean Region is definitely some ways away from being realized. Entities, organisations, personnel, decision and policy makers have to be truly educated and made aware of the potential of bringing datasets together to create the 'big picture' and allow for better decisions to be made. In conjunction, the managers and decision makers need to identify the types of data required; data infomediaries need to become common place as a go-between regarding data custodians and those relying on the data; data collection methods need to be standardized.

One key potential method of addressing the above mentioned issues are to go from issues/problems to the required data rather than from data to decision. One identified method would be to tackle distinct issues with the protected areas sector by opening up the required datasets need to make an informed decision. The development of success stories and use cases would therefore serve as promotion and incentives for buy-in throughput the region and thus driving the open data movement forward.

Without a doubt, many challenges still remain, primarily stemming from limited human and financial resources, limited technical capabilities and varied perceptions about data and its ownership and usage. Another key insight gathered from the initiative is the role of funding agencies in assisting with the promotion of open data. Perhaps writing the openness of data generated in projects, into proposal and grant funding presents one avenue for driving the open data movement and assisting with the development of open data ecosystems.

7.2 *Theory of Change*



7.3 Conclusions & Future Research

The need for open data and the potential benefits to be derived cannot be easily denied. The path towards such is however not as straight forward. Players and stakeholders at all levels have to have a change in mind-sets, to allow for data to be utilised in the decision making process and data holders to feel comfortable sharing their data. The value of entering into this open data ecosystem has to be apparent to all involved to ensure equal access and benefits sharing.

This initiative only covered a subset of the Caribbean Region and would therefore need to be conducted in the other countries to facilitate a greater movement. The relative success of the initiative has indicated that scalability to the rest of the region should be quite achievable and an area of high priority moving forward.

Key areas to be addressed moving forward would include:

- More ground work needs to be done to gather socioeconomic data on a PA level
- Stronger bonds should be made with protected areas for them to begin the collection of data
- Formation of a group to include statistical offices, PA administrators and the gateway to allow ease of updates
- Public drive to publicize the need for open data
- Connect with institutes of higher learning, students and staff can use the information for research purposes
- greater involvement of data infomediaries
- greater use of data in the decision making process
- greater involvement of funding agencies to help drive the open data movement
- development of success stories and use cases where the opening up and bringing together of datasets were able to solve or resolve issues
- greater use of technology (e.g. apps) to promote the visualisation aspect of open data

8 ANEXES

8.1 Annex I Country selection

Criteria used for country selection

C1 Link(s)/contact(s) to/with existing functional stakeholders
C2 Existing open data policy/ open data readiness
C3 Availability of additional non-census data
C4 Data format

Scoring for each criterion
1 - extremely low, 2 - low, 3 - average, 4 - high, 5 - extremely high

Rank	Country	C1	C2	C3	C4	Score
1	Belize	4	4	5	5	18
2	St. Lucia	5	4	4	4	17
3	Grenada	4	3	5	3	15
4	Antigua and Barbuda	5	3	3	3	14
5	Jamaica	5	4	1	4	14
6	Dominica	4	4	3	3	14
7	Trinidad and Tobago	5	4	1	4	14
8	Bahamas	3	3	4	3	13
9	Barbados	5	2	3	3	13
10	St. Kitts and Nevis	2	3	3	4	12
11	St. Vincent and the Grenadines	2	3	3	4	12
12	Guyana	3	4	1	1	9

8.2 Annex II People interviewed / Focus Groups

Country	ID	Person	Institution	Contact Info.
Regional	1	June Masters	The Caribbean Regional Fisheries Mechanism	(784) 457- 3474
Antigua	2	Stachel Edwards	Antigua Statistics Office	1-268-462-0451
Antigua	3	Philmore James	Ministry of Fisheries	1 268-462-6106
Antigua	4	Environmental Awareness Group (EAG)	Environmental Awareness Group (EAG)	(268) 462-6236
Belize	5	Statistical Institute of Belize	Statistical Institute of Belize	501 822-2207
Grenada	6	Tamica George	Grenada Statistics Department	(473) 440-1369
Jamaica	7	Statistical Institute of Jamaica	Statistical Institute of Jamaica	(876)-630-1600
St Lucia	8	St Lucia Statistic Office	The Central Statistical Office (CSO) of Saint Lucia	1 758 452 3716
St Lucia	9	Chamberlin Emmanuel	The Organisation of Eastern Caribbean States (OECS)	758-455-6327

8.3 Annex III Open Data ecosystem assessment questions and responses

QUESTIONS

1. Have you heard of the Caribbean Protected Areas Gateway (Caribbean Gateway) and or the BIOPAMA programme?

2. Have you ever visited the online portal and utilised the information available?

3. What are your thoughts on open data?

4. What is the extent of openness of the data you possess?
    a. is the data in digital format
    b. is the data publicly available
    c. is the data available for free
    d. is the data available online
    e. is the data machine readable
    f. is the data available in bulk (whole data set available)
    g. is the data openly licensed
    h. is the data provided on a timely and up to date basis

5. What licenses, if any, do you currently utilise for your data?

6. What are the present constraints to having open data?

7. What types of data does the CRFM possess?

8. What do you use the data for?

9. What data are used to formulate policies?

10. What datasets can be made available to the Caribbean Gateway?

RESPONSES

SURVEY QUESTIONS	**Name**				Chamberlin Emmanuel	June Masters	Stachel Edwards	Philmore James	Statistical Institute of Belize	St Lucia Statistic Office	Grenada Statistics Department	Statistical Institute of Jamaica	Environmental Awareness Group (EAG)
	Question 1				NO	NO	YES	YES	NO	NO	NO	NO	YES
	Question 2				NO	NO	NO	NO	NO	NO	NO	NO	
	Question 3				FOR	FOR	FOR	FOR	FOR	FOR	FOR	FOR	FOR
	Question 4	**a**			YES	YES	YES	NO	YES	YES	YES	SOME	
		b			YES	SOME	SOME	-	YES	YES	YES	YES	
		c			YES	YES	YES	-	YES	YES	YES	SOME	
		d			YES	YES	NO	-	YES	YES	NO	SOME	
		e			NO	NO	NO	-	YES	YES	YES	YES	
		f			YES	YES	YES	-	YES	YES	YES	YES	
		g			NS	NS	YES	-	YES	YES	YES	YES	
		h			NO	YES	YES	-	YES	YES	YES	YES	
	Question 5				NS	NS	OPEN	-	OPEN	OPEN	OPEN	OPEN	
	Question 6				-	-		COST OF COLLECTION / LIMITED PERSONEL					
	Question 7				Variety of Data	fisheries	census	beach monitoring	census	census	census	census	

	Question 8				Reports (Gov't use for decision making)	policies relating to fisheries	Reports (Gov't use for decision making)	Reports (Gov't use for decision making)	Reports (Gov't use for decision making)	Reports (Gov't use for decision making)	Reports (Gov't use for decision making)	Reports (Gov't use for decision making)	
	Question 9					over fishing, species		-					
	Question 10				all data needed that is considered open	fish catch, species, # of fishermen	census but not community based	none	census but not community based	census but not community based	census	census	
	Progress Made				Data sent	Data sent	Data sent		permission given to download data	permission given to download data	Data sent	permission given to download data	

8.4 Annex IV Journals

8.4.1 OUTCOME JOURNAL

WORK DATING FROM/TO: June-October 2016
CONTRIBUTORS TO MONITORING UPDATE: Dionne Carbon

OUTCOME CHALLENGE: The project intends to see Government agencies exhibiting greater data sharing, networking and collaborating among themselves and with PA stakeholders (policy makers, administration & management, NGOs, CBOs, researchers, students, residents and general public) and influencing PA policy makers.		
LOW = O **MEDIUM = OO** **HIGH = OOO** Low = 0– 40%, Medium = 41– 80%, High = 81–100%)		
EXPECT TO SEE		**Who?**
LMH		
	Government agencies attend meeting to be made aware of the concerns of stakeholders	
OO	Respond positively to the request for sharing Data	
Like to see		
OOO	Influence policy makers	
OOO	Give support to PA administration	
Love to see		
OOO	Implementation of open data and data sharing policies	
OOO	Promotion of open data and the Caribbean Gateway	

DESCRIPTION OF CHANGE: Some boundary partner's attitude towards data openness changed. they were more willing to provide data need to improve the gateway**.**
CONTRIBUTING FACTORS & ACTORS: A number of meeting held with the boundary partners helped to explain why open data with PA is needed.
SOURCE OF EVIDENCE: Data received
LESSONS & REQUIRED PROGRAM CHANGES/REACTIONS: More time is needed to engage boundary partners to help establish open data policies for those who do not have and to have an increase in workshops and training opportunities to help manage and make use of data.

8.4.2 STRATEGY JOURNAL

STRATEGY TO BE MONITORED: COLLECTION OF DATA	**STRATEGY TYPE:**
DESCRIPTION OF ACTIVITIES **(What did you do? With Whom? When?)**	• compiled list of data needed • compiled list of data custodians • sent out email/ made calls to data custodians between July 1st and 15th
EFFECTIVENESS? **(How did it influence the change in the boundary partner(s))**	• most data custodians were willing to assist • a few needed to be persuaded as to why open data can be beneficial • eventually most custodians saw the need for open data and how it can lead to better decision making
OUTPUTS	• data visualization • assessment of the open data ecosystems
REQUIRED FOLLOW-UP OR CHANGES	• follow-up emails and call will be made to data custodians
LESSONS	• more time needed to engage partners so quality data can be obtained

8.4.3 PERFORMANCE JOURNAL

PRACTICE 1. PROSPECTING FOR NEW IDEAS, OPPORTUNITIES, & RESOURCES

EXAMPLE OR INDICATORS
a questionnaire was created to track responses of data custodians

SOURCE OF EVIDENCE:
response log

LESSONS:

PRACTICE 2. SEEKING FEEDBACK FROM KEY INFORMANTS

EXAMPLE OR INDICATORS:
a total of 50 emails and counting has been sent out.
Records of answers to questionnaire

SOURCE OF EVIDENCE:
survey log

LESSONS:
keeping records makes it easier to monitor respondents who were positive about open data

PRACTICE 3. OBTAINING SUPPORT OF YOUR NEXT HIGHEST POWER

EXAMPLE OR INDICATORS

weekly meetings with highest power

SOURCE OF EVIDENCE:

report is sent out after every meeting

LESSONS:

having regular meetings helps keep those involved informed and there is greater input

PRACTICE 4. ASSESSING & (RE)DESIGNING PRODUCTS, SERVICES, SYSTEMS, AND PROCEDURES

EXAMPLE OR INDICATORS
No changes have been made to the initiative

SOURCE OF EVIDENCE:
LESSONS:

PRACTICE 5. CHECKING UP ON THOSE ALREADY SERVED TO ADD VALUE

EXAMPLE OR INDICATORS
calls made, emails sent to remind partners of data request and to discuss the need for data openness

SOURCE OF EVIDENCE:
emails, survey log

LESSONS:

PRACTICE 6. ORGANIZATIONAL REFLECTION & SHARING YOUR BEST WISDOM

EXAMPLE OR INDICATORS

SOURCE OF EVIDENCE:

LESSONS:

PRACTICE 7. EXPERIMENTING TO REMAIN INNOVATIVE

EXAMPLE OR INDICATORS

SOURCE OF EVIDENCE:

LESSONS:

PRACTICE 8. ENGAGING IN ORGANIZATIONAL REFLECTION

EXAMPLE OR INDICATORS

SOURCE OF EVIDENCE:

LESSONS:

8.5 Annex V Blogs

8.5.1 OPEN DATA AND THE CARIBBEAN GATEWAY: CONTRIBUTING TO SUSTAINABLE MANAGEMENT OF PROTECTED AREAS

What's in the future for Marine Protected Areas (MPA) data sharing and access? Here in the Caribbean there are two possible data futures, open or closed. A closed future would mean that data collection, sharing and use are limited. Whereas an open future is one where data collected is shared and open to the public and can be used by various organizations to inform policy or decision making. With an open data future for MPAs, governments, businesses and civil society collect, use and publish data openly, so anyone can access it. But the hope is that the aggregation of multiple datasets will paint a bigger picture in terms of what needs to be done and what decisions will benefit the MPAs.

This is the goal of the Caribbean Protected Areas Gateway, linking data to better decisions on the Caribbean's protected resources. The Caribbean Gateway was established under the Biodiversity and Protected Areas Management Programme (BIOPAMA) as a resource hub for facilitating and promoting viable decisions and policies by decision makers and resource managers for effective and sustainable management of protected areas and biodiversity. BIOPAMA is an initiative of the Africa, Caribbean and Pacific (ACP) Group financially supported by the European Union's 10th European Development fund (EDF) and is jointly implemented by IUCN, the European Commission Joint Research Centre (EC-JRC) and the Access and Benefit Sharing (ABS) Initiative. The Gateway is hosted by the University of West Indies (UWI) and located in the Centre for Resource Management and Environmental Studies (CERMES), Cave Hill campus. With access to better data and analytic tools, MPAs can be monitored and assessed to recognize any changes, be it positive or negative (better outcomes), and determine what decisions can be made to mitigate (better policies and decisions).

Now we need to be reminded that we are in the Caribbean where, culturally, most data are often considered top secret. Many government agencies are reluctant to share data internally. So, imagine this initiative reaching out to these partners seeking data, "nuff road blocks"!! Being sent around on a wild goose chase to find the data custodian who is never in office or just stepping out when you called. Or those who are on vacation until late August and there is no one else who can help out. So I am here thinking that I am alone in the Universe (as Arthur C. Clarke said). Then voila! you get in touch with a few like-minded persons who understand the need for open data and are willing to help. After the talking and interaction there is a better understanding of why data is not being shared, not that I agree, but I understand.

This is why so many gaps exist here in the Caribbean. Data does exist but it is not being shared. For example, fisheries divisions may have information about the number of fishermen and fish catch within a community, and community development or gender affairs offices hold data on employment, livelihoods and education. The problem is that there is no merging of these data, so no informed decision can be made. An MPA manger may decide to implement policies that will lead to an expansion of a MPA, but as a result of limited availability to data the manager may not fully understand how it will affect the community. Will fish catch

decline? Will fishermen change trade and become masons? Will they be able to provide for their families (food, education)? All these are questions that need to be considered before decisions are made. And with the absence of open data or data sharing a lot more uninformed decisions will be made.

The Caribbean Gateway Open Data initiative seeks to demonstrate the value of bringing diverse datasets together to enhance innovation in planning, management and communications and effective decision-making about Protected Areas. The initiative is picking up momentum, datasets are slowly coming in, relationships are being built with various agencies and data custodians. Change is the law of life; data will need to be updated, so fostering good relationships would create a willingness to assist in the future.

"A rolling stone gathers no moss." Although the Caribbean Gateway will focus on PAs, it's a start! We begin with just data relating to PAs but the possibilities are endless. If data custodians realize the benefit of sharing data with the Caribbean Gateway, they may be influenced to do the same with other kinds of government data. Think of the possibilities!!

8.5.2 BUILD IT AND THEY WILL COME: AN OPEN DATA FALLACY?

The Caribbean Gateway is a resource hub for facilitating and promoting viable decisions and policies for effective and sustainable management of protected areas and biodiversity, established by the BIOPAMA programme and hosted by the Centre for Resources Management and Environmental Studies (CERMES) UWI.

Part of the vision of the Caribbean Gateway includes the sharing and openness of data that leads to the sustainable development of the Caribbean's protected areas. One of the first steps to achieving this vision was to get data custodians on board. During the many interactions with the various boundary partners (i.e. key stakeholders whose behaviors we aim to influence positively), there were a few recurring responses giving reasons why they are not willing to share data. One reason was that it was the first time hearing about the Caribbean Gateway, and that's understandable. They needed to ensure that the initiative is legit. So we moved along setting up meetings via Skype and phone calls to properly explain the purpose of the Gateway.

The intent was that by the end of this meeting they would fully understand the purpose of the Gateway and would be literally willing to hand over data on a "silver platter" as they suddenly converted to pro-open data. Sadly, not all were willing to do so, but the majority of boundary partners who had data in their possession responded positively to the prospect of open data and were willing to assist. Some even made recommendations to help improve the Gateway by suggesting types of data that might be useful to decision making in and around PAs.

So we are finally on track to getting data from various groups that we consider boundary partners. But it now seems like getting them on board was just the beginning. They are willing to provide data, but they just don't have much data to offer. Most of the data custodians, especially the PA administrators, highlighted challenges that limit the type and quality of data in their possession. These include:

- Inadequate human resources to deal with data collection- Non-profit organizations complain about limited human resources that have hindered their ability to collect required data. Limited staff means that limited quantity and quality data will be collected.
- Funding for data collection is limited- There is a cost to data collection. If there are not enough volunteers, then persons have to be paid to gather the necessary information. Depending on the cost of data collection, organizations gather information that is not nearly enough to make any informed decisions
- Relatively new to open data - Others actually are not aware of the benefits of open data so have never considered making data collected open or even publishing the data.

These challenges, however, create opportunities for increased awareness-building, advocacy and demonstration that opening and sharing data can actually mitigate some of the challenges of limited resources, with the ultimate goal of changing attitudes and behaviors towards open data. Most of the interactions with data custodians were either through telephone calls or Skype calls. With respect to the lack of human resources and funding, partners were advised to seek voluntary assistance from higher learning

academic institutions to help collect data. Most of these schools make it mandatory that students engage in community development to be eligible for graduation. So in this case everybody wins. The students volunteer their services and are given approval for graduation, and the boundary partner receives data collection services and also data at no charge. A crash course was also given to partners to discuss the concept of open data, its benefits and various open data licensing agreements.

Now that we have addressed many of the issues that boundary partners face with sharing data, we can now look forward to the actual uploading of data to the Gateway. But let's take a step back for a minute here and consider this: what if all that data is uploaded and no one makes use of it? A total waste, right? I agree that this would be a complete wasted effort and worse, make it difficult to convince boundary partners of the merit and value of open data for future or sustained initiatives! We therefore need to ensure that the Gateway has data that will be used by those involved such as policy makers and researchers. After much discussion with boundary partners there is a better understanding of what type of data is most beneficial. That has made choosing datasets a bit easier.

Attaching an open license agreement also makes users feel more comfortable. We have all been there, when we want data but we are given a form to complete asking for all sorts of questions that is considered unnecessary and then we decide "nah", we will find some other way to get the information. We will also be creating, through this initiative, visualizations that demonstrate the power of integrating data of various types from multiple sources to create compelling narratives and enhance understanding of our protected areas and their socio-economic contexts.

Just as importantly, the Caribbean Gateway and open data have to be made discoverable by the average person that we want to reach, to influence, through the use of social media (Facebook, Twitter, Instagram). But I am not talking about only creating a page and waiting for persons to happen along and find this page by accident, like it, and never to return. I am thinking about innovative options such as Thunderclap. This is basically a tool that allows your message to be heard when you and your friends broadcast a message at the same time. Think of it like this: if the Gateway has 500 friends combined between Facebook, Twitter and Instagram, they will all share the message at the same time, kind of like a flash mob, but online. This on its own can generate endless traffic.

Many Open Data initiatives fall prey to the fallacy of "Build it and they will come" by focusing only on supply-side engagements, and publishing data that is not informed by real user needs or interest. By actively considering the needs of PA administrators, policy makers and researchers and creating visual tools to increase data accessibility and understanding, we hope to mitigate this fallacy to make way for our vision of a new "Open Data Reality" where the sharing and openness of data contributes to the sustainable development of the Caribbean's protected areas.

8.6 Annex VI Research Symposium Paper abstract

Open Data as a Catalyst for Problem Solving: Empirical Evidence from a Small Island Developing States (SIDS) Context
Maurice McNaughton, Michelle McLeod, Matthew McNaughton, Julian Walcott

Regardless of whether the philosophical driver for a particular open data initiative is increased government transparency, improved public service delivery, enhanced government-citizen collaboration, or a stimulus for innovation & entrepreneurship, opening up data provides a catalyst for problem solving that is relevant across many different sectors, social contexts and data communities.

Central to this problem-solving mantra is the remarkable convening power that open data engenders in bringing together government officials—who have both access to data and an understanding of key policy problems—with stakeholders, domain experts and innovators from outside government, across different countries and different sectors, around shared problem spaces and practical problem solving. The kind of "Big Tent" philosophy espoused by Weinstein & Goldstein (2012).

This problem-centric approach has always been an imperative for the emerging Open Data landscape in the Caribbean. In addition to the resource constraints typical of developing contexts, the Small Island Developing states (SIDS) of the Caribbean are challenged by limited scalability as well as cultural and institutional norms that typically forego the use of data, and other forms of evidence, for policy and decision making. In this setting, the open data narrative demands tangible returns on the investment of scarce resources, if it is to compete for political attention and problem-solving has become the dominant means of a resonant discourse.

This paper synthesizes findings and insights from three (3) sector-specific case studies implemented in Caribbean countries under the Open Data for Developing Countries (OD4D) Research Program. Each of these cases was conceptualized and anchored by a clearly-defined and scoped Problem Statement and the Outcome Mapping Methodology (OMM) is employed for the research design, monitoring and evaluation. This allows for a rich documentary account of how the behaviour, relationships and actions of the target individuals and institutional actors are affected as a result of the open data intervention. This collection of case studies inform and help to synthesize a distinctive "Theory of Change" about Open Data in the Caribbean, and provide practical, justifiable evidence of the significant opportunity that open data represents for the Caribbean community. This represents a timely contribution that will augment and help to amplify the effectiveness of imminent government-led Open Data initiatives in the region.

Keywords: Caribbean Open Institute; open data and problem-solving; outcome mapping methodology; Caribbean