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Survey of the regional science-policy interface for ocean governance in the Wider Caribbean Region

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Sustainable Management of the shared Living Marine Resources of the Caribbean Large Marine Ecosystem (CLME) and Adjacent Regions

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Survey of the regional science-policy interface for ocean governance in the Wider Caribbean Region

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Contents

Acronyms

ACS	Association of Caribbean States
AIMS	Africa, Indian Ocean, Mediterranean and South China Sea SIDS
ARAP	Autoridad de los Recursos Acuáticos de Panamá
CANARI	Caribbean Natural Resources Institute
CARICOM	Caribbean Community and Common Market
CCA	Causal Chain Analysis
CCCCC	Caribbean Community Climate Change Centre
CEHI	Caribbean Environmental Health Institute
CERMES	Centre for Resource Management and Environmental Studies
CIMAB	Regional Activity Centre for the LBS Protocol (Cuba)
CITES	Convention on International Trade of Endangered Species
CLME	Caribbean Large Marine Ecosystem
CNFO	Caribbean Network of Fisherfolk Organisations
CRFM	CARICOM Regional Fisheries Mechanism
CSC	Caribbean Sea Commission
CSI	Caribbean Sea Initiative
CSME	CARICOM Single Market and Economy
CTO	Caribbean Tourism Organisation
EAF	Ecosystem Approach to Fisheries
EBM	Ecosystem-based Management
EEZ	Exclusive Economic Zone
FAO	Food and Agricultural Organization
GCFI	Gulf and Caribbean Fisheries Institute
GDP	Gross Domestic Product
GEF	Global Environmental Fund
ICCAT	International Commission for Conservation of Atlantic Tunas
INFOPESCA	(International organisation for development of fisheries and aquaculture)
IOCARIBE	Inter-governmental Oceanographic Commission – Caribbean Subcommision
IPCC	Intergovernmental Panel on Climate Change
IUU	Illegal, Unregulated and Unreported (fishing)
IW	International Waters
LAPE	Lesser Antilles Pelagic Ecosystem Project
LME	Large Marine Ecosystem
LMR	Living Marine Resources
MCS	Monitoring, Control and Surveillance
MPA	Marine Protected Area
NGO	Non-Governmental Organization
OECS	Organization of Eastern Caribbean States
OSPESCA	Organization of the Fishing and Aquaculture Sector of the Central American Isthmus
RSMAS	Rosenstiel School of Marine and Atmospheric Science
SAP	Strategic Action Programme
SIDS	Small Island Developing States
SPAW	Protocol Concerning Specially Protected Areas and Wildlife
TDA	Transboundary Diagnostic Analysis
TNC	The Nature Conservancy

TWAP	GEF Transboundary Waters Assessment Project
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme
UWI	University of the West Indies
WCR	Wider Caribbean Region
WECAFC	Western Central Atlantic Fishery Commission

Summary

The Caribbean Large Marine Ecosystem and Adjacent Areas (CLME) Project (www.clmeproject.org) aims to improve the management of shared living marine resources (LMR) within the Wider Caribbean Region (WCR). Its Causal Chain and Transboundary Diagnostic Analyses have identified weak governance as a root cause of the problems facing these social ecological systems. The CLME Project is designed to begin the process of building the framework for the WCR through a series of targeted 'learning by doing' activities aimed at specific parts of the framework and at testing the effectiveness of the LME Regional Governance Framework (RGF) concept. One of the fundamental units of action and analysis in this process is the policy cycle. Policy cycles may span a single level or multiple levels of governance (i.e. national, sub-regional/regional, global) through linking and nesting. Integral to any fully functioning policy cycle is the communication of marine science data and information, through the stages of the cycle, ultimately for use in marine policy decision-making. The networks of ties between science and policy constitute science-policy interfaces. In order to develop a regional science-policy interface for ocean governance we must understand what currently exists. This will assist the project to develop an Information Management System (IMS) and Regional Environmental Monitoring Programme (REMP) to track the status and long-term WCR trends in fisheries, habitat degradation, pollution and other issues.

According to an international panel of scientists assembled in the UNEP Foresight Process on Emerging Environmental Issues for the 21st century, the cross-cutting issue "Broken Bridges: Reconnecting Science and Policy" is the fourth most pressing one confronting the world today in efforts to achieve sustainable development. This report, following a brief review of literature on the topic, describes the process and product of an interview investigation of the science-policy interface in the WCR conducted as part of the RGF consultancy with the CLME project. The report contributes to developing the RGF and formulating a Strategic Action Programme (SAP) as the next major stage of the CLME project. The target audiences are all CLME participants and interested parties. Findings should be of particular interest to those dealing with the IMS and REMP.

Twenty countries and four regional organisations were surveyed, resulting in 103 respondents from 73 interviews across the organizations and government ministries concerned with environment, fisheries, foreign affairs and tourism that were targeted. Most of the respondents were from fisheries ministries. Just over half of the 20 countries had English as their official language (Figure 7) and about the same proportion were islands. Five of the eight continental countries in Central and South America were Spanish-speaking and one was Dutch. Few ministers agreed to be interviewed, but almost half of the respondents were high level policy advisers (Vice-Ministers and Permanent Secretaries) who interact directly and frequently with policy makers. Lower level policy advisers were the heads of administrative, technical or planning units. The survey covered the topics listed below.

- Typical meeting situation
- Main purpose, context
- Source organisations
- Constraints on information use
- Public perception sources
- Information sharing
- Regional versus international
- Demand for information
- Top three information demands
- Ranking of top three
- Any other points to make
- Information fit into governance

Even high level policy advisers said that they had less experience of regional marine policy meetings than technical meetings. Policy discussions which used marine science extensively were infrequent. When used it was mainly as background information, as input into decision-making and for negotiation. Respondents identified CRFM, UWI, FAO/WECAFC and OSPESCA as the top four credible regional marine

science source organisations. Credibility was due to features such as maintaining academic standards of quality assurance, having a well respected “brand” name from long length of good service to the region, formal organisational mandate, frequency of interaction with others, a history of information sharing and a culture of research. Patterns emerged as to organisations being credible for a variety of reasons.

Constraints on use of science included lacking capacity, science not being provided in policy-relevant format, not having easy access to databases and low policy demand for science. There are no good regional level sources of information on public perception concerning issues of concern to science and policy. There is little transboundary marine science information sharing except through informal social networks. Respondents usually had more experience of the use of marine science information in policy meetings at the international level than at the regional level. The absence of a culture of evidence based or informed policy-making in the region must be addressed before there will be any significant change in use of properly packaged science.

Few regional marine policy meetings included information related to marine sector GDP, employment and EEZ matters. Some meetings included tourism, ecosystem health and the marine mandates of organizations. Most meetings included marine science related to disaster risk reduction or management, climate change and fisheries. Time-series charts or other graphics showing trends in a simple fashion were clear preferences for the communication of science information. Overall, fisheries management then ecosystem health then climate change were predicted to be the top three types of information most likely to be in demand for marine policy in the future. There was a strong perception of a large gap between marine science and marine policy with only a few places of strong connection such as in the meetings concerning climate change. Underpinning and sustaining this gap are fundamental deficiencies such as a low level of science culture and capacity that pervades society generally, not only the policy domain or marine matters.

An analytical framework focusing on external influences, political context, science and evidence, links and networks was used to distil the results and develop the recommendations below. We recommend:

- that any strengthening of the science-policy interface at regional level not be perceived or implemented in ways that serve to weaken or disconnect interfaces at the international level that should be maintained or further strengthened
- that the IMS-REMP be designed to incorporate best practices at the international level not only from science and technology perspectives, but also from appropriate information management, advocacy and communication research. We recommend that countries and organisations in the region task their staff and delegates to seek skills transfer from suitable international actors and projects to enhance the regional science-policy interface
- that outreach be made to key actors of the science-policy interface at all stages of the major policy processes in the region in order to sensitise them to possible areas for improvement
- we recommend that the general public be targeted in communication campaigns on use of marine science as part of the IMS-REMP, national science programmes and organisational work plans
- establishing mechanisms for much greater input from the general public, perhaps via civil society organisations, into policy and developing clear public opinions at the regional level on topics due for policy decision-making
- urgent attention to making scientific information of all types (i.e. both natural and social science, and interdisciplinary studies) more available from regional databases to many levels of users

- that the science-policy interface be investigated more thoroughly from a resilience perspective in order to determine where to make the most strategic interventions for success and the leverage of resources for further change
- that development of the IMS-REMP, coordinated with national information systems, be strategic into the SAP phase by taking advantage of areas of critical mass for enhancing interfaces
- that CLME stakeholder analyses consider who are the brokers in the science-policy interface at all stages of policy cycles and how they exercise power or influence
- that information from ongoing or planned regional network analyses be used to inform decisions and change management related to the science-policy interface

Some of these recommendations can be incorporated into the ongoing pilots and case studies, and the continuing development of the regional ocean governance framework. Others may be better addressed in the development of the SAP. All of them resonate deeply with other investigations around the world that highlight the urgent need to repair or strengthen the science-policy interfaces of LME projects.

1 Introduction

1.1 CLME Project and LME Governance Framework

The Caribbean Large Marine Ecosystem and Adjacent Areas (CLME) Project (www.clmeproject.org) aims to improve the management of shared living marine resources (LMR) within the Wider Caribbean Region (WCR). Its Causal Chain and Transboundary Diagnostic Analyses have identified weak governance as a root cause of the problems facing these social ecological systems (Mahon et al 2011a, Whalley 2011). The CLME Project therefore has a strong emphasis on assessing LMR governance systems and on proposing ways of strengthening them. Due to the overarching importance of governance among the five modules of a typical LME project, the subject has received special attention and some new thinking in the CLME. The background to the way that governance is addressed in the CLME Project, including the development of the LME Governance Framework, is discussed in Mahon et al (2011a).

The CLME Project is designed to begin the process of building the framework for the WCR through a series of targeted 'learning by doing' activities aimed at specific parts of the framework and at testing the effectiveness of the LME Governance Framework concept (Fanning et al 2009, Mahon et al 2011b). This conceptualising, operationalising, testing, learning and adapting is expected to be a long-term process that engages the over two dozen countries in the WCR and its marine ecosystems (e.g. continental shelf, pelagic and reef).

One of the fundamental units of action and analysis in this process is the policy cycle (Figure 1). Policy cycles may span a single level or multiple levels of governance (i.e. national, sub-regional/regional, global) through linking and nesting. Integral to any fully functioning policy cycle is the communication of marine science data and information, through the stages of the cycle, ultimately for use in marine policy decision-making. The networks of ties between science and policy constitute science-policy interfaces. They are “social processes which encompass relations between scientists and other actors in the policy process, and which allow for exchanges, co-evolution, and joint construction of knowledge with the aim of enriching decision-making” (van den Hove2007:807). In order to develop a regional science-policy interface for ocean governance we must understand what currently exists. This will also assist the CLME Project to develop a cost-effective Information Management System (IMS) and Regional Environmental Monitoring Programme (REMP) to track the status and long-term trends in CLME fisheries, habitat degradation, pollution, etc.

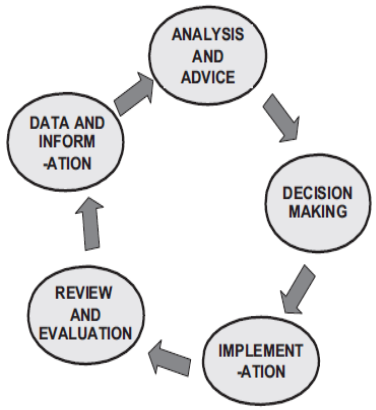


Figure 1 The basic policy cycle

1.2 About this report

This report, following a brief review of literature on the topic, describes the process and product of an interview investigation of the science-policy interface conducted as part of the Regional Governance Framework (RGF) consultancy with the CLME project. The full terms of reference are in Appendix 1.

The report contributes to the elaboration of the RGF and formulation of a Strategic Action Programme (SAP) which is the next major stage of the CLME project. The target audiences are all CLME participants and interested parties. Findings should be of particular interest to those dealing with the Information Management System (IMS) and Regional Environmental Monitoring Programme (REMP).

2 Science-policy interface

According to the panel of 20 distinguished scientists from around the world who consulted with 400 more during the UNEP Foresight Process on Emerging Environmental Issues for the 21st century, the cross-cutting issue labelled "Broken Bridges: Reconnecting Science and Policy" is the fourth most pressing one confronting the world today in efforts to achieve sustainable development (UNEP 2012). In essence, critical scientific knowledge is not being communicated effectively to audiences ranging from decision-makers to the general public. The panel found that public confidence in the environmental science that is communicated is diminishing due to deepening distrust of scientific outputs. There is increasing resistance among policy decision-makers against easily accepting scientific advice. Failed communication, however, is said to be more often at the root of the problem than real issues with the quality of the science (Holmes and Clark 2008). Few scientists are trained to communicate science in a way that policy makers and advisors can readily receive in order to translate information into action. When policy makers and advisors seek out scientific information, it is often inaccessible to them. This is an alarming global perspective, but what is the Caribbean situation with marine science and policy?

In order to answer this, and to understand the situation well enough for it to be adequately addressed, we need to consider several factors. For example, what is it that policy makers demand of marine science in order to make use of it? If scientific information was supplied as they wished, how would it be used? It has been suggested that very little science (natural or social) is demanded by policy makers, and when it is received, it may be used primarily to legitimize decisions already taken based on non-scientific criteria (evidence-backed) rather than to truly inform decision-making (evidence-based)(UNEP 2012). Both points are worrisome because arenas of decision-making are becoming more complex, and science is an invaluable asset in making well-informed decisions and formulating policy that takes into account complexity and uncertainty. It would be naïve, however, to suggest that policy decisions will be based on science/evidence alone. Many factors influence the provision and acceptance of science, and evidence more generally (Figure 2), but there are simple frameworks for analysing them (e.g. Figure 3).

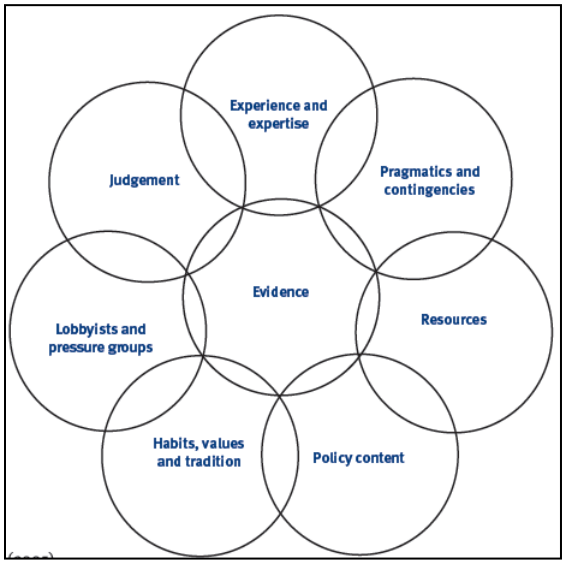


Figure 2 Many factors influence the provision and acceptance of scientific evidence in policy making (Source Jones and Walsh 2008)

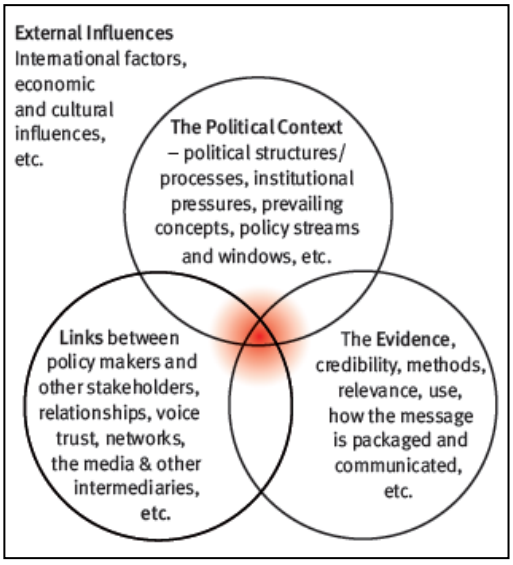


Figure 3 The RAPID framework provides a simple approach to analysing the policy-science interface (Source Jones and Walsh 2008)

Jones and Walsh (2008:4) note that this particular science-policy interface framework emphasises:

- the importance of embedding an understanding of the political context within the design and communication of research
- the necessity of providing quality evidence and twinning this with the communication of key findings through a credible messenger
- the value of fostering linkages and active engagement between researchers and policy-makers to ensure that research products are part of an ongoing dialogue

Research on policy-science interfaces is neither new nor novel, although there appears to have been little attention to this in the WCR. This is especially so in the area of marine science and policy despite much discussion on topics of data, information, decision-making and political will in regional meetings (e.g. Fanning et al 2011). Based on a global survey, Jones et al (2008) concluded that research on science–policy interfaces in developing countries was scarce, with few analyses offering practical strategies and recommendations for strengthening the interfaces. Despite this, we can use research from other places, and for topics other than marine matters, to suggest methods and to compare their results with our findings.

For an example of what researchers are finding, consider the international study on the science–policy interface mentioned previously (Jones et al 2008). It focused on how information generated by research is accessed for development policy-making (particularly in developing countries), what types of science communication are most useful to policy makers, and the ways in which intermediary organisations can facilitate communication between science and policy communities. The study used both qualitative and quantitative methods. A sample of the results is shown in Figure 4 concerning the obstacles to uptake of scientific information. It shows that a wide range of factors must be considered in respect of the science providers, intermediaries and the policy actors for both delivery of and feedback on information.

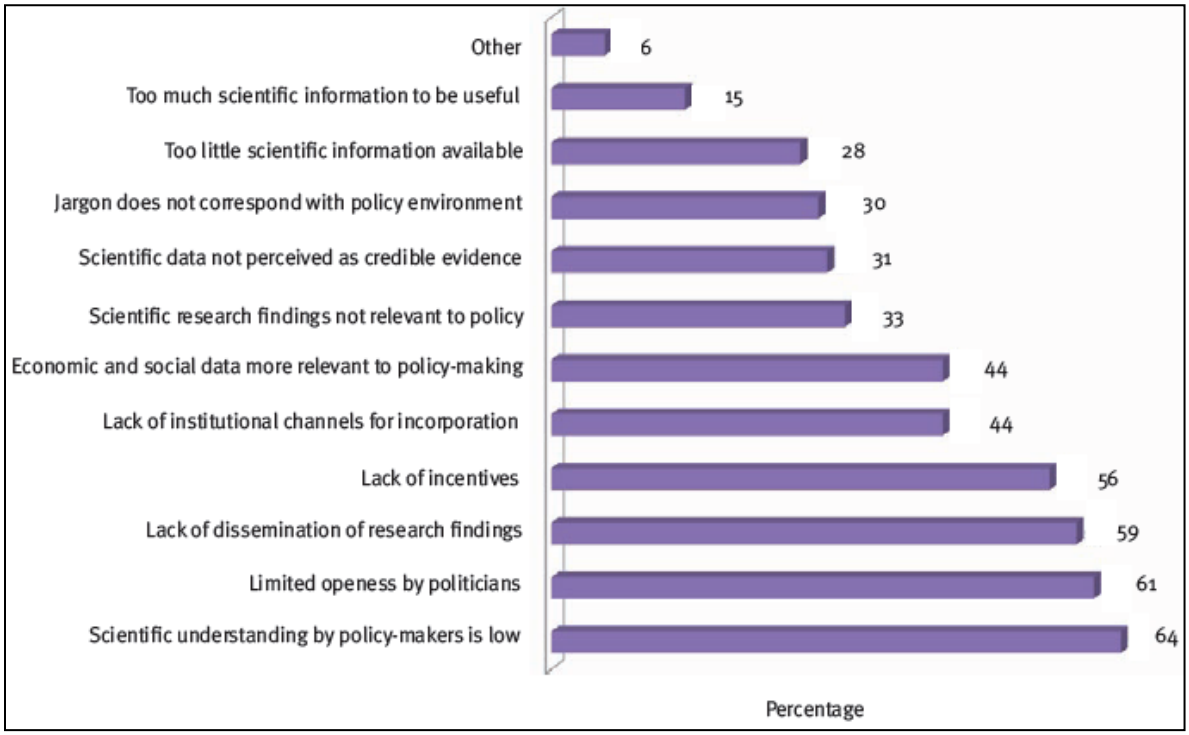


Figure 4 Several obstacles to the uptake of scientific information may be encountered and overcome (Source Jones and Walsh 2008)

In this study we investigate how policy makers and advisers relate to and make use of marine science at the regional level in the Wider Caribbean Region. We try to discover what scientific information they seek from regional sources and what makes those sources credible. Information sharing and the formats in which information should be presented are addressed as well as the top picks for future demand. The results should allow us to assess the extent of any science-policy gap and to consult literature on how it can be closed based on international experience. The findings and conclusions will be used to design the IMS-REMP and the Strategic Action Programme.

3 Methods

Survey methods have been used with policy actors to obtain their perceptions and experiences related to science–policy interfaces (e.g. Jones et al 2008, Rosenström 2006). Our research employed a short interview guide (Appendix 2) comprising mainly open ended questions supplemented by some closed choices and a visualisation palette (Appendix 3) for questions on the preferred format of information presentation. The survey instrument was designed to be easily understood by non-scientists and to take around 30 minutes to administer unless the respondent wished to elaborate on his or her responses. It was a much scaled down and simplified version of international survey instruments (Jones et al (2008) Appendices 2 and 3). The survey respondents were policy makers and advisers from nation-states and territories (hereinafter all called 'countries') participating in the CLME project.

Using the entire list of CLME project countries as a sample frame, the researchers selected some to visit based on simple criteria including size (large/small), geography (island/continental), official language (Spanish/English/French), political status (territory/nation), membership in (sub-)regional organisations (e.g. OSPESCA, CARICOM, ACS) as well as the logistic practicalities of travel and budget. Sixteen countries were so selected with a standby list of several others, should visits to any of those selected prove impractical. In each country, the policy makers and advisers in the government ministries concerned with environment, fisheries, foreign affairs and tourism were identified. These four portfolios reflect the scope of the CLME project and were considered to be most likely to have an interest, to greater or lesser extent, in using marine science in the policy cycles in which they participate, especially at the decision-making stage. The list of countries visited and persons actually interviewed is in Appendix 4 and a summary of them is in Appendix 5.

The researchers, with help from the CLME project focal points and a CERMES research assistant, set up interview appointments in advance of visiting the countries for typically 2-3 days each. The opportunity was also taken at regional conferences to approach representatives of countries and individuals who fit the selection criteria and were willing to give interviews on the spot. The opportunistic interviews included people occupying top posts in regional organisations working on marine science and policy matters. Interviews were all done face-to-face in order to probe and pursue responses as necessary. This was important given that the research was exploratory with emphasis on understanding perspectives and experiences rather than seeking to quantify and categorise them based upon prior knowledge.

The interview guide starts with the customary statement on purpose of research and confidentiality, but then includes text read out to the respondent (see Appendix 2) to firmly anchor the interview context in a scenario of participating in regional marine policy meetings. This was necessary to reduce the very high probability of responses being made in the contexts of either national or international meetings. The respondent was asked to confirm that the scenario was clear before the interview proceeded, and the first question asked for an example of such a scenario drawn from the experience of the respondent. The latter point was reinforced to ensure responses were based to the extent possible on the firsthand knowledge of the respondent rather than norms and assumptions. Another point communicated early

was that 'science' in this study encompassed both natural and social science as well as facts and figures not generated by scientific research, but by systematic data collection and analysis (a stage of the policy cycle) that could otherwise be termed 'statistics'. The survey covered the topics listed below.

- Typical meeting situation
- Main purpose, context
- Source organisations
- Constraints on information use
- Public perception sources
- Information sharing
- Regional versus international
- Demand for information
- Top three information demands
- Ranking of top three
- Any other points to make
- Information fit into governance

The instrument was administered in either English or Spanish, with the latter being done in some cases with the assistance of an interpreter. The interviewer noted responses directly on the survey paper and supplementary sheets with few cases of audio recording where translation was necessary. Although the identities of the respondents were known, there was no need to return to anyone for more information. The number of people present in interviews ranged from one to five. In most cases there was a main speaker. This person typically called on others present to provide input. This was encouraged since it often enriched the discussion, providing new insight. In a few cases respondents provided documents or referred the interviewer to supplementary sources of information.

The data collected were entered from the survey sheets into Excel worksheets by each interviewer and then combined to form the final data set. The do-it-yourself data entry facilitated data checking and editing. The entire data set was small enough to be analysed in Excel. Although almost all qualitative data from open-ended questions can be sorted, coded and analysed quantitatively for numerical results, this was not done extensively. Reporting response category percentages from the open-ended questions was kept to a minimum as appropriate to the exploratory nature of the research. Response descriptions are reported as few, some or most to approximate frequencies within the bottom, middle and top thirds respectively. Survey notes captured the nuances of responses. The results in all cases are indicative, not statistically representative. They are reported in the next section along with some interpretation. The main points are analysed in the discussion from which we draw recommendations to aid the development of the regional ocean governance framework and SAP.

4 Results

Twenty countries and four organisations were surveyed (Figure 5) resulting in the participation of 103 respondents in 73 interviews across the organizations and four ministries targeted (Figure 6). Most of the respondents were from fisheries ministries. Just over half of the 20 countries had English as their official language (Figure 7) and about the same proportion were islands. Five of the eight continental countries in Central and South America were Spanish-speaking and one was Dutch. Few (7) ministers agreed to be interviewed (Figure 8). In most cases ministers were said to have schedules that were too busy. Some of the seven interviewed had a keen personal interest in marine matters such as through recreational fishing. When ministers were unavailable, the interviewers were referred to their advisers who were also part of the target sample. Almost half of the policy advisers were high level (Vice-Ministers and Permanent Secretaries) who interact directly and frequently with policy makers. Lower level policy advisers were the heads of administrative, technical or planning units. In most ministries, at all levels, there was no significant institutional memory of the CLME project that could be called upon by the respondents. Only a few people who had recently participated in CLME meetings were fairly well informed about the project.

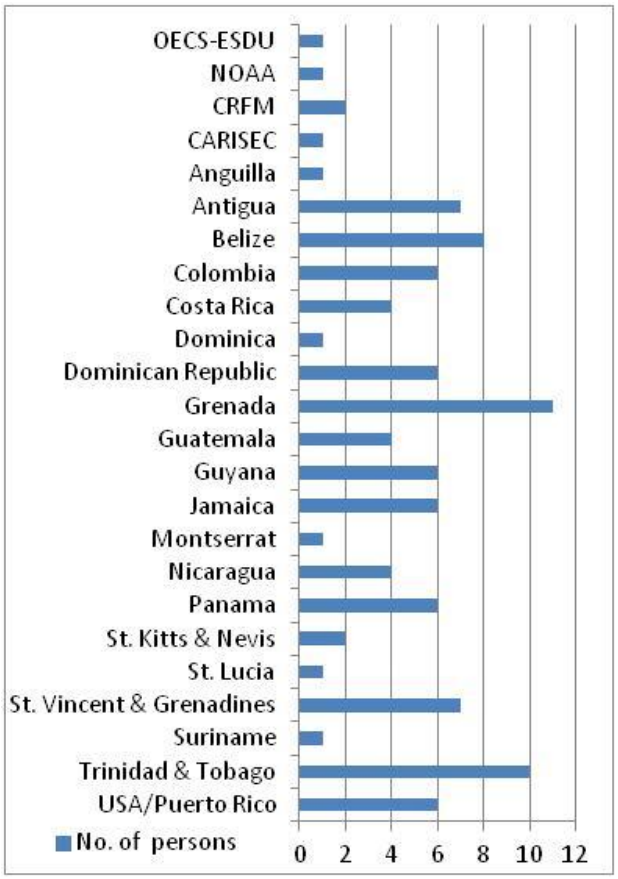


Figure 5 Distribution of respondents among the twenty countries and four organisations

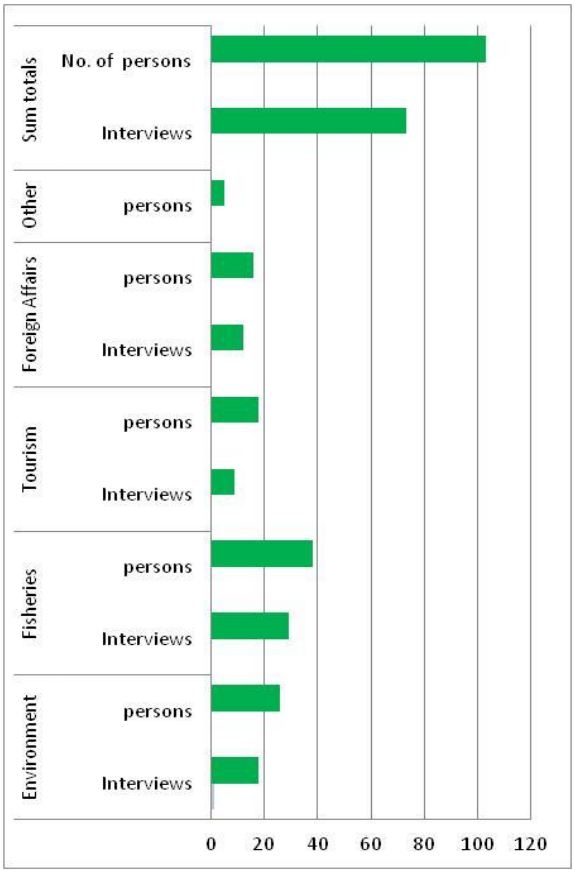


Figure 6 Distribution of interviews and persons interviewed by ministries and organizations

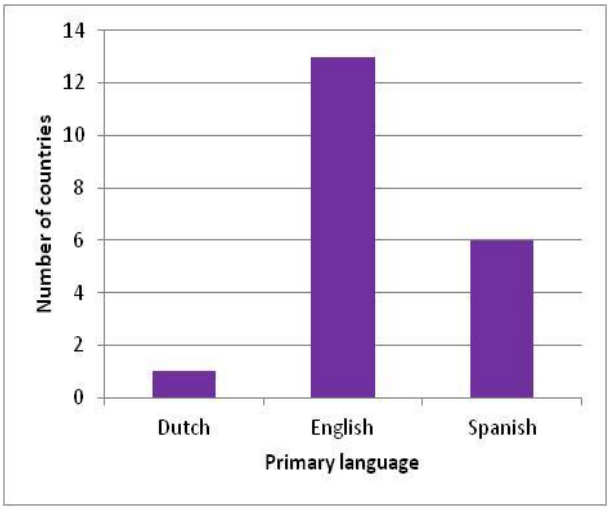


Figure 7 Countries investigated sorted by official language

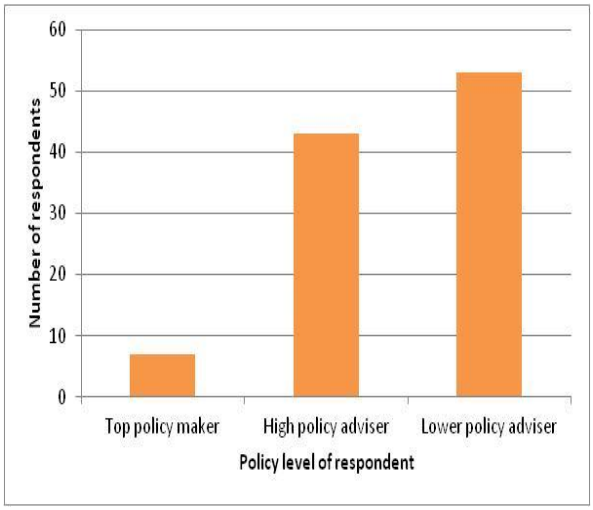


Figure 8 Respondents sorted by their policy level

Respondents understood what was meant by the science-policy interface and appreciated the need to know more about it in order to improve how it worked within the context of regional ocean governance. No one refused to participate in the survey, but in a few cases the interviewer was re-directed to one or more individuals who were better informed on the subject matter. This occurred, for example, in a case where the Permanent Secretary (PS) was new to the ministry and suggested that the former PS who had experience with marine matters was more appropriate, despite now being assigned to another ministry.

4.1 Meetings of the science-policy interface

The first question asked: "As in the scenario, can you describe a situation when marine science information was very useful in a regional policy meeting? What was it that made the science information so useful in that case?"

Although respondents said that they understood the scenario some had difficulty keeping to a regional focus and could not easily identify meetings that met the criteria. Most were able to name a meeting by the acronym of its host organization such as ACS, CARICOM, CCCCC, CITES, CLME, CRFM, CTO, OECS, OSPESCA, SPAW, UNEP and WECAFC (see list of acronyms for full titles). CRFM stood out as the most frequently named (Figure 9) particularly for its Ministerial Council meetings.

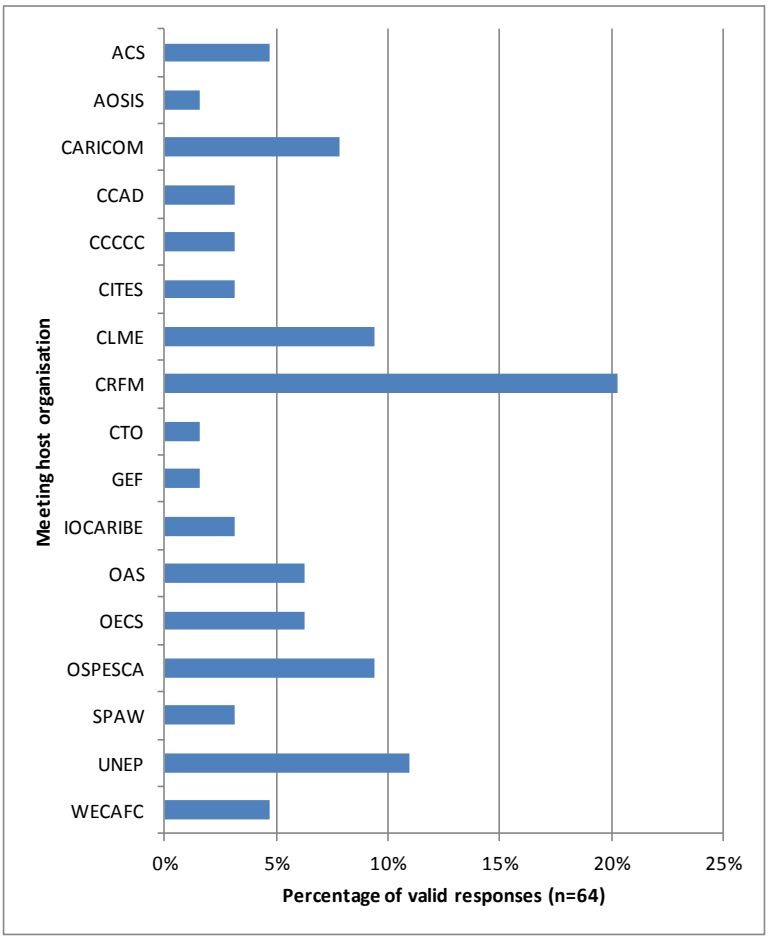


Figure 9 Organisations with regional marine policy meetings

UNEP, OSPESCA and CLME were mentioned about half as often. For OSPESCA, high level meetings on the harmonized lobster closed season were common examples. Also named were some specialized ad hoc meetings, e.g. of CITES on conch, rather than a regular or institutionalized series of policy meetings.

Even high level policy advisers admitted that they had little experience of regional marine policy meetings compared to technical meetings. It was not easy for them to say why the science information had been useful, but this was also taken up in the next question.

4.2 Main purpose and context of science

"What are the main purposes for which you or delegations most often use regional marine science information in regional marine policy meetings? In what types of contexts do people demand it?" was the second question. Marine science was said to be used mainly as background information, as input into decision-making and for negotiation (Figure 10). Less often mentioned were general awareness raising and funding.

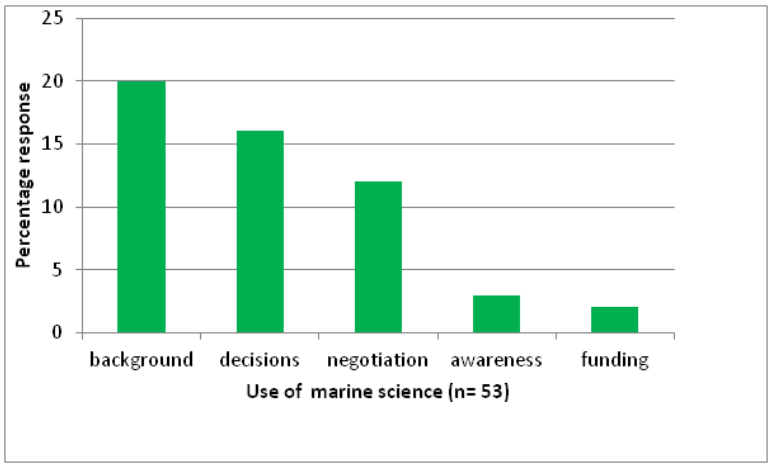


Figure 10 Main uses of marine science at policy meetings

Background science information included explaining the nature of an issue or its context or the possible solutions. Decision-making included choices among management measures or resource allocation in the case of managed fisheries. Science-informed decisions also included trade-offs between conservation and livelihoods or economic uses of areas. Negotiation was linked to the decision-making but also included working out marine programmes with other countries or international agencies and conflict management. Funding was related to the observation that proposals containing good science tended to be more readily accepted for funding and that this was sometimes in competition with other entities in the region. Most of the examples offered illustrated science being used to gain national advantage over competing countries rather than to formulate regional policy or solve regional problems.

Respondents reiterated that policy discussions which used marine science extensively were infrequent. The reason for encountering difficulty in responding was explained by the comment that science (of any type) is so rarely used in regional policy meetings that it could be considered irrelevant to policy. Such statements were usually followed by the respondent offering an opinion that this state of affairs was undesirable but deeply institutionalised.

4.3 Source organizations and credibility

Third, we asked: "In terms of providing regional marine science information for policy, which regional organizations stand out as the most credible sources of information that is useful for decision-making? Why?"

Respondents identified CRFM, UWI, FAO/WECAFC and OSPESCA as the top four credible regional marine science source organisations followed by "none" and universities in general (Figure 11). Credibility was due to features such as maintaining academic standards of quality assurance, having a well respected

"brand" name from long length of good service to the region, formal organisational mandate, frequency of interaction with others, a history of information sharing and a culture of research (Figure 12).

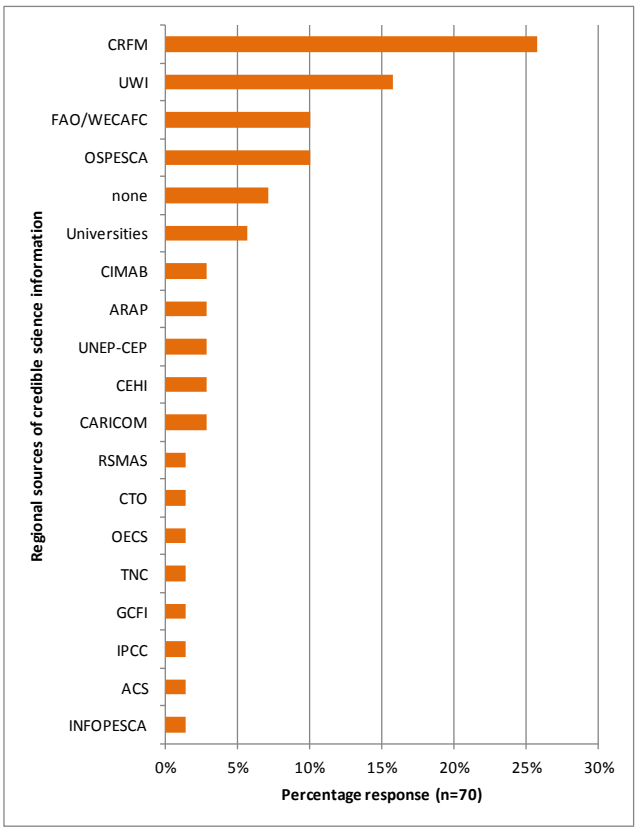


Figure 11 Which regional organisations are credible suppliers of marine science information

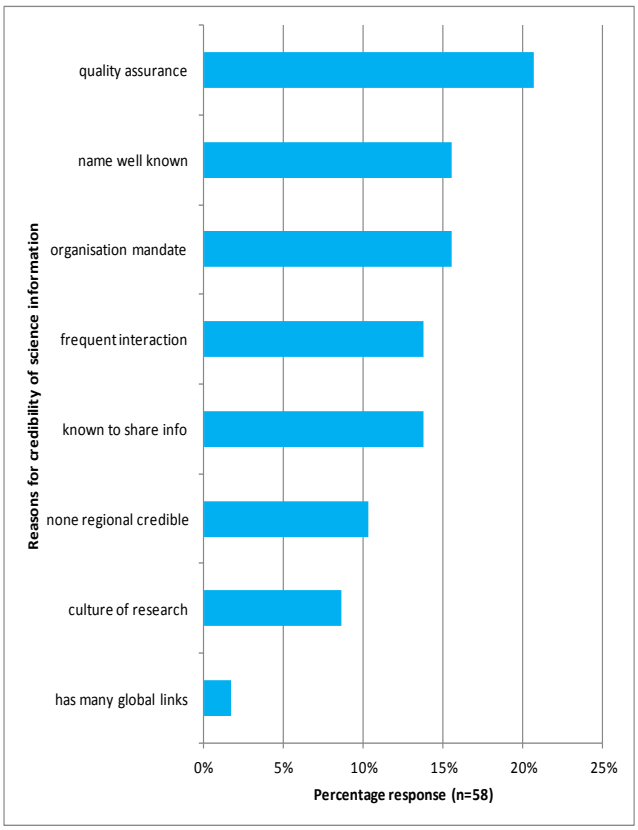


Figure 12 Reasons why the regional marine science information providers are credible

There was, however, considerable uncertainty about the types of information available from the sources and many respondents admitted that their knowledge of the organisations was second hand. This may be related to the high rank of there being no credible regional sources of marine science shown in both charts above. Respondents who said this explained that in their experience more useful information on the region came from external sources including foreign government agencies and big international NGOs. They added that many regional organisations were too political or had too low science capacity to be credible.

Patterns emerged as to which organisations were credible for what reasons (Figure 13). Universities in general were considered credible mainly due to their culture of research and quality assurance of peer review for maintaining good academic reputations. OSPESCA was identified as highly transparent and easily accessible for all types of information sharing that was actively encouraged and kept reasonably up to date. CARICOM was also said to share information. CRFM was deemed credible mainly due to its name being well known and its mandate. FAO/WECAFC was credible mainly due to its well respected name and the quality assurance reported to be a feature of the UN system. UNEP-CEP shared this along with global linkages which respondents thought ensured greater objectivity or balance and neutrality.

ACS, ARAP and CEHI were rated highly for being interactive, reflected in a felt presence at regional meetings.

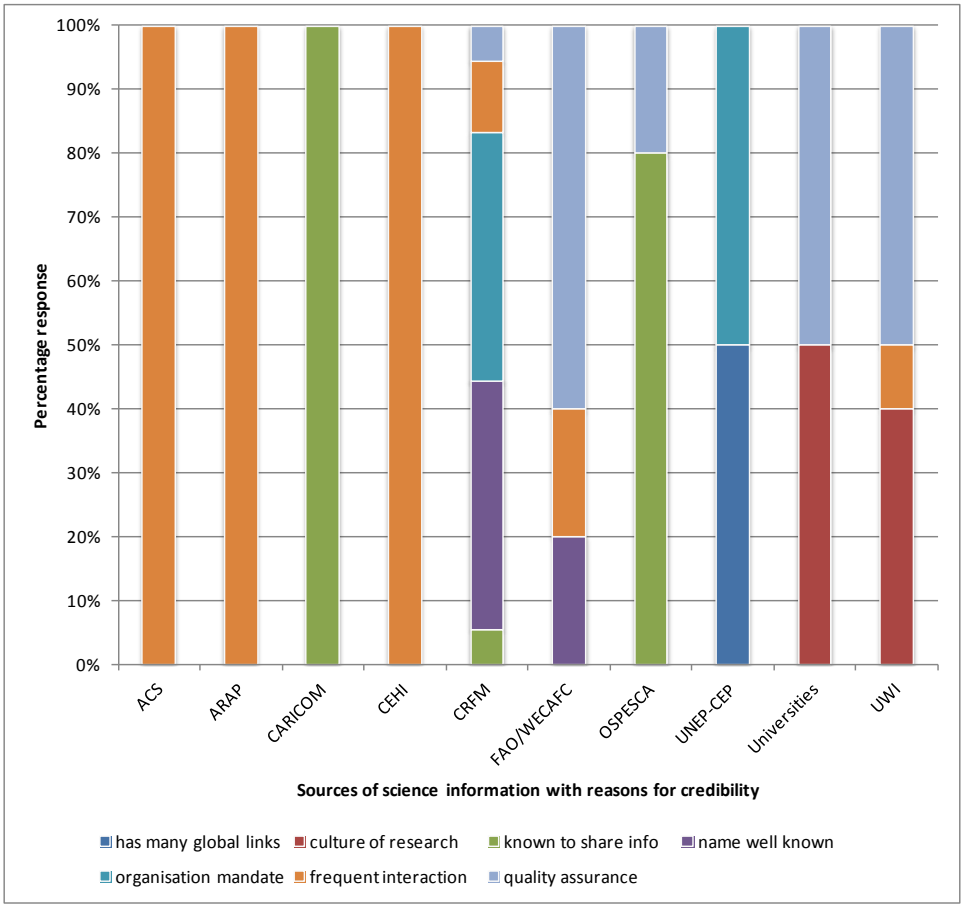


Figure 13 Sources of science information, with reasons given for their credibility

It should be noted, however, that apart from universities most of the agencies named above are mainly disseminators rather than producers of science. They provide information based on science but rarely directly implement scientific studies. They are information and communication brokers or boundary organisations of both the policy and science arenas. This important role will be returned to in discussion.

4.4 Constraints on information use

Next we queried: "What, if anything, constrains the use of regional marine science information by you or delegations?" Most respondents found it easy to list constraints on information use (Figure 14). Top of the list were lacking capacity to use scientific information, science not being provided in policy-relevant format, not having easy access to databases and there being little policy demand for science. Reasons external to their agencies also included scientific information being outdated, of poor quality, being slow to be supplied, costly, scarce, and not useful for reducing uncertainty. Internal constraints included not knowing what is available or not being able to get it unless one had personal contacts at the source.

Low science capacity was reported for both science sources and science users. The external reasons sum up deficiencies at the source, but the capacity deficiencies at the policy end were related to not knowing the potential uses of science in marine policy. The root cause of low capacity was related to basic lack of

awareness of the roles of science at policy level, but this was said to be due to poor communication of science from scientists and the technical intermediaries in the ministries. Some respondents added that even with such awareness the absence of a culture of evidence based or informed policy-making must be addressed before one could expect to see any significant change in use of properly packaged science.

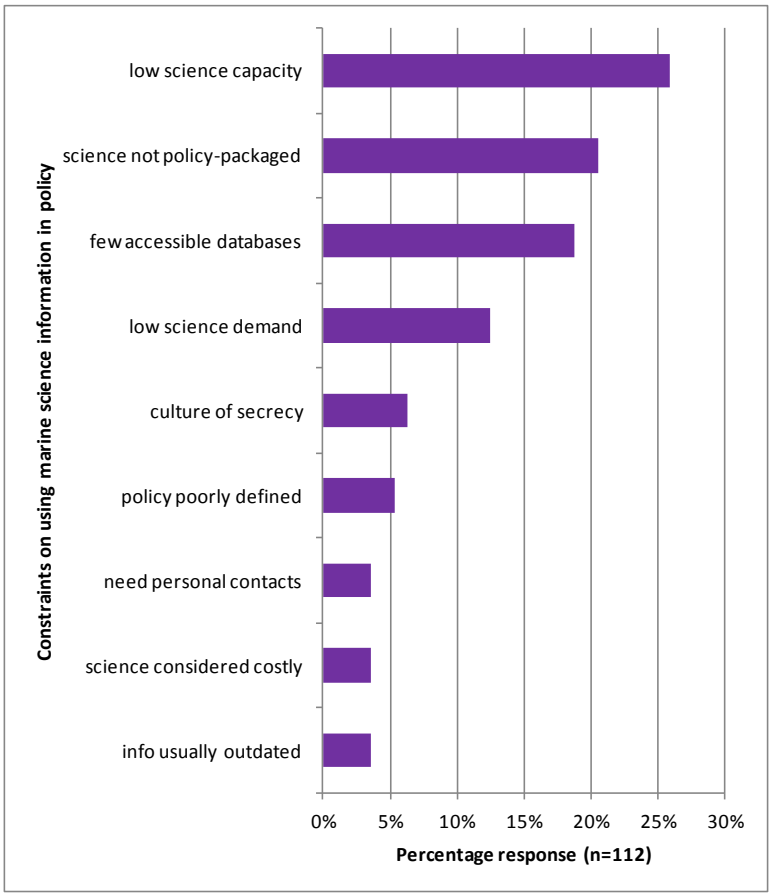


Figure 14 Constraints on using marine science in policy

4.5 Sources of public perception

Question five was more complex: "Policy-makers and advisers usually value public perception and local knowledge when making national level marine policy decisions. What sources and types of information, if any, provide or substitute for public perception and local knowledge at regional level meetings in the Caribbean?" Some probing and additional explanation was often required to ensure it was understood.

Some respondents said that there were no good regional sources of information on public perception. Hence policy makers and advisers mostly relied on sets of compared national perceptions (Figure 15). That is, they asked colleagues what public opinion was in their countries and compared notes to form a regional image. In particular, ministers conferred among themselves for political interpretation of public views rather than rely solely on information from technical or administrative policy advisers. This often took place at meetings, but some information exchange occurred electronically by email or telephone among the closest of colleagues. Less often, the respondents used mass media reports, special studies, NGOs and personal social networks that extended to other countries.

It was mainly in the Central American countries that respondents described policy meetings at which NGOs were present at the table to make direct inputs from interested civil society organisations if not

the general public. In the insular Caribbean the CNFO was highlighted in the case of fisheries but said to be currently a weak voice for the fishing industry. Many respondents said that media reports were not a reliable guide to public perceptions or opinion. They also suggested that regional perceptions may not be relevant if most decisions are taken from national and not regional perspectives.

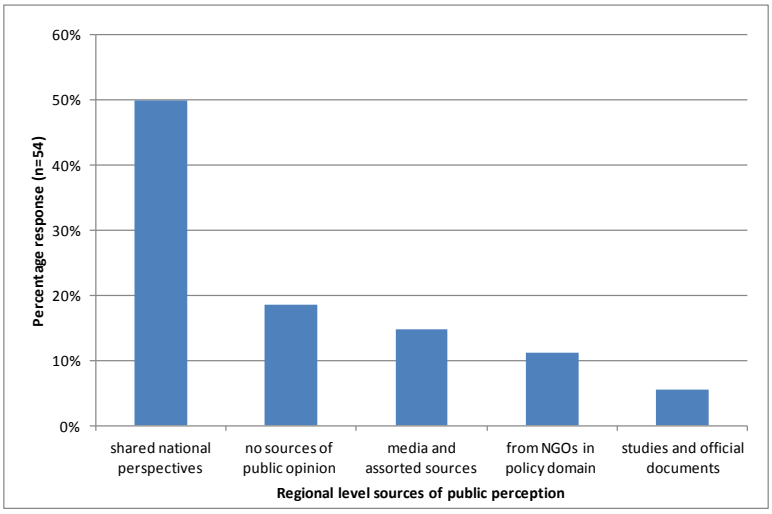


Figure 15 Regional level sources of information on public perception

4.6 Regional information sharing

Sixth was: "Some say national authorities (environment, tourism, fisheries etc.) do not or cannot readily share data and information to collaboratively develop regional marine science information. Comment?" Most respondents said that there was little transboundary marine science information sharing except through informal social networks… who you know provides or receives information. This reflects poorly developed formal information exchange and a culture of not sharing information (Figure 16).

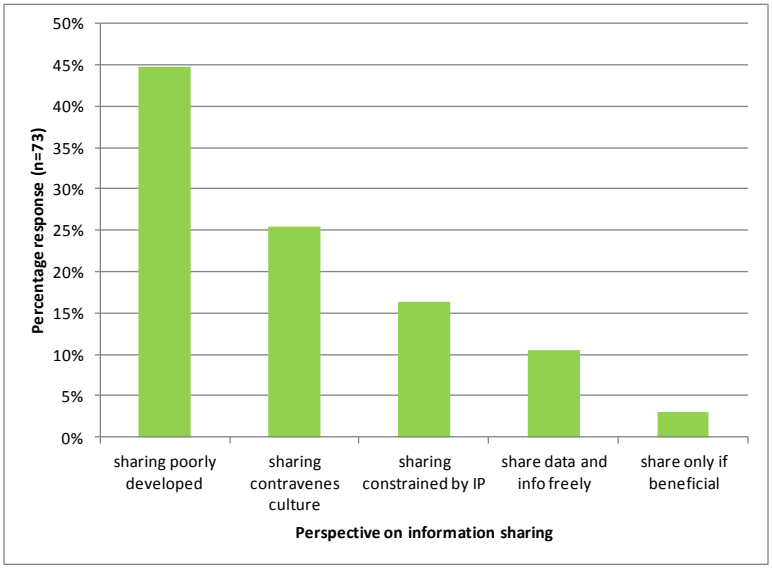


Figure 16 Perspectives on regional information sharing

Reasons were offered for the limited sharing of marine science information. Fear of the information making the source "look bad" was prominent. The root causes for this included exposing poor quality

data and analysis, incomplete data, incompatible data, inability to properly understand or generate scientific documents, and the embarrassing release of "sensitive data". The latter could be almost anything. Real or alleged concern over intellectual property (IP) matters was a recent additional constraint. Civil servants typically did not share technical and scientific data and information unless directed to do so or there were clear precedents for doing so on the specific topic and with the specific data recipient. In the public service, there were few incentives to share information and often much "red tape" to discourage it. Sharing mainly occurred where it was legally or administratively mandated and institutionalized such as the monthly to annual provision of statistics of all sorts to national, regional or international bodies. Very little of this sharing was directly between countries.

Some of the above reflect the poor development of sharing mechanisms which is largely a technical matter of designated contact persons, data protocols, administrative procedures, quality checks, joint analyses and reporting, training and the like. These must be distinguished from the culture of not sharing which meant that even if all of the above were in place on paper they would not routinely be used in practice. Respondents spoke of the need to have clearly identified mutual benefits from sharing. The relatively few respondents who reported free sharing of information were mainly from Central America. Others reported few constraints on transboundary information sharing once it was done at aggregate level so as to maintain source confidentiality especially related to costs and earnings data.

4.7 Regional vs. international levels

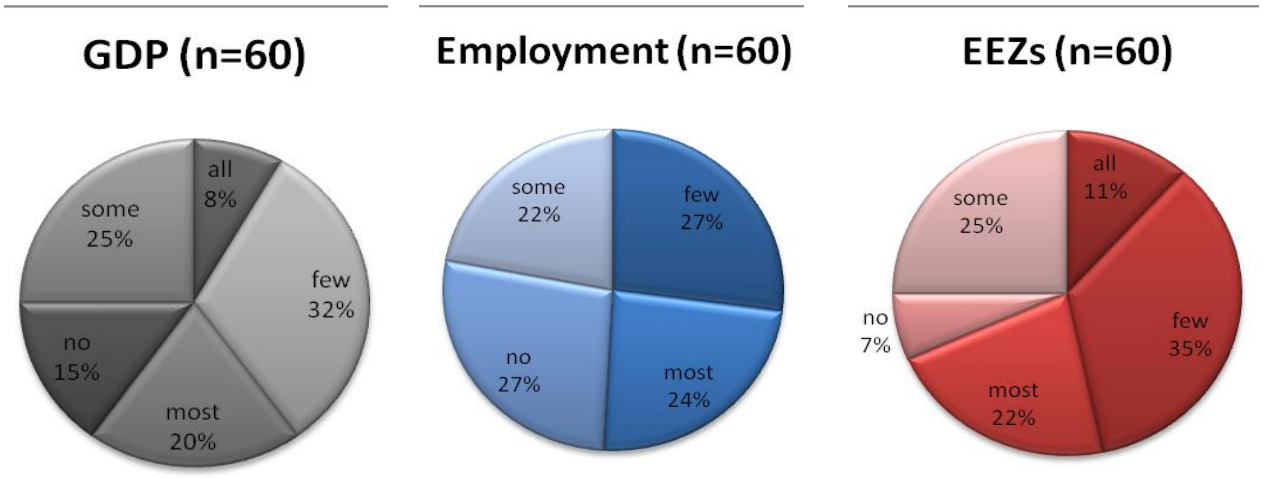
Next we stepped up a level to ask: "What, if anything, are the differences between regional and international policy meetings in terms of demand for and use of regional marine science information? If there are differences, why is this?" Responses to this were quite consistent, with little variation to chart.

Respondents usually had more experience of the use of marine science information in policy meetings at the international level than at the regional level. They said that regional marine science was perceived to be of better quality when packaged for policy-making at international level meetings. There seemed to be more demand for good marine science from the region at international level than at regional level. The sources, at international meetings, of such regional science were often international, not regional, agencies. These sources often re-packaged information from the region and added their own advocacy-oriented interpretations, especially in the case of big NGOs. Many pointed out, however, that "region" needed to be clearly specified since information on the insular Caribbean typically gets "lost" or ignored if "Latin America and the Caribbean" (LAC) is the unit of analysis unless the issue is of special concern to small island developing states (SIDS) or a matter of poverty or disasters (e.g. for Haiti).

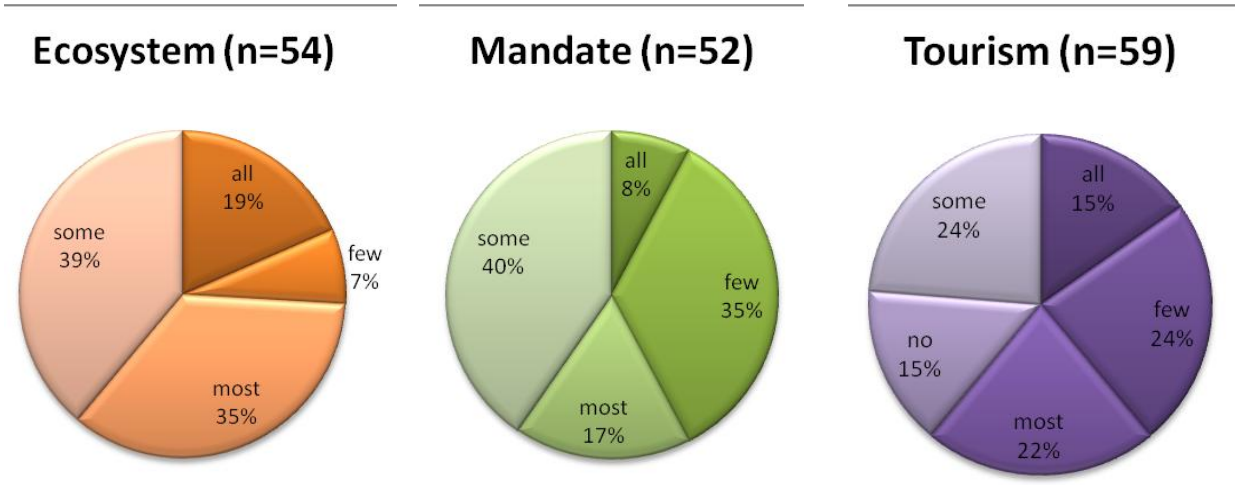
Climate change meetings were highlighted as having a high content of regional marine science actively used for policy purposes especially in fora such as AOSIS. The dynamics of the marine science-policy interface at international meetings was said to be vastly different from regional meetings in numerous ways since there was a high policy pull for science and competing science providers from developed countries and big NGOs. However, even in AOSIS, the Caribbean SIDS were said to sometimes be less prepared with policy-packaged science than their Pacific or AIMS colleagues. An observation was that even when regional marine science was at the disposal of Caribbean delegates, they tended not to use it much in international meetings, the exception being at times the delegates from Central America. Part of the reason, it was suggested, was that the Caribbean delegates at international policy meetings were often not scientists or did not possess the technical background to be comfortable with scientific data.

4.8 Demand for science at regional meetings

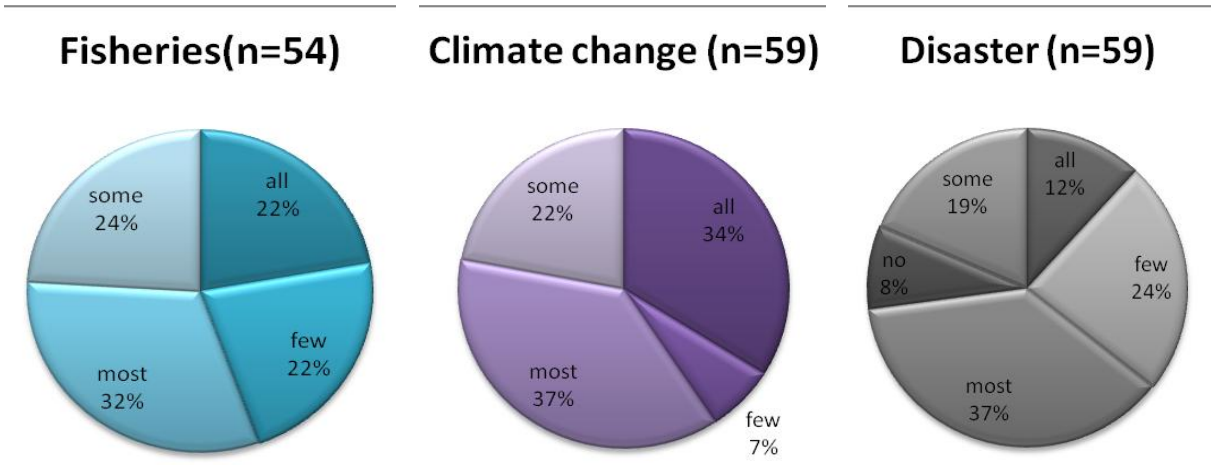
There were three parts to the eighth item: "What is the nature of marine science information that you have used to participate effectively? For different types of information we are interested in frequency and format." Results from the first and second parts are in Figure 17. Format is addressed later.



Modal response: Few meetings demanded marine science information in the above subject areas



Modal response: Some meetings demanded marine science information in the above subject areas



Modal response: Most meetings demanded marine science information in the above subject areas

Figure 17 The percentage of regional policy meetings at which there was demand for different types of marine science information

Many respondents prefaced their responses with the caveat that they were only rough general guides on the use of marine science which was very situation dependent. That is, the marine science in use depended on variables such as the economic sector, topic and its context, purpose of the meeting, interests of the countries and organizations attending, preparation required, host organization, levels and backgrounds of the delegates present at the time, and so on. Bearing this in mind and the limited closed response options, the results show that few meetings included information related to marine sector GDP, employment and EEZ matters. Some meetings included tourism, ecosystem health and the marine mandates of organizations. Most meetings included marine science related to disaster risk reduction or management, climate change and fisheries.

Regarding the preferred formats for communication of marine science information to policy makers and advisers, there were responses favouring all of the options illustrated on the visualisation palette used for this question (see it in Appendix 3). The results were compiled by summing the top two or three choices named, given that most respondents said all formats were appropriate even for the same minister, depending on the complexity of the information being communicated and the specific topic. Among the choices, time-series charts or other graphics showing trends in a simple fashion were clear preferences and practically should be combined with indicator diagrams of different types (Figure 18).

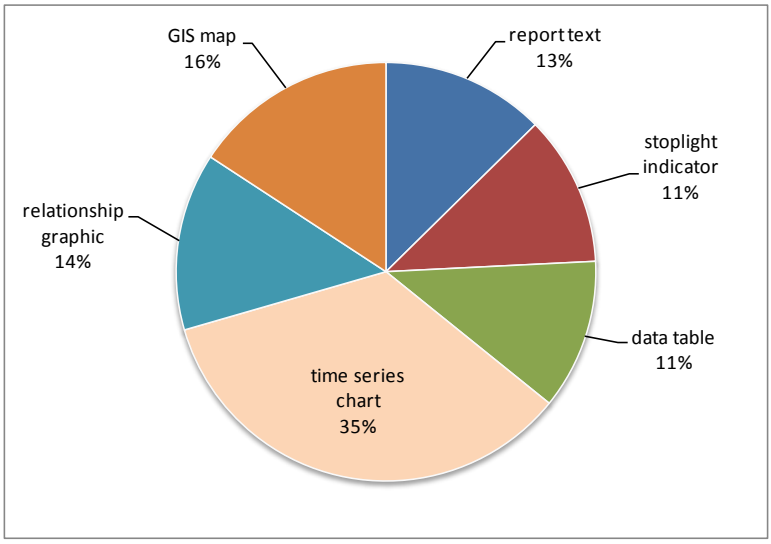


Figure 18 Preferred formats for communication

Data tables were least preferred except by a few who said that their policy makers had accounting or business backgrounds and were comfortable with making sense for themselves of the numbers. Text was noted as the preferred backup for reference, including bulleted slides. Relationship graphics were most useful for ministers and topics concerned with communicating more than facts and figures, but respondents warned that sometimes such images were easily dismissed as "just pretty pictures". The mapping of data and information was said to be a growing preference, but not appropriate for some types of information. Additional media said to be used included video and computer animation such as making a time-series of information visually dynamic. A few respondents stressed that oral briefings eclipsed all graphics in terms of effective communication. Policy makers wanted to get information in as few words as possible for understanding and then have documents for reference. If the oral briefing was not done properly there were likely to be issues with the use of information in any visual format. There were wide-ranging comments on the extent to which policy makers understood scientific information.

4.9 Top information demands

Questions 9 and 10 concerned naming and ranking to ascertain the future demand for different types of scientific information. We asked: “Looking ahead to the next five years, of the various types of regional marine science information that we have discussed, and any others that come to mind, what would be your top three (3) in terms of future overall value for decision-making at regional level?”

In answering the first (listing) part of the question, some respondents used the labels from question #8 and others insisted on making up new combinations. Some were more specific or general than others in naming the types of information. For example, status of fish stocks was often stressed in preference to more general information on fisheries management. Several interpreted climate change as including disaster risk reduction and management while others separated them. The situation was similar for marine biodiversity and ecosystem health. Consequently, these results should be interpreted generally.

Based on listing alone, the top ten marine science information demands for future policy are shown in Figure 19. The annotation 'general' means that several similar terms were combined in interpretation. The top three ranked demands are shown in Figure 20. To derive these the first ranked demands were weighted 3, second ranked were 2, and third ranked were not weighted. The information labels were also further collapsed so that, for example, the specific “status of fish stocks” is integrated into the more general “fisheries management” as it should ideally be part of an information suite.

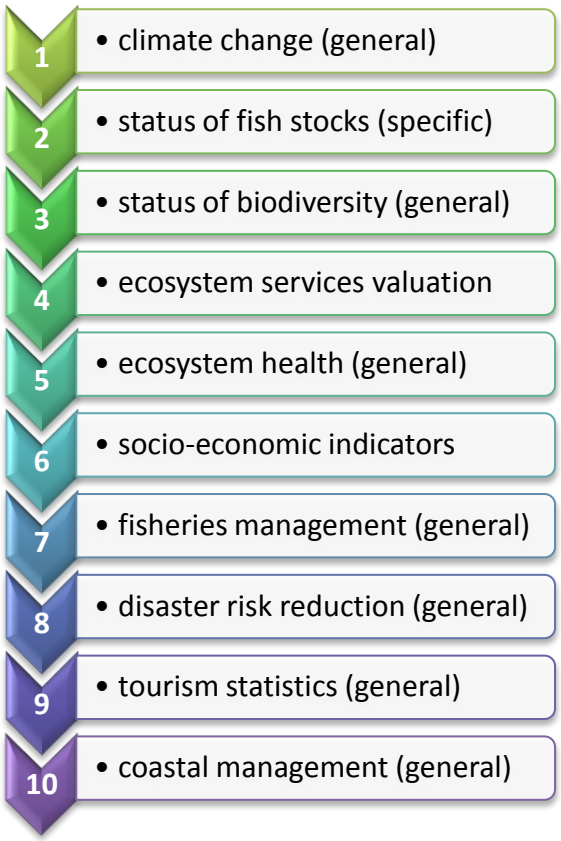


Figure 19 Top ten marine science information demands for future policy in the region

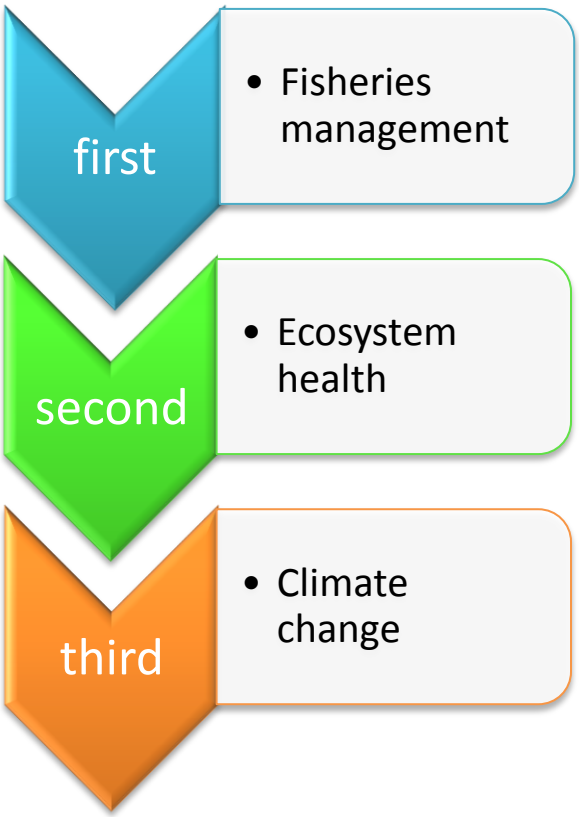


Figure 20 Ranking of top three marine science information types demanded for future policy

From these we see that overall, fisheries management precedes ecosystem health followed by climate change. This is not surprising, noting that most respondents were from fisheries ministries, and that respondents from other ministries often associated marine science mainly with fisheries matters. All three demands are, however, closely related and overlapping. The top ten list shows interdisciplinarity as bio-physical/ecological, social and economic information types are all named. Although it can be read into some information types, the demand for [social] science relating to the governance or institutional arrangements for marine matters such as sustainable fisheries management, biodiversity conservation, climate change adaptation and the like is less obvious than that related to natural science or economics.

4.10 Any other views on science-policy interface

We solicited any other information with the last two questions: "Is any other aspect of getting marine science information into regional policy important to take into account in designing useful Wider Caribbean marine science-policy interfaces (e.g. IMS and REMP)?" and "Is there anything that you would like to ask or recommend concerning the regional governance framework and the role of marine science information in governance in the Wider Caribbean?"

Some respondents offered the additional observations listed in Table 1, reported in no particular order. What was most striking is that the perception of the science-policy interface needing fixing was high. None said that there was little to add because there was nothing that required attention. Those who did not offer additional comments typically said that the most pertinent information had already been captured earlier in the interview. Responses did not suggest that major burning issues had been omitted in the scoping survey given the brevity of the instrument.

Table 1 Observations on getting marine science into policy and its role in governance

Getting marine science information into policy	Role of marine science information in governance
• Policy-makers must first buy into science	• Ocean governance not taken seriously
• Need culture of evidence-based policy	• Poor appreciation of governance issues
• Need public awareness of marine science	• Strengthen regional governance first
• Capacity-building by regional universities	• Weak sub-regional bodies are constraint
• Easier access to information is the key	• Politics may overshadow policy-making
• Information must match scales of policy-making	• Awareness of CLME increasing but low

The observations above reflect the overwhelming perception communicated in many earlier parts of the interview that there is a large gap between marine science and marine policy with only a few places of strong connection such as in the meetings concerning climate change. Underpinning and sustaining this gap are fundamental deficiencies such as a low level of science culture and capacity that pervades society generally, not only the policy domain or marine matters. According to respondents, weaknesses are intergenerational and institutional such that the youth of today are not expected to grow up much different despite the increasing use of technology in everyday life as distinct from using or appreciating science. Respondents who were most fervent in their earlier responses often reiterated and reinforced the need for better communication at multiple levels by multiple means to reach diverse target audiences if any changes were to take place in the interfaces between marine science and policy.

5 Discussion and recommendations

This was a fairly light scoping survey compared to many others in the literature as noted earlier. Lessons learned and conclusions should be subject to future validation in more in-depth studies of particular topics or target audiences. The latter term is used intentionally since the issues concern communication

more than simply the generation and dissemination of scientific information. For these reasons caution should be exercised in interpreting the findings, and especially in making generalisations across the region. We use the UK Overseas Development Institute (ODI 2004) Research and Policy in Development (RAPID) Context, Evidence, Links Framework for Analysis (summarised in Figure 3) to structure the discussion and recommendations. As shown in the diagram, these are not discrete facets; they overlap and inter-connect to a large extent, and the core of the science-policy interface is about policy influence.

5.1 External influences

In order to examine external influences the researcher, or preferably the key stakeholders in a social-ecological system, need to determine the system boundaries. For the regional marine science-policy interface the boundaries are very porous and fuzzy. Geographically, politically, ecologically, socially and otherwise we can use the boundaries of the Wider Caribbean Region for practical purposes. Within this envelope, similar to marine jurisdictions and ecosystems, there will be numerous finer scale boundaries. We need to discuss what influences external actors and factors have on the science-policy interface in the WCR. These influences, once we are aware, may be perceived as good, bad or neutral.

The results clearly indicate that they are many external influences. Chief among them is agenda-setting. The topics for which there is forecast greatest policy demand to be made on science reflect global issues and agreements. The greater familiarity that respondents had with international compared to regional marine policy meetings suggests that implicitly or explicitly there will be external influences of all sorts. The reported perception, perhaps surprising to some scientists, that there may be no or few credible regional sources of marine scientific information adds an element of deep concern. Comparison to SIDS in other regions was not favourable. Extra-regional governments and international NGOs are clearly making impacts with their tactics of compelling science and persuasive advocacy.

Few of the above are negative. Indeed most have advantages if addressed strategically. It is highly advantageous for the region's policy making and advising delegates to have access to international actors and be exposed to international factors that shape the science-policy interface at global level. We ***recommend that any strengthening of the science-policy interface at regional level not be perceived or implemented in ways that serve to weaken or disconnect interfaces at the international level that should be maintained or further strengthened***.

We may wish to adopt or adapt to the region what works at international science-policy interfaces. Packaging science for policy that results in action is a major feature at the international level and a major weakness in the region. Conservation International, a big NGO, has staff dedicated to managing the science-policy interface and has publications suitable for most audiences that address the topic from both sides (e.g. Karrer et al 2011). Several international agencies have offices in the region and, as the results show, are considered part of the regional organisational landscape. They use science to influence policy. We ***recommend that the IMS-REMP be designed to incorporate best practices at the international level not only from science and technology perspectives, but also from appropriate information management, advocacy and communication research.*** We ***recommend that countries and organisations in the region task their staff and delegates to seek skills transfer from suitable international actors and projects to enhance the regional science-policy interface***.

5.2 Political context

Policy makers (mainly ministers) were not well represented in the scoping survey. Future research must investigate to greater depth exactly how they view the policy-science interface and what they would like to see change. According to most advisers not many policy makers have a high demand for science. This, they say, is due mostly to a general lack of appreciation of and experience with marine science. If true it is not surprising that there is little demand and one should not expect this to change until the contexts

for evidence-based, evidence-informed or evidence-aware policy decision-making change and provide adequate incentives for improving the science-policy interface. This brings us to the policy cycle and the institutions for marine policy decision-making. These, according to respondents, are relatively few at the regional level since fisheries and other regional organisations are mainly advisory and themselves have low science capacity to the point of some not being considered credible sources of science information. We ***recommend that outreach be made to key actors of the science-policy interface at all stages of the major policy processes in the region in order to sensitise them to possible areas for improvement***. This should be done primarily by the leaders and secretariats of regional fisheries bodies such as WECAFC, OSPESCA and CRFM as well as at the national level by the fisheries authorities. In this communication, particular attention must be paid to both the actual and perceived advantages and disadvantages to incorporating more science or evidence into policy cycles.

Respondents also pointed out that changes at the policy level would be necessary but not sufficient. They said that many elected policy makers respond primarily to the voting public. Hence **we *recommend that the general public be targeted in communication campaigns on use of marine science as part of the IMS-REMP, national science programmes and organisational work plans***. There should be several campaigns over extended periods that are monitored and evaluated as part of the policy cycles of the topics that they address. When successful, they will open windows of opportunity for policy influence that can be taken advantage of to transform the science-policy interface most effectively and efficiently. We also ***recommend establishing mechanisms for much greater input from the general public, perhaps via civil society organisations, into policy and developing clear public opinions at the regional level on topics due for policy decision-making***. Since few policy-makers participated in the interviews, it would be very useful for them to review and comment on the findings. One mechanism for this could be via the CLME Project National Inter-sectoral Committees (NICs), and these could be further used to draw in a wider range of public stakeholders. Where there are no NICs, alternative bodies such as Fisheries Advisory Committees, National Commissions on Sustainable Development and others can be used. One regional mechanism could be built on linking and scaling up these national participatory initiatives.

5.3 Science and evidence

Simultaneous with addressing the perceived low capacity to produce and use scientific information we ***recommend urgent attention to making scientific information of all types (i.e. both natural and social science, and interdisciplinary studies) more available from regional databases to many levels of users***. These are not just matters of quality assurance, intellectual property and technology. Until the IMS-REMP becomes fully functional interim measures could include CRFM, OSPESCA and WECAFC putting out more communication product from existing databases and challenging organisations such as the Caribbean Network of Fisherfolk Organisations (for example) to actively use the information in regular interaction with resource user groups. Create opportunities for open source construction of new products from combined information. Encourage information consumers to become familiar with the products. Communication research is needed to inform the most appropriate design from end-user and end-use standpoints. We have information on the types of information expected to be in most demand and some characteristics of the use of information. The generation of evidence for policy is a major concern (Holmes and Lock 2010).

Much can be accomplished with improvements based on current science and policy processes. But if there is a greater demand for science or evidence from policy-makers, then we need to go deeper into the processes for producing and packaging marine science. Science must also be made more timely and relevant to address policy issues on several time-scales. Mismatches in time, space and jurisdiction will deter the development of the science-policy interface. Some situations are more resilient or vulnerable to deficiencies in the science-policy interface and some institutions have more adaptive capacity than

others to cope with changes in the science policy-interface. We ***recommend that the science-policy interface be investigated more thoroughly from a resilience perspective in order to determine where to make the most strategic interventions for success and the leverage of resources for further change***.

For example, an intuitive strategy may be to focus much on mainstreaming an overarching area such as climate change which is currently receiving considerable funding, already provides good examples and can encompass other top areas such as fisheries management and ecosystem health. The three main issues from the transboundary diagnostic analysis (TDA) can all be incorporated as well as emerging re-formulations of sustainable development such as taking place in the blue and green economy dialogues. We ***recommend that development of the IMS-REMP, coordinated with regional and national information systems, be strategic into the SAP phase by taking advantage of areas of critical mass for enhancing interfaces***.

5.4 Links and networks

The above overlapping and inter-connected components of the framework bring us to consider links and networks in the science-policy interface and the important role of brokers (Godfrey et al 2010). Most respondents identified intermediary regional organisations as key actors in the regional science-policy interface. However, their strategic positioning was neither fully appreciated nor utilised. There is rarely direct interaction between marine scientists and policy-makers in the Caribbean or anywhere else in the world. Typically, marine scientists report to an individual or agency that interfaces (perhaps through additional links) with the policy apparatus. Exceptions include some meetings with expert testimony and certain negotiations. The actor or agency that brokers the communication between science and policy in the simplest models serves to 'translate' messages between them. Thus, for most fisheries or tourism or biodiversity meetings, there will be technical intermediaries such as secretariats at the regional level. The literature on science-policy interfaces points out the need to know who these brokers are and how they communicate both science and policy, including interpreting them to serve their own agendas or reflect their organisational cultures. We ***recommend that SAP implementation consider who are the brokers in the science-policy interface at all stages of policy cycles and how they exercise power or influence***. Although the case studies and pilot projects included stakeholder analyses, and some inferences can be made, their terms of reference and approaches did not thoroughly address power and influence. This will help to identify and target key actors in regional information management systems.

The science-policy interface is all about communication networks and effecting change through shared evidence that leads to collective action at the regional level. Social network analysis can be instructive especially in the light of respondents reporting the importance of transboundary personal networks, epistemic communities and communities of practice for gathering and sharing information regionally. If formal networks and processes are to replace or institutionalise these, for example in the IMS-REMP and revised policy cycles, the designers and change agents need to know what networks currently exist, their structures, dynamics and the purposes that they serve. We ***recommend that information from ongoing or planned regional network analyses be used to inform decisions and change management related to the science-policy interface***.

5.1 Pilots and case studies

Although the pilot projects and case studies are well under way they can still be incorporated into a fairly simple analysis based upon some of the above recommendations and there contribute more to the development of the SAP. These pilot and case activities were originally designed to test and document the policy cycles associated with various ecosystems, fisheries and issues. At each stage of the policy cycle, and via the multi-level linkages that connect their components and stakeholders, it is possible to identify and investigate aspects of the science-policy interface. Such an investigation could use the

outputs from institutional and stakeholder analyses plus any other documentation generated as secondary data. It would look at how stakeholders communicate science and policy, and what institutions connect them at each stage and between each stage of the policy cycle.

See Figure 21 as a simple example of this based on the fairly compact but multi-level Eastern Caribbean flyingfish case study. Each stage of the policy cycle is characterised by stakeholders in formal or informal institutions. As with the governance assessment, our interest is primarily in the formal institutions and the stakeholders associated with them. Illustrated are just a few of the stakeholders, institutions, and documents associated with them and hence useful for studying the science-policy interface. We can see if or how science and policy are communicated, to and from whom, by what means, with which aims, messages and outcomes. We can learn from these to design the IMS-REMP and SAP.

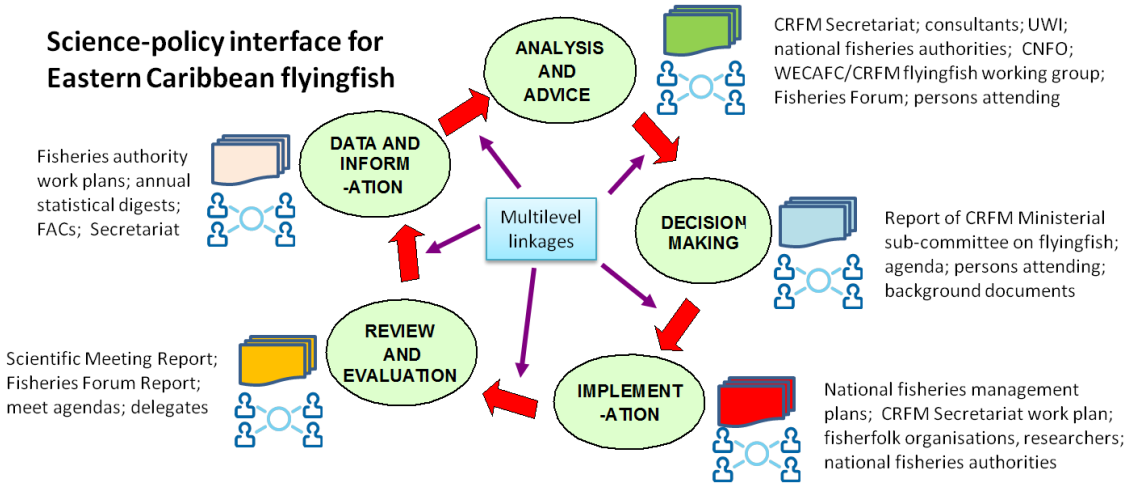


Figure 21 Eastern Caribbean flyingfish example of policy cycle points for science-policy interface

5.2 Conclusion

Attention to the science-policy interface has a prominent place in governance reform (Fritz 2010). This attention is increasing as a means of understanding and addressing complexity (Jones 2011). Developing countries, however, are generally lagging behind in this arena and urgent consideration needs to be given to closing the gap, for which a global blueprint approach will not be successful (Jones et al 2008). Greater regional and national level awareness of the roles of culture and politics, understanding science, knowing if or how organisations interact, and the negotiated or contested role of science in policy are all necessary to effect well-informed and managed change (Mahon et al 2010, Stahl and Cimorelli 2005). Without such information, used in a systematic approach, the barriers to improving any aspect of a science-policy interface on any level are likely to be formidable (Weichselgartner and Kasperson 2010).

This scoping survey of the science-policy interface relevant to ocean governance in the Wider Caribbean Region contributes to the broad aim of improving governance globally. It provides directions for tactical and strategic action within the context of the CLME project but its recommendations must be taken up by stakeholders at many levels and implemented on several different scales. The main point is that change is necessary according to the respondents. Taking no action to improve the science-policy interface is not a viable option if the goals and targets for sustainable development that the region and its nation-states have subscribed to are to be achieved. This point is echoed at the international level.

The Global Environment Facility (GEF) International Waters (IW) Science forum known as the Large Marine Ecosystems and the Open Ocean Working Group has reported (2012 a and b)on science-policy interface issues in LME projects worldwide. Noting many deficiencies in the use of science in LME

projects in addition to the lack of articulation with policy the reports argue for better communication of science throughout the GEF process and especially within TDA execution and SAP formulation. The group recommends clear documentation on the influence of science on policy from short to long terms.

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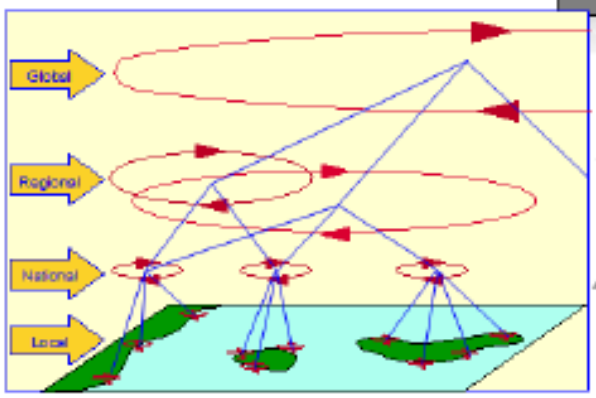
Appendix 1: Consultancy flyer with terms of reference

Caribbean LME Project

Regional Governance Framework for the Caribbean LME Project area

The LME Governance Framework

A multi-level policy-cycle based governance framework



Must be:
- Complete
- Linked vertically
- Linked laterally

Diversity of cycles

- What is involved in the development of a regional science-policy interface for ocean governance in the Wider Caribbean Region?
- How can we assess ocean governance arrangements and their functionality for reef, pelagic and continental shelf fishery ecosystems?
- What are the appropriate regional ocean governance framework options for input to the Strategic Action Programme (SAP)?

These are key questions to be answered in the consultancy being implemented from January 2011 to May 2012 by the Centre for Resource Management and Environmental Studies (CERMES) of the University of the West Indies in collaboration with Dalhousie University.

CLME GOVERNANCE

Depicting the ways in which key stakeholders can be networked in multi-level policy cycles to address marine resource issues facing the Caribbean Large Marine Ecosystem (CLME).

CERMES

in collaboration with

DALHOUSIE UNIVERSITY

The Caribbean Large Marine Ecosystem and Adjacent Regions (CLME) Project is a 4-year Global Environment Fund (GEF) intervention worth a total of US$56 million. Project partners include 23 GEF countries, 2 associate countries, 11 organizations.

The CLME Project will assist Caribbean countries to improve the management of their shared living marine resources, most of which are considered to be fully or over exploited, through an ecosystem approach.

The project will prepare a Transboundary Diagnostic Analysis (TDA) followed by a Strategic Programme of Action (SAP).

The process includes developing and promoting the use of a CLME Regional Governance Framework (RGF) through this consultancy being led by CERMES.

Expected outputs include:

- Governance and stakeholder analysis by fishery ecosystem
- Analyses of basic policy cycles
- Assessment of legal and institutional arrangements by fishery ecosystem
- Draft report on Regional Governance Framework highlighting strengths and weaknesses of current governance
- Draft regional governance framework options paper for the WCR region

Caribbean LME Project

Details of the consultancy terms of reference

1. Pilot the development of regional science-policy interface for ocean governance by
   a. Developing linkages with selected major regional inter-governmental organizations (IGOs) to determine the most useful and desirable pilot inputs for ocean governance policy making with specific reference to the three fishery ecosystems;
   b. Collaborating with relevant fishery bodies in developing these linkages;
   c. Review the legal and institutional arrangements and international agreements currently in place in the CLME region (regional level) keeping focus on the three fishery ecosystems (continental shelf, pelagic and reef ecosystems);
   d. Emphasizing valuation of ecosystem services as an input through a Wider Caribbean Region (WCR) overview via a desk study;
   e. Developing selected identified pilot inputs (liaising with the monitoring and reporting component to develop inputs),
   f. Liaising with the data and information component to inform an appropriate system for
      - Delivering data and information to the regional IGOs,
      - Obtaining feedback from them, and,
      - Evaluating the pilot activity and providing recommendations for its further development

2. Assess ocean governance arrangements and functionality (e.g. complexity, diversity, dynamics) in the WCR with specific reference to the three fishery ecosystems by:
   a. Assessing the relationships among the regional organizations that are engaged in Living Marine Resources (LMR) governance,
   b. Evaluating the performance of the policy cycles associated with regional organizations with a mandate for ocean governance, with special emphasis on the major regional IGOs,
   c. Collaborating with the pilot projects and case studies to support their governance assessment activities;
   d. Incorporating the governance assessments from the pilot projects and case studies

3. Propose appropriate regional ocean governance framework options for input to the SAP by:
   a. Analyzing and incorporating the inputs on governance at local and national level provided by the pilot projects and case studies;
   b. Taking into consideration, international and regional Multilateral Environmental Agreements (MEAs);
   c. Reviewing existing institutional arrangements in the WCR;
   d. Assessing the results of the CLME project activities (e.g. pilot projects, cases, TDA);
   e. Taking into consideration ocean governance principles

RESEARCH METHODS

- Document analysis
- Survey questionnaires
- Personal interviews
- Social network analysis
- Economic analysis

PARTICIPATION

Participatory methods will be used throughout to the extent feasible. In particular, the research team will interact with pilot projects and case studies.

COMMUNICATION

The outputs of the consultancy will be made available for public access via the CLME Project web site and its other communication media.

CERMES

in collaboration with

DALHOUSIE UNIVERSITY
Inspiring Minds

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Appendix 2: Science-policy interface interview instrument

Country _____Interviewer ____ Date _____ ID#_____

Policy-science interface interview guide

Introduction

[Refer to 2-page info doc] The Caribbean Large Marine Ecosystem (CLME) Project is assisting about 25 countries in the Wider Caribbean to improve the management of their shared living marine resources through an ecosystem approach. To do this there needs to be regional level (not just national) science-policy interfacing for ocean governance. Hence the CLME Project is going to develop a cost effective Information Management System (IMS) and Regional Environmental Monitoring Programme (REMP) to track the status and long-term trends in CLME fisheries, habitat degradation, pollution, etc. These would provide policy advisers and decision-makers with the science information needed to make the best informed marine resource governance decisions. To guide development of the IMS and REMP I will ask you to share your experience of using marine science information in regional policy-making meetings. What you share with us will be combined with experiences from other countries for a CLME Project report that will be finished next year. You will not be identified with any particular data or statement in the report without your permission. Is there anything else that you would like to know for background?

Scenario

We would like you to share your knowledge based on the experiences of your country's delegates who attend marine-oriented regional forums. Think of how they make use of marine science information on the Caribbean Sea (especially living marine resources and human use of resources) to form opinions, offer advice and make decisions at a ***regional*** level. This could be at regional meetings on fisheries, biodiversity and conservation, sustainable development, climate change, environment, tourism and the like. Our focus is only on ***regional Caribbean meetings*** aimed at reaching collective decisions on Wider Caribbean marine matters. These meetings may later contribute to global negotiations and policy decision-making, e.g. in the UN system. For example, think of your country delegation at a Caribbean Sea Commission meeting, gatherings concerning the Cartagena Convention or meetings to prepare regional perspectives for upcoming SIDS or post-Rio or CITES or CBD sessions. Organizations in the region that are involved include IOCARIBE, CARICOM, SICA, CRFM, OSPESCA, OECS and others.

Questions

1. As in the scenario, can you describe a situation when marine science information was very useful in a regional policy meeting? What was it that made the science information so useful in that case?

2. What are the main purposes for which you or delegations most often use regional marine science information in regional marine policy meetings? In what types of contexts do people demand it?

Country _____Interviewer ____ Date _____ ID#_____

3. In terms of providing regional marine science information for policy, which regional organizations stand out as the most credible sources of information that is useful for decision-making? Why?

4. What, if anything, constrains the use of regional marine science information by you or delegations?

5. Policy-makers and advisers usually value public perception and local knowledge when making national level marine policy decisions. What sources and types of information, if any, provide or substitute for public perception and local knowledge at regional level meetings in the Caribbean?

6. Some say national authorities (environment, tourism, fisheries etc.) do not or cannot readily share data and information to collaboratively develop regional marine science information. Comment?

Country _____Interviewer ____ Date _____ ID#_____

7. What, if anything, are the differences between regional and international policy meetings in terms of demand for and use of regional marine science information? If there are differences, why is this?

8. What is the nature of marine science information that you have used to participate effectively? For different types of information we are interested in frequency and format.

Marine natural and social science info for regional policy meetings. *[if information used is not listed, insert it in blank spaces below]*	Frequency of use 1. no meetings 2. few meetings 3. some meetings 4. most meetings 5. all meetings	Preferred format 1 text/bullets 2 table/matrix 3 chart/graph 4 mapped/GIS 5 graphics/photos
a. Marine industry contribution to GDP regionally / economic value		
b. Marine industry employment / regional labour statistics		
c. Marine boundaries / extent of Exclusive Economic Zones		
d. Marine organisation mandates / areas of agreed jurisdiction		
e. Climate change impacts (e.g. ecological, economic social)		
f. Fisheries statistics (e.g. landings, gear and fleets , seafood trade)		
g. Ecosystem health (e.g. status of habitats, biodiversity, pollution)		
h. Tourism (e.g. costs, earnings, visitors, environmental impacts)		
i. Disaster risk reduction (e.g. impact costs, risk types, probability)		
j.		
k.		
l.		

9. Looking ahead to the next five years, of the various types of regional marine science information that we have discussed, and any others that come to mind, what would be your top three (3) in terms of future overall value for decision-making at regional level?	10. Rank (1-3)

Country _____Interviewer ____ Date _____ ID#_____

11. Is any other aspect of getting marine science information into regional policy important to take into account in designing useful Wider Caribbean marine science-policy interfaces (e.g. IMS and REMP)?

12. Is there anything that you would like to ask or recommend concerning the regional governance framework and the role of marine science information in governance in the Wider Caribbean?

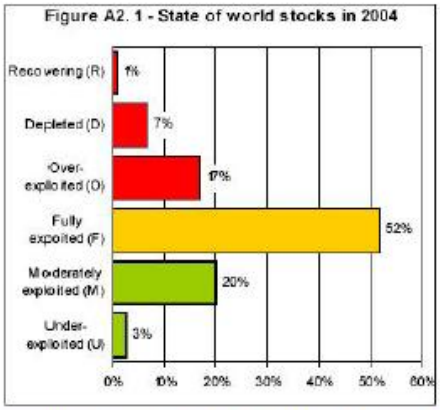
THANK YOU FOR YOUR TIME AND INFORMATION

Appendix 3: Visualization palette

Visualisation of marine science information

Coastal and marine ecosystems are amongst the most productive ecosystems in the world and provide many services to human society; however, many of these ecosystems have become degraded. Food provisioning in the form of *fisheries* catch is one of the most important services derived from coastal and marine ecosystems. With more than a billion people relying on fish as their main or sole source of animal protein, fisheries in developing countries are a particularly important source of protein. Fisheries and fish products provide direct employment to 38 million people, with a further 162 million people indirectly involved in the fisheries industry (FAO 2004). The state of industrial fisheries is of concern as many people depend on their existence for food and employment, with many fisheries being overexploited. (See Figure 1.) *Aquaculture* is the fastest-growing food-producing sector, accounting for 30% of total fish consumption.

TECHNICAL REPORT TEXT

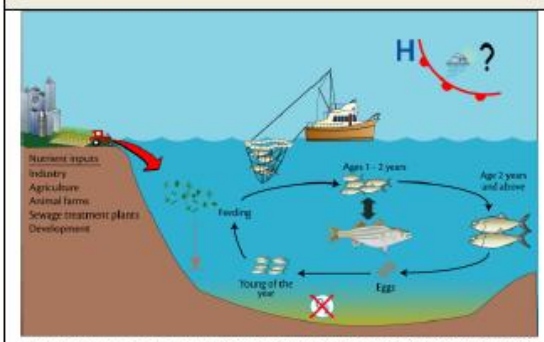


STOPLIGHT INDICATORS IN A BAR CHART

	2000	2001	2002	2003	2004	2005
	(Million tonnes)					
PRODUCTION						
INLAND						
Capture	8.8	8.9	8.8	9.0	9.2	9.6
Aquaculture	21.2	22.5	23.9	25.4	27.2	29.9
Total inland	30.0	31.4	32.7	34.4	36.4	38.6
MARINE						
Capture	86.6	84.2	84.5	81.5	81.6	84.2
Aquaculture	14.3	15.4	16.5	17.3	18.3	19.9
Total marine	101.1	99.6	101.0	98.8	104.1	103.1
TOTAL CAPTURE	95.6	93.1	93.3	90.5	91.0	93.8
TOTAL AQUACULTURE	35.5	37.9	40.4	42.7	45.5	47.8
TOTAL WORLD FISHERIES	131.1	131.0	133.7	133.2	140.5	141.6
UTILIZATION						
Human consumption	96.9	99.7	100.2	102.7	105.6	107.2
Non-food uses	34.2	31.3	33.5	30.5	34.8	34.4
Population (billions)	6.1	6.1	6.2	6.3	6.4	6.5
Per capita food fish supply (kg)	15.9	16.2	16.1	16.3	16.6	16.6

INFORMATION IN A TABLE

TIME SERIES CHART



Ecosystem based fisheries management aims to manage fisheries in a manner that considers a variety of interactions with the fishery of interest. Ecosystem based fisheries management is now strongly advocated and in some cases even mandated. Some of the main ecological interactions affecting menhaden biomass and recruitment are availability of food (plankton), level of predation from fish such as striped bass, and habitat quality such as dissolved oxygen, nutrient input, and weather pattern variability.

RELATIONSHIPS GRAPHIC

INFORMATION MAPPED

Appendix 4: Persons interviewed on science-policy interface

Anguilla

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Ministers				
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Colombia

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Dominican Republic

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Dominica

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	Amanda Byer, AOSIS Coordinator	Mr. Justin Rennie Chief Fisheries Officer Fisheries Division Ministry of Agriculture, Forestry, and Fisheries Ministerial Complex Botanical Gardens, St. George's Tel: 473-440-3814/3831 Fax: 473-440-4613/4191 Email: justinar7368@hotmail.com	Mr Alva Brown, Foreign Service Officer	Ms. Lima Frederick, Senior Technical Officer Dr. George Vincent, Consultant Mr Michael Jessamy. Heritage Conservation Officer Mr . Robertson

Guatemala

Ministry	Environment	Fisheries	Foreign Affairs	Tourism
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Ministry	Environment	Fisheries	Foreign Affairs	Tourism
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	Lic. Mario Diaz Coordinator Mesoamerican Biological Corridor Unit MARN			

Guyana

Ministry	Environment	Fisheries	Foreign Affairs	Tourism
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Jamaica

Ministry	Environment	Fisheries	Foreign Affairs	Tourism
Minister				
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Ministry	Environment	Fisheries	Foreign Affairs	Tourism
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Montserrat

Ministry	Environment	Fisheries	Foreign Affairs	Tourism
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Nicaragua

Ministry	Environment	Fisheries	Foreign Affairs	Tourism
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Panama

Ministry	Environment	Fisheries	Foreign Affairs	Tourism
Minister				
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St Kitts and Nevis

Ministry	Environment	Fisheries	Foreign Affairs	Tourism
Ministers				
Policy Advisors		Dr. Hermia Morton-Anthony Permanent Secretary Ministry of Agriculture Marine Resources, Co-		

Ministry	Environment	Fisheries	Foreign Affairs	Tourism
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St. Lucia

Ministry	Environment	Fisheries	Foreign Affairs	Tourism
Ministers				
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St Vincent and the Grenadines

Ministry	Environment	Fisheries	Foreign Affairs	Tourism
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Ministry	Environment	Fisheries	Foreign Affairs	Tourism
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				Hayden Billingy, Superintendent of Rivers, Beaches and Recreation Sites, National Parks, Rivers and Beaches Authority, Saint Vincent and the Grenadines

Suriname

Ministry	Environment	Fisheries	Foreign Affairs	Tourism
Mnisters				
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Ministry	Environment	Fisheries	Foreign Affairs	Tourism
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Ministry	Environment	Fisheries	Foreign Affairs	Tourism
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	Commodore Anthony Franklin Director, Institute of Marine Affairs Hilltop Lane, Chagauramas Trinidad and Tobago Tel: 868-634-4291 Fax: 868-634-4433 Email: director@ima.gov.tt		Ms. Marisse Warner Legal officer Levels 10 - 14 Tower C, International Waterfront Complex, Wrightson Road, Port of Spain; Trinidad, West Indies	

USA/Puerto Rico

Ministry	Environment	Fisheries	Foreign Affairs	Tourism
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CRFM SECRETARIAT	**OECS/ESDU**
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Appendix 5: Composition of science-policy interface interviewees

Respondent location	*Environment*		*Fisheries*		*Tourism*		*Foreign Affairs*		*Other*	*Sum totals*	
Country or organisation	*Interviews*	*Persons*	*Interviews*	*Persons*	*Interviews*	*Persons*	*Interviews*	*Persons*	*Persons*	*Interviews*	*Persons*
Anguilla			1	1						1	**1**
Antigua	1	1	4	4	1	1	1	1		7	**7**
Belize	1	2	2	2	1	3	1	1		5	**8**
Colombia	1	2	2	4						3	**6**
Costa Rica	1	1	1	1	1	1	1	1		4	**4**
Dominica			1	1						1	**1**
Dominican Republic	2	2	1	2	1	1	1	1		5	**6**
Grenada	1	2	2	2	1	5	1	2		5	**11**
Guatemala	2	3	1	1						3	**4**
Guyana	1	3	2	2			1	1		4	**6**
Jamaica	2	2	1	1	1	2	1	1		5	**6**
Montserrat			1	1						1	**1**
Nicaragua	2	2	1	1	1	1				4	**4**
Panama			2	4	1	1	1	1		4	**6**
St. Kitts & Nevis			1	2						1	**2**
St. Lucia			1	1						1	**1**
St. Vincent & Grenadines			2	2	1	3	2	2		5	**7**
Suriname			1	1						1	**1**
Trinidad & Tobago	2	4	1	2			1	4		4	**10**
USA/Puerto Rico	2	2	1	3			1	1		4	**6**
CARISEC									1	1	**1**
CRFM									2	2	**2**
NOAA									1	1	**1**
OECS-ESDU									1	1	**1**
Total	**18**	**26**	**29**	**38**	**9**	**18**	**12**	**16**	**5**	**73**	**103**