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Oceans and the law of the sea**Note verbale dated 2 January 2013 from the Permanent Mission of the United States of America to the United Nations addressed to the Secretary-General**

The United States Mission to the United Nations presents its compliments to the Secretary-General and has the honour to submit the enclosed document (see annex). Pursuant to General Assembly resolution 65/37 B of 4 April 2011, a workshop was held in Miami, United States of America, from 13 to 15 November, under the auspices of the United Nations, in support of the first phase of the first assessment cycle of the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects (the “workshop”). The attached summary of the workshop, also prepared under United Nations auspices, is a useful synopsis, and the United States therefore requests that the present letter and the annex thereto be circulated as a document of the General Assembly, under agenda item 75.



Annex to the note verbale dated 2 January 2013 from the Permanent Mission of the United States of America to the United Nations addressed to the Secretary-General

Final report of the fourth workshop held under the auspices of the United Nations in support of the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects

Miami, United States of America, 13-15 November 2012

I. Report overview

1. The present report focuses on critical information for the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects, and the Group of Experts as they develop the Wider Caribbean region component of the first global integrated marine assessment (hereafter referred to as the world ocean assessment). It specifically highlights workshop findings related to Wider Caribbean region information gaps, capacity needs for marine assessments in the region, suggestions for development of the world ocean assessment, and next steps in the production of the assessment. These insights were synthesized from the presentations, breakout group discussions and concluding session of the workshop. The annexes to the report provide other details of the workshop and its outcomes, including the agenda, list of participants, summaries of the presentations, and breakout group results.¹ The breakout group results provide an inventory of environmental and socioeconomic marine assessments, including specific sources of information and experts relevant to both the Wider Caribbean region and parts III-VI of the world ocean assessment outline.

II. Background: objectives, history and participants

2. Following the recommendations made at the meeting of the Ad Hoc Working Group of the Whole on the Regular Process in June 2011, and endorsed by the General Assembly in its resolution 66/231 of 24 December 2011, the workshop was held for the Wider Caribbean region from 13 to 15 November 2012 in Miami, United States of America, under the auspices of the United Nations in support of the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects.

3. The objectives of the workshop were to:

- Enhance dialogue between marine experts within Governments, international government organizations and regional initiatives
- Develop an inventory of environmental and socioeconomic marine assessments

¹ All annexes to the present report can be found on the workshop website (<http://www.woawcr.org>) and on the website of the Regular Process secretariat (http://www.un.org/Depts/los/global_reporting/global_reporting.htm).

- Consider the linkages among assessments, including driving factors and the state of the marine environment
 - Identify marine assessment capacity-building needs and consider means to address those needs.
4. The Government of the United States of America, with the technical and financial support of the United Nations Environment Programme, the secretariat for the Cartagena Convention and the Intergovernmental Oceanographic Commission Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE), hosted the workshop.
5. The workshop was facilitated by Co-Chairs Bonnie Ponwith (United States National Oceanic and Atmospheric Administration (NOAA)) and Lorna Inniss (Joint Coordinator of the Group of Experts). Participants (see annex A) included experts from 25 countries within the Wider Caribbean region, experts from countries outside the region, many local, regional and international organizations, and five members of the Group of Experts: Patricio Bernal (Chile), Sean Green (Jamaica), Lorna Inniss (Barbados), Enrique Marschoff (Argentina), Andrew Rosenberg (United States of America) and Renison Ruwa (Kenya).

III. Conduct of the workshop

6. The workshop was conducted in accordance with the agenda (see annex B).
7. A series of presentations were provided on the first day to explain the world ocean assessment and to set the context of its Wider Caribbean region component. Summaries of the presentations and the ensuing discussions are provided in annex C.
8. The second day was devoted to the breakout groups in which participants self-selected into four groups in line with the four major sections of the world ocean assessment: biophysical (part III, chaps. 4-7); food security and food safety (part IV, chaps. 10-15); socioeconomics (part III, chaps. 3 and 8, and part V, chaps. 17-30); and marine biological diversity (part VI, chaps. 34-43). The breakout groups were conducted according to the guidance developed to ensure comparable outcomes that reflected the objectives of the workshop (see annex D).
9. During the third day, the breakout groups presented the highlights of their discussions (these highlights and the specific details of the breakout group discussions are included in annexes E-H). Following these presentations, Co-Chair Lorna Inniss provided a recap of the means by which the participants should engage further in the conduct of the world ocean assessment and highlighted the achievements of the workshop. Ambassador Donatus Keith St. Aimee (Co-Chair of the Ad Hoc Working Group of the Whole on the Regular Process) closed the workshop. Participants were asked to fill out an evaluation of the workshop (see annex I) to inform the lessons learned document produced as a courtesy for future workshop hosts (see annex J).

IV. Wider Caribbean region information gaps

10. Numerous information gaps were identified throughout the presentations and discussions, breakout groups and closing discussion, including the following:

- Standardized protocols and methods across the region for comparability. The Group on Earth Observations was recommended as a source of insight into comparable approaches and methods
- Improved national and regional data analyses abilities. Too often, the limitation is not research, but the capacity to store and analyse existing data. There is a wealth of raw data in the region, as well as outside the region to be repatriated, awaiting analysis
- Greater exchange and sharing of information to support regional policymaking. Protocols need to be established for information-sharing. The articles in the Cartagena Convention provide relevant guidance
- Integration of research and collaboration among different areas of the region. There is a particular need for regional-level socioeconomic syntheses, since socioeconomic studies are often site-specific
- A dynamic, living atlas of the Wider Caribbean region marine environment. Such an atlas could provide a foundation for an international Wider Caribbean region network to share ideas, data, tools, strategies and deliverables to improve utilization of Wider Caribbean region data for research and operational applications. The challenge is not the production of individual data products, but the generation of harmonized data sets to maximize the impact and benefit for scientific analyses and syntheses. The Global Ocean Observing System Regional Alliance for the IOCARIBE region (IOCARIBE-GOOS) is a potential mechanism for such an atlas. The Caribbean Marine Atlas project of the Intergovernmental Oceanographic Commission represents a first step in this process
- Reliable, consistent monitoring programmes that continue beyond the initial assessments
- Ensuring increased access to, and affordability of, the most advanced technology and tools while also ensuring cost-effectiveness. It is not uncommon for huge investments to go into high-tech equipment that is too expensive to maintain when a more economical version would have sufficed
- Improved access to scientific literature
- Science-to-policy approaches to ensure that research informs decision-making. Research needs to be planned and designed to meet management needs by engaging decision makers in design as well as implementation. The critical scientific needs of the region need to be articulated
- Improved science communication and integration. There is a great deal of data and information; however, they are not always readily available or synthesized in a usable form. An important amount of information is not published (grey literature) or exists only as internal reports of the public or private sector. Scientific results need to be synthesized and culled to identify key coherent messages relevant to management and policy agendas

- Scientific results need to be translated from “academic-speak”, communicated in relevant, useful, understandable and accessible forms and then communicated in the appropriate forums and along the relevant policy timelines. Communication strategies need to be appropriate to the knowledge demands of varying publics, which range from political to civil society organizations and communities
- A collective regional institution or institutional arrangements to facilitate a solid science foundation to the decision-making processes at the regional and national levels. This requires an institution capable of providing regular information on the biophysical and socioeconomic conditions in the Wider Caribbean region. As noted above with regard to the atlas concept, initiatives such as IOCARIBE-GOOS are intended to provide such regular information services
- Awareness efforts that promote the benefits that people receive from the oceans to engender stewardship. Too often, scientists, policymakers and conservationists highlight the negative aspects of the marine environment (e.g., hurricanes and shoreline erosion)
- Political will and leadership at all levels
- Improved inter-agency cooperation (e.g., establish memoranda of understanding and data-sharing protocols) both within and between countries
- More engaged non-traditional stakeholders (i.e., the private sector, schools and community groups) and simplified reporting frameworks (e.g., agree on information-sharing protocols to support decision-making)
- Greater national inputs to reports on the state of the Cartagena Convention (notably the reporting templates of the Protocol concerning Pollution from Land-based Sources and Activities)
- Improved documentation of institutional knowledge
- More financing for monitoring and assessments.

11. On the basis of the presentations and discussions, the following topics were identified as needing further study in the Wider Caribbean region:

- Ecosystem service and socioeconomic assessments, including studies of economic, social, linguistic and cultural diversity in the region
- Offshore and deep-sea studies
- Analyses of impacts of watershed activities on marine resources
- Studies in less-developed countries.

12. The breakout group tables (see annexes E-H) define information gaps for each chapter of the world ocean assessment outline.

V. Capacity needs for marine assessments in the Wider Caribbean region

13. Drawing on the presentations, discussions and breakout group discussions, participants made the following observations regarding capacity needs and measures to address those needs for the Wider Caribbean region:

- Previous or ongoing regional marine assessments, specifically the Caribbean Coastal Marine Productivity Programme, the Caribbean Planning for Adaptation to Climate Change project and the Caribbean Large Marine Ecosystem Project, were highlighted as success cases for capacity-building
- In some disciplines, such as physical oceanography and remote sensing of the ocean environment, capacity is highly aggregated in a few institutions. In other disciplines, such as social sciences, it is highly dispersed
- Access to research vessels (e.g., NOAA ships) and ships of opportunity (e.g., those used in relation to the Living Oceans Foundation) offer opportunities and synergies on a wider scale with technological advances for enhanced marine assessments
- There is often an abundance of data, including those collected by ships of opportunity; the limitation, then, is in the capacity to manage the data, including how to organize, store, synthesize and analyse them. Participants discussed the need for nationals to study at institutions where data are already being used and then to bring home the expertise
- Building collaboration among scientists, resource managers and other stakeholders is central to capacity-building, especially as it includes building a willingness to share and communicate. With this need in mind, networks of practitioners, experts, institutions and countries need to be established and fostered and regional programmes promoted
- There is a fundamental need to increase capacity to integrate the key insights of existing research into policy and management agendas
- There is a critical need to retain the knowledge that is invested in training employees and management leadership. This requires fiscal incentives to retain individuals in positions. The constant cycle of promotion at all levels results in an export of knowledge out of the field. Often, the bulk of expert individuals will be lost from policy and management to narrow academic research fields.

VI. Suggestions for development of the world ocean assessment

14. During the presentations and discussions, the participants noted that the world ocean assessment might be a first step in a renewed effort to mobilize institutions and experts of the region to enhance cooperative work and to find synergies. The world ocean assessment also represents an opportunity to bring experts together as they contribute to the working papers on the different topics. This initiative can, therefore, help to produce the needed information to address the common problems due to the increased use of the ocean and its resources, and to prepare the Wider Caribbean region to adapt to the impact of global climate change.

15. Participants identified the following topics, which need to be better reflected in the world ocean assessment outline:

- Ocean governance: highlighting the state of governance is fundamental to ensuring that the world ocean assessment leads to policy change
- Ocean acidification
- Analysis of reference points
- Analysis of biological, social and economic impacts of alternative policies (e.g., cost of pollution in terms of use and non-use values)
- Plausible future scenarios
- Watersheds where land activities influence coastal environments
- Climate change
- Gender
- Poor and vulnerable communities.

16. The participants also made the following suggestions regarding the approach, structure and methods of the world ocean assessment:

- A comprehensive strategy is needed for communicating and disseminating results and influencing policy
- Engage Governments and other stakeholders throughout the drafting of the Wider Caribbean region component of the world ocean assessment to ensure that the analyses provide information that will be useful to decision makers. With that in mind, the analyses need to be upstream and demand-driven (country-driven) to ensure that there is ownership and buy-in of outputs and follow-up. Engagement will also foster buy-in and ultimately help to ensure that policymakers integrate the findings into regional and national policies
- Clarify what is unique about the world ocean assessment compared with other meta assessments and processes, past, present and future
- Clarify how the structure relates to drivers-pressures-state-impact-response
- Clarify to what extent the world ocean assessment will be quantitative
- Clarify how reference points/baselines will be calculated
- Be transparent regarding choice of methods, data sources and assumptions
- Consider that global and regional economic values will not have much impact and will be difficult to track for trends and, instead, consider calculating local values, which are useful for policy and management agendas.

VII. Next steps in the production of the world ocean assessment

17. The results of the workshop will be shared with the Group of Experts to inform the drafting of the Wider Caribbean region component of the world ocean assessment. The assessment timeline includes the following key steps:

- Further nominations by States to the Pool of Experts
- Approval of the guidance to contributors
- Preparation of working papers for each chapter (fall 2012-fall 2013)
- Preparation of draft chapters based on working papers (October 2013-March 2014)
- Production of the first draft of the first world ocean assessment (April-May 2014)
- Peer review and review process (June-August 2014)
- Final draft (September 2014)
- Submission to the Ad Hoc Working Group of the Whole on the Regular Process (December 2014)
- Publication (February 2015).

18. Workshop participants were aware that the process of holding the workshop would also inform the conduct of other workshops. The upcoming workshops are: the western Indian Ocean (Maputo, December 2012), the south-west Pacific (Brisbane, Australia, February 2013), the South Atlantic (city to be determined), and the northern Indian Ocean, Arabian Sea, Red Sea and Gulf of Aden (city to be determined). All countries will receive notice of all Regular Process workshops through invitations issued through their missions to the United Nations.

19. Participants were asked to send any additional sources of information and names of experts to Kareem Sabir (ksabir@coastal.gov.bb) for inclusion in the present report. Participants were also encouraged to join the Pool of Experts and, if selected by the Group of Experts, to engage in drafting the Wider Caribbean region component of the world ocean assessment.

WORLD OCEAN ASSESSMENT WORKSHOP FOR THE WIDER CARIBBEAN REGION (WCR)

NOVEMBER 13-15, 2012

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Annex B: Agenda



WORKSHOP FOR THE WIDER CARIBBEAN REGION (WCR)

Under the Auspices of the United Nations, in Support of the UN Regular Process for Global Reporting and Assessment of the State of the Marine Environment, Including Socioeconomic Aspects

13-15 November 2012

Sheraton Miami Airport Hotel & Executive Meeting Center
Miami, Florida, United States of America

Day 1: Tuesday, 13 November

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|--------------------|---|
| 8:00-9:00 | Registration of Participants |
| 9:00-10:45 | Opening Ceremonies (Led by UN secretariat of the Regular Process, SRP) |
| 9:00-9:10 | Call to Order (Annebeth Rosenboom, SRP) |
| 9:10-9:40 | Welcome Statement from Host Government (Eric Schwaab, United States) |
| 9:40-9:45 | Adoption of Agenda |
| 9:45-9:50 | Selection of Workshop Chairs |
| 9:50-10:15 | Group Photo & Break |
| 10:15-12:00 | Overview of Regular Process (Led by Workshop Chairs) |
| 10:15-10:30 | Overview of Evolution and Structure of WOA (Annebeth Rosenboom, SRP) |
| 10:30-11:00 | Overview of WOA Report Outline and Timeline (Patricio Bernal, Group of Experts [GoE]) |
| 11:00-12:00 | Questions and Answers |
| 12:00-1:30 | Lunch |
| 1:30-6:00 | Overview of Workshop Objectives (Led by Workshop Chairs) |
| 1:30-3:30 | WCR Environmental and Socioeconomic Assessments (led by Chris Corbin, UNEP-CEP) <ul style="list-style-type: none">• <i>The Cartagena Convention: Framework for Monitoring and Assessment in the WCR</i> – Christopher Corbin, UNEP• <i>Pollution Loading and Hot Spot Monitoring in the Wider Caribbean - Status, Lessons Learnt and Recommendations</i> - Antonio Villasol, Cuba (presented by Chris Corbin)• <i>Monitoring and Assessment in SIDS...Trends, Challenges and Opportunities</i> - Christopher Cox, St. Lucia |

- *Making the Socio-economic Case for Monitoring and Assessment Programmes in the Wider Caribbean* - Laretta Burke, World Resources Institute
 - Open Discussion
- 3:30-4:00 Break
- 4:00-5:00 WCR Data Resources and Methodologies for Assessments (Led by Cesar Toro, IOCARIBE)
- *Assessments of the Marine Environment in the Wider Caribbean Region* - Elva Escobar, Mexico (presented by Cesar Toro)
 - *Maritime Safety Information and Meteo-Ocean Data* - Edgard Cabrera, UN World Meteorological Organization
 - *Harmonized Observations and Data Products* - David Halpern, United States
 - Open Discussion
- 5:00-6:00 WCR Capacity-building Needs (Led by Sean Green, GoE)
- *An Overview of the Existing Strengths, Gaps and Capacity Needs within the Wider Caribbean Region to Conduct Assessments for the Regular Process* - Robin Mahon, Barbados
 - *Opportunities and Synergies Available for Building National and Regional Capacities to Conduct Marine Assessments for the Regular Process* - Dale Webber, Jamaica
 - Open Discussion
- 6:00-6:30 **Reception (Led by Workshop Chairs)**
- 6:30-8:00 Poster Session on Integrated Marine Assessments and Ecosystem-Based Management
Remarks on Regional Findings of the Ocean Health Index – Andrew Rosenberg, GOE

Day 2: Wednesday, 14 November

- 9:00-10:00 Establish Break-out Groups (Led by Workshop Chairs)
- Group I – Biophysical Aspects:** WOA Chapters XXX
(Led by Francisco Arias, Colombia & Patricio Bernal, GoE)
- Group II – Food Security and Safety Aspects:** WOA Chapters XXX
(Led by Michael Schirripa, United States & Sean Green, GoE)
- Group III – Socioeconomic Aspects:** WOA Chapters XXX
(Led by Patrick McConney, Barbados & Marlene Attzs, Trinidad and Tobago)
- Group IV – Marine Biological Diversity Aspects:** WOA Chapters XXX
(Led by Antonio Diaz-de-Leon, Mexico & Andrew Rosenberg, GoE)

- 10:00-12:00 Break-out Group Discussions**
Group I – Room A, Group II – Room B, Group III – Room C, Group IV – Room D
- 12:00-11:30 Lunch
- 1:30-5:30 Continue Break-out Group Discussions**
Group I – Room A, Group II – Room B, Group III – Room C, Group IV – Room D

Day 3: Thursday, 15 November

- 9:00-11:40 Summary from Break-out Group Discussions (Led by Workshop Chairs)**
Presentations of 30 min each + 10 min for discussion
- 9:00-9:40 Group I
- 9:40-10:20 Group II
- 10:20-11:00 Group III
- 11:00-11:40 Group IV
- 11:40-12:00 Break
- 12:00-1:00 Closing Ceremonies**
- 12:00-12:30 Workshop Conclusions and Follow-up (Led by Workshop Chairs)
- 12:30-12:45 Closing Remarks from Ambassador Donatus Keith St. Aimee Co-Chair of the UN Ad-Hoc Working Group of the Whole for the Regular Process
- 12:45-1:00 Adjournment (Annebeth Rosenboom, SRP)

Annex C: Presentation Summaries & Discussion Points

Opening Ceremonies (led by Annebeth Rosenboom, UN Secretariat of the Regular Process)

Call to Order (Annebeth Rosenboom, SRP)

The Workshop was called to order by Annebeth Rosenboom, Secretariat for the Regular Process. Ms. Rosenboom welcomed the participants noting the importance of this workshop to the Regular Process, which is slated to be completed by 2014. This Workshop follows the achievements of the previous WOA workshops, which have been held for North Atlantic, the Baltic Sea, the Mediterranean and the Black Sea (Brussels, June 2012), Eastern and South-eastern Asian Seas (Sanya, February 2012) and South Pacific (Santiago, September 2011). The drafting of the WOA will be conducted by the Group of Experts, which includes 25 individuals, who will draw from the Pool of Experts. The Pool of Experts currently includes 255 individuals worldwide; however, 200 experts need to be appointed for each region. Approximately 100 experts have been identified for the Wider Caribbean Region.

Thanks were given to the United States, IOCARIBE, UNEP-CEP and the attending members of the Group of Experts. Ms. Rosenboom noted the guidelines provided for the Workshops (Guidelines for Workshops to Assist the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socio-economic Aspects) were addressed in coordination of this workshop.

Lorna Inniss, Joint Coordinator of the Group of Experts, announced the passing of Angela Cropper, the former Deputy Executive Director of the United Nations Environment Programme. One minute of silence was observed.

Welcome Statement from Host Government (Eric Schwaab, United States)

Eric Schwaab, Acting Assistant Secretary for Conservation and Management for NOAA, welcomed the participants and noted the United States is honored to be hosting such a distinguished group of experts. He thanked the Group of Experts for their dedication to this initiative, the participants for their time and commitment to this initiative, and UNEP, IOCARIBE and the Secretariat for the Regular Process for their support and endurance. He noted the United States' commitment to strengthening marine assessment in the Caribbean region, which build regional capacity, ecosystem based management and overall environmental stewardship. The tremendously destructive weather events this year, including 19 tropical storms and 11 hurricanes in this region alone, illustrate the importance of regional cooperation to protect life and property and to sustainably manage natural resources. In this regard Mr. Schwaab noted the United States relies on regional partnerships to achieve high priority goals, including: 1) strengthening science; 2) enhancing coordination; 3) building capacity; and, 4) achieving effective, regional management. Significant regional collaborations already exist and include partnerships on comprehensive observations of physical, chemical and biological conditions as well as forecasts of hurricanes and other extreme weather events. Specific programmatic examples include the Large Marine Ecosystem Program and

the Caribbean Fisheries Management Council. Finally, Mr. Schwaab highlighted the importance of this WCR for the WOA in building and strengthening networks of colleagues and advocates across the region and setting the example for other regional workshops by demonstrating a productive, collective vision.

Adoption of Agenda & Selection of Workshop Chairs

The agenda was adopted as written (Annex B). The representative of the host Government of United States, Ms. Bonnie Ponwith, and the Joint Coordinator of the Group of Experts, Ms. Lorna Inniss, were appointed as Co-Chairs.

Overview of Regular Process (led by Bonnie Ponwith and Lorna Inniss, Workshop Co-Chairs)

Evolution and structure of the Regular Process (Annebeth Rosenboom, SRP)

Annebeth Rosenboom, Secretariat for the Regular Process, explained the evolution of the Regular Process and the Structure of the Regular Process. Ms. Rosenboom provided an overview of the history of the Regular Process, described the mandate of the Regular Process, discussed the institutional arrangements and noted next steps. She noted that the Regular Process is particularly critical because it gives a global picture of the state of the marine environment that incorporates socio-economic aspects. The Regular Process takes an integrated (not sectoral) approach to understanding the oceans, includes inter-linkages between social and economic development on land, and emphasizes interfaces between scientific knowledge and decision-making. The institutional structure, the Ad Hoc Working Group of the Whole, is under the General Assembly. The Group of Experts, which is tasked with writing the WOA, will draw on the Pool of Experts. The key next steps for the WOA are:

- (1) establish the Bureau of the Regular Process (the Working Group will adopt guidance on Nov 16);
- (2) strengthen the Pool of experts of the Regular Process, including 200 experts per region group (currently 107 from the WCR); and,
- (3) complete the regional workshops.

WOA Outline and Timeline (Patricio Bernal, GoE)

Patricio Bernal, Member of the Group of Experts, explained the WOA history and outline of the WOA. The WOA outline was discussed extensively, including three reviews, and finally approved by the Ad Hoc Working Group of the Whole (AHWG) in April 2012. Mr Bernal noted the assessments will be conducted approximately every six years. Yet, the WOA is largely unknown among policy-makers because of the challenges of calling attention to the oceans.

The UN General Assembly endorsed the recommendations of the AHWG that the output of the Regular Process (by 2014) should be an integrated assessment of the oceans, include cross-cutting thematic issues and provide a baseline for future global assessments. The socioeconomic aspects are a high priority, particularly highlighted by developing nations. The underlying approach was the framework of Drivers-

Pressures-Status-Impact-Response, which suggested three possible approaches for structuring the assessment: pressures (e.g. land-based pollution, shipping, etc), habitats (e.g. mangroves, coral reefs, etc.) and ecosystem services (e.g. food security, coastal protection). The WOA outline is divided into seven parts: (1) summary for decision-makers; (2) the context of the WOA; (3) ocean ecosystem services; (4) cross-cutting issue – food security and safety; (5) other human activities; (6) biodiversity and habitats; and (7) overall evaluations.

Open Discussion

The following comments and questions were raised with the noted responses from the Group of Experts as a panel:

What level of influence will the governments have in writing the WCR component of the WOA? *GoE Response:* The WOA will be a technical report for which all the members of the GoE are responsible. Governments will have an opportunity to question statements and make suggestions, which must be considered by the GoE; however the governments cannot edit the WOA. There will also be an external peer review process to ensure the best scientific-based assessment.

When will the WOA be completed? *GoE Response:* The WOA is due by end of 2014; however, that deadline is being reconsidered.

It is important to align with the International Sea Bed Authority (ISBA). *GoE Response:* This point relates to all specialized agencies. The WOA will produce a high-level assessment that integrates all existing assessments, including ISBA and many other analyses. IPCC, as another example, will be particularly important for climate and weather. The challenge will be integrating across these various assessments. All these studies are the basis on which the comprehensive assessment will be produced.

How does the WOA relate to the DPSIR structure and to what extent will the WOA be quantitative? *GoE Response:* The first cycle (ending in 2014) will be qualitative; however, the goal is to continually assess the state of the oceans and consequently future assessments are expected to be more quantitative (hence the name Regular Process).

Ocean acidification (OA) needs to be better addressed in the WOA. OA has become a more prominent concern in the last few years. *GoE Response:* OA has become increasingly important; however, there are still many unknowns about OA. The researchers in each region need to consider OA in their analysis; however, there is not a mandate that OA be highlighted in all regions.

The state of ocean governance needs to be addressed in the WOA. *GoE Response:* It has been agreed by States that the WOA needs to be policy-relevant, but not policy-prescriptive. Thus, while the first WOA provides a comprehensive view of the oceans as they are, their importance to human well-being, and attempts to clearly define what sustainable oceans should look like, the issue of ocean governance will

not be a feature of any chapter. However, discussions on ocean governance can take place at the regional level.

What is the deadline for submitting applications for the Pool of Experts? *GoE Response:* The first deadline was March 16, 2012, but as states were slow to respond with nominations, it has become a rolling deadline; however, nominations will have to be completed during the next several months.

How will information gaps be addressed by the WOA analysis? *GoE Response:* The assessment draws on existing assessments. The WOA does not involve collecting new data. Consequently, there will be gaps where no assessment has been conducted. Those gaps will be identified in the Break-Out Group discussions. The WOA will identify the gaps which, it is expected, will be filled before the second cycle of the WOA.

To what extent will the GoE define ecosystem goals for the future (i.e. reference points)? *GoE Response:* It is not up to the scientists to determine the goals, but managers. However, reference points can be defined by scientists. As illustrated by the Ocean Health Index, there are ways to calculate these which the GoE will pursue.

It would be very useful to include plausible future scenarios, which communicate the importance of ocean governance and the impacts of decisions. *GoE Response:* In the first cycle of the assessment, the WOA will more likely focus on trends than modeled scenarios.

WCR Environmental and Socioeconomic Assessments (led by Christopher Corbin, UNEP)

The Cartagena Convention: Framework for Monitoring and Assessment in the Wider Caribbean (Christopher Corbin, UNEP)

Christopher Corbin discussed the framework for monitoring and assessment in the WCR from the perspective of UNEP CEP and Cartagena Convention (ratified by 25/28 nations in WCR). The UNEP Caribbean Environment Programme (CEP) and Secretariat for the Cartagena Convention, the only legally binding regional environmental agreement for the protection and development of the Caribbean Sea, represents an ideal regional governance framework for providing data and information for the first World Ocean Assessment (WOA-1). The Secretariat can call upon a network of government experts, specialized Regional Activity Centres (RACs) for oil spills, biodiversity and pollution, as well as a range of collaborating agencies to provide scientific and technical expertise for the review, analysis and evaluation of data and information relating to the Caribbean Sea. CEP can also identify and nominate experts for the Pool of Experts.

Through various projects and programme activities, the CEP has published several technical reports, guidelines, methodologies, manuals, toolkits, case studies, and experience notes on the management of coastal and marine resources of the Caribbean Sea. These include information on status, trends and impacts on

economic sectors such as tourism, fisheries and maritime transportation. Results of recent monitoring and assessment studies have also been presented visually in atlases and through online interactive data bases and GIS tools available through the UNEP CEP Clearing House Mechanism.

Recent monitoring and assessment studies confirm the continued negative impacts of pollution from land and marine based sources and habitat degradation on coastal and marine resources. These include pollution from untreated domestic wastewater, nutrients, solid waste and agrochemical non point sources including the run-off of sediments. Many of these impacts have direct socio-economic consequences and these impacts have been further exacerbated by climate change especially on coastal areas and for SIDS. The sustainability of future assessment programmes for the region should be grounded in an existing reporting framework such as that for the State of Convention Area Report (SOCAR). This will require continued capacity building for environmental monitoring and assessment programmes and greater application of data and information generated for improved policy development and decision making. Challenges with limited information exchange also need to be addressed and lessons can be learned from several Articles in the Cartagena Convention relevant to monitoring and assessment.

Pollution Loading and Hot Spot Monitoring in the Wider Caribbean – Status, Lessons Learnt and Recommendations (Antonio Villasol, Cuba – presented by Chris Corbin)

Chris Corbin highlighted several relevant regional studies to be considered for the WCR component of the WOA:

- The Global International Waters Assessment, SubRegion Caribbean, which was led by INVEMAR Colombia, was a comprehensive assessment of waters. It examined issues, immediate causes and impacts. (www.iwcam.org, www.gefcrew.org and www.cep.unep.org/repcar)
- UNEP Technical Report #52 summarized an inventory of pollution loads. The Report examined biological oxygen demand, examined domestic wastewaters flow discharged by sub-region into the WCR, evaluated organic matter inflow and domestic origins and determined their impacts on the marine environment. (www.iwcam.org, www.gefcrew.org and www.cep.unep.org/repcar)
- Programa de Monitoreo de la Calidad de Ecosistema examined areas of highest risk based on monitoring data of high levels of coastal zone development, poor wastewater treatment for residential and industrial areas, and high impact port developments. (www.iwcam.org, www.gefcrew.org and www.cep.unep.org/repcar)

The major challenges identified in these studies included:

- Irregular monitoring, particularly from government (universities more commonly have monitoring data);
- Lack of knowledge of technology available and new innovations and often unaffordable and unsustainable high levels of technology;
- Limited information sharing;
- Heavy dependence on low-cost treatment systems, which are not efficient; and,
- Financing problems for monitoring and assessments.

In addition, several needs were raised, including: human capacity, cooperation to share insights across projects, financing and political drivers to move forward.

Monitoring and Assessment in SIDS...Trends, Challenges and Opportunities
(Christopher Cox, St. Lucia)

Abstract: The watersheds and coastal areas of the Caribbean are among the world's most diverse and productive, encompassing extensive areas of complex and unique eco-systems harbouring many species that are endemic to the Caribbean region. Many of these are at risk from anthropogenic influences where it is expected that at least 20% of species in risk areas may be lost over the next 30 years if significant action is not taken to manage and protect these biological resources and the ecosystems services they provide. Human-induced stresses ultimately result in aquifer degradation, reduction in surface water quality and availability, and loss of watershed and coastal biodiversity; processes that will no doubt be accelerated by influences of climate change. This will compromise the long-term security of key economic pillars, namely tourism and agriculture. While there is recognition of the value of monitoring and assessment of the state of land and coastal resources in driving policy and interventions, the Caribbean region faces challenges in translating outputs from monitoring and research into practical evidence-based decision-making and action.

The Caribbean Environmental Health Institute, which is an inter-governmental technical institution of the Caribbean Community (CARICOM), was established to provide technical assistance throughout the region. Two key examples of regional fresh and coastal water approaches in monitoring and assessment for decision-making are:

Regional level: Coastal water quality study of Caribbean SIDS. This initiative, which was under the "Know-Why Network", was a collaboration with the Regional Activity Centre (RAC) for the LBS Protocol of the Cartagena Convention based in Cuba and the Centro De Ingeniería Y Manejo Ambiental De Bahías Y Costas (CIMAB). The 2009 study entailed the compilation of assessments of the quality of coastal waters in the English-speaking Eastern Caribbean countries. The study identified main sources of pollution, types, location and coastal areas being affected. Countries were, however, unwilling to release data (related to the possibilities associated with bad public relations that may impact the tourism sector). The study revealed the general lack of national, centralized, systematic data collection and archival systems (difficult to access historic data, multiple agencies involved in data collection, decision-making fragmented). Human and financial resource constraints pose significant challenges as well.

National level: Water Quality Assessment –Saint Lucia Northwest Coastal Corridor. This initiative was designed to rationalize and prioritize monitoring efforts for land-based sources of (LBS) pollution and to target interventions within national protected area frameworks. Water quality pollution profiles were developed for target watersheds in the study area based on water quality measurements in rivers

and the receiving coastal waters. Pollution hotspot assessments were conducted for several locations across the target watersheds based on a standardized assessment tool. The outcome of the assessment tool was a numeric ranking that indicated the level of relative risk for pollutant generation based on the nature of activities at the hotspot. The ranking is the basis for the priority for future interventions in pollution reduction.

Strong capacity building efforts for watershed and coastal areas water assessment are illustrated by the recently concluded GEF-funded Integrating Watershed and Coastal Areas Management (IWCAM) Project. The Project delivered capacity building in all of the 13 participating countries where there was training in lab diagnostic quality assurance, quality control, practical water quality monitoring, membrane filtration techniques, amongst others. All these efforts contributed to improved capacity in microbiological analyses and chemical analyses.

Monitoring and assessments of fresh and coastal waters are recognized to be increasingly important, particularly for safe drinking water and for recreational use. The assessment of impacts on ecosystem services is weak. Challenges at the national level will need to be addressed through strengthening inter-agency cooperation in monitoring (establish MOUs, data sharing protocols), engaging non-traditional stakeholders (private sector, schools, community groups), and establishing simple reporting frameworks (agree on info sharing protocols to support decision-making – LBS protocol core parameters). At the regional level there is a need to continue to strengthen national inputs to the State of Cartagena Convention Area Reports (notably LBS Protocol reporting templates), formalize and harmonize data collection agreements among regional partners (strengthen the CEP Secretariat as a hub), and advocate for improved information exchange to support regional high-level policy making and agree on protocols for information sharing.

Making the Socio-economic Case for Monitoring and Assessment Programmes in the Wider Caribbean (Lauretta Burke, WRI)

Lauretta Burke noted that physical and socioeconomic assessments conducted at a variety of scales (global, regional, national, local) can inform a World Ocean Assessment (WOA), provided a reasonably standardized framework for assessment is used. Ms. Burke provided a brief survey of a variety of assessments covering all or part of the Wider Caribbean region as an input for discussion on the types of information and assessments needed for the WOA.

These assessments included the following categories with examples noted: *Threat analyses*. Reefs at Risk Revised examined local and global threats to reefs and assessed risks spatially as low, medium, high or very high;

Evaluations of habitat coverage relative to protection. Reefs at Risk Revised evaluated to what extent coral reefs are included in marine protected areas (FYI in the Caribbean, 30% of reefs are in MPAs but only 2% are effectively managed.);

Evaluations of the social and economic vulnerability of coastal communities to habitat degradation. WorldFish Centre examined threats, reef-dependence and adaptive capacity to determine the most vulnerable nations;

Evaluations of marine management effectiveness. The Eco-Audit project led by WRI examined the effectiveness of coastal and fisheries management for the Mesoamerican Reef;

Assessments of vulnerability to climate change; and,

Valuations of the annual economic contribution of marine resources. The Coastal Capital project examined the marine goods and services, including fisheries, tourism and shoreline protection of five countries.

Ms. Burke noted that policy uptake was influenced by local demand for studies, a clear policy question, strong local partnerships, access to decision-makers, good governance with high transparency and study areas with a high dependence on coastal resources. She further noted that precisions and methods are not as important as transparency about assumptions; standardized methods have merit; local analyses are more adaptable than global or even regional studies; climate change needs to be incorporated into planning assessments; global and regional economic values have limited meaning, especially as it is difficult to track large-scale trends; local values derived for policy are useful; and, it is important to identify data sources to validate assessments.

Open Discussion

Several questions and comments were made as follows:

How do you calculate useful values for policy-makers? *Response (Ms. Burke):* We are often documenting things we already know. We know the benefits of reefs, but these studies provide supporting evidence. We are often encouraged to produce a one page summary and even a short video.

Several presenters noted data sharing and standardized protocols are critical to success, yet often lacking. *Response (David Halpern):* The GoE would benefit from looking into the experiences of the Group on Earth Observations (GOE).

How do you include social values in fisheries studies? *Response (Ms. Burke):* Fisheries data are often difficult to obtain. Commercial data are usually more accessible than subsistence information. In Trinidad & Tobago and in St Lucia we conducted use surveys where we asked why people fish and found most fished for enjoyment and for traditional reasons, not for nutritional needs.

WCR Data Resources and Methodologies for Assessments (led by Cesar Toro, IOCARIBE)

Cesar opened the session by highlighting the lack of investment in ocean and coastal environmental research. Yet, science is the foundation for policy-making, which also considers the economy, society and governance. Policy-makers need the best available data and information in order to make informed decisions.

He noted that IOCARIBE is an important regional player for the WCR component of the WOA and includes partner institutions throughout the Caribbean as well as with USA and Europe. The most relevant initiative to the WOA is the Transboundary Water Assessment Programme. The TWA Programme is establishing a standard set of indicators and methodology; contributing to the global comparative baseline assessment of Large Marine Ecosystems (LMEs), and open ocean areas; and establishing a technical framework for periodic assessments.

The Caribbean Large Marine Ecosystem (CLME) Assessment of the Marine Environment in the Wider Caribbean Region (Elva Escobar, Mexico presented by Cesar Toro)

Cesar Toro noted there is increasing stress on marine resources from over-fishing, pollution, habitat destruction, climate change and invasive species. CLME is examining the state of the LME, which includes 25 countries and 19 territories. The types of indicators being examined include: process indicators to assess the progress of certain administrative and organizational processes; pressure or stress indicators to evaluate impacts and possible changes thereof; status indicators to determine the actual state of the environment and ecosystems; and socio-economic indicators (although focusing on first three).

There are several key institutions involved in regional assessments, including:

Research Institutions & Universities

Regional IGOs - ACS, CAST, CEHI, CIMH, Caribbean Tourism Association, CARICOM CRFM, OECS, OLDEPESCA & OSPESCA

International IGOs - ICCAT

UN organizations with regional bodies - WECAFC of FAO, UNEP Caribbean Environmental Programme, IOCARIBE of IOC-UNESCO, UN Economic Commission for Latin America & UNECLAC, UNDP, UNEP for Latin America, Caribbean GEO, GEF

International NGOs - WWF, TNC, WRI, IUCN, Census of Marine Life

Regional organizations - WIDECAST, GCFI

In 2009 an assessment of assessments was conducted in which 42 assessments were identified and collated into the GRAMED database. Many information gaps were identified at that time. The topics covered were primarily on biodiversity (20%) followed by coral reefs (18%), then anthropogenic (13%) and then monitoring (10%). Most of studies were conducted by Venezuela, French Guyana and Colombia and most of the studies focused on coastal areas (<200m).

Several major gaps were identified, including studies of: less developed countries; the economic, social, linguistic and cultural diversity in the region; socio-economics in general; offshore and deep water areas; and, the effect of watersheds on coastal

oceans. In addition, the need to link with managers and policy-makers was highlighted due to the lack of integration of science into policy and management.

Maritime Safety Services & Metocean Data for Climate Services (Edgard Cabrera, UN World Meteorological Organization)

Abstract: The status of the availability of the Maritime Safety Information (MSI), prepared for the Global Maritime Distress Safety System (GMDSS) on the GTS, and references to the WMO-IMO-IHO World Wide Metocean Information Warning System and METAREA Coordinators and the volume II (Regional Aspects) were presented, as well as the updated versions of both the Manual on Marine Meteorological Services (WMO-No. 558) and the Guide on Marine Meteorological Services (WMO-No. 471).

It is important that all national meteorological and hydrological services implement a quality management framework (QMF) in order to ensure the use of best practices and the improvement of value for mariners (e.g, the “Marine Weather, Tsunami Warning and Ocean Services Quality Manual” published by the Australian Bureau of Meteorology BoM, a .

The recent developments with regard to the Global Framework for Climate Services (GFCS), and the outcome of the Extraordinary Session of the World Meteorological Congress (Cg-Ext.(2012)), which was held in Geneva from 29 to 31 October 2012, were discussed.

The Global Framework for Climate Services will bring together providers of climate services, researchers and users to make sure that the information provided by meteorologists and climate scientists is understandable and relevant to climate-sensitive activity. The initial focus will be on improved service delivery for disaster risk reduction, health, water management, and agriculture and food security. The development of the Marine Climate Data System (MCDS) will be one important element of the WMO/IOC Joint Commission for Oceanography and Marine Meteorology (JCOMM) contribution to the GFCS.

Harmonized Observations and Data Products (David Halpern, NASA)

Abstract: Uniformly processed observations and data products will improve the credibility of the first World Ocean Assessment (WOA-I). For example, many sea surface temperature (SST) data products exist. However, the WOA-I should use only a single SST data product throughout the global ocean, including the Wider Caribbean Region (WCR). Otherwise, differences between SST data products (e.g., biases and sampling characteristics) would increase uncertainty of the validity of the result and conclusion. Utilization of a single data product would prevent interpretation errors caused by merging.

The production of observations and data products of different ocean parameters for analyses in WOA-I should be harmonized to improve synergy in interdisciplinary analyses. These analyses would include selection of common schemes for location,

time, and spatial and temporal resolutions and estimates of uncertainty, accuracy, and precision would enhance interoperability and integration of multiple datasets.

This paper will illustrate the benefits of uniformly processed, harmonized observations and data products for WOA-I, including the WCR, and will provide talking points for generation and maintenance of a dynamic, living atlas of the WCR marine environment. Such an atlas could provide a foundation for an international WCR network to share ideas, data, tools, strategies and deliverables to improve utilization of WCR data for research and operational applications. The challenge is not the production of individual data products, but the generation of harmonized datasets to maximize the impact and benefit for scientific analyses and syntheses.

There are several relevant global data sets on oceans. NASA has relevant data, including sea surface salinity, sea surface temperature (Group on High Resolution SST), wind speed and direction – the wind vector community is working on standardizing format and sharing data.

The Caribbean Marine Atlas involves 9 Caribbean countries and is coordinated by IOC. Geospatial datasets need to be organized into an atlas of environmental themes for the Caribbean region.

Open Discussion

Participants asked for clarification regarding the boundaries for data collection.

Response: The entire watershed should be the boundary. Land features need to be addressed if they are part of a watershed that affects the coastal ocean.

WCR Capacity-Building Needs (led by Sea Green, GoE)

Capacity for World Ocean Assessment in the Wider Caribbean Region

(Robin Mahon, Barbados)

Abstract: This presentation looks at three aspects of the capacity for World Ocean Assessment in the Wider Caribbean Region: how capacity is distributed in the Wider Caribbean, geopolitical considerations, and dimensions of capacity. A wide range of disciplines are needed for monitoring oceans. These include natural sciences (physics, chemistry, biology) and social sciences (sociology, economics, political studies). An inventory of the distribution of skills and capacity in all these areas would be challenging. This capacity is distributed throughout the 26 countries 18 territories and more than 30 regional organizations that have some responsibility for ocean governance. In some disciplines such as physical oceanography and remote sensing of the ocean environment capacity is highly aggregated in a few institutions. In other disciplines such as social sciences it is very dispersed. Capacity is also very fluid as people come and go, particularly with development projects. Rather than an inventory approach what is needed is a flexible, networking, self-organizing portal for access to capacity as needed. It needs to be adaptive and ongoing.

The geopolitical complexity of the WCR will affect the approach to capacity. Capacity cannot be solely, or even primarily for the purpose of informing the WOA. It must be usable and used for ocean governance. It must have a demand and be

part of a governance process that determines when and how information will be used beyond the WOA. This brings us face to face with familiar issues of scale, nestedness and subsidiarity. Ocean governance processes occur at multiple organizational and geographical scale levels. Various types of capacity will be appropriate for various levels. Furthermore given the small size of many countries there will be the need to centralize capacity at appropriate supra-national levels. This creates institutional design problems can only be addressed through regional cooperation.

Finally it is critical to note that capacity is much more than the acquisition of technical skills. CANARI recognizes seven types of capacity that provide a useful perspective that we should keep in mind as we discuss capacity development. These types of capacity include: world view; culture; structure; adaptive strategies; skills; material resources; and, linkages. If addressed together, these types of capacity will increase the chances of sustainable capacity development.

Opportunities and Synergies Available for Building National and Regional Capacities to Conduct Marine Assessments for the Regular Process (Dale Webber, Jamaica)

Abstract: Marine assessments throughout the wider Caribbean have been varied and sporadic. Results range from exceptional to less than acceptable with location dominating assessment quality and coverage. Although many tools, aids, programmes and initiatives have been initiated and many still exist, the most common limitation to acceptable and reliable assessments is lack of capacity within countries and across the region. Efforts to increase and maintain capacity are therefore important in facilitating the conduct of marine assessments in the Wider Caribbean.

Capacity building involves the strengthening of the skills, competencies and abilities of individuals, communities, institutions, countries and eventually regions. This is achieved by identifying and evaluating the existing human, scientific, technological, organizational, and institutional resource capabilities, then formulating a response to meet the limitations of the resources, implementing a strategy and finally evaluating the results and impact. This approach implies a level of willingness to participate and communicate, the availability of leadership, knowledge and technology or the resources to provide them, as well as a commitment to accountability.

The vastness of the region and the various languages are often seen as barriers to synergy between nations of the Wider Caribbean Region however physical fora, electronic discussions and information (and data) management and sharing provide tools for synergy. Examples from previous regional marine assessments such as Caribbean Coastal Marine Productivity (CARICOMP), Caribbean Planning for Adaptation to Climate Change (CPACC) and Caribbean Large Marine Ecosystems (CLME) are evidence that opportunities and synergies have been successful in the past. The question of funding and sustainability presents the larger challenge. Furthermore, availability of access to research vessels/ships of opportunity (NOAA, Woods Hole, and Living Oceans) offers opportunities and synergies on a wider scale

with technological advances for enhanced marine assessments. Willingness to participate and communicate are the greatest hurdles to be overcome.

Open Discussion

The following points were discussed:

There is a wealth of data from “ships of opportunity”, but often there is a lack of capacity to manage the data. The region needs capacity to organize, store, synthesize and analyze data. *Responses:* Data handling is another important component in capacity building. We need nationals to study at institutions where data is already being used and bring home their expertise. Building up this capacity can take decades. It requires training and over time building long-term commitments. There need to be long-term efforts, including mentoring and building institutions. Capacity is about ownership. What we do is driven by owners and their decisions. It does not matter how much data we have, as what we do with the information. The challenge, then, is determining how to focus research around policy needs.

Relevant Regional Assessments

Remarks on Regional Findings of the Ocean Health Index (Andy Rosenberg, Union of Concerned Scientists)

The Ocean Health Index is the first quantitative, comprehensive global assessment of the critical relationship between the ocean and people, framed in terms of the benefits people derive from it. These 10 benefits (or goals) are: food provision; artisanal fishing opportunities; natural products; carbon storage; coastal protection; livelihoods and economies; tourism and recreation; sense of place; clean waters; and biodiversity. The Index evaluates the coastal waters of the world’s 171 countries with ocean shorelines. The Index is a collaborative project engaging over 65 scientists and ocean experts around the world and drawing on over 100 global datasets. Evaluated globally and by country, the 10 goals represent the wide range of benefits that a healthy ocean provides people, from the food people eat to the places they value and enjoy. The average of all 10 of its goal scores forms the overall score for each country. Overall scores and individual goals scores are directly comparable between all countries. The Index global score is the area-weighted average of all the country scores. Each goal is evaluated on the basis of four dimensions: status, trend, pressure and resilience. The status of each goal is judged against a reference point that specifies the maximum condition or benefit that can reasonably be achieved.

Communication of the results at national to global scales has been a critical component of the initiative and included an engaging, informative, vibrant website (www.oceanhealthindex.org) that highlights the results as well as insights into ocean conservation more broadly. Report card-like summaries were produced for 18 priority nations and launches were held worldwide with extensive media coverage. Work continues to now incorporate the results into national agendas and to continue to have annual updates.

Open discussion:

The following questions and comments were discussed:

Why was the high seas not included in the analysis? *Response (Andy):* Very little information is available on the open seas. Most data are within the EEZs of nations. The next step is to try to address this gap.

Some of the country scores do not reflect true status. Belize, for example, has the largest reef in the world, yet a relatively low marine biodiversity score. *Response (Andy):* Global datasets are self-reported and, therefore, need to be reported more carefully. The first results are setting up the methodology and one of the next steps is to work on soliciting more accurate data.

To get WOA and OHI to match, we need to disaggregate OHI down to the Caribbean. *Response (Andy):* Disaggregation can be done. For example, the USA has one score, but only a portion of the EEZ is relevant to Caribbean. The USA score can be recalculated specific to the USA Caribbean EEZ. But otherwise the national scores are the default.

The Ocean Biogeographic Information System: a UNESCO-IOC/IODE source of biological data (Patricia Miloslavich, OBIS)

Abstract: OBIS, a legacy of the Census of Marine Life Program, and now under the aegis of UNESCO's Intergovernmental Oceanographic Commission (IOC) is the largest source of information on marine species distributions with over 32 million records. It is organized in 15 regional nodes and includes more than 1000 datasets which examine over 100,000 marine species. Data in OBIS can be searched by the following parameters: taxa, dataset, region, data & season, and oceanography (bottom depth, temperature, salinity, nitrogen, oxygen, phosphate, silicate). The data can be downloaded in several formats (e.g. Excel files) and visualized as maps, time-series graphs, and histograms. OBIS is very useful in providing information on aspects such as marine diversity and connectivity, and can help identify areas of ecological and biological significance.

The OBIS database has ~6000 species reported in the Caribbean region, which is about half of what has been reported by taxonomic expertise (12,046 species). The Caribbean biodiversity "hotspots" as shown by OBIS would be near Belize, Santa Marta in Colombia, Cuba, Puerto Rico, with a lesser extent in the Lesser Antilles coinciding with locations of long taxonomic tradition. OBIS is a very powerful tool to provide data for informed conservation and management policies, and therefore, the input of data for its completeness should be encouraged.

Closing Remarks (Ambassador Donatus Keith St. Aimee, Co-Chair of the UN Ad-Hoc Working Group of the Whole for the Regular Process)

Ambassador St. Aimee closed the workshop by reiterating the importance of regional cooperation, which is essential to successfully protecting lives and property,

and to sustainably managing resources. He noted that the region's collective effort on the first World Ocean Assessment is very important.

He acknowledges the sponsors beginning with the Energy and Climate Partnership of the Americas, which was launched by President Obama in 2009 to serve as a platform for multi-stakeholder partnerships between governments, civil society, and private sector representatives across the hemisphere to share innovative technologies and best practices, collaborate on creative solutions, and work together to leverage investments in climate change, adaptation, and sustainable energy development that support our collective energy and climate goals. The workshop was clearly relevant to these objectives.

In addition to the United States, UNEP contributed substantially through its support for Regional Seas Conventions and Action Plans. In fact, this was the fourth WOA workshop that UNEP has supported since 2011. The updated inventory of assessments the participants received in table form was generated by IOCARIBE of UNESCO, specifically Cesar Toro. Cesar has offered to make sure that the inventory – will be merged with the Break Out Group tables that were produced.

He acknowledged the leadership and diplomacy of the Co Chairs, Lorna Inniss & Bonnie Ponwith, the breakout session chairs, their rapporteurs & coordinator Jennifer Schull, the 19 poster session participants & coordinator Mandy Karnauskas, the logistics team of UNEP CEP, especially Annie Muchai and Sancha Foreman, and finally the Workshop Organizing Committee.

He noted that a tremendous wealth of knowledge was gained to contribute to the WCR component of the WOA. Thanks to the active participation of over 84 experts participating from 26 countries throughout the WCR, the Workshop was a tremendous success.

Annex D: Breakout Group Guidance

World Ocean Assessment Workshop for the Wider Caribbean Region

Guidance for Break-Out Groups

The goal of the breakout group sessions is to provide as much information and knowledge as possible to guide the development of the Wider Caribbean Region component of the World Ocean Assessment (WOA). The WOA will be written in the subsequent months; consequently, the purpose of the breakout sessions is not to draft text, but to provide feedback and input that will guide and inform the WOA. Fundamental to this goal is ensuring regional and national experts from throughout the Caribbean have a genuine opportunity to provide their input.

The more specific objectives of the breakout group sessions are listed below. To structure the discussion and ensure a productive output, the attached table has been provided. The table will be the basis for recording feedback and input from participants.

- *1st column:* Determine the appropriate topics and sub-topics relevant to the breakout group. To do so, participants will review the outline provided in the first column and suggest additional topics and sub-topics as appropriate to WCR.
- *2nd column:* Identify sources of information related to the topics, including assessments, studies and reports. These sources will be explored as the WOA Wider Caribbean Region section is drafted. An Inventory of Assessments has been compiled and provided to the groups for review. Participants will need to review this Inventory and also consider additional sources not noted in the Inventory. For each topic, in the second column, please provide a reference for these sources and include a short annotated bibliography describing the relevant aspects of each source. The result will be a metadata database critical to drafting the WOA WCR.
- *3rd column:* Identify priority individuals and institutions that should be engaged in drafting the topic. Their name, email and who recommended them need to be noted. Note that the individuals will need to join the Pool of Experts (information on how to do so will be provided on the first day of the workshop and is already available on the workshop website, www.WOAwcr.org) in order to contribute.
- *4th column:* Determine information gaps that should be highlighted in the WOA. These gaps should relate to the sub-topics and be areas in which there is a lack of information on the sub-topic.
- Identify assessment capacity needs (i.e. what does the region need as far as training, resources/infrastructure (facilities/boats), etc) and suggest measures to address these needs that should be highlighted in the WOA. The capacity needs will be discussed related to all the topics and, consequently, will be recorded after the table.

Process: The breakout groups will meet the entire second day of the workshop in order to complete the above objectives. The third and final day (Thursday), one of the chairs will present the results of the

discussions using the table to highlight key points. The final breakout group reports are due at the close of the workshop.

**World Ocean Assessment
Workshop for the Wider Caribbean Region**

Guidance Specific to Break-Out Group Chairs & Rapporteurs

Roles of the Break Out Group Co-Chairs

- Keep the discussion focused around the BO Group Topics and related questions noted in the table
- Engage all participants
- Ensure participants are succinct and respectful of everyone's time (long-winded comments need to be halted)
- Halt extraneous points, which can be discussed separately
- Remain neutral. That said, there may be situations where the chair has expertise or an opinion she/he wants to share. In those cases, please clarify that you're briefly taking 'off your chair hat' and engaging as a participant. Something as simple as, "I'd just like to step out of my neutral chair role for a minute and note that XXX." If there's a topic that one of the chairs has a lot of knowledge about, then he/she might ask the other chair to run that topic.
- Review the rapporteur's notes at breaks and at the end of the session as a check to ensure all the points are incorporated
- Report back to the entire workshop on the morning of the final day. The presentation should highlight the key points related to each objective and use the table.

Roles of the Rapporteurs

- There will be 2 rapporteurs for each BO Group. We recommend the "first rapporteur" focus on the table; the "second rapporteur" should assist the first rapporteur as they are completing the table, particularly if there's a lot of discussion. In this way, the 2nd rapporteur is essentially a back-up to the first rapporteur. The other role of the second rapporteur is to keep a document (in Word) of important points that don't fit into the table. This second document will be reviewed to identify what needs to be added to the WCR report and any other next steps.
- The first and second rapporteurs may want to switch responsibilities periodically. And they should check-in at breaks to ensure the table is being accurately completed by reviewing the 2nd rapporteur's notes.
- Neither rapporteur should note everything that is said and certainly not who said what unless it is particularly relevant. They are tasked with capturing the essence of discussions – not a transcript.
- Similar to the chairs, the rapporteurs are intended to remain neutral. That said (as noted for the chairs), there may be situations where one of the rapporteurs has expertise or an opinion he/she wants to share. In those cases, please clarify that you're briefly taking 'off your rapporteur hat' and engaging as a participant. Something as simple as, "I'd just like to step out of my neutral rapporteur role for a minute and note that XXX." If there's a topic that one of the rapporteurs has a lot of knowledge about, then he/she might ask the other rapporteur to run be the notetaker for the table related to that topic.
- Each breakout group will have the option of a laptop screen projected for all participants to see. We recommend that the first rapporteur with the table have their screen be projected with big enough font for everyone to read, but small enough that they can see more than a few words.
- We will have a check-in at lunch on Wednesday.
- The breakout group reports are due at the end of the second day (Wednesday)

Points Related to the Table and Overall Document for Recording the BO Group Discussion

- The Comments section is a place to capture key points related to the topics that don't fit into the other columns. This is where the rapporteur could note feedback related to the substance of the topics and sub-topics. For example, for Food Security and Food Safety, under Capture fisheries, someone might mention foreign fishing fleets being a major concern (which relates to the first sub-topic). That point should be noted under the Comments column. There may be some overlap with what the 2nd rapporteur is documenting. At the breaks and at the end, you should compare notes and ensure the key points are noted in the Comments section.
- While the topics are set in stone by the UN, you can add new topics and new subtopics that may have been overlooked. And, if participants feel a topic is not relevant to the region, note "This topic not relevant to region" in the remarks section.
- For the second column, try to get as much information as you can regarding relevant sources of information. You can encourage the participants to search the internet to try to find the reference. While titles of documents and what institution produced it are good, a link to a website with the document is ideal. If you only get a partial reference, note who mentioned the source so the GoE can follow-up with them.
- A section titled "Overall Points" is noted before the table. This is where you need to note any overall points people made about the process or other information you think is especially important for the GoE.
- A section titled "Capacity needs..." is noted after the table. Consequently, the capacity needs discussion should happen after a bulk of the science conversations are complete, although if points are raised earlier, be sure to note them in this section while the Chair facilitates the discussion back to the other issues. There is where you need to capture the key points related to capacity needs and suggestions for how to address them. This discussion may be more free-flowing, so do your best to focus on the key points.

Clarifying Questions:

Who will write the WOA?

The Group of Experts (GoE) is a group of 25 international experts (already identified) tasked with producing the WOA. They will draw expertise and assistance from the Global Pool of Experts – a group of 1000 – 2000 global experts – that is still being recruited. Participants are encouraged to join the Global Pool of Experts. Information on how to join will be provided the first day of the workshop by the workshop leads, who will reiterate the need for additional nominees for the Global Pool of Experts. The table each break out group is completing includes a column to note priority individuals and institutions that the Group of Experts should engage for that topic. If those individuals are not already members of the Global Pool of Experts, the experts will discuss membership with them.

What is the participant's role after this workshop?

Participants will not necessarily be consulted after the workshop unless they serve in the Global Pool of Experts and are contacted by the Group of Experts related to relevant chapters. If participants are particularly knowledgeable about a topic, then their name should be noted in the table in the "Priority Individuals and Institutions" column.

Is scale important?

Scale is not an issue. All sources of information should be considered no matter the spatial or temporal scale although priority is for regional and national level information.

Materials for EACH BO Group:

Flipchart and pens

Mock Sample Completed Table

- 10 hard copies

Guidance for Break-Out Groups (above 1st page of this document)

- 10 hard copies

Inventory of Assessments

- 5 hard copies
- Website access information

Outline of Break-Out Group Topics and Sub-Topics

- 10 hard copies

2 laptops for rapporteurs with projector and screen for one

Mini-chocolates as motivators for chairs to use to generate participation

MOCK SAMPLE (in green) BREAK-OUT GROUP REPORT

Participants (name, email, institution)

Juan Arden, jarden@carib.net, University of Fish

Gloria Black, gloriablack@coastal.org, Coastal Organization

etc

Overall Points Related to Completing the Table and the Relevant Part of the WOA for WCR

Task: record how the following table was completed and any overall discussion regarding the relevant part of the WOA for WCR

The group discussed the chapters on socioeconomics of the ocean: chapters 11, 12 and 17-30 of outline. The discussions were based on viewing human activities in the context of sustainable use of marine resources. The group started by discussing the methodological framework to be used by the drafting teams for background working papers and the chapters themselves. In particular we considered the level of importance that should be associated to the many types of assessments available:

- If available, large scale integrated assessments such as the Quality Status Reports produced by Regional Sea Conventions should be the first source of information to be used. They are discussed and quality assured by a large community of experts and States.
- There is a particular need in these chapters for comprehensive literature reviews and peer reviewed scientific advice on the types of ecosystem effects likely to result from specific human activities, and on factors that affect the likelihood and severity of these effects. Such reviews and advice have been produced by ICES, by IGOs (eg. FAO, IOC, UNEP), by national processes (e.g. Norway thematic assessments, Canadian CSAS Science Advisory Reports) and reviews by prestigious scientific organisations (e.g. US National Academy reports, royal societies of UK, NL, Norway, etc).
- Wherever information is completely lacking for an activity and area, widely credible global pressure and impact assessments, such as the one by Helprin et al (2008) are strongly preferred as a starting point, compared to simply reporting that nothing is going on in an area, or that nothing at all is known.

| Topics (e.g. Capture Fisheries) and Sub-Topics (e.g. Commercial fish...) to Include in the WCR Assessment | Relevant Studies, Documents, Reports and Other Sources of Information (refer to the Inventory list) | Key Individuals & Institutions to Engage (email & who suggested) | Information Gaps | Comments |
|---|---|--|--|--|
| <i>Task:</i> review and add any new topics or sub-topics | <i>Task:</i> identify relevant sources of information, | <i>Task:</i> list key individuals and institutions, including participants, who are important to engage in | <i>Task:</i> identify sub-topics lacking | <i>Task:</i> include key points, particularly related to the |

| | including but not limited to the Inventory list | writing this topic (note: the authors will contact them regarding becoming part of the Global Pool of Experts and then contributors) | information | substance of the topics and sub-topics |
|--|--|--|--|--|
| Capture Fisheries <ul style="list-style-type: none"> ○ Commercial fish and shellfish stocks status and factors affecting large-scale industrial, artisanal, and recreational sectors and their socioeconomic implications ○ Other fish and shellfish stocks status and factors affecting artisanal and recreational sectors and their socioeconomic implications ○ Effects of pollution and the socioeconomic implications ○ (new) Effects of climate change | <i>State of Commercial Fisheries in the Caribbean.</i> 2011. Caribbean Regional Agricultural and Fisheries Development Program (www.CRAFDP/stateoffisheries) – details country-by-country status of commercial fish and shellfish and major threats | Fred Jones (fjones@fishguy.com ; Geoff Brown) | Lack of information on lobster fishery related to fishing bans | Foreign fishing fleets major factor adversely affecting artisanal and national industrial fishing fleets |
| etc | | | | |

Overall Capacity Needs and How to Address Them

More social scientists, including economists and anthropologists, are needed to examine the socioeconomic aspects of the marine and coastal environments. In particular, we need people considering the impacts of policy decisions on communities and identifying mitigation measures. Etc.

Annex E: Biophysical Aspects Break-Out Group (Part III, Chapters 4-7)

Chairs:

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Patricio Bernal, patricio.bernal@gmail.com, Chile

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Geoffrey Cook; geoffrey.cook@noaa.gov; USA

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Overall Points Related to Completing the Table and the Biophysical Aspects Part of the WCR Assessment

The participants noted this part of the WOA needs to:

- 1) consider several unique characteristics of the Caribbean Sea: river outflows from Amazon and Mississippi rivers; the Caribbean Sea is semi-enclosed; the Caribbean Sea is connected to other regions of North Atlantic Ocean;
- 2) consider atmosphere, such as trade winds, rainfall and hurricane activity;
- 3) address ocean acidification, which will have a large impact on coral reefs and thus on fisheries and food issues in society;
- 4) incorporate the IPCC-AR5 report into the sea level rise analysis because the report will provide much enhanced information because it will have a much better handle on sea-ice melting effects;
- 5) consider that sea-level rise is not uniform and, consequently, we need to study the historical and future projection of the sea-level rise for the Caribbean Sea; and
- 6) consider approaching insurance companies, which may have some related data.

Atmospheric influences over the CS are insufficiently studied such as the importance of rainfall, which input of freshwater onto the surface layers is estimated to be greater than direct rivers inputs. Rainfall patterns are partially controlled by the fluctuation of the trade winds, and hurricane activity.

Until now the impact of ocean acidification is not known, the monitoring of acidification is incipient in the WCR, although it would have a large impact on coral reef stability, thus on associated fisheries and livelihoods. The eventual loss of reefs would increase the vulnerability of coastlines.

The WCR is particularly vulnerable to the effects of climate change. Inundation of lowlands and islands, could lead to the loss of special habitats and ecosystems like mangroves, sea-grasses and coral reefs. It is also expected a significant change of the rainfall patterns over the region. These effects together with less frequent but more intense hurricanes will have an overall negative impact on the economy of the region, especially in the island states.

Sea-level rise is not uniform around the world. Sea level in the Caribbean Sea is raising at a lesser rate than elsewhere, although there are areas in the WCR with significant subduction. The group considered that it would be important to study the historical record as well as the future projection of the sea-level rise for the Caribbean Sea. For sea-level rise the IPCC-AR5 report will provide much enhanced information because it will address the dynamic aspects of glaciers and continental ice melting effects.

| Topics (e.g. Oceans' roles in hydrological cycle) and Sub-Topics (e.g. Freshwater fluxes...) to Include in the WCR Assessment | Relevant Studies, Documents, Reports and Other Sources of Information (refer to the Inventory list) | Priority Individuals & Institutions to Engage (email; who suggested) | Information Gaps | Comments |
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| <p>Oceans' roles in hydrological cycle (Chapter 4)</p> <ul style="list-style-type: none"> Freshwater fluxes into the ocean, sea ice, sea level Socioeconomic implications of ocean warming, sea level change, and freshwater fluxes Changes in chemical composition of seawater – salinity and nutrients – and their socioeconomic implications Sediment Inputs (new sub-topics) - account for Inputs | <p><i>Fresh Water Fluxes</i> Siung Chang A.M. & Lum Kong A. 2001. Possible link between reef-fish mortality and South American River Discharge. Bull Mar Sci 68:343-340.</p> <p>Joyce et al 1999, DSR II 46: 245-278. long term hydrographic changes...</p> <p>LOICZ 2011</p> <p>Coastal discharge to the coastal ocean, Cambridge Press</p> <p>2008 USF Bob Weisburg JPO – Altimetry based Coral core data based studies</p> <p>Global International Water Assessment: UNEP, 2004. Bernal, M.C., Londono, L.M. Troncoso, W. Sierra-Correa, P.C. and F.A Arias-Isaza Caribbean Sea/Small Islands. GIWA Regional assessment 3a. University of Kalmar, Kalmar, Sweden.</p> <p>UNEP, 2006. Isaza, C. F.A., Sierra-Correa, P.C. Bernal-Velasquez, M., Londono, L.M., and W.</p> | <p><i>Fresh Water Fluxes</i> Bob Weisberg (USF)</p> <p>Dr. Javier Alcocer, UNAM (Mexico)</p> <p>Dr. Jorge Herrera Silveira, CINVESTAV-IPN (Mexico)</p> <p>Enrique Mejia Maravilla, CONAGUA (Mexico)</p> <p>Salvador Arimendi Guadarrama, CONAGUA (Mexico)</p> <p>Dra. Margarita Caso, Instituto Nacional de Ecología y Cambio Climático (Mexico)</p> <p>José Luis Ochoa de la Torre – CICESE (Mexico)</p> <p>Dr. Jorge Zavala, UNAM (Mexico)</p> | <p><i>Fresh Water Fluxes</i></p> <p>In situ measurement test of rainfall contribution to WCR (vs riverine input)</p> <p>Need for Reference stations</p> <p><i>Socioeconomics</i> SLR and relative rates of change in WCR (in situ gauges needed)</p> <p><i>Changes in Chemistry</i> Regional data</p> | <p><i>Fresh Water Fluxes</i> Coral core data may provide freshwater flux variability in the region in historical perspectives</p> <p><i>Socioeconomics</i> Increased humidity in the atmosphere makes the high latitude regions more vulnerable to diseases.</p> <p><i>Changes in Chemistry</i> (no comments)</p> <p><i>Heat Transport</i> Data available but not easily accessible (no centralized body) -working paper</p> |

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| <p>from Magdalena, Mississippi, Orinoco, Amazon, etc</p> <ul style="list-style-type: none"> Ocean heat transport, ocean circulation, and patterns – El Nino – and their socioeconomic implications | <p>Troncoso.</p> <p>Caribbean Sea/Colombia & Venezuela, Caribbean Sea/Central America & Mexico, GIWA Regional assessment 3b, 3c. University of Kalmar, Kalmar, Sweden.</p> <p>Jose Benito and Vives De Andreis, 2003: Netherlands Climate Change Studies Assistant Program, Colombia: Defining vulnerability of Bio-geophysical and Socio-economic systems due to sea level change in the Columbia coastal zone (Caribbean and Pacific) and adaptation measures. Executive Summary. Institute de Investigaciones Marinas y Costeras, Santa Marta</p> <p>ESA CCI 2012 SLR 1993-2010. Puerto Rico – stations (~30) –Tsunami</p> <p>GLOS – IOC</p> <p>Surface drifter Data (AOML)</p> <p>Carioco project: US-Venezuela joint project</p> <p>Caribbean Atlantic time series: www.caricoos.org</p> <p>Moore WS and TM Church. 1996 Nature 382:122 – submarine groundwater discharge</p> <p>Florida cable data at AOML: Western Boundary time series</p> <p>Rainfall time series from TRIM satellite project</p> | <p><i>Socioeconomics</i></p> <p>CDMA – Caribbean disaster management (Barbados)</p> <p>WRI. Natural Capital Project</p> <p>UN ECLAC</p> <p>National Disaster Prevention Center (Mexico; e.g. frequency of events)</p> <p>CDMA</p> <p>Patrick McConney CERMES</p> <p>National Weather Service (USVI/PR)</p> <p><i>Changes in Chemistry</i></p> <p>NOAA/AOML/OCD - US</p> <p><i>Sediment</i></p> <p>Restrepo – Medellin, Flux of Magdalena River</p> <p>Alvarado-Barranquilla Caribbean Environment Program-UNEP</p> | <p>are scattered.</p> <p>-it is desirable that all those data be added to the WOA</p> <p>There is a database of nutrients - NOAA World Ocean Atlas: WOA</p> <p><i>Sediment</i></p> <p>Other rivers impacting region (lack of data)e.g. Rio San Juan, Central America</p> <p><i>Heat Transport</i></p> <p>-Data accessibility</p> <p>-El Nino is not the only factor that controls climate.</p> <p>-We need to know more about local processes,</p> | |
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| | <p><i>Underground hydrology (cenotes)</i> Alcocer, J., Lugo, A., Marín, L. y Escobar, E. (1998). "Hydrochemistry of waters from five cenotes and evaluation of their suitability for drinking- watersupplies, northeastern Yucatán, Mexico". <i>Hydrogeology Journal</i>, 6, 293-301.</p> <p>Coastal Atlas of Puerto Morelos Merino, M. y L. Otero. 1991. <i>Atlas Ambiental Costero. Puerto Morelos-Quintana Roo</i>. CONACYT, UNAM y CIQRO. 80 pp. + 1 Carta.</p> <p><i>Socioeconomics</i> Regional Tsunami Program</p> <p>NCAP project</p> <p>WRI – Cooper et al 2009 – valuation barrier reef</p> <p>Nat Cap 2012 - Project – Belize, Mesoamerican Reef communities at risk</p> <p>WRI – Laretta's work (see Day 1 presentation)</p> <p>UN ECLAC – Climate Change Impact Reports - multisector - <u><i>inundation level data exist in many countries in the Caribbean.</i></u></p> <p>Tendencias del nivel del mar en las costas mexicanas. Jorge Zavala-Hidalgo, Rebeca de Buen Kalman, Rosario Romero-Centeno, Felipe Hernández Maguey. En: A.V. Botello, S. Villanueva-Fragoso, J. Gutiérrez y J. L. Rojas</p> | <p><i>Heat Transport</i> CATHALAC Carlos Andrade candrade@exocol.com.co</p> <p>Chris Mooers (works with C. Andrade)</p> <p>Ed Barton (Colombian basin) (works with C. Andrade)</p> <p>Dr. Murray Simpson – University of Oxford (murray.simpson@ouce.ox.ac.uk)</p> <p>Dr. Fromard – Laboratoire Dynamique de la Biodiversité (LADYBIO) – (Francois.Fromard@cict.fr)</p> | <p>such as those associated with the Atlantic multi-decadal oscillation (AMO).</p> | |
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| | <p>Galaviz (eds.), Vulnerabilidad de las zonas costeras mexicanas ante el cambio climático. SyG Editores. Gobierno del Estado de Tabasco. Semarnat-INE, UNAM-ICMyL, Universidad Autónoma de Campeche, pp. 249-267, 514 p. ISBN 978-607-7887-11-9 (v. impresa). ISBN 978-607-7887-12-6 (v. electrónica), 2010.m</p> <p><i>Changes in Chemistry</i> LBSP (Point/Non-Point Loading) Reports</p> <p>POPS(Persistent Organics)</p> <p>REPCAR Report</p> <p>Next year Nutrient Meeting</p> <p>Gulf of Mexico database –National Institute of Ecology and Climate Change</p> <p>Herrera-Silveira, J.A. 1994. Nutrients from uderground discharges in a coastal lagoon (Celestún, Yucatán, México). Verh. Internat. Verein. Limnol. 25: 1398-1403.</p> <p>Herrera-Silveira, J.A. 1994. Spatial and temporal patterns in a tropical coastal lagoon with groundwater discharges. Journal of Coastal Research 10 (3): 738-746.</p> <p>Herrera-Silveira, J .A. 1994. Phytoplankton productivity and submerged macrophytes biomass variation in a tropical coastal lagoon with groundwater discharge. Vie Milieu. 44 (3-4):257-</p> | | | |
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| | <p>266.</p> <p>Herrera-Silveira, J.A. and F.A. Comín. 1995. Nutrient fluxes in a tropical coastal lagoon. <i>Ophelia</i>. (42):127-146.</p> <p>Caso, M., E. Peters, V. Gutiérrez-Avedoy 2013. The establishment of the baseline for the Mexican portion of the Gulf of Mexico in response to the British Petroleum oil spill. This information is confidential and will be released probably in 2013.</p> <p><i>Sediments</i> LBS Report- Orinoco Plume</p> <p>Influx references: http://www.cep.unep.org/publications-and-resources/marine-and-coastal-issues-links/sedimentation-and-erosion#ref</p> <p><i>Heat Transport</i> Factors influencing: FL Straits, Warm Pool, Upwelling (in south of region), Riverine Inputs Satellite observations</p> <p>Jouanno et al., 2012. Seasonal and interannual modulation of the eddy kinetic energy in the Caribbean Sea. <i>J. Phys. Ocean.</i> 2012. doi: 10.1175/JPO-D-12-048.1</p> <p>Coastal circulation in the Mexican Caribbean Sea Aspectos de la Circulacion Costera Superficial del Caribe Mexicano con base en Observaciones</p> | | | |
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| | <p>Utilizando Tarjetas de Deriva - José Luis Ochoa (CICESE)</p> <p>Apoyo a los Análisis de datos de corrientes, hidrológicos y meteorológicos y su consistencia con teorías y modelos numéricos.</p> <p>Lograr un entendimiento integral de la circulación oceánica a lo largo del Caribe Mexicano. Obtener los patrones de circulación oceánica a lo largo del Caribe mexicano; entendiendo la interacción entre la circulación de gran escala y la cercana a la costa de tal forma que se puedan diseñar forzamientos realistas para la modelación de corrientes y transporte de partículas y difusión de sustancias.</p> <p><i>Potential Impacts of Contemporary Changing Climate on Caribbean Coastlines.</i> 1990. Ocean and Shoreline Management, 13.1. Gable, F.J., Aubrey, D.G. Coastal Research Center/Woods Hole Oceanographic Institution. Examines the trends in changing coastlines, appropriate response strategies, research programs within the WCR. (from IOCARIBE inventory)</p> <p><i>CARIBSAVE Climate Change Risk Profile for Belize.</i> 2012. Caribsave. (http://www.caribsave.org/assets/files/CCCRA%20Final%20Documents/FINAL%20Summary%20Document%20CCCRA%20-%20Belize.pdf)</p> <p>Approaches to building resilience and capacity so to address the challenges of climate change. (from IOCARIBE inventory)</p> | | | |
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| | <p><i>Half a century of dynamic coastal change affecting mangrove shorelines of French Guiana. A case study based on remote sensing data analyses and field surveys.</i> 2004. Marine Geology – Volume 208 2.4. http://www.sciencedirect.com/science/article/pii/S0025322704001112) Examines the role of mangrove forests for shoreline protection. (from IOCARIBE inventory)</p> | | | |
| <p>Sea/air interaction (Chapter 5)</p> <ul style="list-style-type: none"> • Atmospheric fluxes, oxygen production, carbon dioxide sequestration • Hurricanes, monsoon, trade winds (no typhoons in the region; new: El Nino impacts) • Trends in meteorological phenomena and their socioeconomic implications • Ocean acidification | <p><i>Atmospheric fluxes, etc</i> -IPCC Assessment Report 5 -National Communications to UNFCCC</p> <p><i>Hurricanes</i> -UN ECLAC – Reports on Socioeconomic Impacts -Future Water Availability/Shortages IDRC CATHALAC Funded</p> <p>Impacts of El Niño - Magaña Rueda Víctor (Editor) (2004). Los impactos del niño en México. Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México, Secretaría de Gobernación. México, 229 p.</p> <p><i>Ocean acidification</i> -Coral Reef impacts of OA. IUCN Reports - PMEL Stations - Hoegh-Guldberg, O., Mumby, P.J., Hooten, A. J., Steneck, R. S., Greenfield, P., Gomez, E., Harvell, D. C., Sale, P., Edwards, A.J., Caldeira, K., Knowlton, N., Eakin, C. M., Iglesias-Prieto, R., Muthiga, N., Bradbury, R.H., Dubi, A., and</p> | <p><i>Atmospheric fluxes, etc</i> - Roy Armstrong (Aeolian Flux –Sahara/Hurricanes) -Rik Wanninkhof –AOML -Jorge Zavala –UNAM -Julio Scheinbaum –CICESE -Julio Candela-CICESE - Dr. Roberto Iglesias Prieto, Unidad Académica: Puerto Morelos (UNAM)</p> <p><i>Hurricanes</i> -NOAA/AOML/HRD -NOAA/NWS/NHC</p> <p><i>Meteorological phenomena</i> -Colombian Institute of Meteorology -Vasu Misra – FSU -Dave Enfield – rainfall? -Art Douglas -Roger Pulwarty –</p> | <p><i>Atmospheric fluxes, etc</i> -cruise ships emit CO2 to the atmosphere, but we do not know how much it contributes to the overall emission in the region.</p> <p><i>Hurricanes</i> -lower frequency/higher intensity hurricanes?</p> <p><i>Meteorological phenomena</i> Data</p> | <p><i>Atmospheric fluxes, etc</i> -Saharan dust (Aeolian Flux) is an important source of nutrients and also affects source of CO2 compared to background sources</p> <p><i>Hurricanes</i> ENSO related regional impacts -displacement of individuals due to changes in rainfall patterns (i.e. damage from storms) -possible changes in regional rainfall</p> |

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| <p>and the socioeconomic implications</p> | <p>Hatzios, M. (2007). The carbon crisis: coral reefs under rapid Climate and ocean acidification. <i>Science</i>, 318: 1737–1742.</p> <p>- Hoegh-Guldberg, O., Mumby, P.J., Hooten, A. J., Steneck, R. S., Greenfield, P., Gomez, E., Harvell, D. C., Sale, P., Edwards, A.J., Caldeira, K., Knowlton, N., Eakin, C. M., Iglesias-Prieto, R., Muthiga, N., Bradbury, R.H., Dubi, A., and Hatzios, M. (2007). Coral adaptation in the face of climate change-Response. <i>Science</i>, 320:315-316.</p> <p>- Magaña V. y C. Gay. Vulnerabilidad y Adaptación Regional Ante El Cambio Climático y sus Impactos Ambiental, Social y Económicos http://www2.ine.gob.mx/descargas/cclimatico/vulnerabilidad</p> <p><i>Initial Damage Assessment Report: Hurricane Richard – Belize</i>. 2010. National Emergency Management Organization. (http://site.nemo.org.bz/wp-content/gallery/publications/IDA%20Hurricane%20Richard_final.pdf) Magnitude of disaster, societies impact, capacity to cope, priorities of action, level of continuing/emerging threats. (from IOCARIBE inventory)</p> <p><i>Hurricane Vulnerability in Latin American and the Caribbean: Normalized Damage and Loss Potentials</i>. 2003. Natural Hazards Review. (http://www.aoml.noaa.gov/hrd/Landsea/NHR-Cuba.pdf) Examines the trends in hurricane activity in Latin America/Caribbean. Factors that</p> | <p>CIMH(Barbados) -Climate Services CCCCC – climate change - Ulric Trotz Homero Silva-UTech/PAHO Felipe Vasquez – National Meteorological Service - Mexico) - CATHALAC</p> <p><i>Ocean acidification</i> Ian Enochs, Derek Manzello (sp?) NOAA/AOML Corals & OA -Rik Wanninkhof - AOML</p> <p>Dr. Roger Pielke – Centre for Science & Technology Policy Research (pielke@colorado.edu).</p> <p>Dr. Jose Rubiera – Cuban Meteorological Service (jose.rubiera@insmet.cu)</p> | <p>describing regional-scale meteorological phenomena -impact of ENSO, NAO, AMO indices (teleconnections)</p> <p><i>Ocean acidification</i> -Open and active area of research -Where to measure (long-term) Monitoring system -longitudinal shifts in OA impact (storage of CO2) from WCR to Atlantic (offshore, central Caribbean, inshore)</p> | <p>(forecasting), changes in precipitation (i.e. less rainfall) - decreases/ changes in thermohaline circulation and influence on WCR -Human Health impacts-disease transmission (related to vector-transmitted)</p> <p><i>Ocean acidification</i> -Extend one of WOCE monitoring lines into WCR -Impact to livelihoods (via impact to e.g. conch fishery), tourism, -Risk to coastal ocean development (i.e. fringe reefs), wave energy dissipation Impact to fisheries (finfish & shellfish) by way of impact to lower trophic levels (e.g. pteropods)</p> |
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| | <p>have increased vulnerability. (from IOCARIBE inventory)</p> <p><i>Assessment of the Economic Impacts of Hurricane Gilbert on Marine and Coastal Resources of Jamaica.</i> 1989, United Nations Environment Programme. http://www.cep.unep.org/publications-and-resources/technical-reports/tr04es.pdf. (from IOCARIBE inventory)</p> | | | |
| <p>Primary production, cycling of nutrients, surface layer and plankton (Chapter 6)</p> <ul style="list-style-type: none"> • Primary production distribution • Surface layer and plankton, factors influencing the surface layer and species variation • Socioeconomic implications of primary production trends and other factors affecting food webs | <p><i>Primary production distribution</i></p> <ul style="list-style-type: none"> -Riverine Influx of nutrients, Dead Zones Biogeosciences. Special Issue on Hypoxia (2011) -Carbon sequestration by Mangroves (GEF) – Blue Carbon initiatives -CarSea Report 2007 - loss of mangroves paper by John Agard -Low carbon Development Strategy –LCDS, REDD+ D E Canfield et al. Science 2010;330:192-196 -R. A. Duce <i>et al. Science</i> 320, 893 (2008); Impacts of Atmospheric Anthropogenic Nitrogen on the Open Ocean -J N Galloway et al. Science 2008;320:889-892; Transformation of the Nitrogen Cycle: Recent Trends, Questions, and Potential Solutions - El sistema ecológico de la Bahía de Chetumal, costa occidental del Mar Caribe. Julio Espinoza Ávalos (editor principal) Gerald Alexander Islebe y Héctor Abuid Hernández Arana http://w2.ecosur-qroo.mx/cna/julio/libbahia.pdf <p><i>Surface layer and plankton</i></p> <ul style="list-style-type: none"> -CATS time series(?) -Ships of Opportunity Program | <p><i>Primary production distribution</i></p> <ul style="list-style-type: none"> -John Agard (Mangroves) -Frank Muller-Karger -USF -HABSOS Monitoring Network - Frank Muller-Karger -Dr. Martin Merino Ibarra, UNAM <p><i>Surface layer and plankton</i></p> <ul style="list-style-type: none"> -Center for Marine Sciences – Dale Webber UWI -Francisco Arias-INVEMAR <p><i>Socioeconomics /Food webs</i></p> <ul style="list-style-type: none"> -Rabalais N. – Hypoxia Gulf of Mexico -CERMES -Robin Mahon -Mark Jury –UPR -Sharon Herzka-CICESE | <p><i>Primary production distribution</i></p> <ul style="list-style-type: none"> -What and where to measure and consistency of data (long-term data production) <p><i>Surface layer and plankton</i></p> <ul style="list-style-type: none"> -Need to reestablish in situ chlorophyll (and other) measurements in WCR -need regularly monitored stations | <p><i>Primary production distribution</i></p> <ul style="list-style-type: none"> Lots of Mangroves being lost (but doing well in Belize). Intra-regional differences. Red Tides increasing <i>Socioeconomics</i> Changes in Food Web- micro-pico plankton (i.e. nutrient flux impacts lower trophic levels), change in phytoplankton/zoo plankton ratios Campeche Sound - |

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| | <p>-1980s Indian Ship (publications available) -CARICOMP -IOC data availability? -Fixed Buoys – weather, Tsumani, etc (WHOI) -ICON Stations -Meso-Scale Eddies & Transport, influence on currents -TOPEX/Poseidon Data -Corredor J.E. and Morell J. M. 2001. Seasonal variation of physical and biogeochemical features in eastern Caribbean surface Water. J. of Geophysical Research. 106, 4517-4525.</p> <p><i>Socioeconomics/ Food webs</i> -Possible linkages among shelf spp and OA; e.g. altering food webs, loss of apex predators, shift; e.g. JBC Jackson et al 2001 Science (Historical Overfishing) -Jury MR. 2011. Environmental Influences on Caribbean Fish Catch. International Journal of Oceanography.</p> <p><i>Global Applications of the Large Marine Ecosystem Concept 2007-2010.</i> 2007. NOAA – National Marine Fisheries Service. (http://www.lme.noaa.gov/LMEWeb/Publications/tm208.pdf). (from IOCARIBE inventory)</p> <p><i>Global International Waters Assessment.</i> 2004. United Nations Environment Programme. (http://www.unep.org/dewa/giwa/areas/reports/r4/giwa_regional_assessment_r4.pdf). (from IOCARIBE inventory)</p> | | <p>(Eularian time series data) -Long term satellite data already exist and need to be better utilized. -Many diffuse data sources, but lacking a central organizing body as access point (data inventory needed)</p> | <p>possible 2nd Hypoxic Zone</p> |
| Ocean-sourced | | Shakira Khan-Butterfield – | Lack of | Ocean-sourced |

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| <p>carbonate production (Chapter 7)</p> <ul style="list-style-type: none"> • Role of ocean-sourced carbonate production in the formation of atolls and beaches and potential impacts of ocean acidification • Loss of habitat associated with ocean-sourced carbonate (new sub-topic) | <p>No information in IOCARIBE inventory.</p> | <p>Marine Geology unit, UWI Blanca Posada – geologist INVEMAR Roberto Iglesias - UNAM</p> | <p>regional-scale data describing the relationship between ocean-sourced carbonate chemistry and impact on atolls/beaches -Importance of silicate vs carbonate in WCR (unique)</p> | <p>carbonate</p> <p>Could make this a subsection of other chapters, or make focus broader</p> <p>Main cause of loss of beaches</p> |
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Overall Assessment Capacity Needs Related to Biophysical Aspects and How to Address Them

The participants identified the following needs:

- development of a regional framework – participating in the WOA process is viewed as capacity development for nations involved;
- support for reestablishing in situ measurements;
- access to research vessels for region – vessel from Norway, US NOAA vessels, identification of vessels, ships of opportunity;
- improved capacity and capability of people who can collect new and analyze existing data at regional level; systematic standardized training program for people in the region; inter-institutional training network;
- clear articulation of scientific questions for the region– common goals for region; and
- plan for new forecasting tools to move WCR biophysical oceanography programs into a strategic position for the coming decades. Students could go to this location to receive training for protracted period of time, then return to internally build capacity.

There was a consensus that the region has access to an important volume of data and information; However, these data are not always readily available or synthesized in a usable form. There is also an important amount of information that is not published (grey-literature) or exists only as internal reports of the public or private sector. Although this is a weakness due to often fragile institutional arrangements, in the context of the World Ocean Assessment it represents an opportunity, if an effort to produce these synthesis is organized, for example to draft Working Papers on the different subjects. This discussion highlights the needs for capacity development in the region, a topic that was addressed several times during the discussions. It was suggested that some sort of collective regional institution or institutional arrangements could facilitate significantly the work that is required to provide a solid science foundation to the decision making processes at the regional and national level. This requires an institution capable of providing regularly information on the biophysical conditions in WCR. Existing initiatives like IOCARIBE GOOS, designed to provide regular information services, can serve as interesting examples.

In summary the group considers that the WOA might be a first step in a renewed effort to mobilize institutions and experts of the region to enhance cooperative work and to find synergies in order to produce the needed information to address the common problems due to the increased use of the ocean and its resources and to prepare and adapt the WCR to the impact of global change.

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- access to research vessels for region – vessel from Norway, US NOAA vessels, identification of vessels, ships of opportunity;
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- clear articulation of scientific questions for the region– common goals for region; and
- plan for new forecasting tools to move WCR biophysical oceanography programs into a strategic position for the coming decades. Students could go to this location to receive training for protracted period of time, then return to internally build capacity.

There was a consensus that the region has access to an important volume of data and information; However, these data are not always readily available or synthesized in a usable form. There is also an important amount of information that is not published (grey-literature) or exists only as internal reports of the public or private sector. Although this is a weakness due to often fragile institutional arrangements, in the context of the World Ocean Assessment it represents an opportunity, if an effort to produce these synthesis is organized, for example to draft Working Papers on the different subjects. This discussion highlights the needs for capacity development in the region, a topic that was addressed several times during the discussions. It was suggested that some sort of collective regional institution or institutional arrangements could facilitate significantly the work that is required to provide a solid science foundation to the decision making processes at the regional and national level. This requires an institution capable of providing regularly information on the biophysical conditions in WCR. Existing initiatives like IOCARIBE GOOS, designed to provide regular information services, can serve as interesting examples.

In summary the group considers that the WOA might be a first step in a renewed effort to mobilize institutions and experts of the region to enhance cooperative work and to find synergies in order to produce the needed information to address the common problems due to the increased use of the ocean and its resources and to prepare and adapt the WCR to the impact of global change.

Annex F: Food Security & Food Safety Break-Out Group (Part IV, Chapters 10-15)

Participants

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Samuel Heyliger, DMRSKN@gmail.com, Dept of Marine Reserves, St. Kitts and Nevis

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Enrique Marschoff, marschoff@hotmail.com, Instituto Antártico Argentino

Overall Points Related to Completing the Table and the Food Security and Food Safety Part of the WCR Assessment (based on summary presentation)

In general, the availability of information related to the main chapter topics were ranked as: capture fisheries (fair); aquaculture (limited); fish stock (limited); seaweed/sea-based (limited); ocean and seafood (limited); and social and socioeconomic (limited). The following topics were identified as having significant gaps: socio-economic data; marine protected area enforcement; trans-boundary issues; data for quantitative stock assessments and ecosystem-based fisheries management; larval transport; and, information regarding the value chain from supporting industries.

Several key data sources were identified for the Group of Experts to consider: FAO, CRFM, SEDAR (FMC), OSPESCA, CANARI, OECS, CLME, ICCAT, UM/RSMAS and UWI. And several key individuals were identified to be part of the Pool of Experts: Susan Singh Renton, CRFM; Manuel Perez & Bessy Aspra, OSPESCA; Raymon van Anrooy, FAO/WECAFC; and Elizabeth Mohammed, Fisheries Division – Trinidad; Robin Mahon; Milton Haughton, UWI; Terrence Phillips; Angel Gumy, FAO/Rome; Paul Medley; and Patrick McConney.

Several overall capacity limitations were identified, including:

- Lack of documented institutional knowledge
- Lack of standardized data and data management services
- Limited access to tools & scientific literature

- Lack of quantitative stock assessment expertise
- Limited harmonization across regional vs national capacities
- Limited health and safety abilities for processing products for international export

It was also noted that the Caribbean Dev Bank is willing to fund CB projects.

| Topics (e.g. Capture Fisheries) and Sub-Topics (e.g. Commercial fish...) to Include in the WCR Assessment | Relevant Studies, Documents, Reports and Other Sources of Information (refer to the Inventory list) | Priority Individuals & Institutions to Engage (email; who suggested) | Information Gaps | Comments |
|---|--|--|--|----------|
| <p>Capture fisheries (Chapter 11)</p> <ul style="list-style-type: none"> Commercial fish and shellfish stocks status and factors affecting large-scale industrial, artisanal, and recreational sectors and their socioeconomic implications Other fish and shellfish stocks status and factors affecting artisanal and recreational sectors and their socioeconomic implications Effects of pollution and the socioeconomic implications Scale, location and impact on fish stocks of illegal, unreported and unregulated fishing Projections of status of fish and shellfish over the next decade | <p>Pelagic fishery studies: ICCAT – commercial stock status for HMS (BFT, YFT, billfish etc) www.iccat.org</p> | <p>CRFM: Susan Singh Renton - ssinghrenton@vincysurf.com (OSPESCA and CRFM are the two main fishery management bodies in the wider Carib. Assessments in Caribbean region on conch and groundfish)</p> | <p>Bycatch/discards, don't include regional coastal pelagics (blackfin tuna, wahoo, mackerels etc); indices of abundance</p> | |
| | <p>Pelagic fisheries: Mahon, R. and P. McConney. 2004 [ed]. Management of large pelagic fisheries in CARICOM. FAO Fisheries Technical Paper No 464, 149 p.</p> | <p>OSPESCA: Manuel Perez (general): mperez@oirsa.org (OSPESCA and CRFM are the two main fishery management bodies in the wider Carib. Assessments in Caribbean region on conch and groundfish)</p> | <p>Problems with species IDs in some reports</p> | |
| | <p>OSPESCA - Manuel Perez (general): mperez@oirsa.org</p> | <p>Bessy Aspra (spiny lobster):</p> | <p>Socioeconomic data</p> | |

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| | Bessy Aspra (spiny lobster): baspra@oirsa.org.hn (*project-based position) | baspra@oirsa.org.hn | | |
| | FAO working group on Lobster - OSPESCA: Bessy Aspra (spiny lobster): baspra@oirsa.org.hn (*project-based position), CRFM review of lobster fisheries in Wider Caribbean Reports - http://www.caricom-fisheries.com/PublicationsandDocuments/CRFMFisheryReports/tabid/85/Default.aspx | FAO/WECAFC: Raymon van Anrooy Raymon.VanAnrooy@fao.org | Assessments of dolphinfish (Mahi Mahi) | |
| | FAO working group on shrimp and groundfish on Guayana/ Brazil Continental Shelf (link on website broken) – Tarub Bahri tarub.bahri@fao.org | Elizabeth Mohammed (Fisheries Division – Trinidad) e.mohammed@ttst.net.tt | Indices of abundance for stock assessments | |
| | CRFM - Susan Singh-Renton ssinghrenton@vincysurf.com http://www.caricom-fisheries.com/ | Robin Mahon – UWI – rmahon@caribsurf.com Professor of Marine Affairs and Director Centre for Resource Management and Environmental Studies (CERMES) University of the West Indies, Milton Houghton miltonhaughton@hotmail.com | Age, growth, fecundity, life history studies | leader of regional conch effort, plus all US Fisheries in US Caribbean |
| | Reports - http://www.caricom-fisheries.com/PublicationsandDocuments/CRFMFisheryReports/tabid/85/Default.aspx | Terrence Phillips Terrencephillips@vincysurf.com | Pollution studies | |

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| | Documents/CRFMFisheryReports/ tabid/85/Default.aspx | urf.com | | |
| | Research Publication: http://www.caricom- fisheries.com/PublicationsandD ocuments/CRFMResearchPaper Collection/tabid/86/Default.asp x | Angel Gumy – FAO/Rome Angel.gumy@fao.org | Impacts of fishing activities on habitat | |
| | Management : http://www.caricom- fisheries.com/PublicationsandD ocuments/CRFMManagementRe ports/tabid/91/Default.aspx | Paul Medley – UK contractor who does some regional resource assessments paulahmedley@yahoo.c o.uk Paul.medley@virgin.net | Ecosystem models | |
| | University of British Columbia – catch reconstructions for Caribbean - Daniel Pauly | Patrick McConney – CERMES | Fishery independent indices of abundance | |
| | IFREMER- Lionel Reynal (lionel.reynal@ifremer.fr) | GulfBase - Good source for points of contact throughout the Caribbean Region | Industrial scale fishing fleets – especially foreign fleets | |
| | GCFI www.gcfi.org - publication page has 60+ years of publications on science in the Wider Caribbean | Elizabeth Mohammed (Fisheries Division – Trinidad) | Fisheries bycatch and discards | |
| | Mahon, R. 1999. Dolphinfish fisheries in the Caribbean region. Scientia Marina. 63 (3-4): 411-420. | Lauretta Burke – WRI | Disputed boundaries for transboundary species | |
| | Mahon, R. and H.A. Oxenford. 1999. Precautionary assessment and management of dolphinfish | Dr. Cesar Toro, IOC UNESCO: c.toro@unesco.org | Recreational Fishing – WECAFC just established a | |

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| | in the Caribbean. Scientia Marina. 63 (3-4): 429-438. hazel.oxenford@cavehill.uwi.edu) | | group recently. | |
| | OECS - Sustainable Environmental Unit – Peter Murray (pamurray@oecs.org) - Ocean Governance, find OECS Fisheries Digest (historical data) | US Caribbean Fishery Management Council - Miguel Rolon | Artisanal fisheries | |
| | CITES regional assessments (eg conch) | FAO-WECAFC ad hoc working group on flying fish - Raymon van Anrooy Raymon.VanAnrooy@fao.org | Contributions of fishing to local economies – “value chain” eg: recreational/tourism, artisanal | |
| | Cuba assessment data Rodolfo Claro, Julio Baisre (chief of fisheries, GulfBase), Ken Lindeman, Georgina Bustamante (action: get OSPESCA participant list from Panama Mtg for POCs) | | | |
| | Claro, R., Y. S. Sadovy de Mitcheson, K.C. Lindeman, and A. Garca-Cagde. 2009. Historical analysis of commercial Cuban fishing effort and the effects of management interventions on important reef fishes: 1960 2005 . Fisheries Research 99(1):7-16. | | | |
| | CLME – portal IMS Paul Geerders: paul@pgcons.nl (*project-based position) Dr. Cesar Toro, IOC UNESCO: | | | |

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|--|---|--|--|--|
| | c.toro@unesco.org | | | |
| | Caribbean Natural Resource Institute – Nicole Leotaud (director) assessments/socioeconomic linkages, capacity building | | | |
| | TNC, WCS (shark populations), EDF | | | |
| | Sources of fishery independent visual reef surveys: REEF – reef environmental education foundation (www.reef.org), AGGRA (Henri.valles@cavehill.uwi.edu), REEF check, Mesoamerican Barrier Reef System synoptic monitoring program (Miguel Alamilla - species@btl.net) - distribution and abundance of reef fish, Lionfish invasion | | | |
| | Honduras – shark conservation - Center for Marine Ecology (Stephen Box) | | | |
| | IWC – whaling activities in the Caribbean (St. Vincent & Grenadines) | | | |
| | Int'l Fund for Animal Welfare (Rebecca Brimley) www.ifaw.org Produce Marine Mammal Plan for the Wider Caribbean - fishing for small cetaceans | | | |
| | SCRFA (Society for the Conservation of Reef Fish Aggregations = Clearing house | | | |

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| | for reef fish spawning aggregation data) - Yvonne Sadovy Sadovy de Mitcheson, Y., Cornish, A., Domeier, M., Colin, P.L., Russell, M., and Lindeman, K.C. 2008. Reef fish spawning aggregations: a global baseline . Conservation Biology 22(5):1233-1244. | | | |
| | FAO – State of World Fisheries and Aquaculture 2012(ISSN 1020-5489): http://www.fao.org/docrep/016/i2727e/i2727e.pdf | | | |
| | Reefs at Risk and Reefs at Risk Revisited | | | |
| | TNC Eco Regional Planning | | | |
| | Paddack 2009 | | | |
| | Stahlings | | | |
| | Fanning, L., R. Mahon and P. McConney. [Eds.]. 2011. Towards Marine Ecosystem-based Management in the Wider Caribbean. Amsterdam University Press, Amsterdam, 426 p. | | | |
| | MAREA – Nestor Windevoxhel | | | |
| | Conch Assessments – Wesley Clerveaux (Turks and Caicos gov't – wvclerveaux@gmail.com) Also Paul Medley | | | |
| | Area 31 FAO Species update? (2008ish?) – 3 volumes | | | |
| | LAPE (Lesser Antilles Pelagic | | | |

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| | Ecosystem) – 6 reports on ecosystem considerations with Fisheries - Downloadable from FAO website; Elizabeth Mohammed and Paul Fanning | | | |
| | Health and safety/sanitary aspects of fishery products for export to the EU (evaluation of capacity needs) | | | |
| | Transboundary Diagnostic Analysis via CLME program CLME website www.clmeproject.org Paul Geerders: paul@pgcons.nl (*project-based position) | | | |
| | Coral Reef Targeted Research Program (Mesoamerican Reef Program) www.gefcoral.org | | | |
| | Larval Connectivity Studies: Cowen/Sponaugle/Claire Paris | | | |
| | Millennium ecosystem scenarios within subregional CARSEA (Caribbean Assessment) – (publication from Robin Mahon) http://cbd.cbd.netdna-cdn.com/doc/meetings/mar/rw_ebsa-wcar-01/other/rwebsa-wcar-01-crfm-03-en.pdf | | | |
| | Turtle Fishery (St. Lucia, Turks and Caicos, Nicaragua, plus others): Amdeep Sanghera (MCS UK partnership project with and | | | |

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| | <p>TCIG – looking at socioeconomics of turtle fishery in TCI) - amdeep.sanghera@mcsuk.org</p> <p>Peter Richardson – MCS UK – peter.richardson@mcsuk.org Aquaculture of turtles for consumption and release: Cayman Turtle Farm (info@turtle.ky) Sea Turtle Monitoring Network in St. Kitts - Kimberly Stewart - cturtlegirl@gmail.com</p> <p>Legislation: http://www.widecast.org/Legislation/Caribbean.html</p> <p>Publication: http://www.widecast.org/Resources/Pubs.html</p> <p>http://www.widecast.org/Resources/Pubs.html</p> <p>http://www.widecast.org/Resources/Docs/Fleming_Swimming_Against_the_Tide_pre-print.pdf</p> | | | |
| | <p>John MacManus – assessment of regional fisheries regulations</p> | | | |
| | <p>Flying fish: Oxenford, H.A., R. Mahon and W. Hunte (eds). 2007. Biology and management</p> | | | |

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| | of eastern Caribbean flyingfish. Centre for Resource Management and Environmental Studies, UWI, Barbados. 268 pp. | | | |
| | D.C. Dunn, K. Stewart, R.H. Bjorkland, M. Haughton, S. Singh-Renton, R. Lewison, L. Thorne, P.N. Halpin. A regional analysis of coastal and domestic fishing effort in the wider Caribbean< http://www.sciencedirect.com.ezproxy.library.dal.ca/science/article/pii/S0165783609002744 > Fisheries Research, Volume 102, Issues 1–2, February 2010, Pages 60-68 | | | |
| | <i>Coastal Fisheries of Latin America and the Caribbean.</i> 2011. Food and Agriculture Organization of the United Nations. (http://www.fao.org/docrep/014/i1926e/i1926e.pdf) Trends in coastal fishing in L.A/Caribbean Nations. Profiles of coastal fishing for countries in Latin American, Caribbean and South America. | Caribbean Regional Fisheries Mechanism (http://femar.rsmas.miami.edu/research.htm) Central Caribbean Marine Institute (http://feru.sites.olt.ubc.ca/) Centre for Resource | | |

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| | <p>NOAA Fisheries Stock Assessments. 2012. NOAA Fisheries – Office of Sustainable Fisheries. http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm#roc06) Stock assessments for the Wider Caribbean Region, status of rebuilt stocks, overfished stocks.</p> <p>(from IOCARIBE inventory)</p> | <p>Management and Environment Studies</p> <p>Caribbean Fisheries Management Council http://www.cavehill.uwi.edu/cermes/)</p> <p>FAO – Fisheries and Aquaculture. Silvia Salas (ssalas@mda.cinvestav.mx) Ratana Chuenpagdee (Memorial University of Newfoundland – ratanac@mun.ca)</p> <p>NOAA Fisheries http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm#roc06)</p> | | |
| <p>Aquaculture (Chapter 12)</p> <ul style="list-style-type: none"> • Economic magnitude, location and species of aquaculture activities and their ecosystem and socioeconomic impacts • Impacts of chemical pollution and contamination of wild fisheries | <p>FAO – Aquaculture development in LA and the Caribbean ISBN#9747313553</p> | <p>Working group on impacts of shrimp aquaculture (Latin Amer.)</p> | | |

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| <ul style="list-style-type: none"> Projections of aquaculture activities over the next decade | | | | |
| | <p>OIE (World Animal Health) (from Lucille)</p> | | | |
| | <p>Datasets from conch production from Caicos Conch Farm - Dept. of Env and Maritime Affairs (Turks and Caicos) contact: Luc Clerveaux</p> | | | |
| | <p>UN University – Impacts of persistent organic pollution and Pers. Toxic substances – Hanneke Van Lavieren (vanlav@unu.edu) http://www.inweh.unu.edu/Coastal/CCPP/Whitegrunt/Finalreport.pdf</p> | | | |
| | <p>IFREMER – in Martinique – Red Drum (en.aquaculture.ifremer.fr/secteur/fish/discoveries/red-drum.)</p> | | | |
| | <p>Cobia Aquaculture – University of Southern Mississippi (Jeffrey M. Lotz - jeff.lotz@usm.edu) Daniel Benetti UM RSMAS (dbenetti@rsmas.miami.edu)</p> | | | |
| | <p>Fishery Attraction Devices (FADs) - IFREMER; JICA CRFM master plan- Milton Haughton</p> | | | |

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| | and Peter Murray , Caribbean Fishery Management Council (Miguel Rolon) | | | |
| | Tilapia aquaculture in seawater - Dr. Barrington Brown (www.snapper.com) (from Samuel Heyliger) | | | |
| | Report on Aquaculture for the Future; WECAFC – Raymon Van Anrooy Raymon.VanAnrooy@fao.org | | | |
| | <i>A regional shellfish hatchery for the Wider Caribbean – Assessing its feasibility and sustainability.</i> 2010. FAO Fisheries and Aquaculture Proceedings. (http://www.fao.org/docrep/014/i2179e/i2179e00.pdf) Status of aquaculture in the Caribbean, species profiles, recommendations for future development. (from IOCARIBE inventory) | Caribbean regional Fisheries Mechanism FAO – Fisheries and Aquaculture – Alessandro Lovatelli (alessandro.lovatelli@fao.org), Samia Sarkis (Department of Conservation Services – Bermuda) Universidad de la Habana University of West Indies – Trinidad & Tobago | | |
| Fish stock propagation (Chapter 13) • Rebuilding depleted stocks • Ecosystems and socioeconomic impacts of artificial propagation on | Annual report to Congress on the Status of the stocks by NOAA Fisheries – | CRFM, OSPESCA, WECAFC – regional fisheries management | Enforcement of fishery management | We are unclear on the definition of “artificial |

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| natural ecosystems | www.caribbean.fmc.com/reports.htm | organizations | laws/regulations | propagation” - from FAO: Collection, rearing of eggs, larvae and fry; to achieve a better survival of offspring From Enrique Marschopp old draft “ranching and release of fish from hatcheries, transplantation of LMR to different ecosystems” |
| | SEDAR – provides assessments of US Caribbean fish stocks (www.sefsc.noaa.gov/sedar/) Gulf of Mexico Fishery Management Council (www.gulfcouncil.org); Caribbean Fishery Management Council (www.caribbeanfmc.com) | ICCAT – transboundary management of HMS | | |
| | <i>Cost and benefits of the cooperation and the development of capacity for the arrangement of responsible fishing.</i> 1999. (ftp://ftp.fao.org/fi/DOCUMENT) | FAO – Fisheries and Aquaculture (http://www.fao.org/fishery/en) | | |

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| | /weca/c/9thsess/costos.htm) Developments for responsible fishing in the wider Caribbean, rebounding from overfishing. (from IOCARIBE inventory) | | | |
| Seaweeds and other sea-based food (Chapter 14) • Economic magnitude and location of food other than fish and shellfish and their ecosystem and socioeconomic impacts | General pub ref: http://www.canari.org/publications.asp | CANARI - Caribbean Natural Resource Institute – Nicole Leotaud (director) (seamoss, sea urchins) | Population information on sea cucumber, diamondback squid (exploratory fishery); impacts of foreign buyers | |
| | Belize is doing an assessment of sea cucumber populations (Dr. Leandra Cho – Env. Research Institute, Univ. of Belize – lricketts@ub.edu.bz) Turks and Caicos is not considering Sea Cucumber fishing until studies are complete | | Market potential for sustainable exploitation (socioeconomics) | |
| | West Indian Sea Egg – FAO “Biology and Management of the White Sea Urchin” Circular #1056 | | Bait fisheries in the region (population, take, impact on fisheries/trophic cascades, market) | |

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| | Smith, A. H. and F. Berkes. 1991. Solutions to the "Tragedy of the Commons": sea-urchin management in St. Lucia, West Indies. Environmental Conservation 18(2):131-136. | | | |
| | Smith, A. H. and R. Walters. 1991. Co-management of the white sea urchin resource in St. Lucia. CANARI Communication No. 38:12 pp. | | | |
| | Smith, A.H. and S. Koester, 2001. A description of the sea urchin fishery in Laborie, St. Lucia. CANARI LWI Project Document No. 4. CANARI Technical Report No. 294: pp. (41 Kb) | | | |
| | Information on seaweed cultivation & socioeconomic impacts @ Union Island in the Grenadines - Raul Rhinconé (sustainable Grenadines NGO - Director: Martin Barriteau - Susgrenpm@vincysurf.com) | | | |
| | <i>Inventary of the Fauna of Hispaniola. 2012. Programa EcoMar.</i> (http://programaecomar.com/Inventario.pdf) List and summary of marine fauna surrounding | Programa EcoMar - Alejandro Herrera-Moreno, Liliana Betancourt-Fernandez (ongprogramaecomar@yahoo.com) | | |

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| | <i>Hispaniola</i> . (from IOCARIBE inventory) | | | |
| Oceans and seas as sources of food (Chapter 10) • Human dependence on the oceans for food | FAO database on seafood consumption by country globally – we can extract Caribbean fraction(www.fao.org/economic/ess/ess-home/en/) | | Subsistence level fishing, protein availability | |
| | FAO Food Security Statistics - http://www.fao.org/economic/ess/ess-fs/en/ | | | |
| | Entangled Communities: Socioeconomic Profiles of Fishers, their Communities and their Responses to Marine Protective Measures in Puerto Rico (Volume 2: Regional Profiles) http://elciel.files.wordpress.com/2008/03/v2regionalprofiles.pdf | | | |
| | <i>El hábitat del hombre Caimán</i> . 2008. Parque Cultural del Caribe. http://www.culturacaribe.org/publicaciones/LIBROHABITAT.pdf | Parque Culture del Caribe – (German Marquez Calle (gemarquezc@unal.edu.co) | | |

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| | f) Examines the relationship people have with the coasts. (from IOCARIBE inventory) | FAO – Fisheries and Aquaculture (http://www.fao.org/fishery/en) | | |
| Other social and economic aspects of fisheries and sea-based food (Chapter 15) <ul style="list-style-type: none"> • Health benefits and contamination risks • Employment and injuries • Socioeconomic implications of fisheries in social structure • Implementation of international fisheries agreements • Long-distance transport of landed fish and shellfish | CLME economic valuation of fisheries for Wider Caribbean Region – 200 studies for marine environment – CLME website (www.clmeproject.org) | SOLAS (Safety of Life at Sea) – International Convention | This topic is generally lacking information | |
| | FAO – social and economic statistics by country on fish consumption, employment, exports, etc pointing to valuation of fisheries | NOAA Fishwatch (www.fishwatch.org) | Employment from supporting industries (boat repair, boat building, processing & marketing and resale) | |
| | Job satisfaction in fishing – Dominican Republic (MAST - journal) (get from Robin Mahon) | Bioprospecting for pharmaceutical interests etc. International Cooperative Biodiversity Group (ICBG.org) | sustainable livelihood strategies | |

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| | 1 study in Grenadines (?) | SOCMON – Peter Espeut (Jamaica) | | |
| | Future of Reefs in a Changing Environment (FORCE) – EU project with 18 regional partners - \$10m Euros. www.force-project.eu (will have data outputs at regional level – reef ecology, reef fish populations, livelihoods) | | | |
| | <i>Resource Value Assessment of the Port Honduras marine Reserve, Toledo Distric, Belize. 2005. Toledo Institute for Development and Environment. (http://www.seaaroundus.org/conference/belize/belize_scientific_papers/Coleman_etal2005.pdf) Financial assessment of the inshore fishery, and tourism within the Port Honduras. (from IOCARIBE inventory)</i> | Parque Culture del Caribe – (German Marquez Calle (gemarquezc@unal.edu.co) FAO – Fisheries and Aquaculture (http://www.fao.org/fishery/en) | Toledo Institute for Development and Environment – Robin Coleman, Erika Diamond (info@tidebelize.org). | |

Overall Capacity Needs Related to Food Security & Food Safety and How to Address Them

The following food security-related needs were identified for the region:

- Ability to export fishery products, ensure health and safety and provide sanitary aspects for exports (to the EU in particular). Currently there are no processing plants preparing fish for export.
- Non-functioning, designated MPAs, which are not enforced, due to limited human and financial resources.
- Further development for straddling stocks with regard to getting boundaries properly delineated between very close islands.
- Management of larval source/sink dynamics & connectivity. One country has breeding population and countries downstream reap benefits of other countries' management programs. In particular: lobster stock/fishery, some research has been done on this issue.
- Access to tools, literature and what overall scientific community is doing.
- Lab/research capacity to use scientific findings to inform management decisions.
- Access to international markets.
- An institution in region that teaches fisheries from practical standpoint to marketing as well on both artisanal to industrial fleet, master fisherman courses. More industry based rather than scientific.
- Seafood inspection for export: need a national authority to certify seafood for export
- Initiative to harmonize legislation in order to set regional standards
- Development of fisheries and aquaculture. Caribbean Development Bank did a study focusing on food security, which singled out development of fisheries and aquaculture (find that report). Willing to fund training programs in terms of capacity building. Opportunity for development with the Bank.
- Stronger stock assessment capabilities. Stock assessments are very data expensive, very difficult to get all the necessary data in order to conduct the fishery. There is a lack of data but also a lack of manpower to actually go out and collect the data. People trained to collect data at the landing sites however to get biological data need to buy fish so becomes a financial burden. Region needs data collection as well as a central repository for collected data. Data management and archiving, exists at national level but not at regional level. Need for central regional, database for each country to log on and enter data. One standard for data regionally so each country can enter their own into central repository. The reason why the existing (and previous) database do not function is that each country has its own method of data collection and recording. Need collection, standardization and data management. If the region had these things, next would need stock assessment capabilities.
- Reduction in personnel turnover.
- CRFM mandated by governments to do a stock assessment, each country have own assessment but CMM apply to region, not nations.
- Program to address the lack of fishery independent abundance/effort data
- Understanding of connections to apply ecosystem based management, how do all these integrate together to an entire ecosystem
- Basic monitoring activities that you can do to see impacts of aquaculture. Could include monitoring for land-based pollutants
- If food supply is going to be coming more from aquaculture, need to build up more capacity for increasing aquaculture

- Alternative livelihoods for fishermen to reduce fishing capacity to protect fish stocks
- Sustainable fisheries management transfer of knowledge to fishers
 - CRFM has groups where fishermen are stakeholders to bridge that gap
 - In many countries, not transparent how decisions are made and translated to fishermen, not institutionalized
 - Co-ops of fishermen, under form of co-management. Buying materials, vessel repairs etc, forming co-op would lower costs for all fishermen
 - More capacity building on business management, ie micro-loans
 - Over-capitalized fishery could be put towards fishery independent assessment, additionally use vessels to take tourist out, making the fish worth more in the water
 - Need to consider educational and social, traditional culture aspects of fishing. Alternatives to fishing and alternatives fishing methods

Annex G: SOCIOECONOMIC ASPECTS BREAK-OUT GROUP

Participants (name, email, institution)

| Name | Email | Institution |
|-----------------------------|--------------------------------|---|
| MARIA PENA | maria.pena@cornell.edu | CERMES, ILO |
| JOHN BOTHWELL | John.Bothwell@gov.ny | CAYMAN DEPT ENVIRONMENT |
| Maxine Monsanto | dee.sco@goff.d.gov.bz | Department of Environment |
| Minu Parakhoe | minu.phm@yahoo.com | Consultant - Ministry of Land |
| KAREEM SABIR | ksabir@coastal.gov.bb | COASTAL BARBADOS |
| LEONARD NURSE | leonard.nurse@cornell.edu | CERMES (US) |
| Gisbert Boekhoudt | gisbert.boekhoudt@aruba.gov.aw | Director of Nature |
| Christophe Liere | christophe.liere@unep.org | NETA Fisheries |
| DAVID W CARTER | david.w.carter@unep.org | " " |
| ALBERTO PACHECO | ALBERTO.PACHECO@UNEP.ORG | UNEP |
| CHRISTOPHER COX | CCOX@cehi.org.jc | Caribbean Env. Health Institute |
| Lauretta Bulla | LAURETTA@WRI.ORG | WRI |
| Paula Patricia Sierra-Loren | Paula.sierra@unep.org | INVERMAR Colombia |
| MICHELLE N. YSSE | michelle.yisse@unep.org | MINISTRY OF FOREIGN AFFAIRS |
| MERIDA CABLE | meridacable@gmail.com | AG'S CHAIRPERSONS/MIN. OF INT'L TRADE |
| CECAL TO RO | c.toro@unesco.org | UNESCO IOC |
| CLINTON THOMPSON | cthompson@mtg.gov.jm | MINES & GEOL. SURV. - Ministry of TECHNOLOGY, ENERGY & MINING |
| Omar Shamir Beydoso | omar.shamir@unep.org | Min Env. Nat. Res. |
| JOSTEN NYLAND | jnyland@worldbank.org | WORLD BANK |
| RICHARD HUBER | RHUBER@OAS.ORG | OAS-DSD |
| LUCIENNA EXIL | exillucienna@yahoo.fr | Ministry of Environment |
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Overall Points Related to Completing the Table and the Socioeconomic Aspects WCR Assessment

Most of the chapters assigned to the socio economic aspects of the report were deemed to be deficient in well known socio economic assessments. Much of the information cited seemed to be in grey literature. There seem to be few regional assessments. Most socioeconomic assessments are national or sub-national. The Gulf of Mexico LME documents were considered an overall important source for many of the topics. A Dropbox folder was set-up and has numerous reports and other documents as noted. Co-chair Lorna Inniss' colleague, Kareem Sabir (KSabir@coastal.gov.bb), is responsible for the Dropbox and can be reached for details and access.

| Topics (e.g. Scientific understanding of ecosystem services) and Sub-Topics (e.g. Shoreline protection...) to Include in the WCR Assessment | Relevant Studies, Documents, Reports and Other Sources of Information (refer to the Inventory list) | Priority Individuals & Institutions to Engage (email; who suggested) | Information Gaps | Comments |
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| Scientific understanding of ecosystem services (Chapter 3) | | | | |
| <ul style="list-style-type: none"> Shoreline protection | <p>IDB reference reports (www.iadb.org); DELCAN; HALCROW References (1990s – 2000s); Baird and Ass. Barbados long history of work. (Barbados focused; in Dropbox)</p> <p>CZMU Website and Hardcopies; Dr. Lorna Inniss (contact)</p> <p>Laretta B, WRI: UNEP 2008, In the Frontline: shoreline protection and other ecosystem services. (global study; in Dropbox) http://www.unep.org/pdf/infrontline_06.pdf</p> <p>Laretta B, WRI: All of WRI's shoreline protection assessments are found under the Coastal Capital project - http://www.wri.org/project/valuation-caribbean-reefs I attach the results for Belize and Tobago and St. Lucia. (in Dropbox)</p> <p>Laretta B, WRI: Also from the Coastal Capital project - http://www.wri.org/project/valuation-caribbean-reefs (Jamaica focused; in Dropbox)</p> <p>John Bothwell, Cayman Islands: http://www.doe.ky/about/boards-committees/brac/ - Cayman Islands shoreline management, including consultant</p> | <p>Minu Parahoe, Suriname: glenn redjopawiro - secretariaat@rgb.gov.sr</p> | <p>Paucity of socio-economic data eg. Impact on Insurance premiums etc with respect to Barbados</p> <p>Insufficient info on shoreline protection services provided by reefs under varying levels of health</p> <p>Not for the entire coastal zone</p> | <p>Much of the info is hardcopy and not publicly available (need permission)</p> |

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| | <p>resource</p> <p>Maxine Monsanto, Belize: http://www.un.org/esa/dsd/resources/res_pdfs/ga-66/inputs/belize.pdf</p> | | | |
| <ul style="list-style-type: none"> Carbon storage | <p>John Bothwell, Cayman Islands: 5Cs - climate change outreach programmes, especially case studies, consultants and how-to's - http://www.caribbeanclimate.bz/ - communication/PR and any climate-change issues</p> <p>Turtles in the Caribbean Overseas Territories (TCOT), http://www.seaturtle.org/mtrg/projects/tcot/ - social surveys and socio-biological technical to public reporting TCOT Publicity, http://www.seaturtle.org/mtrg/projects/tcot/finalreport/section12.pdf - communicating information to the rest of society and getting them on board with the goals</p> <p>UK Joint Nature Conservation Committee (JNCC) - economic assessments - http://jncc.defra.gov.uk/default.aspx?page=4136 - Scientific Understanding of Ecosystem Services, i.e., how to communicate what is known in terms civil society will understand</p> <p>Gulf of Mexico Large Marine Ecosystems: resources at risk from CC (Chapter 8; in dropbox)</p> <p>Blue Carbon Report – socio economics re financing mechanisms Available from www.unep.org</p> | <p>CCCCC Belize (www.caribbeanclimate.bz)</p> | | <p>Need for timely response to data requests</p> |
| <ul style="list-style-type: none"> Natural products (i.e. ornamental fish, shells...) | <p>Paula Sierra, INVEMAR, Colombia (ornamental fish and others in Spanish): http://www.invemar.org.co/noticias.jsp?id=4559&idcat=106</p> | <p>Dr. Javier Gomez (javier.gomez@invemar.org.co) from COLOMBIA and he works at INVEMAR</p> | | |

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| | <p>The "socioeconomic and socioecological analysis of Ciénaga Grande de Santa Marta - COLOMBIA" is an important study in socioeconomic issues in the Caribbean coast of Colombia. Dr. Sandra Vilarity (sandra.vilarity@uam.es, Universidad del Magdalena en Colombia).</p> <p>Worldbank publication: Little green data book</p> <p>CITES – list of some products traded</p> <p>(John Bothwell, Cayman Islands: Gulf & Caribbean Fisheries Institute - http://www.gcfi.org/index.php http://johnspace2011.wordpress.com/)</p> | Paula.sierra@invemar.org.co | | |
| <ul style="list-style-type: none"> Jobs & livelihoods | <p>Worldbank publication: Little green data book</p> <p>"Gulf of Mexico at a Glance" (2011) (in dropbox)</p> <p>Paula Sierra, INVEMAR, Colombia – Coastal vulnerability to sea level rise; an integrated coastal zone study (In the table of contents the step 2,3,4 and 5 are very relevant for socioeconomic topics).</p> <p>OPAAL – OECS – livelihoods and protected areas</p> <p>Caribbean Tourism – CTO – a series of publications (see below)</p> | <p>Peter A Murray</p> <p>Paula Sierra, INVEMAR, COLOMBIA (paula.sierra@invemar.org.co)</p> | | |
| <p>Aesthetic, cultural, religious and spiritual ecosystem services derived from the sea (Chapter 8)</p> <ul style="list-style-type: none"> Human interactions | <p>John Bothwell, Cayman: TCOT (below) also makes some address to 'cultural use of marine resources', i.e., turtles.</p> | <p>M. Witter</p> <p>UNESCO – world heritage sites</p> <p>Belize: Joseph Palacio</p> | Unknown, needs more attention. | |

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| <p>with the oceans on aesthetic, cultural, religious and spiritual levels, including burials at sea, and ways in which these interactions may be affected by other changes.</p> | | | | |
| <p>Shipping (Chapter 17)</p> <ul style="list-style-type: none"> • Economic significance of shipping and trend over the next decade • Harmful impacts from pollution, acoustics, disasters, transport of invasive species and hazardous, noxious substances • Shipping-related industries and commerce | <p>Maxine Monsanto, Belize: Gulf of Honduras Ports, Shipping, etc.: http://www.proyectogolfodehonduras.com in Spanish (the Spanish version has more of the documents); www.gulfofhondurasproject.com in English</p> <p>Caribbean Shipping Association</p> <p>Journal: Caribbean Maritime</p> <p>Ballest water/Harmful algae blooms UNESCO/IOC</p> <p>John Bothwell, Cayman Islands: invasive species - Giant African Snail (no references, just mentioning in case the biodiversity group are totally marine focused)</p> <p>Caribbean Invasive Alien Species Network (http://www.ciasnet.org/)</p> <p>Alvarez Porfir (in dropdown): CMSP in Mexico, invasive species: Check Chapter in page 113 about Socioeconomic analysis Transboundary Diagnostic Analysis Gulf of Mexico LME, CH 3 Impact of Fishing on Biodiversity GoM LME Transboundary Diagnostic Analysis Gulf of Mexico LME, Ch 5 Impact of Invasive Species on Biodiversity GoM LME Trnasboundary Diagnostic Analysis Gulf of Mexico LME, Ch, 4</p> | | | |

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| | <p>Governance in the GoM LME</p> <p>Mexico's National Strategy for Invasive Species</p> <p>North America (Canada US Mexico) Commission for Environmental Cooperation (CEC) NAFTA, Trinational Guidelines Invasive Species</p> | | | |
| <p>Ports (Chapter 18)</p> <ul style="list-style-type: none"> Economic significance of ports and trend over the next decade Ports development and maintenance and socioeconomic implications | <p>American Association Ports</p> <p>www.aapa-ports.org</p> <p>Gulf of Mexico LME document (in dropbox)</p> <p>US NPS USVI small boat cruising...</p> <p>International Maritime Org. – global integrated shipping info.</p> | <p>Caribbean Cruise ship Association</p> <p>PLIPDECO Trinidad</p> | <p>Look at merchant seamen</p> | <p>Cruise ship association driving port construction</p> |
| <p>Submarine cables and pipelines (Chapter 19)</p> <ul style="list-style-type: none"> Economic magnitude and location of cables and pipelines and socioeconomic implications Pollution | <p>Worldbank – Caribbean regional electricity supply options (2011, sections on interconnectivity)</p> <p>Edgar Cabrera (WMO): International Telecommunications Union (ITU)</p> <p>EIAs may be a useful source</p> | <p>World Bank</p> <p>International telecommunication union (ITU)</p> <p>Study group on environment</p> <p>Cristina Sueti – cristina.bueti@itu.int</p> | | <p>There might be documents with different titles that have good information.</p> |
| <p>Coastal, riverine and atmospheric inputs from land (Chapter 20)</p> <ul style="list-style-type: none"> Source of pollution, including municipal wastes, industrial wastes, and agricultural runoff Eutrophication Desalinization | <p>Saharan dust - Barbados monitors this dust – human health and coral health impacts</p> <p>EPD Barbados beach water quality 2004</p> <p>Alvarez Porfir: Gulf of Mexico LME (Chapter 8) in Dropbox</p> <p>Paula Sierra, INVEMAR, Colombia: Global International Water Assessment for Caribbean in Dropbox</p> <p>GEF Ag pesticides REPCAR</p> | <p>Anthony Headley, Deputy Director, Environmental Protection Department (aheadley@epd.gov.bb)</p> <p>Paula.Sierra@invemar.org.co</p> <p>Luisa.espinosa@invemar.org.co (Contact for REPCAR)</p> | <p>Gaps may exist with respect to socioeconomic details</p> | <p>NB.: WB Working on Water Quality issues through Global Partnership for Oceans Prg. More into to be sent from Josteinygare (World Bank)</p> |

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| | <p>Maxine Monsanto, Belize: National Action Plan for the Control of Land Based Sources of Land Based Sources of Marine Pollution in Belize (2008) - issue papers on Sediment Loading, Nutrients, Physical Alteration/Destruction of Habitats, and Solid Waste – sections related to the marine environment.</p> <p>Jostein, Worldbank (and/or Chris Cox): (limited estimations of socio-economic impact here, but that could be mentioned in the gap part; Chris Cox is the expert on the UNEP/CEP/CIMAB literature) (i) Original 1994 report (# 33): http://www.cep.unep.org/publications-and-resources/technical-reports/tr33en.pdf</p> <p>(ii) Updated 2010 report (updated # 33): http://www.cep.unep.org/meetings-events/14th-igm/draft-of-updated-cep-technical-report-no-33-eng.pdf</p> <p>(iii) Updated 2012 report (# 52) http://www.cep.unep.org/publications-and-resources/technical-reports/Update%20TR%2033%20-Ingles-%20VERSION%20FINAL.pdf</p> <p>Christopher Cox: Caribbean Sea Ecosystem Assessment (CARSEA). A contribution to the Millennium Ecosystem Assessment prepared by the Caribbean Sea Ecosystem Assessment Team</p> <p>Making Mainstreaming Work. An Analytical Framework, Guidelines and Checklist for the Mainstreaming of Marine and Coastal Issues into National. Planning and Budgetary Processes. John Soussan (SEI)</p> | <p>Christopher Cox:</p> <p>Co-ordinating Lead Authors JOHN B. R. AGARD AND ANGELA CROPPER</p> <p>UNEP CEP UNEP/GPA Coordination Office</p> | | |
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| | <p>Wastewater Management at Hotels and Resorts in the Caribbean</p> <p>Guidelines on Municipal Wastewater Management</p> <p>Sick Water? The central role of wastewater management in sustainable development. A Rapid Response Assessment.</p> <p>Bathing Water Quality Monitoring Plan for Barbados</p> <p>Marine Pollution Act Proposed Discharge Standards</p> <p>Draft National Plan of Action for the Control of Land-Based Sources of Marine Pollution in Belize</p> <p>Sewage Effluent Standards. (Extracted from the Jamaican National Sewage Effluent Standards, 1996). A Strategic Approach to Marine Litter Reduction and Control in the Caribbean.</p> <p>Review of Policy, Laws & Institutional Structures For the GEF "Integrating Watershed & Coastal Areas Management in Caribbean Small Island Developing States (GEF-IWCAM)" Project</p> <p>The Netherlands Clearing House: http://www.gpa.unep.org Visiting address: Kortenaerkade 1, The Hague, The Netherlands, UNEP/IETC International Environmental Technology Centre of UNEP Osaka Office, 2-110 Ryokuchi Koen Tsurumi-ku, Osaka 538-0036 Japan</p> | <p>PO Box 16227 2500BE The Hague The Netherlands Tel: +31 70 31144 60 Fax: +31 70 345 66 48 Email: gpa@unep.nl Web: www.gpa.unep.org Stockholm Environment Institute Kräftriket 2B 106 91 Stockholm Sweden Tel: +46 8 674 7070 Fax: +46 8 674 7020 Email: postmaster@sei.se Web: www.sei.se Publications Manager: Erik Willis Web Manager: Howard Cambridge Layout: Richard Clay Cover Photo: John Soussan</p> <p>A.A. Vlugman Sanitary Engineer, PAHO/WHO</p> <p>REGIONAL CONFERENCE ON ENVIRONMENTAL HEALTH AND SUSTAINABLE TOURISM DEVELOPMENT Nassau, Bahamas 8-11 November 1993</p> <p>UNEP/GPA, The Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, GPA Coordination Office, P.O. Box 16227 2500 BE The Hague</p> | | |
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| | <p>Web: http://uneo.or.jp/ietc UNESCO-IHE, Institute for Water Education PO Box 3015, 2601 DA Delft The Netherlands Web: http://www.unesco-ihe.org</p> <p>Corcoran, E., C. Nellemann, E. Baker, R. Bos, D. Osborn, H. Savelli (eds). 2010 United Nations Environment Programme, UN-HABITAT, GRID-Arendal. www.grida.no Produced for: Environmental Engineering Division and Coastal Zone Management Unit, Ministry of Housing, Lands and the Environment, Government of Barbados. Prepared by: In association with: University of the West Indies October 2004 February 2008 Department of Environment Ministry of Natural Resources and the Environment</p> | <p>Christopher Corbin1 and Seba Sheavly E mail: cjc.@cep.unep.org</p> <p>Environmental Advisors, Inc www.iwcam.org</p> | | |
| <p>Offshore hydrocarbon industries (Chapter 21)</p> <ul style="list-style-type: none"> • Scale and significance and socioeconomic implications • Impacts from exploration • Disasters | <p>REMPEITC - Technical Node for Oil spills Protocol</p> <p>www.isa.org.jm/ - Info on hydrocarbon and mineral resources</p> <p>Oil Companies – BHP Billiton, BP, REPSOL</p> | <p>OLADE (www.olade.org)</p> <p>jwilliams@caricom.org - Joseph Williams, Manager Energy Desk CARICOM</p> <p>NIMOS- Yolanda Babb- ybabb@nimoss.org Green Heritage Fund Suriname- Monique Pool-info@greenfundsuriname.org (suggested by Minu Parahoe, Suriname)</p> <p>International association of oil and gas producers (OGP) / various committees www.ogp.org.uk (suggested by Edgar Cabrera, WMO)</p> | | <p>Complaints from fishermen re the impact of seismic activities on their livelihoods</p> <p>Conversely are there benefits to fishermen from increased catches around rigs?</p> |
| <p>Other marine-based energy industries (Chapter 22)</p> <ul style="list-style-type: none"> • Scale of wind, wave, ocean thermal and tidal | <p>CEIS – Caribbean Energy Information Systems</p> | <p>Mona White</p> <p>CCCCC Contact : Al Binger (yengar@hotmail.com)</p> | | <p>Areas of opportunity not yet significantly exploited/explored in the Caribbean.</p> |

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| <p>power generation</p> <ul style="list-style-type: none"> • Environmental benefits and impacts • Expected economic performance • Significant socioeconomic aspects | | <p>Cayman Institute, http://caymaninstitute.org.ky/ (suggested by John Bothwell, Cayman Islands)</p> | | |
| <p>Offshore mining industries (Chapter 23)</p> <ul style="list-style-type: none"> • Sand and gravel mining and socioeconomic implications • Status of non sand/gravel mining activities | <p>www.isa.org.jm/ - Info on hydrocarbon and mineral resources</p> <p>www.irf.org (Island Resources Foundation)</p> <p>US Sea Grant Project, University of Puerto Rico (Mayaguez)</p> <p>Leonard Nurse: Lettsome, B, et al. "Sand mining in the British Virgin Islands" - www.nsgl.gso.uri.edu/pru/pruw96001_pt-b2.pdf</p> | <p>Secretary General, International Seabed Authority</p> <p>Michelle Bond, Librarian</p> <p>Gillian Cambers</p> | | |
| <p>Solid waste disposal (Chapter 24)</p> <ul style="list-style-type: none"> • Types and amounts dumped into the sea and trend over the next decade | <p>Planning of an integrated Solid Waste Management System in Suriname</p> <p>Lauretta Burke/WRI: The Ocean Conservancy annual beach cleanup - http://www.oceanconservancy.org/our-work/marine-debris/2012-data-release-behind-the-scenes.html</p> <p>Maxine Monsanto, Belize: http://www.doe.gov.bz/documents/EIA/Solid%20Waste/C11%20SW%20Rev%20EIA%20Appendices%20K.pdf</p> | <p>Dr. L. Zuilen, University of Suriname l.zuilen@uvs.edu</p> <p>Maxine Monsanto: sw.director@mnrei.gov.bz for Mr. Gilroy Lewis, P. Engr. Director</p> | | |
| <p>Marine Debris (Chapter 25)</p> <ul style="list-style-type: none"> • Causes • Approaches to combating marine debris | <p>MoBay Marine Park Studies</p> <p>Gulf and Caribbean Fisheries Institute (website: marine debris survey)</p> <p>Project Global (Duke University)</p> | | | |

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| <p>Land/sea physical interaction (Chapter 26)</p> <ul style="list-style-type: none"> • Magnitude and location of land reclamations and habitat modifications • Erosion of land by the sea and socioeconomic implications • Sedimentation changes and trend over the next decade | <p>Fisheries SOCMON Project (CERMES) in Dominica - available from CERMES website (At Cavehill)</p> <p>CANARI – www.canari.org</p> <p>IWCAM Project – www.iwcam.org</p> <p>Information on Haiti available from www.foprobim.org</p> <p>Reclamation studies on the Bridgetown ports</p> <p>Invemar reports 2009-2011 on Erosion (<i>documents in Dropbox</i>)</p> <p>Marine Geology Department, UWI Mona – data on erosion in Negril</p> <p>CARIBSAVE Documents</p> <p>UNEP CEP Website (Contact person Chris Corbin)</p> <p>John Bothwell, Cayman Islands: US State Department, White Water 2 Blue Water Initiative, now defunct but information collected may still be available, http://2001-2009.state.gov/g/oes/rls/fs/2003/18969.htm</p> <p>Alvarez Porfir (in dropbox): LMEs and climate change, chapter 8, Gulf of Mexico LME resources at risk from climate change</p> <p>Lauretta Burke, WRI: Beach erosion in Negril; and the cost of beach erosion in the DR and Jamaica.</p> | <p>Maria Pena maria.pena@cavehill.uwi.edu</p> <p>Nicole Leotaud (Nicole@canari.org), Exec Director</p> <p>Christopher Cox (ccox@cehi.org.lc) – contact for IWCAM Project</p> <p>Paula.Sierra@invemar.org.co</p> <p>Chris Corbin (cjc@cep.unep.org)</p> <p>Contact for Coastal Capital: lauretta@wri.org</p> <p>For erosion in Negril: Ted Robinson of UWI-Mona is the contact.</p> | | |
| <p>Tourism and recreation (Chapter 27)</p> | <p>Caribbean Tourism Organisation Travel and Tourism Economic Impact</p> | <p>Maxine Monsanto, Belize: Institution for contact on tourism and</p> | | |

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| <ul style="list-style-type: none"> • Magnitude and location, including cruise ships, of tourism and ecosystems and socioeconomic implications • Pollution • Habitat disturbance | <p>Colombia – valuation of tourism sites vs mangrove areas (INVEMAR Studies)</p> <p>World Bank Reports on use of natural resources for Tourism</p> <p>Green Globe and Blue Flag Programmes</p> <p>www.iwcam.org (Bahamas study)</p> <p>UNEP Study (2011)</p> <p>Recreational Value of Coral Reefs</p> <p>Maxine Monsanto, Belize: http://www.academia.edu/776291/Cruise_ship_tourism_in_Belize_The_implications_of_developing_cruise_ship_tourism_in_an_ecotourism_destination https://www.centralbank.org.bz/docs/rsh_4.5_conferences-working-papers/direct-economic-impact-of-cruise-tourism.pdf?sfvrsn=6</p> <p>Maxine Monsanto, Belize (Social Viability of Cruise Ships in South Belize): http://www.placencia.com/BELIZE%20CRUISE%20VIABILITY%20REPORT_2011.pdf</p> <p>Lauretta Burke, WRI (documents in the Dropbox): Coastal capital studies value coral-reef associated tourism. Contact: Lauretta@wri.org WRI has GIS data set on cruise ship ports and a rough indicator of frequency and size of visitation (port of calls). These data are from 2009 – 2010.</p> | <p>recreation is the Ministry of Tourism/Belize Tourism Board</p> <p>Gail Henry (CTO) – gnhenry@gmail.com</p> <p>Paula.Sierra@invemar.org.co</p> <p>Loretto Duffy-Mayers (CHTA – Caribbean Hotel and Tourism Association) re- blue flag and green globe</p> <p>Marelviz.londono@invemar.org.co</p> <p>kreytar@wri.org or Lauretta@wri.org</p> | | |
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| | <p>John Bothwell, Cayman Islands: Tourism - 5Cs, website below, tourism vulnerability assessments on various countries, e.g., (for Cayman) http://www.doe.ky/sustainability/ (bottom of the page, in 4 parts).</p> <p>Tourism - Cayman Islands Tourism Management Plan(s); email foi@caymanislands.ky; also EIA, etc., Port Scoping Documents. Note: This is a 'Freedom of Information' email so engage in a conversation otherwise the request will fall in to an FOI Process which could take longer than simply asking, if they are amenable to providing the information. Obviously very country specific so may not be worth pursuing if there are broader based information sources available.</p> | | | |
| <p>Desalinization (Chapter 28)</p> <ul style="list-style-type: none"> • Magnitude and location of desalinization activities and socioeconomic implications | <p>www.caribda.com (Caribbean Desalinisation Organisation)</p> <p>Caribbean Water and Wastewater Assn (www.cwwa.net)</p> <p>National Studies for Aruba, Antigua, Bahamas, Cayman Islands and Barbados</p> <p>Socio econ impacts of desal plants based on discharge into the marine zone – check for references</p> <p>John Bothwell, Cayman Islands: http://www.doe.ky/wp-content/uploads/2010/03/Cayman-Islands-Climate-Change-Policy-Final-Draft-30-Sep-2011.pdf - Cayman Islands Climate Change Policy refers to potential desalination impacts from Climate Change. Also lots of other Climate Change impacts (potential).</p> <p>Leonard Nurse: Gunzbourg, Jde and T. Froment, 1987. Construction of a solar desalination plant (40 cum/day) for a French Caribbean island. Desalination, 67, 53-58.</p> | <p>Manuel Pereira (mpereira@aqualectra.com)</p> <p>Cyprian Gibson (wccgibson@wsc.com.bs) - Contact for desal in the Bahamas</p> | | |

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| | Bruno-Vega and K.S. Thomas, 1994. The Virgin Islands desalination experience. <i>Desalination</i> (1-3), 443-450. | | | |
| Use of marine genetic resources (Chapter 29) <ul style="list-style-type: none"> Magnitude and location of marine scientific research and exploitation and socioeconomic aspects | <p>Convention on Biodiversity may have information ???</p> <p>www.Stateofthecoast.Noaa.gov – summary of the medical applications one may derive from coral reef materials</p> <p>UNEP CEP under SPAW Protocol</p> | Contact re SPAW Protocol: Alessandra Vanzella-khouri AVK@cep.unep.org | | New area of research – bioprospecting taking place in the Caribbean but not clear on availability of data |
| Marine scientific research (Chapter 30) <ul style="list-style-type: none"> Topic and location of marine scientific research and socioeconomic implications | <p>SOCMON (Socioeconomic Monitoring for Coastal Management) English and Spanish speaking Caribbean. Information available from www.socmon.org</p> <p>Valuation of the Montego Bay Marine Park</p> <p>UNEP CEP under SPAW Protocol</p> <p>CLME website</p> <p>www.eclac.org</p> <p>GEF Project – Marine Protected Areas Subsystem which looks at financial sustainability of MPAs and also Valuation of new MPAs</p> <p>Caribbean Regional Fisheries Mechanism and OSPESCA</p> <p>Caribbean Fisheries Management Council</p> <p>Gulfbase – data portal</p> <p>Hart Research Institute</p> <p>IOCaraiibe</p> | <p>Maria.pena@cavehill.uwi.edu</p> <p>Contact re SPAW Protocol: Alessandra Vanzella-khouri AVK@cep.unep.org</p> <p>Pilar.Lozano@invemar.org.co (Project Coordinator)</p> <p>Robert Leeworthy, NOAA</p> <p>Megan Jungwiwattanaporn mvj3@duke.edu</p> | | |

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| | <p>Carter, David (NOAA coral reef valuation database): http://coastalsocioeconomics.noaa.gov/core/reefs/reeflit1.html</p> <p>Lauretta Burke, WRI: The Marine Ecosystem Services Partnership (MESP) has a database of economic valuation studies (@Duke Uni). http://nicholasinstitute.duke.edu/oceans/mesp</p> <p>John Bothwell, Cayman Islands: CampPAM (Caribbean Protected Areas Managers forum) http://campam.gcfi.org/campam.php. Also a good source of experts, if they haven't already been approached. Also, GCFI (below) is another good source for this sort of thing.</p> <p>CITES significant trade review for conchs, e.g., http://www.cites.org/eng/com/ac/19/E19-08-3.pdf. Also, http://procs.gcfi.org/pdf/gcfi_57-54.pdf and possibly, ftp://ftp.fao.org/docrep/fao/010/a1121e/a1121e.pdf.</p> | | | |
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Overall Assessment Capacity Needs Related to Socioeconomic Aspects and How to Address Them

The groups discussed several key issues with regards to capacity building in the region:

- Both human and institutional capacity are weak in the region. In that context the group suggested that in seeking to strengthen the human and institutional capacity there is usually a trade-off and therefore a need to have informed decision making in that prioritisation process.
- Networks – national and regional - offer solutions to build capacity. Another way to strengthen capacity is to network regional projects and programmes.
- There is a lack of political capacity e.g. translating interdisciplinary research into policy. There is a need to improve the link between societally driven research, evidence from science and other sources, into producing actions that improve well being.
- The social sciences could help articulate research questions based on what the political priorities may be (which could help close the gap between the policy making and implementation).
- Careful attention needs to be paid to communication strategies that are appropriate to the knowledge demands of varying publics which range from the political to civil society organisations and communities.

Issues for WOA to Address

The group had an engaging discussion regarding the WOA, which raised the following recommendations and questions:

- What might be an appropriate node for sharing information on the Caribbean in the context of the WOA? Perhaps the Cartagena Convention/CEP ?
- Socio economic assessments are often site-specific. Therefore, there is a need to build a regional picture based on scaling up (where possible).
- What is the strategy going forward with respect to communication, information dissemination etc. ? There should be an opportunity for public engagement as early in the process as feasible with connections to the political processes so that the output answers specific societal questions. The analyzes need to be upstream, demand-driven (country driven) to ensure there is ownership/buy-in of outputs and follow-up (the Sustainability dimension)
- What is the value added to be derived from the WOA process vs other meta assessments and processes past and present (and future). From a socio-economic perspective there needs to be a sense of the total Economic value e.g. the cost of degradation from pollution but also capturing use and non-use values from the ocean. In addition, the WOA should capture cross cutting issues, including: climate change issues (ocean acidification, SST, flooding etc.); gender; poor and vulnerable communities; and, governance specifically as an integrating factor across the chapters.

Annex H: Marine Biological Diversity Aspects Break-Out Group (Part VI, Chapters 34-43)

Co-Chairs: Andrew A Rosenberg & Antonio Diaz De Leon

Rapporteurs: Nathan Vaughan & Bill Harford

Participants

- 1.-Sharmer Fleming
- 2.-Philmore James
- 3.-Tamica J. Rahming
- 4.-Melanie McField
- 5.-Linnetthe Petricia Flosei Aries
- 6.-Robert Kock
- 7.-Juan L. Mate
- 8.-Renison Ruwa
- 9.-Patricia Miloslavich
- 10.-Jaime Bolanos
- 11.-Henry Wilson
- 12.-Liza I. Gonzalez
- 13.-Joana Akrofi
- 14.-William Harford
- 15.-Norman Vaughan

Overall Points Related to Completing the Table and the Marine Biological Diversity Aspects Part of the WCR Assessment.

Within the greater Caribbean region, some delegates suggested that the spatial organization of the assessment would be better organized according to mangrove, sea grass, and reef zones, rather than as a combined coastal zone. A large fraction of the coastal shelf within the broader Caribbean falls within mangrove, sea grass, and reef zones. Correspondingly, discussions pertaining to these areas were pervasive throughout discussions, as both data availability and research capacity have been focused on these coastal regions. Readers should be aware that many details within the 'coastal' section of the table are broadly applicable to all habitats.

Knowledge gaps with regard to marine biological diversity are extensive. Some specific examples are provided in the table. More broadly, these gaps include early life history of most organisms, historical baselines against which to compare current indicators of ecosystem status, and knowledge of deepwater environments. Further knowledge gaps exist with respect to how to integrate many regional data sources into useful frameworks for characterizing the Caribbean. Some delegates cautioned that regional aggregation of data must proceed based upon appropriate biological and/or socioeconomic spatial frames of reference. There remains a related need for tools to synthesize information, including global reporting and database management.

| Topics (e.g. Coastal sediment habitats) and Sub-Topics (e.g. Overall status of major groups...) to Include in the WCR Assessment | Relevant Studies, Documents, Reports and Other Sources of Information (refer to the Inventory list) | Priority Individuals & Institutions to Engage (email; who suggested) | Information Gaps | Comments |
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| <p>Coastal (0 – 50 m depths) habitats (across Chapters 34-43) - coral reefs, sea grass, mangrove habitats</p> <ul style="list-style-type: none"> Overall status of major groups of species and habitats within this regime Status and trends of, and threats to, marine ecosystems, species and habitats that are threatened, declining or otherwise in need of attention Significant socioeconomic aspects in relation to the conservation of marine species and habitat | <p>Submitted by: Sharmer Fleming Status of Anguilla’s Marine Resources 2008 Status of Anguilla’s Marine Resources 2010)</p> <p>Submitted by: Melanie McField Regional for Mesoamerican reef reports and data. Healthy Reefs Initiative healthyreef.org. Report card on the health of the Mesoamerican reef 2010 www.healthyreefs.org</p> <p>IUCN reef resiliency project: meta analysis for Caribbean (and global – 2013)</p> <p>Long-Term Region-Wide Declines in Caribbean Corals. Toby A. Gardner et al Science 15 August 2003: Vol. 301 no. 5635 pp. 958-960</p> <p>Jeremy Jackson- Database of Reef Time Series</p> <p>IUCN - Crunch time for Caribbean corals www.iucn.org/?uNewsID=10903 Sep 7, 2012</p> <p>Jeremy Jackson, Science Director, Global Coral Reef Monitoring Network (GCRMN) - Center for Marine Biodiversity & Conservation cmbc.ucsd.edu</p> <p>Sala E & Jackson JBC (2006) Structure of Caribbean coral reef communities</p> | <p>Submitted by: Sharmer Fleming Anguilla – Department of Fisheries and Marine Resources. James Gumbs / Kafi Gumbs</p> <p>Submitted by: Melanie McField Belize – University of Belize, Leandra Cho Ricketts lricketts@ub.edu.b2. Valerie Paul Smithsonian CCRE paul@si.edu, CCRE.si.edu. Honduras – CREDIA.hn Oscar Castillo ocastillorivera@yahoo.com Jeremy Jackson <jeremybcjackson@gmail.com> Katie Cramer <katie.cramer@gmail.com> Mary Donovan <mdono@hawaii.edu>, (fish – in situ meta-analys) Alan Friedlander <friedlan@hawaii.edu>, (fish) LUNDIN Carl Gustaf <carl.lundin@iucn.org> vivian.lam@iucn.org Global Coral Reef Monitoring Network coordinator: Andy Hooten <ajh@environmentservices.com></p> <p>Submitted by: Liza Gonzalez Nicaragua – Cynthia Lagueur WCS clagueux@wcs.org – turtle management program in the Caribbean coast of Nicaragua. www.sica.int/ccad. Have dataset for biodiversity in central America, incl. Mesoamerican coral reef corridor project. Joe Ryan – coral reef mapping. Miguel Gonzalez – York University, fisheries, indigenous people, and socioeconomic aspect migon@yorku.ca. Martin Lezano nicapinol2002@yahoo.com bird inventory. MARENA – www.marena.gob.ni . Costa Rica – CIMAR UCR Jorge Corte. Coral reef, mangrove, fish</p> | <p>Knowledge on “small size” taxonomic groups: almost anything smaller than a polychaete (e.g. all meiofaunal groups)</p> <p>Lack of knowledge on Cryptic Species, macro+micro invertebrates.</p> <p>Cumulative impacts of over-exploitation when compounded with nutrient loading</p> <p>Limited understanding of the realized exploitation effects on marine resources across the shelf</p> <p>Even in multispecies assessments ie AGGRA the species monitored are very limited to a small number of target species. No true understanding of the true biodiversity of low abundance/cryptic species.</p> <p>Nicaragua is caught in the gap between major regional assessments and as a result is left with only local assessment effort which is not readily incorporated into the wider system.</p> <p>Understanding of the remaining</p> | <p>A key often unspoken issue in this field is the growing impact of population density on biodiversity.</p> <p>New fields are currently opening up in the study of bacterial communities with second generation DNA analysis techniques.</p> <p>This workshop spent very little time in the discussion of climate change impacts. (Dr Leonard Nurse - WHOI)</p> <p>Efforts are underway though barcoding programs to understand the genetic structure of regional populations. This could have application through connectivity analysis. (the working group was undecided on the importance of this field to the WOA)</p> |

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| | <p>Consensus statement form Int'l society of Reef Studies 2012: www.icrs2012.com/Consensus_Statement.htm</p> <p>Data set available from Caribbean is: www.agrra.org with a summary document in : www.agrra.org/updates/agrra_bulletin.pdf</p> <p>Robert N. Ginsburg and Judith C. Lang www.agrra.org/arb_volume.html</p> <p>AGRRA "initial results" volume for seagrasses: SeagrassNet Global Seagrass Monitoring Network www.seagrassnet.org/ Global monitoring and information network for seagrass meadows. www.seagrassnet.org/global-monitoring</p> <p>for mangroves: Emil Cherrington, CATHALAC has mangrove analysis for central America over time... several reports available. "Emil Cherrington" <emil.cherrington@cathalac.org>)</p> <p>Submitted by: Tamica Rahming 2006 Ecological Gap Analysis</p> <p>2011 Coral Reef Assessment – Khalid Bin Sultan Living Oceans Foundation (surveyed areas were Andros, Cay Sal and Inagua)...final report is still in progress)</p> <p>Submitted by: Juan Mate STRI mates@si.edu Dr. Ross Robertson (DRR@stri.org) Fishes ecology, biogeography, systematic</p> | <p>Joe Ryan – nicavet2000@yahoo.com)</p> <p>Submitted by: Andrew Rosenberg Dr. Wes Tunnel Univ. Texas, Corpus Christi. Wilford Schmidt, Univ. Puerto Rico, Greater Antilles Biodiv. Report</p> <p>Submitted by: Antonio Diaz de Leon Mexico – Dr. Jose Sarukhan Dra. Patricia Kolef Dr. Elba Escobar. CONABIO www.conabio.mx. ECOSUR (Mexico) www.ecosur.mx for conservation and biodiversity www.gulfbase.org CINVESTAV-MERIDA www.MDA.CINVESTAV.mx Biodiversidad Marina y Costera de Mexico Sergio I Salazar-Vallijo Norma Emilia Gonzalez ECOJUR.org. Cuba – Guillermo Garcia Montero (Director Acuario de Cuba) guillermog@acuariocuba.cub</p> <p>Submitted by: Joseph Wagnac Haiti - Lucienna Exil exillucienna@yahoo.fr specialist in ecosystem studies Joseph Wagnac jeanmaog@hotmail.com Cdr. Haitian Coast Guard)</p> <p>Submitted by: Juan Mate STRI mates@si.edu Dr. Ross Robertson (DRR@stri.org) Dr. Harilaos Lessios (Lessiosh@si.edu) Echinoderm biodiversity Link to pdf: http://www.stri.si.edu/sites/publications/results.php?scientist=Harilaos+A.+Lessios . Dr. Rachel Collin (collinr@si.edu) http://biogeodb.stri.si.edu/bocas_database/ . Dr. Nancy Knowlton (knowltonn@si.edu) Biodiversity http://biogeodb.stri.si.edu/bioinformatics/alpheus/HomeAlpheus.html . Ilka Feller (felleri@si.edu) Mangroves http://www.serc.si.edu/labs/animal_plant_interaction/Trail/VirtualTour.html) Araelis Ruiz – Marine turtles - ruizaesi.edu)</p> | <p>distributions of IUCN Redlist species. Directing more effort to detect local regions of possible functional extinction. Also local regulations may fail to enforce protection of recognized endangered species. May also be local populations able to sustain some exploitation.</p> <p>Solid wastes in the port of Haiti are a growing problem. This is a local problem, yet it is hoped that there may be some potential expert assistance offered in the form of management strategy guidance to help educate government and local communities.</p> <p>Any assessment strategy must take critical account of the complex interdependencies between Mangroves-Sea Grasses-Coral Reefs habitats and the exploited animal communities that rely on them.</p> <p>Large knowledge gaps and hotspots are linked to institutional expertise and capacity. Strategies need to be developed to prevent these localized regions of low capacity and highlight this need.</p> <p>Population status of apex predators.</p> <p>Geospatial mapping capabilities.</p> <p>Limited taxonomic information for killer whale, dolphins, manatees, other</p> | |
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| | <p>http://www.stri.si.edu/sites/publications/results.php?scientist=D.+Ross+Robertson.</p> <p>Fishes: Greater Caribbean, version 1 for iphone Covers 1,599 species, & includes 5,500+ images https://itunes.apple.com/us/app/fishes-greater-caribbean/id570048678?mt=8 or search in iTunes <u>store</u> for <i>fishes greater Caribbean</i></p> <p>Dr. Hector Guzmán (guzmanh@si.edu) Coral reef ecology, systematic Link to PDF publications: http://www.stri.si.edu/sites/publications/results.php?scientist=H%E9ctor+M.+Guzm%E1n</p> <p>Guzmán, H.M. & C.A. Guevara. 1998a. Arrecifes coralinos de Bocas del Toro, Panamá: I. Distribución, estructura y estado de conservación de los arrecifes continentales de la laguna de Chiriquí y la Bahía Almirante. Rev. Biol. Trop. 46: 601-623.</p> <p>Guzmán, H.M. & C.A. Guevara. 1998b. Arrecifes coralinos de Bocas del Toro, Panamá: II. Distribución, estructura y estado de conservación de los arrecifes de las islas Bastimentos, Solarte, Carenero y Colón. Rev. Biol. Trop. 46: 893-916.</p> <p>Guzmán, H.M. & C.A. Guevara. 1999. Arrecifes coralinos de Bocas del Toro, Panamá: III. Distribución, estructura y estado de conservación de los arrecifes de las islas Pastores, Cristóbal, Popa y Cayo Agua. Rev. Biol. Trop. 47: 659-675.)</p> <p>Submitted by Philmore James Inventory of mangroves for Antigua and Barbuda should be finalised by early 2013. This is under the Fisheries Division as focal point for Ramsar.</p> | <p>Submitted by: Robert Kock Dept Agriculture & Fisheries Aruba; contact - Faciendo Franken Aruba Marine Mammal Foundation (NGO); Contact – Angiolina Henriquez Tortugaruba (NGO); Contact – Richard VanderWal Carmabi (Curacao) Regional Coastal+Shelf Rock Dutch Caribbean Nature Alliance Mangrove Inventory of Aruba, Department of Infrastructure and Planning; Contact-Theo Oord Sea Birds assessment of San Nicolas Keys Aruba (Reef Islands); Author –Adrian del Nevo)</p> <p>Submitted by: Tamica Rahming, <i>Bahamas National Trust:</i> Eric Carey – ecarey@bnt.bs Tamica Rahming – trahming@bnt.bs Krista Sherman – ksherman@bnt.bs Lindy Knowles – lknowles@bnt.bs Lakeshia Anderson – landerson@bnt.bs</p> <p><i>Bahamas Department of Marine Resources</i> Michael Braynen –mbraynen@bahamas.gov.bs</p> <p><i>BEST Commission</i> Philip Weech –philipweech@bahamas.gov.bs</p> <p><i>The Nature Conservancy</i> Eleanor Phillips – ephillips@tnc.org</p> <p><i>Long Term Scientific Researchers</i> Craig Dahlgren –craigdahlgren@yahoo.com Peter Mumby -p.j.mumby@uq.edu.au Dan Brumbaugh-dbrumbaugh@amnh.org Kathleen Sealey-ksealey56@gmail.com)</p> | <p>mammals.</p> <p>Across all spatial scales need a more detailed understanding of the ecosystem function. Specifically with respect to complex trophodynamic webs.</p> | |
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| | | <p><i>Regional Key people:</i> Wes Tunnell (USA) Patricia Miloslavich (Venezuela, coastal) Elba Escobar-Briones (Mexico, Deep sea benthic) Juan Manuel Díaz (Colombia, molluscs, biogeography) Jorge Cortés (Costa Rica, coral reefs) Juan Alvarado (Mexico/Costa Rica, echinoderms) Ross Robertson (STRI-Panama, fishes) Judith Gobin (Trinidad & Tobago) Eduardo Klein (Venezuela – data management, data visualization)</p> <p><i>Regional key institutions:</i> Universidad Simón Bolívar-INTECMAR-Centro de Biodiversidad Marina, Venezuela STRI-Panama INVEMAR, Colombia CONABIO-Mexico UNAM-Mexico Universidad de Costa Rica University of Puerto Rico-Mayaguez University of West Indies (Trinidad & Tobago / Barbados))</p> <p>Submitted by Philmore James Institution or Agency-Area of Focus-Comments-Contact Detail Fisheries Division Antigua and Barbuda-Information on Beaches, Mangroves, Sea Grass, Coral Reefs-Data not continuous for these habitats-Chief Fisheries Officer fisheriesantigua@gmail.com http://www.fisheries.gov.ag</p> <p>Organisation of. Eastern Caribbean States Environment and Sustainable Development Unit (OECS-ESDU)-Regional Projects for 6 Eastern Caribbean States e.g OPAAL- May have documents for specific countries of the region-esdu@oecs.org http://www.oecs.org/esdu/</p> <p>CERMES, UWI, Cave Hill, Barbados-Variou research projects on Caribbean coastal and marine habitats-May have documents on various Caribbean coastal and marine</p> | | |
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| | | <p>habitats-Professor Robin Mahon, Director, cermes@cavehill.uwi.edu www.cavehill.uwi.edu/cermes/</p> <p>Caribbean Regional Fisheries Mechanism-Various research projects on Caribbean fisheries management, some dealing with coastal and marine habitats-Executive Director crfm@btl.net http://www.caricom-fisheries.com/PublicationsandDocuments/CRFMResearchPaperCollection/tabid/86/Default.aspx</p> <p>Submitted by Jamie Bolanos Hedelvy Guada CICTMAR/WIDECASST hjguada@gmail.com Clemente Balladares MINAMB/ONDB www.minamb.gob.ve cballadares@minamb.gob.ve Héctor Barrios LUZ-LEG www.luz.edu.ve hbarrios@gmail.com Luis Bermúdez MINAMB/ONDB www.minamb.gob.ve cicvenezuela@yahoo.com Héctor Barrios LUZ-LEG www.luz.edu.ve hbarrios@gmail.com Jaime Bolaños Sea Vida bolanos.jimenez@gmail.com Freddy Arocha Inst. Oceanográfico farochap@gmail.com José Alió MPPAT/INIA josealio@hotmail.com</p> | | |
| <p>Shelf rock (50 – 200 m depths) and habitats (across Chapters 34-43)</p> <ul style="list-style-type: none"> • Overall status of major groups of species and habitats within this regime • Status and trends of, and threats to, marine ecosystems, species and habitats that are threatened, declining or otherwise in need of attention • Significant socioeconomic aspects in relation to the conservation of marine species and habitat | | <p>Submitted by: Robert Kock Carmabi (Curacao) Regional Coastal+Shelf Rock</p> | <p>Knowledge on ecosystems such as rocky shores, shelf rock (data collection currently underway)</p> <p>Across all spatial scales need a more detailed understanding of the ecosystem function. Specifically with respect to complex trophodynamic webs.</p> | |

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| <p>Deep sea (> 200 m depths) benthic habitats (across Chapters 34-43)</p> <ul style="list-style-type: none"> • Overall status of major groups of species and habitats within this regime • Status and trends of, and threats to, marine ecosystems, species and habitats that are threatened, declining or otherwise in need of attention • Significant socioeconomic aspects in relation to the conservation of marine species and habitat | <p>See references described under Water Column Habitats</p> | <p>See experts listed under Water Column Habitats</p> | <p>Knowledge on deep sea: very little knowledge below 200 m in depth</p> <p>There has been some data collected but there is no open access available to these data sets.</p> <p>Understanding pelagic and benthic early life-history stages.</p> <p>Across all spatial scales need a more detailed understanding of the ecosystem function. Specifically with respect to complex trophodynamic webs.</p> | |
| <p>Water column habitats (0 m to hadal depths) (across Chapters 34-43)</p> <ul style="list-style-type: none"> • Overall status of major groups of species and habitats within this regime • Status and trends of, and threats to, marine ecosystems, species and habitats that are threatened, declining or otherwise in need of attention • Significant socioeconomic aspects in relation to the conservation of marine species and habitat | <p>Submitted by Patricia Miloslavich Miloslavich, P. et al 2010. Marine Biodiversity in the Caribbean: regional estimates and distribution patterns. PLOS ONE, Vol. 5 (8):e11916, pp. 1 - 25.</p> <p>Miloslavich, P. y E. Klein (Eds.). 2005. Caribbean Marine Biodiversity: the Known and the Unknown. DesTech Publications, USA.</p> <p>Cortés, J. 2003 (Ed.). Latin American Coral Reefs. Elsevier. ISBN: 978-0-444-51388-5.</p> <p>Alvarado, J.J. 2011. Echinoderm diversity in the Caribbean Sea. Marine Biodiversity, 41</p> | <p>Submitted by Patricia Miloslavich INVEMAR-Colombia INTECMAR/Centro de Biodiversidad Marina, Venezuela Fundación La Salle de Ciencias Naturales, Venezuela</p> | <p>Knowledge on the water column beyond the coast (e.g. center of the Caribbean basin)</p> <p>General lack of knowledge about marine mammal communities.</p> <p>Understanding pelagic and benthic early life-history stages.</p> <p>Across all spatial scales need a more detailed understanding of the ecosystem function, specifically with respect to complex trophodynamic webs.</p> | <p>Large problem in the Caribbean with bio-accumulated toxins such as ciguatera. This is critical in nations where apex marine species such as barracuda are a common food source.</p> |

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| | <p>(2): 261-285.</p> <p>Warner, G.F. 2012. Corals of Florida and the Caribbean. University Press of Florida.</p> <p>Important databases:</p> <p>Global marine biodiversity www.iobis.org</p> <p>Global Distribution of Coral Reefs (2010) data available from: http://data.unep-wcmc.org/datasets/13 Global Distribution of Seagrasses (2005) data available from: http://data.unep-wcmc.org/datasets/10 Global Distribution of Mangroves (1997) data available from: http://data.unep-wcmc.org/datasets/6</p> <p>Historical whale captures http://web.archive.org/web/20070926224128/http://wcs.org/townsend_charts http://web.archive.org/web/20070926224128/http://wcs.org/townsend_charts#GIS Data</p> <p>Important bird areas http://www.birdlife.org/datazone/site/search</p> <p>Southern Caribbean (CARIACO basin) http://cariaco.ws/</p> <p>Vents and seeps http://www.noc.soton.ac.uk/chess/</p> <p>Seamounts Yesson, C., et al., The global distribution of seamounts based</p> | | <p>Limited taxonomic information for killer whale, dolphins, manatees, other mammals.</p> | |
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| | <p>on 30 arc seconds bathymetry data. Deep-Sea Research I (2011), doi:10.1016/j.dsr.2011.02.004</p> <p>Bathymetry http://www.gebco.net/data_and_products/gridded_bathymetry_data/</p> <p>Sediments http://www.ngdc.noaa.gov/mgg/sedthick/sedthick.html</p> <p>Climatology (salinity, oxygen, nitrates, etc) CSIRO Atlas of Regional Seas (CARS) Physical Ocean Climatologies http://www.marine.csiro.au/~dunn/cars2009/</p> <p>Ocean Surface Temperature AVHRR Pathfinder dataset, published by the NOAA National Oceanographic Data Center (NODC)</p> <p>Chlorophyll concentration http://oceancolor.gsfc.nasa.gov/SeaWiFS/BACKGROUND/SEAWIFS_BACKGROUND.html</p> <p>VGPM Ocean Productivity MODIS AQUA data Sea Surface Height Archiving, Validation and Interpretation of Satellite Oceanographic data (AVISO) group</p> <p>Surface Current Velocity NOAA Ocean Surface Current Analysis - Real Time (OSCAR) project: http://</p> | | | |
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| | www.oscar.noaa.gov/ | | | |
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Information Gaps:

Overall knowledge gaps were highlighted in the summary presentation, which noted gaps are extensive in the following fields: early life history of most organisms; historical baselines against which to compare current indicators of ecosystem status; and deep water environments. In addition, the lack of regional coverage (Nicaragua) was noted, the importance of grey and undisclosed databases (7000 sp.) and the need for tools for integrating regional data sources and tools to synthesize information, including global reporting and database management.

The group discussions noted that overall, the taxonomy of small-sized organisms, cryptic and rare species is a major gap. In addition, surprisingly, there were few studies regarding the biodiversity of planktonic species. Phyto and zooplankton organisms represent the first and second trophic levels of the marine food chain, respectively. Phytoplankton species are one of the main primary producers in the marine environment and, thus, are responsible for the uptake of carbon from the atmosphere and its transfer to other levels. It is widely known that phytoplankton composition can be used as an indicator of environmental health (i.e., ecological indicators) and, therefore, can be used as a tool for management. On the other hand, commercial and ecologically important species, such as fishes, lobsters, and sea urchins, spend most of their larval stage in the form of meroplankton. With this in mind, they should be considered essential for studies on organisms associated with zooplankton diversity. They also represent the link between primary producers (i.e., phytoplankton) and higher trophic levels.

Marine microbes (e.g., bacteria, fungi, and yeasts) were another group of “unknowns” that required more studies. Bacterioplankton represented an important “sink” of carbon in the ocean, accounting for about half of the carbon fixation in the marine environment. In addition, they may serve as an index of water contamination, which may contribute to establishing effective management practices.

In general, there's a need for trained personnel, equipment, law enforcements, and more research and education in order to establish better management policies to protect the marine environment in the Caribbean. In addition, more efforts that integrate research and collaboration among different areas of the region are highly recommended. Dr. Miloslavich might be asked to discuss and/or update her detailed overview of marine studies needed by country, as it appears on her 2005 book, co-edited with Klein (Caribbean Marine Biodiversity: The known and the unknown. DEStech Publications, Inc. Pennsylvania. 310 pp).

In particular, there are limited amounts of data available from offshore and deep-sea environments since they have been less studied, and there is an absolute need for standardized methods of collecting data for establishing species inventory and baselines. Although many marine species have been identified, being able to obtain a sufficient amount of data collection to accurately represent and describe the marine biodiversity of the region remains a major concern. Addressing this concern may help to resolve other pertinent issues that may be directly affected by this particular need (e.g., establishing baselines of commercially-important and recreational marine organisms). It is imperative that managers, scientists, and conservationists draw the attention of important local stakeholders and agencies in making extra efforts, as a region, to address these concerns and bring about the change needed for the past few years.

In order to address these information gaps and research needs, the road map of the Census of Marine Life project <http://www.comlsecretariat.org/>, as discussed in Alexander et al (2011), can provide insight. The Census of Marine Life—evolution of worldwide marine biodiversity research. *Marine Biodiversity* 41: 545-554

Overall Assessment of Capacity Needs Related to Marine Biological Diversity Aspects and How to Address Them

The following points were discussed regarding capacity in the region and include points from the summary presentation:

- Local knowledge is tied to local capacity. There is a need for widely distributed capacity not just intense localized institutional capacity.
- The region needs to understand the dimensions and fiscal requirements of capacity building.
- Capacity needs go beyond research capacity. There is also a need for capacity to distribute knowledge and a sense of responsibility to the local individual exploiting the resource.
- There is a critical need to retain the knowledge that is invested in training employees and management leadership. This requires fiscal incentives to retain individuals in positions. The constant cycle of promotion at all levels results in an export of knowledge out of the field. Often the bulk of expert individuals will be lost from policy and management to narrow academic research fields.
- Capacity is highly variable across geographic regions and so dramatically different strategies will be needed to facilitate capacity building.
- Networks of practitioners, experts, institutions and countries need to be established and fostered.
- Education and awareness are lacking regarding biodiversity importance, loss and action.
- The knowledge gaps in deep water sites is critically limited by the funding directed to technological capacity building which is needed to be able to begin exploring these environments. Ties could be found between the industrial capacity for deep exploration for oil resources etc to apply this capacity to research efforts. Many regions are limited to data of opportunity provided by global traveling research vessels passing through the region.
- Capacity and training strategies on how to build capacity on whale watching and necropsy are needed. However these efforts are often limited by language barriers. Workshops are given in Spanish or French and if you attend these workshops your networking interactions will be limited to those colleagues who are most fluent in those particular languages.

Annex I

Lessons for Other Regions based on the Successes and Challenges of the

WOA Wider Caribbean Region Workshop November 13-15, 2012

In Advance of Workshop

Identify individuals to be exclusively responsible for media (soliciting press, producing blogs, arranging group and meeting photographer), marketing materials (POE recruitment handouts, banners, website) and registration materials (hotel welcome kit, local resources, provide preliminary list of registrants for reference).

Have the regional inventory of assessments prepared at least one month in advance and tag each assessment by chapter (i.e. for each document, note which chapter[s] it might contribute to). Participants should be able to easily see the list of relevant assessments – for example, one rapporteur should project the results on a screen, and participants should be able to search among the assessments via an online database, pull up same list and then delve into any of the documents if they want.

Review Pool of Experts list for the region, identify gaps and use the workshop as an opportunity to solicit applicants to fill those gaps.

Require presenters to provide a 1-3 paragraph abstract so that the rapporteurs can focus on capturing discussion instead of summarizing the presentations.

Circulate the regional inventory at least one month in advance, urging participants to submit additional sources of information and names of experts. Provide incentives to get people to submit – welcome bag of goodies, free drink the first night, star on their name badge...

Send other key documents to participants as far in advance as possible – namely, the agenda and guidelines for breakout groups (including the mock reporting table, reporting table specific to each break out group).

Include GoE members in the planning calls, especially if they will be attending or planning other regional workshops.

When participants submit their registration form, be sure that they indicate their own expertise, breakout group preference – and be sure that they have a clear means to understand which parts of the WOA outline will be discussed in each breakout group..

Bring in a fresh set of eyes toward end of planning to help identify over sites/areas for clarification.

Ask participants to bring wireless- ready laptops so that they can receive documents during the workshop and access the internet during the break-out groups, especially for the inventory. That said,

don't assume everyone will be wireless and opening emailed document. At the workshop, provide copies of key documents – agenda, outline, guidelines for breakout groups, and mock table.

During Workshop

Check-in with participating GoE members regularly to ensure the workshop process is soliciting what they need.

Have person(s) solely responsible for media-related things, such as photos, Facebook, You Tube video vignettes and Tweeting.

Presentations

Keep presentations to ½ day so that workshop focuses on soliciting ideas over the subsequent 1 ½ days. A full day of presentations limits participants' ability to engage.

Have one or two overview explanation presentations that clearly articulate the goals and timeline of the WOA, history of workshops, who is involved, and how the products of the workshop will be used for the first WOA. At the end of the overview explanation presentations, hold a panel of the Group of Experts to help clarify questions and to introduce the members to the rest of the participants.

Include two or three regional presentations that set the stage for the regional workshop. Before selecting presenters, agree on the purpose of the talks. Ensure presentations clearly focus on insights to help provide further context for the participants, i.e. lessons learned on doing assessments, information gaps, capacity needs and how to address capacity needs. Not s “this is my project and how I did it”, but instead “this is what we learned regarding how to do assessments”. Potential presenters should receive written and oral guidance on how they need to help tell the story of WOA. Be sure to discuss the strategy with them, listen to what they propose to present, and then readjust as necessary. Seek presenters who can talk about emergent lessons from their experiences and will follow your guidance – not focus on a particular project. Ideal is to have main ideas and then have examples. e.g. one of the WCR speakers identified five types of assessments (e.g. threat analysis, economic valuations), then had one clear example of each. Finalize speakers at least a month in advance. Request and review talks 2 weeks in advance.

Instead of presentations, consider having a panel discussion (with short statements by each panelists), which can facilitate focus on relevant ideas because the chair can ask the panel key questions (known in advance) to draw out the content desired.

Break-Out Groups (BOGs)

Guidance for BOGs are provided in 2 separate documents (following – one is overall, the other details for chairs and rapporteurs). The follow points are supplemental.

Provide very clear guidance to co-chairs and rapporteurs – conference call in advance, meet on site prior to the start of the meeting and ideally, at least once mid-BOG to troubleshoot as necessary.

Ensure representation of expertise throughout the BOGs. And that the BOGs are approximately equal in size.

Two rapporteurs per BOG should be identified before the workshop – do not solicit, on site, from within the BOGs.

Start BOGs by reviewing objectives related to table. Make sure there is a discussion about the topics and sub-topics. Encourage discussion but also ask participants to email or write down ideas and email or hand directly to the 1st rapporteur, who is responsible for the table.

While the 1st rapporteur is completing the table based on the discussion and based on email people are sending, the 2nd rapporteur needs to be showing and searching the inventory and also taking overall notes. Consider use of a Dropbox to simplify document sharing within the BOG.

Select chairs who can follow direction, engender discussion and are trusted by participants.

Have a few rovers who understand the objectives (most likely the organizers) and outputs and can step in and redirect the BOG discussions as needed. Have each rover select a group to start-off with as the first 30 minutes of each BOG are critical to set the stage.

Have 2 screens – one showing the reporting table (this was critical) from the 1st rapporteur's laptop; the other showing the relevant documents from the inventory by topic/chapter.

Provide motivators e.g. give out mini-chocolates to encourage talking and to reward folks for submitting sources of information, names of experts, etc.

Ensure there is wireless access and power outlets for all participants.

Have good snacks.

Have appropriately sized rooms so people are together (not spread out in a plenary-size room). Don't use plenary as a break-out room. The BOG rooms provide a change from the plenary room.

Sit in circle format with 2 screens at the end.

Conclusion Session

Do an evaluation (see example from WCR).

Ask participants to provide advice to the GoE to ensure the success of the WOA. Prime a few folks to speak.

Make sure you have late check-out option.

World Ocean Assessment
Workshop for the Wider Caribbean Region
Guidance for Break-Out Groups

The goal of the breakout group sessions is to provide as much information and knowledge as possible to guide the development of the Wider Caribbean Region component of the World Ocean Assessment (WOA). The WOA will be written in the subsequent months; consequently, the purpose of the breakout sessions is not to draft text, but to provide feedback and input that will guide and inform the WOA. Fundamental to this goal is ensuring regional and national experts from throughout the Caribbean have a genuine opportunity to provide their input.

The more specific objectives of the breakout group sessions are listed below. To structure the discussion and ensure a productive output, the attached table has been provided. The table will be the basis for recording feedback and input from participants.

- *1st column:* Determine the appropriate topics and sub-topics relevant to the breakout group. To do so, participants will review the outline provided in the first column and suggest additional topics and sub-topics as appropriate to WCR.
- *2nd column:* Identify sources of information related to the topics, including assessments, studies and reports. These sources will be explored as the WOA Wider Caribbean Region section is drafted. An Inventory of Assessments has been compiled and provided to the groups for review. Participants will need to review this Inventory and also consider additional sources not noted in the Inventory. For each topic, in the second column, please provide a reference for these sources and include a short annotated bibliography describing the relevant aspects of each source. The result will be a metadata database critical to drafting the WOA WCR.
- *3rd column:* Identify priority individuals and institutions that should be engaged in drafting the topic. Their name, email and who recommended them need to be noted. Note that the individuals will need to join the Pool of Experts (information on how to do so will be provided on the first day of the workshop and is already available on the workshop website, www.WOAwcr.org) in order to contribute.
- *4th column:* Determine information gaps that should be highlighted in the WOA. These gaps should relate to the sub-topics and be areas in which there is a lack of information on the sub-topic.
- Identify assessment capacity needs (i.e. what does the region need as far as training, resources/infrastructure (facilities/boats), etc) and suggest measures to address these needs that should be highlighted in the WOA. The capacity needs will be discussed related to all the topics and, consequently, will be recorded after the table.

Process: The breakout groups will meet the entire second day of the workshop in order to complete the above objectives. The third and final day (Thursday), one of the chairs will present the results of the discussions using the table to highlight key points. The final breakout group reports are due at the close of the workshop.

World Ocean Assessment
Workshop for the Wider Caribbean Region
Guidance Specific to Break-Out Group Chairs & Rapporteurs

Roles of the Break Out Group Co-Chairs

- Keep the discussion focused around the BO Group Topics and related questions noted in the table
- Engage all participants
- Ensure participants are succinct and respectful of everyone's time (long-winded comments need to be halted)
- Halt extraneous points, which can be discussed separately
- Remain neutral. That said, there may be situations where the chair has expertise or an opinion she/he wants to share. In those cases, please clarify that you're briefly taking 'off your chair hat' and engaging as a participant. Something as simple as, "I'd just like to step out of my neutral chair role for a minute and note that XXX." If there's a topic that one of the chairs has a lot of knowledge about, then he/she might ask the other chair to run that topic.
- Review the rapporteur's notes at breaks and at the end of the session as a check to ensure all the points are incorporated
- Report back to the entire workshop on the morning of the final day. The presentation should highlight the key points related to each objective and use the table.

Roles of the Rapporteurs

- There will be 2 rapporteurs for each BO Group. We recommend the "first rapporteur" focus on the table; the "second rapporteur" should assist the first rapporteur as they are completing the table, particularly if there's a lot of discussion. In this way, the 2nd rapporteur is essentially a back-up to the first rapporteur. The other role of the second rapporteur is to keep a document (in Word) of important points that don't fit into the table. This second document will be reviewed to identify what needs to be added to the WCR report and any other next steps.
- The first and second rapporteurs may want to switch responsibilities periodically. And they should check-in at breaks to ensure the table is being accurately completed by reviewing the 2nd rapporteur's notes.
- Neither rapporteur should note everything that is said and certainly not who said what unless it is particularly relevant. They are tasked with capturing the essence of discussions – not a transcript.
- Similar to the chairs, the rapporteurs are intended to remain neutral. That said (as noted for the chairs), there may be situations where one of the rapporteurs has expertise or an opinion he/she wants to share. In those cases, please clarify that you're briefly taking 'off your rapporteur hat' and engaging as a participant. Something as simple as, "I'd just like to step out of my neutral rapporteur role for a minute and note that XXX." If there's a topic that one of the rapporteurs has a lot of knowledge about, then he/she might ask the other rapporteur to run be the notetaker for the table related to that topic.

- Each breakout group will have the option of a laptop screen projected for all participants to see. We recommend that the first rapporteur with the table have their screen be projected with big enough font for everyone to read, but small enough that they can see more than a few words.
- We will have a check-in at lunch on Wednesday.
- The breakout group reports are due at the end of the second day (Wednesday)

Points Related to the Table and Overall Document for Recording the BO Group Discussion

- The Comments section is a place to capture key points related to the topics that don't fit into the other columns. This is where the rapporteur could note feedback related to the substance of the topics and sub-topics. For example, for Food Security and Food Safety, under Capture fisheries, someone might mention foreign fishing fleets being a major concern (which relates to the first sub-topic). That point should be noted under the Comments column. There may be some overlap with what the 2nd rapporteur is documenting. At the breaks and at the end, you should compare notes and ensure the key points are noted in the Comments section.
- While the topics are set in stone by the UN, you can add new topics and new subtopics that may have been overlooked. And, if participants feel a topic is not relevant to the region, note "This topic not relevant to region" in the remarks section.
- For the second column, try to get as much information as you can regarding relevant sources of information. You can encourage the participants to search the internet to try to find the reference. While titles of documents and what institution produced it are good, a link to a website with the document is ideal. If you only get a partial reference, note who mentioned the source so the GoE can follow-up with them.
- A section titled "Overall Points" is noted before the table. This is where you need to note any overall points people made about the process or other information you think is especially important for the GoE.
- A section titled "Capacity needs..." is noted after the table. Consequently, the capacity needs discussion should happen after a bulk of the science conversations are complete, although if points are raised earlier, be sure to note them in this section while the Chair facilitates the discussion back to the other issues. There is where you need to capture the key points related to capacity needs and suggestions for how to address them. This discussion may be more free-flowing, so do your best to focus on the key points.

Clarifying Questions:

Who will write the WOA?

The Group of Experts (GoE) is a group of 25 international experts (already identified) tasked with producing the WOA. They will draw expertise and assistance from the Global Pool of Experts – a group of 1000 – 2000 global experts – that is still being recruited. Participants are encouraged to join the Global Pool of Experts. Information on how to join will be provided the first day of the workshop by the workshop leads, who will reiterate the need for additional nominees for the Global Pool of Experts. The table each break out group is completing includes a column to note priority individuals and institutions that the Group of Experts should engage for that topic. If those individuals are not already members of the Global Pool of Experts, the experts will discuss membership with them.

What is the participant's role after this workshop?

Participants will not necessarily be consulted after the workshop unless they serve in the Global Pool of Experts and are contacted by the Group of Experts related to relevant chapters. If participants are particularly knowledgeable about a topic, then their name should be noted in the table in the "Priority Individuals and Institutions" column.

Is scale important?

Scale is not an issue. All sources of information should be considered no matter the spatial or temporal scale although priority is for regional and national level information.

Materials for EACH BO Group:

Flipchart and pens

Mock Sample Completed Table

- 10 hard copies

Guidance for Break-Out Groups (above 1st page of this document)

- 10 hard copies

Inventory of Assessments

- 5 hard copies
- Website access information

Outline of Break-Out Group Topics and Sub-Topics

- 10 hard copies

2 laptops for rapporteurs with projector and screen for one

Mini-chocolates as motivators for chairs to use to generate participation

Annex J

World Ocean Assessment Wider Caribbean Region Workshop

November 13-15, 2012 Workshop Evaluation

Please answer the following questions. Your responses will help inform future regional workshops. As a reminder of the presentations, the Day 1 Agenda is included on back.

Day 1 - Morning: Overview of World Ocean Assessment - evolution, outline and timeline

Of the information presented, what was most valuable?

What information was not useful?

Day 1 – Afternoon: WCR Assessments, Data Sources and Methodologies for Assessments, Capacity –Building Needs

Of the information presented, what was most useful?

What information was not useful?

Day 2: Break Out Groups

What worked well in the break-out groups that you would recommend future groups do?

How could the break-out groups have been better designed and implemented?

Day 3: Summary of Break Out Groups

What worked well in the summary session?

How could the summary session been better run?

Day 1 Agenda

Opening Ceremonies

Overview of Regular Process

10:15- Overview of Evolution and Structure of the Regular Process
10:30 (Annebeth Rosenboom, SRP)

10:30- Overview of WOA Outline and Timeline (Patricio Bernal, Group of
11:00 Experts [GoE])

12:00- Lunch
1:30

1:30- **WCR Environmental and Socioeconomic Assessments**
3:30

- *The Cartagena Convention: Framework for Monitoring and Assessment in the Wider Caribbean* - Christopher Corbin, UNEP
- *Pollution Loading and Hot Spot Monitoring in the Wider Caribbean - Status, Lessons Learnt and Recommendations* - Antonio Villasol, Cuba
- *Monitoring and Assessment in SIDS...Trends, Challenges and Opportunities* - Christopher Cox, St. Lucia
- *Making the Socio-economic Case for Monitoring and Assessment Programmes in the Wider Caribbean* - Laurretta Burke, World Resources Institute

4:00- **WCR Data Resources and Methodologies for Assessments**
5:00

- *Assessments of the Marine Environment in the Wider Caribbean Region* - Elva Escobar, Mexico
- *Maritime Safety Information and Meteo-Ocean Data* - Edgard Cabrera, UN World Meteorological Organization
- *Harmonized Observations and Data Products* - David Halpern, United States
- Open Discussion

5:00- **WCR Capacity-building Needs**
6:00

- *An Overview of the Existing Strengths, Gaps and Capacity Needs within the Wider Caribbean Region to Conduct Assessments for the Regular Process* - Robin Mahon, Barbados
- *Opportunities and Synergies Available for Building National and Regional Capacities to Conduct Marine Assessments for the Regular Process* - Dale Webber, Jamaica