

**Intergovernmental Oceanographic Commission**

Workshop Report No 242



# **Integrated Coastal Area Management (ICAM) Training Workshop for the English Speaking Caribbean States**

Bridgetown, Barbados  
16–18 March 2011

**UNESCO 2011**

# Caribbean Regional Workshop on Integrated Coastal Zone Management

Courtyard Marriott, Hastings, Christ  
Church, Barbados

March 16-18, 2011



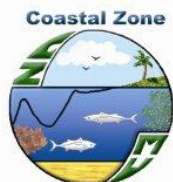
United Nations  
Educational, Scientific and  
Cultural Organization



Intergovernmental  
Oceanographic  
Commission



IOC of UNESCO  
Subcommission for  
the Caribbean and  
Adjacent Regions



Coastal Zone  
Management Unit  
BARBADOS

IOC Workshop Report No 242  
Bridgetown, Barbados, April 2011  
English only

**ABSTRACT**

The Integrated Coastal Area Management (ICAM) Training Workshop for the English Speaking Caribbean States was held in Bridgetown, Barbados, March 16–18, 2011. The Meeting was attended by 22 participants representing Antigua & Barbuda, Barbados, Curacao, Grenada, Guyana, Jamaica, Saint Lucia and Trinidad & Tobago. The main objective of the meeting was to assist Member States in building the resilience of SIDS economies mainly dependant on coastal tourism using knowledge and expertise of the CZMU of Barbados for developing their own capacity to manage coastal areas. The meeting updated the ICAM management plan for the Caribbean Small islands incorporating economic and social issues as well as recent priorities of climate change adaptation and coastal hazard management. It was also agreed to conduct national assessments of capacity, science and technology and governance structures collated into a regional assessment. The group agreed to complete a 10 year project document with a 5 year Implementation Plan to be coordinated jointly with the Intergovernmental Oceanographic Commission (IOC).

Disclaimer

The authors are responsible for the choice and the presentation of the facts contained in this publication and for the opinions expressed therein, which are not necessarily those of UNESCO and do not commit the Organization.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariats of UNESCO and IOC concerning the legal status of any country or territory, or its authorities, or concerning the delimitation of the frontiers of any country or territory.

For bibliographic purposes this document should be cited as follows: Integrated Coastal Area Management (ICAM) Training Workshop for the English Speaking Caribbean States, 16–18 March 2011, Bridgetown, Barbados, UNESCO, 47 pp, 2011 (IOC Workshop Report No. 242) (English)

## TABLE OF CONTENTS

	Page
<b>1. WELCOME AND OPENING OF ICAM TRAINING WORKSHOP .....</b>	<b>1</b>
<b>2. OBJECTIVES AND EXPECTED OUTCOMES.....</b>	<b>1</b>
<b>3. SESSION 1: NATIONAL FRAMEWORK AND PLANNING FOR ICAM .....</b>	<b>2</b>
3.1 INTRODUCTION TO INTEGRATED COASTAL ZONE MANAGEMENT AND PLANNING .....	2
3.2 PARTICIPANT PRESENTATION ON ICZM COUNTRY STATUS.....	3
3.3 INSTITUTIONAL REQUIREMENTS FOR ICZM-OVERVIEW THE CZMU AND ITS TECHNICAL SECTIONS .....	4
3.4 COASTAL DEVELOPMENT CONTROL AND PERMITTING – EIA PROCEDURES .....	4
3.5 THE BARBADOS CORAL REEF AND WATER QUALITY MONITORING PROGRAMME .....	4
3.6 DEVELOPING AN ICZM POLICY AND ASSOCIATED LEGISLATION –THE BARBADOS COASTAL ZONE MANAGEMENT ACT AND OTHER RELEVANT NATIONAL LEGISLATION .....	5
3.7 GEOGRAPHIC INFORMATION SYSTEMS APPLICATIONS AN ICZM CONTEXT – THE CARIBBEAN MAP ATLAS PROJECT.....	5
3.8 THE IMPLICATIONS OF CLIMATE CHANGE FOR SMALL ISLAND DEVELOPING STATES.....	5
3.9 ROUND TABLE DISCUSSION.....	5
<b>4. SESSION 2: RESTORING SHORELINE RESILIENCE AND STABILIZATION .....</b>	<b>6</b>
4.1 OVERVIEW OF COASTAL ENGINEERING SECTION – INSTRUMENTATION REQUIREMENTS FOR OCEANOGRAPHIC ASSESSMENT, DATA COLLECTION AND ANALYSIS AND THE APPLICATION REVIEW PROCESS .....	6
4.2 SELECTING THE RIGHT TYPE OF ENGINEERING SRUCTURE FOR COASTAL SEGMENTS.....	7
4.3 MARINE METEOROLOGY AND MANAGING COASTAL HAZARDS IN A MATURE ICZM PROGRAMME .....	7
4.4 COASTAL INVESTMENT PROGRAMME – PILOT PROJECTS AND TESTING OPTIONS .....	8
4.5 EMERGENCY MANAGEMENT WITHIN AN ICZM FRAMEWORK .....	8
4.6 RAPID VULNERABILITY ASSESSMENT OF THE BARBADOS WEST AND SOUTH COASTS .....	9
4.7 DEVELOPMENT OF THE COASTAL RISK ASSESSMENT AND MANAGEMENT PROGRAMME (CRAMP).....	9

	Page
<b>5. SESSION 3: ROUND TABLE SESSIONS WITH DELEGATES AND TRAINEES .....</b>	<b>10</b>
5.1 THE IMPORTANCE OF MARINE POLLUTION CONTROL AND REGULATIONS .....	10
5.2 PRESENTATION OF THE IOC/UNESCO ICAM CARIBBEAN PLAN.....	10
5.3 REVIEW AND UPDATE OF THE IOC/UNESCO ICAM CARIBBEAN PLAN .....	11
5.4 DEVELOPMENT OF A 10 YEAR REGIONAL PROPOSAL TO DONORS FOR ICZM IN THE CARIBBEAN – IDENTIFICATION OF SIMPLE INEXPENSIVE PROCEDURES FOR IMMEDIATE IMPLEMENTATION IN EACH COUNTRY .....	11
5.5 DEVELOPING A REGIONAL WORKING GROUP ON ICZM – A WAY FORWARD .....	15
<b>6. WORKSHOP EVALUATION AND ROUND TABLE DISCUSSION .....</b>	<b>16</b>
<b>7. CLOSURE .....</b>	<b>16</b>

## **ANNEXES**

- I. AGENDA
- II. OPENING STATEMENTS
- III. LIST OF PARTICIPANTS
- IV. LIST OF ACRONYMS AND ABBREVIATIONS

## **1. WELCOME AND OPENING OF ICAM TRAINING WORKSHOP**

The Integrated Coastal Area Management (ICAM) Training Workshop for the English Speaking Caribbean States was held at the Courtyard Marriot Hotel in Bridgetown, Hastings, Christ Church, Barbados, 16–18 March 2011.

The workshop commenced with opening remarks delivered by Dr Leo Brewster, Director of the Coastal Zone Management (CZMU) in Barbados, during which he expressed a warm welcome to all participants of the workshop. The opening remarks were followed by an address delivered by Mr Cesar Toro, IOC (UNESCO) Secretary for IOCARIBE and the feature address presented by The Hon. Denis Kellman, M.P., Minister of Environment, Water Resources and Drainage.

During his opening remarks, Dr Brewster highlighted the importance of Integrated Coastal Zone Management to the countries of the Caribbean region as they give consideration to the impacts of climate change on their low lying plains and coastal communities. He explained that the CZMU had teamed up with the United Nations Educational Scientific and Cultural Organization (UNESCO), the Intergovernmental Oceanographic Commission (IOC), and the IOC of UNESCO Sub-commission for the Caribbean and adjacent regions (IOCARIBE) to host this regional workshop in Integrated Coastal Zone Management. Dr Brewster then outlined the aims and expected outcomes of this workshop.

The Honourable Denis Kellman, Minister of the Environment, Water Resources and Drainage of Barbados gave an Opening Lecture. He welcomed participants to Barbados and highlighted the importance of the meeting. In his feature address, Dr Kellman referred to importance of the link between coastal resilience and the socioeconomic resilience of a society and suggested that both traditional and cutting-edge technologies could contribute significantly to building this resilience. He gave an outline of the commitment that the Government of Barbados has given to key areas of coastal zone management and an overview of the plans for a Coastal Risk Assessment and Management Programme which is to come on stream in the near future.

Complete texts of Opening Statements are included in Annex II.

## **2. OBJECTIVES AND EXPECTED OUTCOMES**

Dr Leo Brewster, Director CZMU of Barbados gave an explanation to participants about the organization of the Workshop. He mentioned that the workshop comprised of a series of presentations delivered by the staff of the Coastal Zone Management Unit of Barbados, staff of the IOC of UNESCO, country representatives and invited guests from the Department of Emergency Management (DEM) and the Environmental Protection Department (EPD) in Barbados. Presentations and discussions were delivered under the daily themes of National Framework and Planning for ICZM, Restoring Shoreline Resilience and Stabilization and Round Table Session with Delegates and Trainers.

Dr Brewster referred to the proposed objectives of the Workshop:

1. To reintroduce regional coastal managers to the basic concepts of integrated coastal zone management and the field protocols used in implementing an ICZM programme;

2. To highlight the concepts of coastal vulnerability and risk assessment especially with in a context of climate change and disaster risk management and risk reduction;
3. To provide an overview of established and emerging issues in ICZM in the region, and more importantly to broach new areas of ICZM research interest;
4. To assist in the improvement of capacity to execute ICZM within the region;
5. To begin to develop a network of regional coastal management partnerships for information and technology exchange;
6. To enable greater involvement in regional projects;
7. To foster the development of appropriate national institutional arrangement for ICZM;
8. To clearly demonstrate that there are increasing levels of human capacity found within the region that are professional by training and experience, and have the capability to assist in the establishment of programmes to better implement aspects of ICZM.

Some of the expected outcomes from this workshop included:

1. Cooperation among experts during the workshop which will foster greater integration of coastal research, monitoring, training and management within the region;
2. Learning from each other thereby fostering improved regional collaboration on an issue that affects all of the countries;
3. Coastal managers being better able to contribute to the proper overall management of their respective national coastal areas.

Attendees also participated in a field trip which gave them a firsthand view of the coastal infrastructure and proposed development on the coasts of Barbados.

Participants and presenters attending this workshop comprised of representatives from the IOCARIBE Member States Antigua and Barbuda, Barbados, Curacao, Grenada, Guyana, Jamaica, St. Lucia and Trinidad and Tobago and members of the IOC of UNESCO IOCARIBE Secretariat.

The Agenda for the workshop is included in Annex I. A full List of Participants is included in Annex III. The List of Acronyms and Abbreviations is included in Annex IV.

### **3. SESSION 1: NATIONAL FRAMEWORK AND PLANNING FOR ICAM**

Day 1 of the Workshop consisted of three sessions addressing National Framework and Planning for ICZM. During these sessions presentations were given by staff of the CZMU of Barbados. Participants representing countries other than Barbados were also given the opportunity to inform the forum on the current status of their local ICZM programmes. Key points from these presentations are outlined below.

#### **3.1 INTRODUCTION TO INTEGRATED COASTAL ZONE MANAGEMENT AND PLANNING**

As an introduction to ICZM and planning, Dr Leo Brewster, Director of the Barbados CZMU first outlined the fundamental concepts of ICZM by defining ICZM as a continuous and dynamic process by which decisions are made for the sustainable use, development and protection of coastal and marine resource. He then outlined the general characteristics by

which a coastal zone and its boundaries could be defined. Dr Brewster stated that there are a range of triggers that could indicate the need of an ICM programme and he described the goals and objectives such a programme should aim to achieve and core functions the programme should have. He continued by looking at the types of integration necessary for an ICM programme to be successful and the challenges that may be faced during the integration process. He discussed the stages of implementation of an ICM programme and some of the challenges which are likely to be faced during this process.

Discussions arising after Dr Brewster's presentation surrounded the establishment of linkages between the regional initiatives on ICZM, stakeholder involvement and collaboration with agencies such as UNEP and CEHI with their IWCAM projects. It was stated that the GEF IWCAM initiative is being implemented through demonstration projects which will not necessarily continue after the project is completed. The purpose of this workshop was to promote the formation of coastal zone and water resource management agencies around the Caribbean which will ensure continuity through the formulation of plans, policy and legislation. It was also stated that UNESCO is working with UNEP on projects to implement the LBS protocol which calls for the establishment of intersectoral working groups which will address the issue of stakeholder involvement in these initiatives.

### 3.2 PARTICIPANT PRESENTATION ON ICZM COUNTRY STATUS

Presentations were made by representatives from Trinidad and Tobago, Curacao, Jamaica, St. Lucia, Guyana, Antigua and Barbuda and Grenada on the current status of ICZM in their respective countries. Generally there appears to be a lack of structure in the ICZM programmes and only a few instances of specific legislation or institutions to govern ICZM exist. Mention was made of the effects that industries such as tourism, mining (gold and sand), petrochemicals and agriculture are having on coastal areas in the Caribbean. Presenters also shared information on initiatives which have been undertaken that contribute towards ICZM within their jurisdictions. Some of these initiatives/project locations are:

Trinidad and Tobago: Institute of Marine Affairs (IMA) research activities: Buccoo Reef/ Bon Accord Lagoon Management plan, EcosysteMs Research of Coastal EcosysteMs – Mangroves (Caroni Swamp and Caroni River Basin); Environmental Quality of the Gulf of Paria (water quality and sediment biota); proposal for ICZM Programme with IMA as the lead agency

Curacao: Extensive coral reef management research; prohibition of spear fishing and gill netting on reefs

Jamaica: Watershed management – Drivers River Watershed Communities, Black River Water Quality Monitoring and Early Warning and Response Programme, Palisadoes Port Royal Protected Area Early Warning and Response Programme

St. Lucia: Existing Coastal Zone Management Unit, Coastal Zone Management Committee and Coastal Zone Management Plan

Guyana: Ecosystem research and management programmes addressing hydrological and climatological data collection systems, groundwater resources of coastal aquifers, shore zone monitoring, sea defence structures, mangrove management, coastal and marine resources and training; Low Carbon and Development Strategy ([www.lcds.gov.gy](http://www.lcds.gov.gy))

Grenada: Establishment and management of Molinnierre-Beausejour MPA and Sandy Island Oyster Bed MPA; banning of sand mining



### 3.3 INSTITUTIONAL REQUIREMENTS FOR ICZM-OVERVIEW THE CZMU AND ITS TECHNICAL SECTIONS

Dr Lorna Inniss, Deputy Director of the Barbados CZMU gave an overview of the institutional arrangements, developmental process and capacity building needed for the implementation of an ICZM programme and the challenges and opportunities that may arise in the implementation of such a programme. She used the example of the technical structure of the CZMU in Barbados, which consists of a Director, two Deputy Directors (an Oceanographer and a Coastal Engineer) and three Sections (marine research, coastal planning and coastal engineering), as an example of a continuously developing and successful programme. However, she stressed that a single unit is not a necessity as long as the functions of ICZM are diffused throughout strongly integrated departments and governed by a legal mechanism.

### 3.4 COASTAL DEVELOPMENT CONTROL AND PERMITTING – EIA PROCEDURES

Miss Allison Wiggins, Coastal Planner at CZMU, provided the forum with information on the definitions of the administrative boundaries of the coastal zone in Barbados which is a legally defined management area. This management area is broken down into sub-areas which are delineated based on their characteristics. She described the process by which developers must seek permission from the Chief Town Planner in order to carry out any type of development within the coastal zone. One of the major steps in this process, when necessary, is the execution of an Environmental Impact Assessment (EIA). Miss Wiggins described the EIA as a systematic process which assists in making decisions on projects that may have significant environmental consequences. The decision for the requirement for an EIA to be conducted is governed by legislation and the completed EIA is reviewed by a specially constructed panel and the public prior to decision making.

Discussion following Miss Wiggin's presentation was raised on the likelihood of instances where the EIA panel refuses development but a Minister overrides this decision and approves the development. She indicated that this was possible and in such a case the reviewing agencies would be consulted again to attach conditions to the approval that would minimize the impact of the development on the environment. There was also further discussion on the EIA process in other countries and different techniques that could be used to review proposed plans.

### 3.5 THE BARBADOS CORAL REEF AND WATER QUALITY MONITORING PROGRAMME

Ms Angelique Brathwaite, Marine Biologist of the Barbados CZMU, enlightened participants to the elements of the Water Quality and Monitoring Programme which is conducted by the CZMU. The coral reef monitoring programme is conducted on the fringing, patch and bank reefs which surround the island and consists of (i) Analysis to observe temporal trends in coral reef community characteristics conducted in five year intervals; (ii) Spot checks to observe coral health and abundance; and, (iii) Project based comprehensive coral reef studies. The water quality monitoring programme collects samples from along the coast, four times a year to record a variety of parameters which assists in controlling pollution. She also outlined the practical uses of the water quality and coral reef data and the successes, challenges and likely improvements that could be made to the programme.

Following Ms Brathwaite's presentation there was a general discussion on ways in which information generated from coral reef community and water quality data could be integrated into public awareness in order for the community to advocate for the protection of the coastal environment and put pressure on the politicians to do the same.

### 3.6 DEVELOPING AN ICZM POLICY AND ASSOCIATED LEGISLATION –THE BARBADOS COASTAL ZONE MANAGEMENT ACT AND OTHER £ RELEVANT NATIONAL LEGISLATION

Mr Fabian Hinds, Research Officer of the Barbados CZMU outlined the elements of the policy framework which governs ICZM in Barbados. He indicated that the policy framework was developed to inform the public and private organizations of the requirements, responsibilities and opportunities for ICM and the vision and strategic objectives of ICM in Barbados. He gave an outline of the components of the framework which speaks to standards and procedures to be followed; socio-economic and environmental compatibility; conservation of heritage, culture and ecology; working and living with dynamic coasts and policy implementation needs in the execution of a ICM plan. Mr Hinds then gave a synopsis of the legislation enacted in Barbados which relate to ICM and complement the Coastal Zone Management Act.

### 3.7 GEOGRAPHIC INFORMATION SYSTEMS APPLICATIONS AN ICZM CONTEXT – THE CARIBBEAN MAP ATLAS PROJECT

Mr Ramon Roach, Water Quality Analyst of the Barbados CZMU introduced those in attendance to the Caribbean Marine Atlas Project (CMA). As Regional Coordinator of the CMA, Mr Roach was able to provide information on the background, development, results and the future of the CMA. He indicated that no matter the specific focus of a management programme in a country, there is always a reliance on data and the CMA will be an important tool in improving the quality and convenience of sharing data nationally and regionally. A prototype of the CMA is available with basic functionality, online at [www.caribbeanmarineatlas.net](http://www.caribbeanmarineatlas.net) and a regional marine data manager network has also been established. Phase 2 of the project is in progress and is geared towards expanding the capabilities of the CMA and the design and implementation of national atlases and capacity building for users.

### 3.8 THE IMPLICATIONS OF CLIMATE CHANGE FOR SMALL ISLAND DEVELOPING STATES

Dr Lorna Inniss, Deputy Director of the Barbados CZMU felt that given the wealth of information that is available on the implications of climate change on Small Island Developing States it was not necessary to give a presentation on this topic. Rather, she encouraged participants to consider that it was a new era of ICZM and therefore there needs to be new levels of integration of climate change into ICZM mechanisms because all of the impacts will have implications on the services provided by ecosystems and the main impact will be felt on economic development.

### 3.9 ROUND TABLE DISCUSSION

The round table discussion held at the end of Day 1 allowed participants to share experiences or challenges faced in managing coastal areas. Issues raised are outlined below:

- Vulnerability of agricultural lands if there is a failure in the sea defence structures built between the sea and the land
- Identification of tsunami warning focal points and spreading knowledge about Tsunami Early Warning Systems
- Expense associated with building and maintaining concrete sea defence structures

- Establishment of buffer zones between the sea and agricultural, commercial, industrial or residential lands which is off limits to development
- Successful mangrove replanting exercises
- Communication between countries that share common resources for example in cases where a river crosses political boundaries and bad practices upstream affect those downstream
- Experiences of unusually heavy rainfall in recent times. Technical engineers are looking for alternative technology in case the mechanisms that are in place for normal circumstances are compromised
- Establishment of building regulations for residents in flood prone areas
- Reliance on communities to reverse destruction of coastal ecosystems after developers are given permission for development by a Minister after refusal of development was recommended by reviewing agencies
- Use of past experiences in similar situations to influence decisions about construction or modifications being made within coastal areas
- The involvement/importance of NGOs in advocacy and influencing decision making
- The importance of adopting the scientific approach to data collection and the complexity and consistency of data collection programmes
- Adopting a developmental process to acquiring equipment, building capacity and establishing data collection programmes

Participants were reminded that data collection and analysis is used in every aspect of ICZM and is vital to the establishment and success of an ICZM programme. It is also important to accurately document decisions and recommendations for development that are made based upon the analysis of actual onsite data.

#### **4. SESSION 2: RESTORING SHORELINE RESILIENCE AND STABILIZATION**

The second day of the workshop consisted of three sessions during which there were presentations and discussions on new technologies being engaged to improve the stability and resilience of shorelines. Sessions were facilitated by staff of the CZMU and the DEM in Barbados. Key points from these presentations are outlined below.

##### **4.1 OVERVIEW OF COASTAL ENGINEERING SECTION – INSTRUMENTATION REQUIREMENTS FOR OCEANOGRAPHIC ASSESSMENT, DATA COLLECTION AND ANALYSIS AND THE APPLICATION REVIEW PROCESS**

Mr Ricardo Arthur, Coastal Engineer of the Barbados CZMU gave an overview of the responsibilities of the engineering section of the CZMU, which are, the collection and analysis of data (waves, beach profiles, tides and hydrographical surveys) and the management of Government's coastal infrastructure. He also indicated that they play a role in development control by reviewing applications for shoreline protection and enhancement for private developments in order to ensure they do not result in negative consequences on adjacent shorelines. He further explained the positive and negative attributes of such development which often includes the construction of structures such as seawalls, revetments, groynes and breakwaters. The CZMU encourages private developers to conduct numerical and physical modelling using actual data from the areas in question so that a thorough review of the effects of the constructing the structure can be done. The conditions

of permission for development should include a schedule for reporting, monitoring and modifications to the structure where necessary.

After Mr Arthur's presentation, discussion was raised on the different materials that could be used for shoreline protection structures. It was suggested that boulders be used as opposed to solid concrete since they provide a more flexible structure that will dissipate some wave energy as water is allowed to move through interstitial spaces in the structure. Structures should be appropriately designed using a gradation of boulder sizes. Some discussion also surrounded the use of soft engineering structures such as the building of sand dunes, restoration of vegetation and enforcement of setback regulations. The staff of the CZMU shared their challenges and successes based on experiences in using soft structures. They concluded that it was best to use a combination of soft and hard engineering structures.

#### 4.2 SELECTING THE RIGHT TYPE OF ENGINEERING STRUCTURE FOR COASTAL SEGMENTS

Mr Antonio Rowe, Project Manager of the Barbados CZMU, outlined the steps involved in the planning, designing, construction and monitoring of engineering structures in coastal areas. During the planning process problems and solutions should be identified with all possible designs and combinations of techniques being considered. This evaluation should also include the 'do nothing' alternative. After planning a final design should be chosen which will achieve all stated objectives and which gives consideration to all normal and special conditions which may be experienced in the area, with these conditions having been modelled using actual measured data. The plans, restrictions and specifications of the approval should be explicitly stated. Monitoring should be done during construction to ensure compliance with design specifications and after construction to evaluate the effects of the structure on the environment. Collection of data at all stages of the selection and construction processes is important for the improvement and refining of prediction models for coastal projects.

During the discussion segment after his presentation, Mr Rowe explained that the implications of climate change are considered during the design stage of the structure selection process. He stated that measures pertaining to changes in sea level rise and other implications of climate change are factored into the modelling process, the results of which will influence the final design. A question was also raised about some of the features used in the construction of the Rockley Boardwalk (a project of the Coastal Infrastructure Programme). The features in question were put in place after the construction design was altered due to the discovery of unique characteristics in the area that were only recognised after construction had begun. There was also some discussion on the need to calculate sediment budgets in order to determine the sinks and sources of sand influencing processes in areas of construction.

#### 4.3 MARINE METEOROLOGY AND MANAGING COASTAL HAZARDS IN A MATURE ICZM PROGRAMME

Dr Lorna Inniss, Deputy Director of the Barbados CZMU, Chair of the Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean Sea and Adjacent Regions (ICG-CARIBE-EWS) and Chair of Standing Committee on Coastal Hazards introduced participants to the idea of integrating marine meteorology into an established ICZM programme. She stated that accurate prediction of coastal hazards will allow for early warning systems to be put in place so that small island states would be better prepared to deal with the effects of these hazards. She highlighted sea surface temperatures, marine plumes, pressure gradients/downdrifts, storm surge and winter swell events and erosion as some of the hazards that an ICZM programme

should work towards being able to predict locally rather than waiting on warnings from local meteorological offices or from international agencies. She highlighted Tsunami warning systems as a special case where a regional early warning system is in place but more can still be done towards its improvement.

Discussions following Dr Inniss' presentation highlighted the lack of knowledge about the Caribbean Regional Tsunami Early Warning System. Dr Inniss explained some of the background to the development of the system and its implementation plan. She also described the chain of events that should take place in the event that the alarm is raised and the responsibility of individual Governments to alert the citizens of their countries. Participants also discussed the idea of the implementation of legislation for enforcing mandatory evacuation of citizens in the event of an emergency.

#### 4.4 COASTAL INVESTMENT PROGRAMME – PILOT PROJECTS AND TESTING OPTIONS

Mr Antonio Rowe, Project Manager of the Barbados CZMU described the design and selection processes for coastal infrastructure pilot projects that were undertaken in Barbados. These projects took place during two periods, some as part of the Coastal Conservation Pre-Investment Programme between 1991 and 1995 and others during the investment phase in the Coastal Infrastructure Programme between 2003 and 2009. The projects were devised and undertaken after an inventory of coastal protection structures was conducted which highlighted the need for some of them either to be removed or modified. Initially, the focus of these projects was beach creation and stabilization but the results of the projects have increased lateral access along the coast and created recreational areas that have had a significant positive impact socially and economically for the Barbadian society and visitors alike.

After his presentation Mr Rowe engaged participants in discussion about the likelihood of construction causing increased sedimentation in the marine environment. He explained that prior to and during construction water quality tests are conducted which measure turbidity. If turbidity levels exceed standards outlined in the approved project document then the project is halted until the issue is rectified. Sediment booms are often used to prevent the spread of sediment beyond the immediate construction zone. There was also discussion about whether structures which have been constructed by the CZMU will be able to withstand expected increases in the intensity of marine and other natural hazards. Mr Rowe explained that the major focus of past projects was to offer a means of protection for adjacent properties by increasing the stability of beaches based on current conditions that were causing problems. They have also been beneficial to the economic value of the areas and the services provided therein. This led to further discussion on the patterns of development in coastal areas, the effect of construction on ecosystems and the nature of the tourism product which is being offered to tourists that encourages beach front development.

#### 4.5 EMERGENCY MANAGEMENT WITHIN AN ICZM FRAMEWORK

Mr Simon Alleyne of the DEM explained the concept of Comprehensive Disaster Management to participants and indicated that rehabilitation and recovery becomes expensive when there are no measures put in place to mitigate, manage or plan for natural disasters. He noted that there is a healthy partnership between the CZMU and DEM which is influenced by the need to prepare for the effects of coastal hazards such as Tsunamis, storm surge, hurricanes etc. DEM assists in educating the public of coastal hazards through the website [www.weready.org](http://www.weready.org).

After Mr Alleyne's presentation there was a discussion on the use of cellular phone communication to disseminate messages about imminent disasters and the correct

procedures that should be followed in the event of an earthquake. There was also discussion on the role that the DEM plays in approving plans for development that may be in areas which are at a high risk of being affected by natural hazards. This was followed up by a discussion on the generation of risk/ hazard maps to identify the most vulnerable areas especially in relation to coastal zone development and management. Major concerns that were raised about risk mapping were the access and sharing of sensitive information due to the legal implications and matters relating to insurance that may ensue.

#### 4.6 RAPID VULNERABILITY ASSESSMENT OF THE BARBADOS WEST AND SOUTH COASTS

Dr Leo Brewster, Director of the Barbados CZMU introduced participants of the Workshop to a low cost method of assessing the vulnerability of coastal areas. The concept involves the formulation of an instrument to measure parameters (morphology and sedimentology of the coastline and littoral processes, morphology and sedimentology of the nearshore) that are characteristic of the areas being assessed. The parameters being used are classified into indices (Coastal vulnerability index – CVI) by which the characteristics can be assigned a score which can be further analyzed to determine overall vulnerability (Coastal Vulnerability Assessment – CVA) and degree of risk (Degree of Risk Index - DRI) in coastal segments. A checklist is usually used for rapid data collection of data for these analyses and it can be supplemented with actual data collected as part of routine coastal monitoring.

#### 4.7 DEVELOPMENT OF THE COASTAL RISK ASSESSMENT AND MANAGEMENT PROGRAMME (CRAMP)

The Coastal Risk Assessment Programme Management is a new venture which is being undertaken by the CZMU that looks at integrating climate risk management into integrated coastal zone management in Barbados. Dr Leo Brewster, Director of the Barbados CZMU gave an overview of the activities that have brought CZM to the point it is at today in Barbados and described the upcoming project. The three main components of the project are: (i) Coastal risk assessment, monitoring and management, (ii) Coastal infrastructure and (iii) Institutional strengthening. Each of these components has its specific goals and objectives which all tie into the mission of the CZMU in trying to achieve “A coast to be proud of!”.

Discussion following Dr Brewster’s presentation on the CRAMP addressed the attitude of the judiciary towards breaches in environmental law, control of sewage and waste water in coastal areas and the practicality of conducting cost-benefit analyses for coastal infrastructure projects. There was a general expression of disappointment in the way in which environmental infringements were treated in the court but it was also recognized that the inability to collect adequate evidence to support allegations was a major problem. In some cases this problem is assisted by the willingness of fishermen and coastal area users to report illegal activities which they observe taking place. On the point of controlling sewage and waste water in coastal areas, an overview was given of the sewage treatment processes which take place for public and private sewage systems prior to the discharge entering the marine environment.

Discussions on cost benefit analyses raised points about the increased value of land areas which have been enhanced by coastal infrastructure and the possibility of this increased value being beneficial to the entire country. In dealing with gaining appreciation for environmental laws and conducting cost-benefit analyses, it was noted that it is important to conduct valuations of environmental assets. A participant mentioned that there are facilities online which facilitate the calculation of the value of environmental assets.

At the end of day 2 of the Workshop participants were taken on a field trip where they were able to see one of the completed projects of the Coastal Infrastructure Programme, the Holetown Walkway, and one of the sites which are outlined for the upcoming Coastal Risk Assessment and Management Programme at the Holetown Lagoon. They were also taken to a currently undeveloped cliff top area at Merricks, St. Philip on the South East coast of the island which has been approved for extensive tourism related development. Participants were also afforded the opportunity to drive along the East coast of the island which is relatively undeveloped as compared to the South and West coasts.

## **5. SESSION 3: ROUND TABLE SESSIONS WITH DELEGATES AND TRAINEES**

On the third and final day of the workshop participants were introduced to marine pollution regulations existing in Barbados and the draft plan for the implementation of ICAM in Latin America and the Caribbean.

Participants were given the opportunity to contribute towards the revision of this plan through breakout group sessions and plenary discussions.

### **5.1 THE IMPORTANCE OF MARINE POLLUTION CONTROL AND REGULATIONS**

Mr Anthony Headley, Deputy Director of the Environmental Protection Department (EPD) gave an overview of the legislation and regulations which govern the control of pollution in the marine environment in Barbados. He spoke of the components of the Barbados Marine Pollution Control Act (MPCA) and methods of enforcement which consists of registration, monitoring, reporting and regulation of pollutants according to specific standards and the penalties for non-compliance. The MPCA is supported by a Table of Prohibited Concentrations which provides guidance to the concentrations of particular pollutants that can be tolerated in trying to maintain good ambient water quality. Due to its size and morphology, the entire island of Barbados is viewed as a coastal zone with respect to management of pollutants therefore there is a strong synergy between the CZMU and the EPD.

After Mr Headley's presentation participants discussed the problem of enforcing environmental regulations on institutions that existed prior to the implementation of regulations and legislation. This point was raised pertaining especially to rum distilleries that have significant pollutants in their discharge but have contributed significantly to the economy of the society over many years. Methods being used for water quality analyses were also scrutinized. It was suggested that nutrient and especially ammonium concentrations should be determined based on analysis of sand samples and concentrations of microorganisms because when samples are taken from the water column only the remnants of these compounds left after settlement and assimilation by organisms are measured. A suggestion was also made to alter techniques for assessing coral health by looking at the levels of bacteria in the water rather than analyzing algal growth and nutrient concentrations. A participant suggested that agencies need to keep up to date with the extensive coral reef research which is currently being conducted. Further research also needs to be carried out in order to establish pollutant concentration standards which are relevant to conditions in the Caribbean rather than adopting international standards.

### **5.2 PRESENTATION OF THE IOC/UNESCO ICAM CARIBBEAN PLAN**

Dr Cesar Toro, IOC (UNESCO) Secretary for IOCARIBE presented the plan for ICAM in the Caribbean and Latin America which was the output of the Workshop for the Formulation of a Draft Project on Integrated Coastal Management (ICM) in Latin America and the Caribbean (LAC) held in Cartagena, October 2003.

Dr Toro spoke of the complexity of managing the resources in the Caribbean region due to its rich diversity in history, politics, culture and biodiversity, but emphasized that small island states and countries like those in the Caribbean are major players in achieving environmental sustainability worldwide. He identified several challenges and some likely solutions to achieving environmental sustainability and highlighted the importance of environmental sustainability to the tourism industry on which many Caribbean states heavily depend. He continued by stating the importance of establishing partnerships to facilitate the provision and use of data and policy information by local, regional and international agencies, governments, researchers and businesses. He identified the three main topics which were highlighted during the discussion for a future ICM project as: Governance, Science and Technology for Management and Capacity Building. He also outlined the lines of action which had been proposed to tackle each of these issues. There were also special areas of focus and obstacles to implementation that were highlighted for consideration in planning for ICM.

Dr Lorna Inniss, Deputy Director of the Barbados CZMU, Chair of the Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean Sea and Adjacent Regions (ICG-CARIBE-EWS) and Chair of Standing Committee on Coastal Hazards, added to the presentation of the Caribbean Plan by saying that even though there are a number of challenges associated with implementing an ICAM programme, countries are still committed to it because they recognize the potential for economic benefits. In recent times however, there has been some displeasure expressed because of the inability to transfer the recognition of importance to policy makers. The 'buzz' words are heard in speeches but little action is done to provide funding and support for the implementation of ICAM programmes.

### 5.3 REVIEW AND UPDATE OF THE IOC/UNESCO ICAM CARIBBEAN PLAN

Participants were asked to break into groups to discuss the main steps which need to be taken to implement a 10 year ICAM development plan that could be presented to donor agencies. They were also asked to suggest projects that would assist countries in coping with the three main challenges that had been highlighted in the IOC/UNESCO Caribbean Plan which was being reviewed.

### 5.4 DEVELOPMENT OF A 10 YEAR REGIONAL PROPOSAL TO DONORS FOR ICZM IN THE CARIBBEAN – IDENTIFICATION OF SIMPLE INEXPENSIVE PROCEDURES FOR IMMEDIATE IMPLEMENTATION IN EACH COUNTRY

Participants were asked to present the ideas which came forth during the discussions within the working groups after which there was a general discussion on the proposed 10 year strategy and procedures for immediate implementation in each country. Results of these discussions are outlined below.

Proposed steps needed to implement a 10-year development plan:

#### Modification of governance mechanisms

- Conduct a review of policies related to ICAM in all countries and the extent to which the policies have been implemented. Have this review conducted by external agencies to avoid bias and oversights.
- Policies should reflect agreements made through conventions and legislation
- All countries should have comparable policy so governance can be equitable throughout the Caribbean



- Countries should accede to relevant protocols such as LBS protocol to ensure they are working towards achieving the same goals
- Give consideration to other forms of governance besides creation and review of policy and legislation such as community and stakeholder consultations. Consider the use of existing local governance mechanisms such as village councils

#### Assessment of the status of all countries

- Determine the stage at which different countries are in terms of implementation of strategies. Create a baseline record of what currently exist with respect to strategies, legislation, practices, issues, action plans etc. The current approach to implementing strategies may not be integrated among different sectors.

#### Identification of stakeholders

- Conduct an inventory on coastal zone users and other stakeholders within other industries that influence activity in the coastal zone
- Assess their weight in the overall ICZM equation and the extent of their involvement (positive or negative)
- Identify those stakeholders that may be isolated and those between which links can be established based on common interests or impacts
- Identify specific roles and responsibilities of stakeholders in the case of those who are acting or may be able to act as convention/project focal points
- Determine when stakeholders should be brought into decision making processes to preclude alienation by including them as early as possible
- Maintain transparency in the decision making process by including the public at an appropriate time
- Consider the different strategies and stages of co-management, as outlined by Dr Patrick McConney, consultation, collaboration and delegation as stages on a continuum. In the Caribbean we are usually at the point of consultation but active NGOs in some countries allow for more delegation of management responsibilities.

#### Determination of capacity gaps

- Determine what exists and what is needed in terms of building capacity
- Design a plan to fill the gaps
- Ensure that in building capacity, expertise and tools remain in the countries rather than having to be outsourcing continuously
- Assess institutional arrangements and analyze the effectiveness by identifying gaps and deficiencies and recommend management structures that will help in achieving the intended outcome of the institution

#### Communication and cooperation between agencies

- Most agencies only look out for themselves and focus less on cooperation with others
- This is linked to stakeholder identification and inclusion
- Design a mechanism for establishing cooperation. This can start by establishing a network between all the institution present at this workshop

### Prioritization of issues

- Climate change issues, storm surge, tsunamis, risk mapping, establishment of conservation areas, waste management, pollution, evacuation protocols are some of the issues that have previously been discussed in this workshop and must be considered when devising plans and projects.
- Take into account the local context with small numbers of people and small land space and the issues of economies of scale
- Ensure that when international agreements are signed that the local policy reflects the international mindset

### Establishment of information baseline

- Practice continuous data collection to reflect the 'normal' situation prior to an event or intervention
- Standardise data collection protocols including creation of metadata
- Address issues relating to data access, sharing and costs so that data may be transferred effectively throughout the region and hence be used for multiple purposes. This will assist or be assisted by data collection for the Caribbean Marine Atlas

### Sourcing of funds

- Generate funds by enforcing fines through initiatives such as the polluter pays principle where the greater the pollution the higher the fines or taxation dependent on ecological footprint or based on emissions per unit weight of waste overtime as accumulation of pollution takes place
- Identify existing sources of funding such as UNEP/IWCAM funding. Ensure that existing projects to be done well so that donors will be more willing to give again
- Look to regional organizations for support and funding e.g. CARICOM, OECS
- Explore avenues for international funding such as carbon credit arrangements
- Look to establish a Fund that would be self sufficient after 10 years
- Create a map of donors and their interests. There is always a risk that donors may have underlying interests that are conflicting with the interests of the organization. If there is a plan for implementation of a project stick to the strategy when applying for and negotiating funding agreements
- Add a tax on tourists and tourism as an initiative to raise funds
- Consider entering into bi/tri/multi lateral co-operations

### Utilization of regional bodies to integrate coastal initiatives

- Use regional bodies that already exist and promote integration to push the ICZM development plan– promote less compartmentalization and more integration
- Regional bodies need to be strengthened so they can offer support for countries
- It is essential that local information on ICZM reaches the Ministers that sit in the Regional forum so that ICZM becomes a point of discussion at that level
- Design agreements between all countries which will state who is doing what and in what time frame.

### Formation of linkages with international and other agencies

- Conduct an evaluation of existing technology

- Establish linkages with international agencies to allow for technology transfer to do studies that we in Caribbean cannot do currently and train local persons using the foreign consultants

#### Implementation of activities on phased basis

- Design short, medium and long term goals
- Critical issues should be placed in a 5-yr plan which will be completed first. The second phase will then be implemented based on the successes of the first phase.

#### Public awareness and participation and change of perception and mentality

- Environmental management is people management
- Take a participatory approach, by getting buy-in from the public and tourists
- Maintain a level of transparency. Do not hide information, let people know why choices are being made
- Work towards behaviour modification
- Encourage environmentally friendly projects within the community that can earn money and check to see the progress of these projects at regular intervals
- Increase the capacity of communities
- Encourage active participation and co-management which will lead to change.
- Promote a bottom up approach, whereby the community is in charge so there is a sense of ownership
- In arrangements dealing with Carbon Credits some of the money should go into community
- Investigate the promotion of alternative sustainable livelihoods e.g. techniques to used mangroves/forests for as fuel or charcoal in a sustainable manner
- Promote local culture and architectural value as a tourism product. The Caribbean is marketing tourism but not their way of life
- Promote the establishment of buffer zones in the coastal areas so that there is protection for things that are valuable to the local culture
- Design a strategy to reverse the type of tourism that has taken place and encourage communities who still have their cultural elements to maintain them. Investigate the idea of Geo-tourism, make a paradigm shift instead of looking at sun, sea and sand only

#### Monitoring and evaluation of the Plan

- For 10 year plan to be effective there is a need monitoring, evaluation and revision at the beginning, during and at the end.

Procedures for Immediate Implementation in each Country:

1. Review of all countries policies and legislation that would deal with coastal zone management with the aim of generating regional legislation and implementation of this legislation.
2. Establishment of councils for coastal and marine management.
3. Establishment of CZMUs.
4. Identification of a document of best practices on Ocean and Coastal Management.

5. Conduct national assessments of capacity, science and technology and governance structures which will then be collated as a regional assessment.
6. Formulation of regional networks of labs and research institutions.
7. Synthesis of state of the art ICAM information.
  - a. A collaboration of all scientific and technical research on coastal and marine ecosystems including coastal zone economics on reefs and mangroves.
  - b. Conduct community based ICZM Consultations – politicians and scientists should not formulate national frameworks/policies with prior consultation with communities. Communities should be allowed to give advice in whether proposed ideas will work within the community.
  - c. Establish technical, formal and informal information networks.
8. Information sharing and dissemination – Science and technology:
  - a. Online information resource communications network for ICAM in the Caribbean.
  - b. Online association to the marine labs of the Caribbean.
  - c. Online library similar to IAMS LIC (International Association of Aquatic and Marine Science Libraries and Information Centres).
  - d. Creation of a web portal.
  - e. Online directory of ocean experts.
  - f. Social network utilization.

Dr Toro informed the forum that there was an offer made to the IOC of UNESCO to fund studies geared towards research and development and educational activities to address marine-related challenges confronting developing countries. This offer was made by the Yeosu Project which is based in Korea. He also indicated that some of the projects which were presented by the participants at this workshop could be proposed as regional projects for which the IOC of UNESCO could apply for funding.

#### 5.5 DEVELOPING A REGIONAL WORKING GROUP ON ICZM – A WAY FORWARD

Dr Lorna Inniss, Deputy Director of the Barbados CZMU, Chair of the Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean Sea and Adjacent Regions (ICG-CARIBE-EWS) and Chair of Standing Committee on Coastal Hazards, impressed upon participants the need for a regional network on ICZM to be established. She indicated that a structure for oceans management is lacking and to address this there should be an oceans and coasts commissions set up under commissions addressing sustainable development. This commission should consist of personnel from all agencies associated with coastal zone management so that there is input from all sectors of the public whose activities may have an effect on the oceans and coasts.

She continued by stating that initiatives such as the Caribbean Large Marine Ecosystems (CLME) project are calling for national implementation committees, this for example would be one of the responsibilities of a national oceans and coasts commission. Currently there is some confusion surrounding who should take responsibility for the management of some projects. She also stated that the development of a regional working group on ICZM would help with implementation issues because countries will be experiencing similar problems that may be better dealt with at a regional level than at a national level.

## **6. WORKSHOP EVALUATION AND ROUND TABLE DISCUSSION**

After the conclusion of all presentations and discussions participants were allowed to give an evaluation of the workshop.

Participants expressed their pleasure at being given the opportunity to attend the workshop and their appreciation for the time and effort spent in making it a reality. They were also grateful for the ability to share in the experience of a network of persons from around the region with varying expertise. The excellent scientific content of the information presented was highlighted.

Several suggestions were also made for improvements in the planning of future workshops. Participants agreed that the number of presentations should be reduced to allow more time for discussion and formulation of future plans. Timely distribution on advance of ICAM documentation pertaining governance, performance and sustainability was also suggested.

Participants also indicated their intentions of sharing the knowledge that was gained with other people in that could influence the ICZM process to ensure that plans made are implemented. Many participants highlighted the importance of maintaining communication within the network and fostering of links that have been established during the workshop by formal or informal means.

The meeting proposed the establishment of a registered Caribbean ICZM Group and the creation of an E-group to facilitate ongoing communication among members. The possibility of rotating the meeting to other English Caribbean Member States to increase integration was also considered.

## **7. CLOSURE**

Dr Leo Brewster, Director of the Coastal Zone Management (CZMU) in Barbados thanked participants for their attendance and active involvement in the meeting and wished them a safe return. Special thanks were also given to the Courtyard Marriot Hotel for the provision and facilities; Final Image Inc for filming and production of a DVD of the workshop proceedings to be used as an educational tool; the Barbados Defence Force for provision of transportation; Guest speakers, Mr Anthony Headley and Mr Simon Alleyne; and to the staff of the CZMU and the IOC of UNESCO for their dedication, commitment and assistance in the successful staging of this workshop.

Dr Cesar Toro, IOC of UNESCO Secretary for IOCARIBE thanked all the staff of the Barbados Coastal Zone Management Unit and for their cooperation and hospitality received. He emphasized on the importance of keeping contact. Dr Toro urged participants to convey the message to their Governments and Institutions.

The Integrated Coastal Area Management (ICAM) Training Workshop for the English Speaking Caribbean States was closed at 17.00 hrs on Friday 18 March 2011.

ANNEX I

**AGENDA**

Day 1: Wednesday 16th March 2011  
National Framework and Planning for ICZM

Time	Item	Presenter
8:45	Registration	
9:00	Reception of the Minister of Environment Water Resources and Drainage (MEWRD)	
9:02	Welcome and Opening Remarks	Dr Leo Brewster Director CZMU
9:05	IOC/UNESCO Address	Mr Cesar Toro IOC
9:15	Feature address	The Hon. Denis Kellman M.P. Minister, MEWRD
9:45	Group Photo	
9:50	Break	
10:00	Participant introduction	
10:05	Introduction to integrated coastal zone management and planning	Dr Leo Brewster Director CZMU
10:30	Participant presentation on ICZM country status	
12:00	Institutional requirements for ICZM – Overview the CZMU and its technical sections	Dr Lorna Inniss Deputy Director CZMU
12:30	Lunch	
13:30	Coastal development control and permitting – EIA procedures	Miss Allison Wiggins – Coastal Planner
1400	The Barbados coral reef and water quality monitoring programme	Miss Angelique Brathwaite Marine Biologist CZMU
1430	Developing an ICZM policy and associated legislation – The Barbados coastal zone management Act and other relevant national legislation	Mr Fabian Hinds Research Officer CZMU
1500	Geographic Information Systems applications within an ICZM context – The Caribbean Map Atlas Project	Mr Ramon Roach Water Quality Analyst CZMU
1530	Break	
1600	The implications of climate change for Small Island Developing States	Dr Lorna Inniss Deputy Director CZMU
1630	Round table discussion	
1700	End of session	

Day 2 Thursday 17th March 2011  
Restoring Shoreline Resilience and Stabilization

Time	Item	Presenter
8:45	Review of previous day	Dr Leo Brewster Director CZMU
9:00	Overview of coastal engineering section – instrumentation requirements for oceanographic assessment, data collection and analysis and the application review process	Mr Ricardo Arthur Coastal Engineer CZMU
9:30	Selecting the right type of engineering structure for coastal segments	Mr Antonio Rowe Project Manager CZMU
10:00	Break	
10:10	Marine Meteorology and managing coastal hazards in a mature ICZM programme	Dr Lorna Inniss Deputy Director CZMU
10:40	Coastal Investment Programme – Pilot Projects and testing options	Mr Antonio Rowe Project Manager CZMU
11:10	Emergency management within an ICZM Framework	Mr Simon Alleyne Department of Emergency Management
11:30	Rapid vulnerability assessment of the Barbados West and South Coasts	Dr Leo Brewster Director
12:00	Development of the coastal risk assessment and management programme	Dr Leo Brewster Director
12:30	Lunch	
13:30	Site visits to completed capital works and approved ongoing private development: Rockley Boardwalk, Holetown walkway and CRAMP site, Tent Bay, Merricks, Crane, Welches	Staff of CZMU
1630	Return to hotel	
1700	End of session	

Day 3 Friday 18th March 2011  
Round Table Session with Delegates and Trainers

Time	Item	Presenter
8:45	Review of previous day	Dr Leo Brewster Director CZMU
9:00	The importance of marine pollution control and regulations	Mr Anthony Headley Deputy Director Environmental Protection Department
9:30	Presentation of the IOC/UNESCO ICAM Caribbean Plan	Cesar Toro IOC/ Dr Lorna Inniss Deputy Director CZMU
10:00	Break	
10:15	Review and update of the IOC/UNESCO ICAM Caribbean Plan	Mr Cesar Toro IOC
11:15	Development of a 10 year regional proposal to donors for ICZM in the Caribbean	Mr Cesar Toro IOC
12:30	Lunch	
13:30	Developing a regional working group on ICZM – A way forward	Dr Lorna Inniss Deputy Director CZMU
1430	Next Steps – Identification of simple inexpensive procedures for immediate implementation in each country	Mr Cesar Toro IOC/ Dr Lorna Inniss Deputy Director CZMU
1515	Workshop evaluation and round table discussion	Mr Cesar Toro IOC
1530	Summary comments	All participants
1600	Vote of Thanks and end of workshop	Dr Leo Brewster Director CZMU



## ANNEX II

### OPENING STATEMENTS

-A-

#### WELCOME AND OPENING ADDRESS

#### **Dr Leo Brewster, Director Coastal Zone Management Unit**

It is my great pleasure to welcome you to Barbados to the Regional Workshop on Integrated Coastal Zone Management. I am also pleased to have been asked to provide a few brief opening remarks for this timely meeting.

The coastal landscape is an evolving, dynamic balance between sediment supply, wave energy, and sea-level change. The natural forces of wind and waves continuously shape shorelines, seeking to achieve a dynamic equilibrium between land and sea. As a result of this natural process, coastal areas cannot be studied or developed as stable environments. These dynamic environments shift and change in response to relative shoreline shape and position, the availability of sediment (sand, gravel, and cobble), periodic increases in energy (wind and waves), and continuously rising sea levels. Yes, rising seas. It must be accepted that climate change is a real phenomenon, and as such need to be integrated into the mainstay activity of all that we as Small Island Developing States (SIDS) and low lying coastal countries undertake with in this Caribbean region.

Integrated Coastal Zone Management (ICZM) was placed on the international agenda by the Rio Summit, and has been reinforced by both the Johannesburg and Mauritius Summits. The Intergovernmental Oceanographic Commission has taken up the challenge to facilitate programmes across the globe. Within the Caribbean, the first IOC regional workshop on ICZM was held in Cartagena, Columbia, in October 2002. This resulted in the development of a project document to develop and implement ICZM in the Caribbean region. It is this document that will be reviewed and updated as part of this workshop. Since that time, a subregional workshop was held in 2005, to reaffirm the commitment to the implementation of ICZM; to heighten awareness of the significant role ICZM can play, and needs to perform in the sustainable development of our countries – as tourism is the main revenue base for them. The dependence of tourism on beaches cannot be over stressed! These tropical islands with their sandy beaches attract large numbers of visitors to their shores annually. For most of these islands states, tourism as the principle revenue generating activity can contribute up to, and sometimes in excess of 30% of the Gross Domestic Product of the state in some cases.

For the Caribbean region, the coastal zone is critical to environmental, social, economic and cultural development. Owing to the acceleration of tourism prior to marine resource conservation efforts, many islands have experienced a decline in the quality of habitats within the coastal area. Beaches have retreated landward as a result of indiscriminate coastal development; continuous cumulative residential and commercial discharges have compromised coastal water quality; and islanders have observed the demise of sensitive ecosystems such as coral reefs, sea grass beds, and mangrove swamps.

Coastal managers working within the region are charged with the task of not just halting the negative trend in sustainable use, but reversing it, thereby restoring Caribbean coastal zones to healthy ecosystems capable of sustaining appropriate levels of economic activity - a situation which in some cases may be a Herculean task. This clearly emphasizes the need for proper coastal planning, and management of the shoreline, to ensure its long term sustainability - the prime directive of ICZM.

The concept of ICZM is well known within the region – even if it has not been implemented as thoroughly as it could have been. It should be noted, however, that few governments have developed the capacity required to execute a coastal management programme sustainably. Many projects have been conducted, reports developed, delivered and shelved, and to varying degrees some plans formulated. But implementation has remained the elusive brass ring. The reason for such has so far been limited by available funding and required technical expertise. This workshop hopes to address both of these issues by demonstrating that we as a region have the capacity, capability, and through sourcing the right agencies, funding can be potentially made available. We as a region need to get up and start demonstrating that we can do some ICZM activities for ourselves i.e. create the start point for the jump gate to the ICZM future.

Against this background the Coastal Zone Management Unit of the Ministry of the Environment Water Resources and Drainage, in Barbados, which administers one of the most mature ICZM programmes in the region, has teamed up with:

- the UN Educational Scientific and Cultural Organization (UNESCO),
- the Intergovernmental Oceanographic Commission (IOC), and
- the Intergovernmental Oceanographic Commission of UNESCO Sub-commission for the Caribbean and adjacent regions (IOCARIBE)

To host this regional workshop in Integrated Coastal Zone Management. This is the second workshop of this kind co sponsored by the CZMU in Barbados, demonstrating our commitment to seeing the regional application of ICZM, as an implemented reality. The aims of the workshop are:

1. To reintroduce regional coastal managers to the basic concepts of integrated coastal zone management and the field protocols used in implementing an ICZM programme;
2. To highlight the concepts of coastal vulnerability and risk assessment especially with in a context of climate change and disaster risk management and risk reduction;
3. To provide an overview of established and emerging issues in ICZM in the region, and more importantly to broach new areas of ICZM research interest;
4. To assist in the improvement of capacity to execute ICZM within the region;
5. To begin to develop a network of regional coastal management partnerships for information and technology exchange;
6. To enable greater involvement in regional projects;
7. To foster the development of appropriate national institutional arrangement for ICZM; and
8. To clearly demonstrate that there are increasing levels of human capacity found within the region that are professional by training and experience, and have the capability to assist in the establishment of programmes to better implement aspects of ICZM.

Some of the expected outcomes from this workshop will include:

1. Cooperation among experts during the workshop which will foster greater integration of coastal research, monitoring, training and management within the region;
2. Learning from each other thereby fostering improved regional collaboration on an issue that affects all of the countries;

3. Coastal managers being better able to contribute to the proper overall management of their respective national coastal areas.

Ultimately it is this workshop's intention to assist Caribbean countries to focus on the significance of the management of the coastal fringe for which they are ultimately responsible for, as well as focusing on the realities of implementing ICZM policies. WE are here to take ICZM within this region to a whole new level. I hope you will be honest and frank in your discussions so that the intended aiMs and outcomes will be achieved.

-B-

IOC/UNESCO ADDRESS

**Dr Cesar Toro, IOC (of UNESCO) Secretary for the IOC Sub-Commission for the Caribbean and Adjacent Regions IOCARIBE**

Honourable MP Minister Mr Denis Kellman,  
Dr Leo Brewster - director of the Barbados Coastal Zone Management Unit,  
Dr Lorna Inniss – IOC of UNESCO and IOCARIBE National Focal Point  
Dear Colleagues,  
Members of the media,  
Ladies and Gentlemen.

SIDS are vulnerable and at high risk concerning climate change and natural hazards.

Often they are the first to feel the effects of global environmental problems, due to their often small size, isolated locations. It is clear that most SIDS countries are keenly aware of the importance of the marine environment and its resources to their sustainable development and economic stability. SIDS countries, however, are sometimes constrained by weak institutions and administrative processes and need enhanced human, technical, and financial resources to develop and implement cross-cutting approaches to the planning and management of oceans and coasts.

On the issue of coastal policy, the Mauritius Strategy called for integrated coastal management policies supported by the management of coastal ecosystems, including coral reefs, the implementation of networks of marine protected areas, and called for support from the international community to address the issue of coral. IOC of UNESCO has been instrumental in strengthening and enhancing the capacity of SIDS to implement the Mauritius Strategy and other Conventions and protocols like the Convention on Biological Diversity, and the Cartagena Convention.

The increasing impacts of climate change coupled with the fact that these SIDS have very little or no access to the means to adapt to climate change places an enormous burden on their limited human and financial resource. Often, SIDS governments have had to divert precious budgetary resources to address damage caused by increases in extreme events. Such events as hurricanes and floods cause damage in excess of 20% of GDP in many SIDS. IOC of UNESCO has been developing and implementing an integrated monitoring, warning and awareness system to reduce the risk and increase the SIDS resilience, where the regional components of their global programmes are the main elements of the system: GOOS, GLOSS, Ocean Data and Information Networks, and the Tsunami and other coastal hazards warning systems. In this endeavour, IOC of UNESCO has been working with their regional and national counterparts disaster management agencies and other international and UN partners.

IOC of UNESCO has been promoting the adoption of ecosystem-based approach to marine and coastal management, including fisheries, especially to cope with managing countries transboundary marine resources.

Agenda 21, the Barbados Programme of Action for the Sustainable Development of Small Island Developing States (BPoA), the World Summit on Sustainable Development (WSSD) and more recently the Mauritius Strategy have each underscored the complexities and challenges facing small island states as they seek to attain sustainable development.

As Agenda 21 recognized: Small Island developing States and islands supporting small communities are a special case both for environment and development. They are ecologically fragile and vulnerable. Their small size, limited resources, geographic dispersion and isolation from markets, place them at a disadvantage and prevent economies of scale.

Small island developing States (SIDS) also have special problems and opportunities related to the oceans which need to be recognized and addressed. These nations, small in land area, typically have control and stewardship responsibilities over huge expanses of ocean within their Exclusive Economic Zones. As an example, Barbados Exclusive Economic Zone is 430 times their land area.

The ocean zones under the stewardship of SIDS contain high biological diversity, the most extensive coral reef systems in the world, and significant seabed minerals. Small islands have a critical role to play in the sustainable development of oceans.

The WSSD addressed the special issues of SIDS in the Johannesburg Plan of Implementation by setting forth a number of targets and timetables related to SIDS, and called for a review of the implementation of the 1994 Barbados Programme of Action for the Sustainable Development of Small Island Developing States leading to an international meeting in Mauritius in January 2005.

Implementation of integrated coastal zone management in the majority of the SIDS is still not haphazard and five years ago, it was reported that only 20% of countries had developed specific institutions or interagency mechanisms for the coordination of integrated coastal and ocean management; and only 7% had enacted national coastal zone acts. For most of SIDS tourism represent a major income reaching, for example an average of 36% of the GDP for the Caribbean SIDS and their main assets are located in the first hundred meters of the coastal line. IOC of UNESCO is supporting the development of national adaptation strategies to coastal and climate change in SIDS. For this purpose IOC of UNESCO is providing tools and contributing to the development of planning national policies for coastal development via its Integrated Coastal Area Management (ICAM) working with national environmental and coastal planning agencies.

This Caribbean Regional Workshop on Integrated Coastal Zone Management that UNESCO and the Intergovernmental Oceanographic Commission and its Regional Subcommission IOCARIBE are organising jointly with the Barbados Coastal Zone Management Unit is a major step forward in dealing with the challenges mentioned and it is part of the activities to prepare the participation of the Small Island States in the forthcoming World Conference in Sustainable Development Rio+20.

This workshop is also a demonstration of the Barbados environmental leadership and your dedication to convey the message to World about the critical importance of investing in one of the major assets that the Humanity has for its survival as it is the ocean its coastal zone.

I wish you a fruitful workshop and hope that every one of us will coming back to our countries with new tools and perspectives to improve our way of using our coastal resources.

-C-  
FEATURE ADDRESS

**The Hon. Denis Kellman, M.P. Minister of Environment, Water Resources and  
Drainage**

It is my pleasure to address you this morning on the occasion of the launch of this very important and timely regional workshop on integrated coastal zone management, which represents a partnership between the Government of Barbados, the Coastal Zone Management Unit (CZMU), the Intergovernmental Oceanographic Commission (IOC) and the United Nations Educational, Scientific and Cultural Organization (UNESCO).

Coastal ecosystems within the region, including saltwater marshes, coastal wetlands, coral reefs, and river deltas are at risk from climate change phenomena, and impacts exacerbated by anthropogenic factors.

The related socioeconomic impacts such as increased loss of property and coastal habitats, increased flood risk with potential loss of life and the loss of tourism, recreation, and transportation functions, have the potential to derail the development agenda of several regional small states.

While the issues relating to climate change and coastal management and vulnerability are now familiar concepts, the issue of coastal resilience is less well known, but has become much more important in recent years.

Coastal resilience has ecological, morphological, and socioeconomic components, each of which represents another aspect of the coastal system's adaptive capacity to external disturbances.

What we have to actively work on as Caribbean States is Socioeconomic resilience—our capability as a society to either prevent or cope with the impacts of climate change and sea-level rise, by addressing our technical, institutional, economic, and cultural capability. These capabilities are the elements of an Integrated Coastal Zone Management Approach.

Enhancing this resilience is equivalent to reducing the risk of the impacts on society. This resilience can be strengthened mainly by decreasing the probability of occurrence of hazards; avoiding or reducing their potential effects, and facilitating recovery from the damages when impacts occur.

Let me speak for a minute on the issue of technological capacity, because I believe that this is the area that will make or break us as a region, as we grapple with the challenges of climate change and sea level rise.

The use of appropriate technology is an inherent component of social and economic resilience. Technological options can be implemented efficiently only when the right economic, institutional, legal, and socio-cultural measures are in place. And as we are all aware, many small island developing states have severe challenges accessing cutting-edge technologies.

It is my firm belief that indigenous (or traditional) technologies should be considered as an option to increase resilience. These technologies may often be the best suited to address the impact being experienced – for example, in Barbados, our traditional chattel house design with gable roofs and shutters to withstand excessive hurricane or tropical storm winds; vents within roofs to allow for heat exchange and venting of wind pressure during storms is a perfect example of home grown technology. The use of hedge rows and

Cus Cus grass along road verges to retain top soil in sugar cane fields were innovations implemented at low costs to the private sector and government.

However, as times change and “progress” is achieved, the use of traditional technology may be downplayed as being old fashioned, or ineffective for the present day requirements. However, their prime purpose remains the same and is still effective today. Unfortunately, we have abandoned many of these indigenous technologies in an attempt to be branded as modern. We need to change some of these mindsets.

Ladies and Gentlemen, the Government of Barbados has tried over the years to grapple with many of the challenges I have already outlined to you. Because of the success of our Integrated Coastal Management Programme, Barbados is marketed internationally as a place “Just beyond your imagination”.

The coastal zone of Barbados is one of the country’s main economic assets. The island is virtually surrounded by fringing and barrier reefs, and to a lesser extent, other coastal ecosystems that are found distributed along our 97 kilometres of shoreline. The contrasting coastlines of the West and South coasts with their relatively calm waters, the pounding surf of the East coast, the windswept Southeast and North coasts, and a warm tropical climate, create optimal conditions for a tourism industry that accounted directly and indirectly for 39% of GDP and 50% of total export earnings in 2008.

That being said Ladies and Gentlemen, there are a number of challenges which we have had to effectively address in order to protect this driver of our economy that is pivotal to the social, recreational and economic lives of Barbadians.

Firstly, our beaches are highly susceptible to wave erosion, overwash, longshore drift, flooding, flood scour, wind damage, and dramatic sand movement during storms. These natural phenomena are often exacerbated by human alterations to the system such as through the construction of coastal engineering and property protection structures, flattening of dunes, removal of protective vegetation, and unwise siting of buildings, and roads. When the processes are ignored and natural protection removed, the vulnerability to hazards is increased.

Secondly, the Barbados coast is susceptible to a variety of natural hazards, including coastal storms, storm surge, flooding, coastal erosion, tsunamis, land slippage and land subsidence. All of these hazards threaten lives, property, the natural environment, and, ultimately, the economy - a problem that becomes more pressing as our coastal infrastructure density continues to rise.

The next challenge is that intensive development in the coastal zone not only places more people and property at risk to coastal hazards, but it also degrades the natural environment, interfering with nature’s ability to protect the human environment from severe hazard events.

Fourthly, Barbados and its neighbours have experienced an unprecedented coral bleaching event in 2005, when around 17% of all corals became bleached and 26% of these died. This bleaching event was caused by elevated sea water temperatures (greater than 30°C) which essentially sat on our reefs for an extraordinary eight months from March until October of that year. In Barbados varying levels of coral bleaching occur as an annual event between June and July until the end of October. In 2010, a significant coral bleaching event similar to that observed in 2005 was observed across the region. In Barbados the elevated sea water temperatures (greater than 30°C) remained around the island for six months – between the months of May to October.

Ladies and Gentlemen, while these challenges may sound daunting, the Ministry of the Environment, Water Resources Management and Drainage (in its many constructs over the years) has for a long time had a prima facie role in the management of the coastal and marine environment. This has been achieved, through intra- and inter-ministry action on issues of mutual concern. This integrated approach continues to date. In its current configuration, the Ministry has principal responsibility for the management of the natural environment and its critical resources – a responsibility that is not taken lightly by its various agencies.

The Government's commitment to the protection of our coastal and marine resources was cemented with the creation of the Coastal Conservation Project Unit in 1983; and the ultimate establishment of the Coastal Zone Management Unit (CZMU) in 1995. Since its early inception, successive governments have recognized the significant and valuable scientific contribution this agency has made to the long term sustainable development of the island's coasts. The Coastal Conservation Programme for Barbados is approaching 30 years of active shoreline management. It has been a long road that has been ably assisted by the Inter American Development Bank throughout all of its five project stages.

Those steps are:

- One Diagnostic and Pre Feasibility Studies for the West and South coasts 1982 – 84,
- Two Institutional Strengthening Study 1991 – 93,
- Three Feasibility and Pre investment Studies for the West and South coasts 1991 – 95,
- Four Diagnostic, Feasibility and Pre investment Studies for the North, East and Southeast coasts 1996 – 99
- Five Infrastructure Investment 2003 – 2009

Under the most recently concluded US\$ 25 million dollar Coastal Infrastructure Programme, a new dimension in coastal engineering design standards was introduced with the construction of the south coast boardwalk and west coast access way and the redevelopment of the Welches beach in Christ Church.

I understand that you will visit these locations on your field trip tomorrow. As our Prime Minister, the Honourable Freundel Stuart stated only last week, this last phase of our integrated coastal zone management programme which concluded only last year, displays the types of technical interventions necessary to combat the issues of sea-level rise and coastal erosion, enhanced economic development along coastal areas that were not traditionally accessible, while providing added recreational value for both locals and visitors alike. He further stated and I quote "It presents the ideals that must underpin the transition to a climate-resilient small island green economy."

Ladies and Gentlemen

In February, the Prime Minister signed a loan agreement with the Inter-American Development Bank (IDB) for US\$30 million dollars with a counterpart Barbados contribution of US\$12 million for a Coastal Risk Assessment and Management Programme which will commence in the next fiscal year. This new project will take Barbados into new and exciting dimensions in Integrated Coastal Zone Management. The overall objective is to build capacity in integrating coastal risk management in Barbados, incorporating disaster risk reduction and climate change adaptation in the development and monitoring of the coastal zone. It is intended to build resilience to coastal hazards (including those associated with climate change), through enhanced conservation and management of the island's coastal zone.

The new project has three components:

1. Coastal risk assessment monitoring and management  
This will provide updated and new qualitative and quantitative data on coastal risk and make use of state of the art tools for the systematic routine and efficient use of the quantitative risk information in the development of decision making.
2. Coastal Infrastructure  
This component aims to control shoreline erosion, improve resilience of coastal infrastructure to climate change and other hazards and improve access to beaches, thereby avoiding damages to shorefront properties and public infrastructure and enhancing the recreational opportunities offered to local citizens and residents and tourists.
3. Institutional sustainability for the implementation of the integrated coastal risk management programme  
This cross cutting component aims at establishing the conditions needed for long term sustainability of the actions and investments carried out under the project.

This bold new approach diverges from the past projects, with the emphasis being on the mainstreaming of two topical subjects that often have difficulty in transcending all sectors of government and the private sector – climate change adaptation and disaster risk reduction. I am sure that you will be going into greater detail on this project as part of the workshop.

Coastal resilience has to be the new frontier in coastal conservation and Integrated Coastal Zone Management. It can only be achieved through science that is thorough and cross sectoral which generates results that are demonstrable and easily understood and applicable at all levels. That will be the principle aim and output of the home grown Coastal Risk Assessment and Management programme for Barbados.

While we have made significant strides over the years, the Ministry has recognized that with all the best intentions in the world, it is often difficult to impart on some of the decision makers the significant importance that some small sections of the environment can play in maintaining the natural balance and social well being of this island of ours. Suffice it to say that there is sometimes a trade-off between environment and development. However we have to be very careful how we strike that balance and ensure that the environment is not endangered.

Fortunately the island has a National Sustainable Development Policy, and a Medium Term Development Plan with environments as one of the core components.

Increasingly the world is recognizing that environmental considerations should not be branded as “intangible”. Resource economics has increasingly led the way over the last decade or so, to dispel this misconception, however it is still generally a “hard sell” in some quarters to some decision makers – as it is still not considered to be part of the “practiced” economic science mainstream. This is probably an experience that many of you can relate to.

In Barbados, we recognise the importance of for ensuring a sustainable viable coastline. Given our small size, it has to be remembered that the entire island needs to be considered as a coastal zone, despite the fact that for land use planning and physical development purposes, the coastal zone may be defined by the immediate land sea interface, and its adjoining water bodies.

As was experienced and clearly demonstrated last October, just prior to and during Tropical Storm Tomas, incidences of storm water runoff in the central areas of the island reached the coastline within a few hours, following the natural watercourses and the more



recently constructed major artificial water conduits/waterways (that is, roads) before discharging directly into the nearshore. It is now necessary to be able to put a “cost” to some of the physical damage experienced in post-storm events, as well as to provide realistic, quantifiable values and associated damage costs as a result of loss, along the shoreline.

It can be said therefore that integrated coastal management sits at the heart of many of the environmental issues affecting Barbados – principally because it is the coast that is the end point where all damage will be experienced - either as a result of surficial or subsurficial impacts – and it is that coast that is the breadbasket that sustains us! It is imperative that due recognition be given to Integrated Coastal Zone Management and its need for integration across all sectors of government.

Ladies and Gentlemen, it is my sincere hope that this workshop is as successful as the agenda presents and that it can be repeated biannually across the region as we go forward. A greater appreciation of the techniques currently being employed by all countries should be shared, freely investigated and that information exchanged through regional south - south collaboration and cooperation.

I congratulate you on the implementation of this initiative, and look forward to reviewing the results of the workshop when they become fully available.

ANNEX III

**LIST OF PARTICIPANTS**

**I. PARTICIPANTS FROM  
MEMBER STATES**

**Antigua & Barbuda**

Mr Mark Archibald  
Fisheries Officer  
Fisheries Division  
Point Wharf  
St. Johns, Antigua  
Tel: 268 4621372  
Fax: 268 4621372  
E-mail: fisheriesantigua@gmail.com

Ms Adelle Blair  
Sustainable Tourism Officer  
Ministry of Tourism, Civil Aviation and Culture  
Queen Elizabeth Highway, St. John's  
St John, Antigua & Barbuda  
Tel: 268 460985  
Fax: 268 4606093  
E-mail: aacblair@yahoo.co.uk

**Barbados**

Mr Simon Alleyne  
Department of Emergency Management  
30 Warrens Industrial Park, St. Michael  
Barbados  
Tel: (246) 438 7575  
Fax: (246) 421 8612  
E-mail:

Mr Ricardo Arthur  
Coastal Engineer  
Coastal Zone Management Unit  
Bay Street, St. Michael, Barbados  
Tel : (246) 228 5950  
Fax: (246) 228 5956  
E-mail: rarthur@coastal.gov.bb

Dr Leo Brewster  
Director  
Coastal Zone Management Unit  
Bay Street, St. Michael, Barbados  
Tel : (246) 228 5950  
Fax: (246) 228 5956  
E-mail: director@coastal.gov.bb

Ms Angelique Brathwaite  
Marine Biologist  
Coastal Zone Management Unit  
Bay Street St. Michael, Barbados  
Tel.: (246) 228 5950  
Fax: (246) 228 5956  
E-mail: abrathwaite@coastal.gov.bb

Mr Anthony Headley  
Deputy Director  
Environmental Protection Department  
Dalkeith, St. Michael, Barbados  
Tel : (246) 310 3602  
Fax : (246) 228 7103  
E-mail: enveng@caribsurf.com

Mr Fabian Hinds  
Research Officer  
Coastal Zone Management Unit  
Bay Street, St. Michael, Barbados  
Tel : (246) 228 5950  
Fax: (246) 228 5956  
E-mail: fhinds@coastal.gov.bb

Dr Lorna Inniss  
Deputy Director  
Coastal Zone Management Unit  
Bay Street, St. Michael, Barbados  
Tel : (246) 228 5950  
Fax: (246) 228 5956  
E-mail: linniss@coastal.gov.bb

Mr Ramon Roach  
Water Quality Analyst  
Coastal Zone Management Unit  
Bay Street, St. Michael, Barbados  
Tel : (246) 228 5950  
Fax: (246) 228 5956  
E-mail: rroach@coastal.gov.bb

Mr Antonio Rowe  
Project Director  
Coastal Zone Management Unit  
Bay Street, St. Michael, Barbados  
Tel : (246) 228 5950  
Fax: (246) 228 5956  
E-mail: arowe@coastal.gov.bb

Ms Allison Wiggins  
Coastal Planner  
Coastal Zone Management Unit  
Bay Street, St. Michael, Barbados  
Tel : (246) 228 5950  
Fax: (246) 228 5956  
E-mail: awiggins@coastal.gov.bb

**Curacao**

Mr Alfredo Capello  
Weather Forecaster  
Meteorological Department Curacao  
SERU MAHUMA z/n  
Willemstad, Curacao

Tel: 599-9-0393371  
Fax: 599-9-8692699  
E-mail: fred.capello@meteo.an

Mr Mark Vermeij  
CARMABI  
University of Amsterdam  
Piscaderabaai z/n  
Willemstad, Curacao  
Tel: 599- 9-5103067  
Fax: 599- 9-4624242  
E-mail: carmabilog@gmail.com

### **Grenada**

Mr Paul Phillip  
Senior Environmental Officer  
Ministry of Foreign Affairs, Environment  
Foreign Trade and Export  
Financial Complex  
Carenage, St. George  
Grenada  
Tel: 440 2101  
Fax: 440 0775  
E-mail:paul.phillip@gmail.com

Mr Gordon Paterson  
Head of Watershed Management Unit  
Ministry of Agriculture  
Forestry Department  
Queens Park, St. George  
Grenada  
Tel: 4402934  
Cel Phone: 537 8619  
Fax:  
E-mail:massaiman2004@yahoo.com

### **Guyana**

Mr Aditya Persaud  
Guyana Mangrove Restoration Project  
GMRP Office, NAREI, Mon Repos  
East Coast Dem, Guyana  
Georgetown, Guyana  
Tel: 592 2202843/601 3931(c)  
E-mail: adityapersaud@gmail.com

Mr Mahendra Nauth Ramjit  
Ministry of Agriculture  
Mahaica/Mahaicony Abany  
Agriculture Development Authority  
Ohuenwegt, West Coast Berbice  
Guyana  
Tel: 592 6747044  
Fax: 592 3282291  
E-mail:anattr@yahoo.com

### **Jamaica**

Mr Vivian Karl Blake  
Coordinator  
Environment and Planning Agency (NEPA)  
10-11 Caledonia Avenue  
Kingston 5,  
Jamaica West Indies  
Tel: 876 754 7540  
Fax: 876 754 7599  
E-mail:vblake@nepa.gov.jm

Ms Loureene Jones  
National Environment and Planning Agency  
Acting Coordinator  
Ecosystem Management Branch  
10 & 11 Caledonia Avenue  
Kingston 5, Jamaica  
Tel: 876 7547540  
Fax: 876 7547595  
E-mail: ljones-smith@nepa.gov.jm

### **St. Lucia**

Ms Jasmine G. Weeks  
Physical Planning Officer  
Ministry of Physical Development & Environment  
Graham Louisy Administrative Building  
Waterfront, Castries  
St. Lucia  
Tel: 758 4685044  
Fax:  
E-mail:jweekes@gosl.gov.lc

Mr Christopher Williams  
Physical Planning Officer  
Government of St. Lucia  
Ministry of Physical Development  
P.O. Box 449, Castries  
Castries, St. Lucia  
Tel: 758 7173740  
Fax:  
E-mail: cw5711@gmail.com

### **Trinidad & Tobago**

Mr Lester W. Doodnath  
Officer in Charge Technical Advisory Services  
Institute of Marine Affairs  
Hilltop Lane, Chaguaramas  
P.O. Box 3160 Carenage  
Trinidad & Tobago  
Tel: 868 6344291 Ext. 2543  
Fax: 868 6344433  
E-mail: lwdoodnath@ima.gov.tt

## II. IOCARIBE SECRETARIAT

Mr Cesar Toro  
IOC (UNESCO) Secretary for IOCARIBE  
/Secretario de la COI (UNESCO) para  
IOCARIBE  
Centro, Calle de la Factoría # 36-57  
Apartado Aéreo 1108  
Cartagena de Indias, Colombia  
Tel.: (575) 664 0955 Kingston: (876) 6305300  
Fax: (575) 664 0288 Kingston (876) 6305325  
E-mail: c.toro@unesco.org

Ms Patricia Wills Velez  
Assistant Secretary IOCARIBE-UNESCO  
Centro, Calle de la Factoría # 36-57  
Apartado Aéreo 1108  
Cartagena de Indias, Colombia  
Tel.: (575) 664 0955  
Fax: (575) 664 0288  
E-mail: p.wills-velez@unesco.org

Ms Veronica Baker  
CZM Intern  
IOCARIBE - UNESCO  
Centro, Calle de la Factoría # 36-57  
Apartado Aéreo 1108  
Cartagena de Indias, Colombia  
Tel.: (575) 664 0955  
Fax: (575) 664 0288  
E-mail: vbaker07@gmail.com

## ANNEX IV

### LIST OF ACRONYMS AND ABBREVIATIONS

<b>CZMU</b>	Coastal Zone Management Unit
<b>CARICOM</b>	Caribbean Community
<b>CEHI</b>	Caribbean Environmental Health Institute
<b>CLME</b>	Caribbean Large Marine Ecosystems
<b>CMA</b>	Caribbean Marine Atlas
<b>CRAMP</b>	Coastal Risk Assessment and Management Programme
<b>CVA</b>	Coastal Vulnerability Assessment
<b>CVI</b>	Coastal vulnerability index
<b>CZMU</b>	Coastal Zone Management Unit
<b>DEM</b>	Department of Emergency Management
<b>EIA</b>	Environmental Impact Assessment
<b>EPD</b>	Environmental Protection Department
<b>GDP</b>	Gross Domestic Product
<b>GEF</b>	Global Environment Facility
<b>GLOSS</b>	Global Sea-level Observing System
<b>GOOS</b>	Global Ocean Observing System
<b>IAMSLIC</b>	International Association of Aquatic and Marine Science Libraries and Information Centers
<b>ICAM</b>	Integrated Coastal Area Management
<b>ICG-CARIBE-EWS</b>	Intergovernmental Coordination Group for the Caribbean Early Warning System
<b>ICM</b>	Integrated Coastal Management
<b>ICZM</b>	Integrated Coastal Zone Management
<b>IDB</b>	Inter-American Development Bank
<b>IMA</b>	Institute of Marine Affairs
<b>IOC</b>	Intergovernmental Oceanographic Commission
<b>IOCARIBE</b>	IOC UNESCO Sub-commission for the Caribbean and Adjacent regions
<b>IWCAM</b>	Integrating Watershed and Coastal Area Management
<b>LAC</b>	Latin America and the Caribbean
<b>LBS</b>	Land Based Sources
<b>MEWRD</b>	Ministry of Environment Water Resources and Drainage

<b>MPCA</b>	Marine Pollution Control Act
<b>NEPA</b>	National Environment and Planning Agency
<b>OECS</b>	Organization of Eastern Caribbean States
<b>SIDS</b>	Small Island Developing States
<b>UN</b>	United Nations
<b>UNEP</b>	United Nations Environment Programme
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organization
<b>WSSD</b>	World Summit on Sustainable Development

# IOC Workshop Reports

The Scientific Workshops of the Intergovernmental Oceanographic Commission are sometimes jointly sponsored with other intergovernmental or non-governmental bodies. In most cases, IOC assures responsibility for printing, and copies may be requested from:

Intergovernmental Oceanographic Commission – UNESCO  
1, rue Miollis, 75732 Paris Cedex 15, France

No.	Title	Languages	No.	Title	Languages	No.	Title	Languages
1	CCOP-IOC, 1974, Metallogenesis, Hydrocarbons and Tectonic Patterns in Eastern Asia (Report of the IDOE Workshop on); Bangkok, Thailand, 24-29 September 1973 UNDP (CCOP).	E (out of stock)		5-9 June 1978 (UNESCO reports in marine sciences, No. 5, published by the Division of Marine Sciences, UNESCO).		40	24-29 September 1985. IOC Workshop on the Technical Aspects of Tsunami Analysis, Prediction and Communications; Sidney, B.C., Canada, 29-31 July 1985.	E
2	CICAR Ichthyoplankton Workshop, Mexico City, 16-27 July 1974 (UNESCO Technical Paper in Marine Sciences, No. 20).	E (out of stock) S (out of stock)	20	Second CCOP-IOC Workshop on IDOE Studies of East Asia Tectonics and Resources; Bandung, Indonesia, 17-21 October 1978	E	40 Suppl.	First International Tsunami Workshop on Tsunami Analysis, Prediction and Communications, Submitted Papers; Sidney, B.C., Canada, 29 July-1 August 1985.	E
3	Report of the IOC/GFCM/ICSEM International Workshop on Marine Pollution in the Mediterranean; Monte Carlo, 9-14 September 1974.	E, F E (out of stock)	21	Second IDOE Symposium on Turbulence in the Ocean; Liège, Belgium, 7-13 May 1979.	E, F, S, R	41	First Workshop of Participants in the Joint	E
4	Report of the Workshop on the Phenomenon known as 'El Niño'; Guayaquil, Ecuador, 4-12 December 1974.	E (out of stock) S (out of stock)	22	Third IOC/WMO Workshop on Marine Pollution Monitoring; New Delhi, 11-15 February 1980.	E, F, S, R		FAO/IOC/WHO/IAEA/UNEP Project on Monitoring of Pollution in the Marine Environment of the West and Central African Region (WACAF/2); Dakar, Senegal, 28 October-1 November 1985.	E
5	IDOE International Workshop on Marine Geology and Geophysics of the Caribbean Region and its Resources; Kingston, Jamaica, 17-22 February 1975	E (out of stock) S	23	WESTPAC Workshop on the Marine Geology and Geophysics of the North-West Pacific; Tokyo, 27-31 March 1980.	E, R	43	IOC Workshop on the Results of MEDALPEX and Future Oceanographic Programmes in the Western Mediterranean; Venice, Italy, 23-25 October 1985.	E
6	Report of the CCOP/SOPAC-IOC IDOE International Workshop on Geology, Mineral Resources and Geophysics of the South Pacific; Suva, Fiji, 1-6 September 1975.	E	24	Workshop on the Inter-calibration of Sampling Procedures of the IOC/WMO/UNEP Pilot Project on Monitoring Background Levels of Selected Pollutants in Open-Ocean Waters; Bermuda, 11-26 January 1980.	E (Superseded by IOC Technical Series No.22)	44	IOC-FAO Workshop on Recruitment in Tropical Coastal Demersal Communities; Ciudad del Carmen, Campeche, Mexico, 21-25 April 1986.	E (out of stock) S
7	Report of the Scientific Workshop to Initiate Planning for a Co-operative Investigation in the North and Central Western Indian Ocean, organized within the IDOE under the sponsorship of IOC/FAO (IOFC)/UNESCO/ EAC; Nairobi, Kenya, 25 March-2 April 1976.	E, F, S, R	25	IOC Workshop on Coastal Area Management in the Caribbean Region; Mexico City, 24 September- 5 October 1979.	E, S	44 Suppl.	IOC-FAO Workshop on Recruitment in Tropical Coastal Demersal Communities, Submitted Papers; Ciudad del Carmen, Campeche, Mexico, 21-25 April 1986.	E
8	Joint IOC/FAO (IPFC)/UNEP International Workshop on Marine Pollution in East Asian Waters; Penang, 7-13 April 1976	E (out of stock)	26	CCOP/SOPAC-IOC Second International Workshop on Geology, Mineral Resources and Geophysics of the South Pacific; Noumea, New Caledonia, 9-15 October 1980.	E	45	IOCARIBE Workshop on Physical Oceanography and Climate; Cartagena, Colombia, 19-22 August 1986.	E
9	IOC/CMG/SCOR Second International Workshop on Marine Geoscience; Mauritius 9-13 August 1976.	E, F, S, R	27	FAO/IOC Workshop on the effects of environmental variation on the survival of larval pelagic fishes. Lima, 20 April-5 May 1980.	E	46	Reunión de Trabajo para Desarrollo del Programa "Ciencia Oceánica en Relación a los Recursos No Vivos en la Región del Atlántico Sud-occidental"; Porto Alegre, Brasil, 7-11 de abril de 1986.	S
10	IOC/WMO Second Workshop on Marine Pollution (Petroleum) Monitoring; Monaco, 14-18 June 1976	E, F E (out of stock)	28	WESTPAC Workshop on Marine Biological Methodology; Tokyo, 9-14 February 1981.	E	47	IOC Symposium on Marine Science in the Western Pacific: The Indo-Pacific Convergence; Townsville, 1-6 December 1966	E
11	Report of the IOC/FAO/UNEP International Workshop on Marine Pollution in the Caribbean and Adjacent Regions; Port of Spain, Trinidad, 13-17 December 1976.	E, S (out of stock)	29	International Workshop on Marine Pollution in the South-West Atlantic; Montevideo, 10-14 November 1980.	E (out of stock) S	48	IOCARIBE Mini-Symposium for the Regional Development of the IOC-UN (OETB) Programme on 'Ocean Science in Relation to Non-Living Resources (OSNLR)'; Havana, Cuba, 4-7 December 1986.	E, S
11 Suppl.	Collected contributions of invited lecturers and authors to the IOC/FAO/UNEP International Workshop on Marine Pollution in the Caribbean and Adjacent Regions; Port of Spain, Trinidad, 13-17 December 1976	E (out of stock), S	30	Third International Workshop on Marine Geoscience; Heidelberg, 19-24 July 1982.	E, F, S	49	AGU-IOC-WMO-CPPS Chapman Conference: An International Symposium on 'El Niño'; Guayaquil, Ecuador, 27-31 October 1986.	E
12	Report of the IOCARIBE Interdisciplinary Workshop on Scientific Programmes in Support of Fisheries Projects; Fort-de-France, Martinique, 28 November-2 December 1977.	E, F, S	31	UNU/IOC/UNESCO Workshop on International Co-operation in the Development of Marine Science, and the Transfer of Technology in the context of the New Ocean Regime; Paris, France, 27 September-1 October 1982.	E, F, S	50	CCALR-IOC Scientific Seminar on Antarctic Ocean Variability and its Influence on Marine Living Resources, particularly Krill (organized in collaboration with SCAR and SCOR); Paris, France, 2-6 June 1987.	E
13	Report of the IOCARIBE Workshop on Environmental Geology of the Caribbean Coastal Area; Port of Spain, Trinidad, 16-18 January 1978.	E, S	32 Suppl.	Papers submitted to the UNU/IOC/ UNESCO Workshop on International Co-operation in the Development of Marine Science, and the Transfer of Technology in the Context of the New Ocean Regime; Paris, France, 27 September-1 October 1982.	E	51	CCOP/SOPAC-IOC Workshop on Coastal Processes in the South Pacific Island Nations; Lae, Papua-New Guinea, 1-8 October 1987.	E
14	IOC/FAO/WHO/UNEP International Workshop on Marine Pollution in the Gulf of Guinea and Adjacent Areas; Abidjan, Côte d'Ivoire, 2-9 May 1978	E, F	33	Workshop on the IREP Component of the IOC Programme on Ocean Science in Relation to Living Resources (OSLR); Halifax, 26-30 September 1983.	E	52	SCOR-IOC-UNESCO Symposium on Vertical Motion in the Equatorial Upper Ocean and its Effects upon Living Resources and the Atmosphere; Paris, France, 6-10 May 1985.	E
15	CPPS/FAO/IOC/UNEP International Workshop on Marine Pollution in the South-East Pacific; Santiago de Chile, 6-10 November 1978.	E (out of stock)	34	IOC Workshop on Regional Co-operation in Marine Science in the Central Eastern Atlantic (Western Africa); Tenerife, 1963.	E, F, S	53	IOC Workshop on the Biological Effects of Pollutants; Oslo, 11-29 August 1986.	E
16	Workshop on the Western Pacific, Tokyo, 19-20 February 1979.	E, F, R	35	CCOP/SOPAC-IOC-UNU Workshop on Basic Geo-scientific Marine Research Required for Assessment of Minerals and Hydrocarbons in the South Pacific; Suva, Fiji, 3-7 October 1983.	E	54	Workshop on Sea-Level Measurements in Hostile Conditions; Bidston, UK, 28-31 March 1988.	E
17	Joint IOC/WMO Workshop on Oceanographic Products and the IGOS Data Processing and Services System (IDPSS); Moscow, 9-11 April 1979.	E	36	IOC/FAO Workshop on the Improved Uses of Research Vessels; Lisbon, Portugal, 28 May-2 June 1984.	E	55	IBCCA Workshop on Data Sources and Compilation, Boulder, Colorado, 18-19 July 1988.	E
17 suppl.	Papers submitted to the Joint IOC/WMO Seminar on Oceanographic Products and the IGOS Data Processing and Services System; Moscow, 2-6 April 1979.	E	36 Suppl.	Papers submitted to the IOC/FAO Workshop on the Improved Uses of Research Vessels; Lisbon, 28 May-2 June 1984	E	56	IOC-FAO Workshop on Recruitment of Penaeid Prawns in the Indo-West Pacific Region (PREP); Cleveland, Australia, 24-30 July 1988.	E
18	IOC/UNESCO Workshop on Syllabus for Training Marine Technicians; Miami, U.S.A., 22-26 May 1978 (UNESCO reports in marine sciences, No. 4 published by the Division of Marine Sciences, UNESCO).	E (out of stock), F, S (out of stock), R	37	IOC/UNESCO Workshop on Regional Co-operation in Marine Science in the Central Indian Ocean and Adjacent Seas and Gulfs; Colombo, 8-13 July 1985.	E	57	IOC Workshop on International Co-operation in the Study of Red Tides and Ocean Blooms; Takamatsu, Japan, 16-17 November 1987.	E
19	IOC Workshop on Marine Science Syllabus for Secondary Schools; Llantwit Major, Wales, U.K.,	E (out of stock), S, R, Ar	38	IOC/ROPME/UNEP Symposium on Fate and Fluxes of Oil Pollutants in the Kuwait Action Plan Region; Basrah, Iraq, 8-12 January 1984.	E	58	International Workshop on the Technical Aspects of the Tsunami Warning System; Novosibirsk, USSR, 4-5 August 1989.	E
			39	CCOP (SOPAC)-IOC-IFREMER-ORSTOM Workshop on the Uses of Submersibles and Remotely Operated Vehicles in the South Pacific; Suva, Fiji,	E	58 Suppl.	Second International Workshop on the Technical Aspects of Tsunami Warning Systems. Tsunami Analysis, Preparedness,	E

No.	Title	Languages	No.	Title	Languages	No.	Title	Languages
59	Observation and Instrumentation. Submitted Papers; Novosibirsk, USSR, 4-5 August 1989. IOC-UNEP Regional Workshop to Review Priorities for Marine Pollution Monitoring Research, Control and Abatement in the Wider Caribbean; San José, Costa Rica, 24-30 August 1989.	E, F, S	83	Meeting for the Organization of an International Conference on Coastal Change; Bordeaux, France, 30 September-2 October 1992. IOC Workshop on Donor Collaboration in the Development of Marine Scientific Research Capabilities in the Western Indian Ocean Region; Brussels, Belgium, 12-13 October 1992.	E	103	Liège, Belgium, 5-9 May 1994. IOC Workshop on GIS Applications in the Coastal Zone Management of Small Island Developing States; Barbados, 20-22 April 1994.	E
60	IOC Workshop to Define IOCARIBE-TRODERP proposals; Caracas, Venezuela, 12-16 September 1989.	E	84	Workshop on Atlantic Ocean Climate Variability; Moscow, Russian Federation, 13-17 July 1992.	E	104	Workshop on Integrated Coastal Management; Dartmouth, Canada, 19-20 September 1994.	E
61	Second IOC Workshop on the Biological Effects of Pollutants; Bermuda, 10 September-2 October 1988.	E	85	IOC Workshop on Coastal Oceanography in Relation to Integrated Coastal Zone Management; Kona, Hawaii, 1-5 June 1992.	E	105	BORDOMER 95: Conference on Coastal Change; Bordeaux, France, 6-10 February 1995.	E
62	Second Workshop of Participants in the Joint FAO-IOC-WHO-IAEA-UNEP Project on Monitoring of Pollution in the Marine Environment of the West and Central African Region; Accra, Ghana, 13-17 June 1988.	E	86	International Workshop on the Black Sea; Varna, Bulgaria, 30 September - 4 October 1991.	E	105 Suppl.	Conference on Coastal Change: Proceedings; Bordeaux, France, 6-10 February 1995.	E
63	IOC/WESTPAC Workshop on Co-operative Study of the Continental Shelf Circulation in the Western Pacific; Bangkok, Thailand, 31 October-3 November 1989.	E	87	Taller de trabajo sobre efectos biológicos del fenómeno «El Niño» en ecosistemas costeros del Pacífico Sudeste; Santa Cruz, Galápagos, Ecuador, 5-14 de octubre de 1989.	S only (summary in E, F, S)	106	IOC/WESTPAC Workshop on the Paleogeographic Map; Bali, Indonesia, 20-21 October 1994.	E
64	Second IOC-FAO Workshop on Recruitment of Penaeid Prawns in the Indo-West Pacific Region (PREP); Phuket, Thailand, 25-31 September 1989.	E	88	IOC-CEC-ICSU-ICES Regional Workshop for Member States of Eastern and Northern Europe (GODAR Project); Obninsk, Russia, 17-20 May 1993.	E	107	IOC-ICSU-NIO-NOAA Regional Workshop for Member States of the Indian Ocean - GODAR-III; Dona Paula, Goa, India, 6-9 December 1994.	E
65	Second IOC Workshop on Sardine/Anchovy Recruitment Project (SARP) in the Southwest Atlantic; Montevideo, Uruguay, 21-23 August 1989.	E	89	IOC-ICSEM Workshop on Ocean Sciences in Non-Living Resources; Perpignan, France, 15-20 October 1990.	E	108	UNESCO-IHP-IOC-IAEA Workshop on Sea-Level Rise and the Multidisciplinary Studies of Environmental Processes in the Caspian Sea Region; Paris, France, 9-12 May 1995.	E
66	IOC ad hoc Expert Consultation on Sardine/Anchovy Recruitment Programme; La Jolla, California, U.S.A., 1989.	E	90	IOC Seminar on Integrated Coastal Management; New Orleans, U.S.A., 17-18 July 1993.	E	108 Suppl.	UNESCO-IHP-IOC-IAEA Workshop on Sea-Level Rise and the Multidisciplinary Studies of Environmental Processes in the Caspian Sea Region; Submitted Papers; Paris, France, 9-12 May 1995.	E
67	Interdisciplinary Seminar on Research Problems in the IOCARIBE Region; Caracas, Venezuela, 28 November-1 December 1989.	E (out of stock)	91	Hydroblack'91 CTD Inter-calibration Workshop; Woods Hole, U.S.A., 1-10 December 1991.	E	109	First IOC-UNEP CEPOL Symposium; San José, Costa Rica, 14-15 April 1993.	E
68	International Workshop on Marine Acoustics; Beijing, China, 26-30 March 1990.	E	92	Réunion de travail IOCEA-OSNLR sur le Projet « Budgets sédimentaires le long de la côte occidentale d'Afrique » Abidjan, Côte d'Ivoire, 26-28 juin 1991.	E	110	IOC-ICSU-CEC regional Workshop for Member States of the Mediterranean - GODAR-IV (Global Oceanographic Data Archeology and Rescue Project) Foundation for International Studies, University of Malta, Valletta, Malta, 25-28 April 1995.	E
69	IOC-SCAR Workshop on Sea-Level Measurements in the Antarctica; Leningrad, USSR, 28-31 May 1990.	E	93	IOC-UNEP Workshop on Impacts of Sea-Level Rise due to Global Warming; Dhaka, Bangladesh, 16-19 November 1992.	E	111	Chapman Conference on the Circulation of the Intra-Americas Sea; La Parguera, Puerto Rico, 22-26 January 1995.	E
69 Suppl.	IOC-SCAR Workshop on Sea-Level Measurements in the Antarctica; Submitted Papers; Leningrad, USSR, 28-31 May 1990.	E	94	BMT-IOC-POLARMAR International Workshop on Training Requirements in the Field of Eutrophication in Semi-enclosed Seas and Harmful Algal Blooms, Bremerhaven, Germany, 29 September-3 October 1992.	E	112	IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials (GESREM) Workshop; Miami, U.S.A., 7-8 December 1993.	E
70	IOC-SAREC-UNEP-FAO-IAEA-WHO Workshop on Regional Aspects of Marine Pollution; Mauritius, 29 October - 9 November 1990.	E	95	SAREC-IOC Workshop on Donor Collaboration in the Development of Marine Scientific Research Capabilities in the Western Indian Ocean Region; Brussels, Belgium, 23-25 November 1993.	E	113	IOC Regional Workshop on Marine Debris and Waste Management in the Gulf of Guinea; Lagos, Nigeria, 14-16 December 1994.	E
71	IOC-FAO Workshop on the Identification of Penaeid Prawn Larvae and Postlarvae; Cleveland, Australia, 23-28 September 1990.	E	96	IOC-UNEP-WMO-SAREC Planning Workshop on an Integrated Approach to Coastal Erosion, Sea Level Changes and their Impacts; Zanzibar, United Republic of Tanzania, 17-21 January 1994.	E	114	International Workshop on Integrated Coastal Zone Management (ICZM) Karachi, Pakistan, 10-14 October 1994.	E
72	IOC/WESTPAC Scientific Steering Group Meeting on Co-Operative Study of the Continental Shelf Circulation in the Western Pacific; Kuala Lumpur, Malaysia, 9-11 October 1990.	E	96 Suppl.	IOC-UNEP-WMO-SAREC Planning Workshop on an Integrated Approach to Coastal Erosion, Sea Level Changes and their Impacts; Submitted Papers 1. Coastal Erosion; Zanzibar, United Republic of Tanzania 17-21 January 1994.	E	115	IOC/GLOSS-IAPSO Workshop on Sea Level Variability and Southern Ocean Dynamics; Bordeaux, France, 31 January 1995.	E
73	Expert Consultation for the IOC Programme on Coastal Ocean Advanced Science and Technology Study; Liège, Belgium, 11-13 May 1991.	E	96 Suppl.	IOC-UNEP-WMO-SAREC Planning Workshop on an Integrated Approach to Coastal Erosion, Sea Level Changes and their Impacts; Submitted Papers 2. Sea Level; Zanzibar, United Republic of Tanzania 17-21 January 1994.	E	116	IOC/WESTPAC International Scientific Symposium on Sustainability of Marine Environment; Review of the WESTPAC Programme, with Particular Reference to ICAM, Bali, Indonesia, 22-26 November 1994.	E
74	IOC-UNEP Review Meeting on Oceanographic Processes of Transport and Distribution of Pollutants in the Sea; Zagreb, Yugoslavia, 15-18 May 1989.	E	97	IOC-UNEP-WMO-SAREC Planning Workshop on an Integrated Approach to Coastal Erosion, Sea Level Changes and their Impacts; Submitted Papers 1. Coastal Erosion; Zanzibar, United Republic of Tanzania 17-21 January 1994.	E	117	Joint IOC-CIDA-Sida (SAREC) Workshop on the Benefits of Improved Relationships between International Development Agencies, the IOC and other Multilateral Inter-governmental Organizations in the Delivery of Ocean, Marine Affairs and Fisheries Programmes; Sidney B.C., Canada, 26-28 September 1995.	E
75	IOC-SCOR Workshop on Global Ocean Ecosystem Dynamics; Solomons, Maryland, U.S.A., 29 April-2 May 1991.	E	97	IOC-UNEP-WMO-SAREC Planning Workshop on an Integrated Approach to Coastal Erosion, Sea Level Changes and their Impacts; Submitted Papers 2. Sea Level; Zanzibar, United Republic of Tanzania 17-21 January 1994.	E	118	IOC-UNEP-NOAA-Sea Grant Fourth Caribbean Marine Debris Workshop; La Romana, Santo Domingo, 21-24 August 1995.	E
76	IOC/WESTPAC Scientific Symposium on Marine Science and Management of Marine Areas of the Western Pacific; Penang, Malaysia, 2-6 December 1991.	E	98	IOC Workshop on Small Island Oceanography in Relation to Sustainable Economic Development and Coastal Area Management of Small Island Developing States; Fort-de-France, Martinique, 8-10 November, 1993.	E	119	IOC Workshop on Ocean Colour Data Requirements and Utilization; Sydney B.C., Canada, 21-22 September 1995.	E
77	IOC-SAREC-KMFRI Regional Workshop on Causes and Consequences of Sea-Level Changes on the Western Indian Ocean Coasts and Islands; Mombasa, Kenya, 24-28 June 1991.	E	99	CoMSBlack '92A Physical and Chemical Inter-calibration Workshop; Erdemli, Turkey, 15-29 January 1993.	E	120	International Training Workshop on Integrated Coastal Management; Tampa, Florida, U.S.A., 15-17 July 1995.	E
78	IOC-CEC-ICES-WMO-ICSU Ocean Climate Data Workshop Goddard Space Flight Center; Greenbelt, Maryland, U.S.A., 18-21 February 1992.	E	100	IOC-SAREC Field Study Exercise on Nutrients in Tropical Marine Waters; Mombasa, Kenya, 5-15 April 1994.	E	121	Atelier régional IOC-CERESCOR sur la gestion intégrée des zones littorales (ICAM), Conakry, Guinée, 18-22 décembre 1995.	F
79	IOC/WESTPAC Workshop on River Inputs of Nutrients to the Marine Environment in the WESTPAC Region; Penang, Malaysia, 26-29 November 1991.	E	101	IOC-SOA-NOAA Regional Workshop for Member States of the Western Pacific - GODAR-II (Global Oceanographic Data Archeology and Rescue Project); Tianjin, China, 8-11 March 1994.	E	122	IOC-EU-BSH-NOAA-(WDC-A) International Workshop on Oceanographic Biological and Chemical Data Management; Hamburg, Germany, 20-23 May 1996.	E
80	IOC-SCOR Workshop on Programme Development for Harmful Algae Blooms; Newport, U.S.A., 2-3 November 1991.	E	102	IOC Regional Science Planning Workshop on Harmful Algal Blooms; Montevideo, Uruguay, 15-17 June 1994.	E	123	Second IOC Regional Science Planning Workshop on Harmful Algal Blooms in South America; Mar del Plata, Argentina, 30 October-1 November 1995.	E, S
81	Joint IAPSO-IOC Workshop on Sea Level Measurements and Quality Control; Paris, France, 12-13 October 1992.	E	102	First IOC Workshop on Coastal Ocean Advanced Science and Technology Study (COASTS);	E	124	GLOBEC-IOC-SAHFOS-MBA Workshop on the Analysis of Time Series with Particular Reference to the Continuous Plankton Recorder Survey; Plymouth, U.K., 4-7 May 1993.	E
82	BORDOMER 92: International Convention on Rational Use of Coastal Zones. A Preparatory	E			E	125	Atelier sous-régional de la COI sur les ressources marines vivantes du Golfe de Guinée; Cotonou, Bénin, 1-4 juillet 1996.	E



No.	Title	Languages	No.	Title	Languages	No.	Title	Languages
126	IOC-UNEP-PERSGA-ACOPS-IUCN Workshop on Oceanographic Input to Integrated Coastal Zone Management in the Red Sea and Gulf of Aden, Jeddah, Saudi Arabia, 8 October 1995.	E		Workshop on Atmospheric Inputs of Pollutants to the Marine Environment Qingdao, China, 24-26 June 1998		187	Geological and Biological Processes at deep-sea European Margins and Oceanic Basins, Bologna, Italy, 2-6 February 2003	E
127	IOC Regional Workshop for Member States of the Caribbean and South America GODAR-V (Global Oceanographic Data Archeology and Rescue Project); Cartagena de Indias, Colombia, 8-11 October 1996.	E	154	IOC-Sida-Flanders-SFRI Workshop on Ocean Data Management in the IOCINCWIO Region (ODINEA project) Capetown, South Africa, 30 November-11 December 1998.	E	188	Proceedings of 'The Ocean Colour Data' Symposium, Brussels, Belgium, 25-27 November 2002	E
128	Atelier IOC-Banque Mondiale-Sida/SAREC-ONE sur la Gestion Intégrée des Zones Côtières ; Nosy Bé, Madagascar, 14-18 octobre 1996.	E	155	Science of the Mediterranean Sea and its applications UNESCO, Paris 29-31 July 1997	E	189	Workshop for the Formulation of a Draft Project on Integrated Coastal Management (ICM) in Latin America and the Caribbean (LAC), Cartagena, Colombia, 23-25 October 2003	E F (electronic copy only)
129	Gas and Fluids in Marine Sediments, Amsterdam, the Netherlands; 27-29 January 1997.	E	156	IOC-LUC-KMFRI Workshop on RECOSCIX-WIO in the Year 2000 and Beyond, Mombasa, Kenya, 12-16 April 1999	E		Taller de Formulación de un Anteproyecto de Manejo Costero Integrado (MCI) en América Latina y el Caribe (ALC), Cartagena, Colombia, 23-25 de Octubre de 2003	
130	Atelier régional de la COI sur l'océanographie côtière et la gestion de la zone côtière ;Moroni, RFI des Comores, 16-19 décembre 1996.	E	157	'98 IOC-KMI International Workshop on Integrated Coastal Management (ICM), Seoul, Republic of Korea 16-18 April 1998	E	190	First ODINCARSA Planning Workshop for Caribbean Islands, Christchurch, Barbados, 15-18 December 2003	E (electronic copy only)
131	GOOS Coastal Module Planning Workshop; Miami, USA, 24-28 February 1997	E	158	The IOCARIBE Users and the Global Ocean Observing System (GOOS) Capacity Building Workshop, San José, Costa Rica, 22-24 April 1999	E	191	North Atlantic and Labrador Sea Margin Architecture and Sedimentary Processes — International Conference and Twelfth Post-cruise Meeting of the Training-through-research Programme, Copenhagen, Denmark, 29-31 January 2004	E (under preparation)
132	Third IOC-FANSA Workshop; Punta-Arenas, Chile, 28-30 July 1997	S/E	159	Oceanic Fronts and Related Phenomena (Konstantin Fedorov Memorial Symposium) — Proceedings, Pushkin, Russian Federation, 18-22 May 1998	E	192	Regional Workshop on Coral Reefs Monitoring and Management in the ROPME Sea Area, Iran I.R., 14-17 December 2003	E (under preparation)
133	Joint IOC-CIESM Training Workshop on Sea-level Observations and Analysis for the Countries of the Mediterranean and Black Seas; Birkenhead, U.K., 16-27 June 1997.	E	160	Under preparation		193	Workshop on New Technical Developments in Sea and Land Level Observing Systems, Paris, France, 14-16 October 2003	E (electronic copy only)
134	IOC/WESTPAC-CCOP Workshop on Paleogeographic Mapping (Holocene Optimum); Shanghai, China, 27-29 May 1997	E	161	Under preparation		194	IOC/ROPME Planning Meeting for the Ocean Data and Information Network for the Central Indian Ocean Region	(under preparation)
135	Regional Workshop on Integrated Coastal Zone Management; Chabahar, Iran; February 1996.	E	162	Workshop report on the Transports and Linkages of the Intra-american Sea (IAS), Cozumel, Mexico, 1-5 November 1997	E	195	Workshop on Indicators of Stress in the Marine Benthos, Torregrande-Oristano, Italy, 8-9 October 2004	E
136	IOC Regional Workshop for Member States of Western Africa (GODAR-VI); Accra, Ghana, 22-25 April 1997.	E	163	Under preparation		196	International Coordination Meeting for the Development of a Tsunami Warning and Mitigation System for the Indian Ocean within a Global Framework, Paris, France, 3-8 March 2005	E
137	GOOS Planning Workshop for Living Marine Resources, Dartmouth, USA; 1-5 March 1996.	E	164	IOC-Sida-Flanders-MCM Third Workshop on Ocean Data Management in the IOCINCWIO Region (ODINEA Project), Cape Town, South Africa, 29 November - 11 December 1999	E	197	Geosphere-Biosphere Coupling Processes: The TTR Interdisciplinary Approach Towards Studies of the European and North African Margins; International Conference and Post-cruise Meeting of the Training-Through-Research Programme, Morocco, 2-5 February 2005	E
138	Gestión de Sistemas Oceanográficos del Pacífico Oriental; Concepción, Chile, 9-16 de abril de 1996.	S	165	An African Conference on Sustainable Integrated Management; Proceedings of the Workshops, An Integrated Approach, (PACSIKOM), Maputo, Mozambique, 18-25 July 1998	E, F	198	Second International Coordination Meeting for the Development of a Tsunami Warning and Mitigation System for the Indian Ocean, Grand Baie, Mauritius, 14-16 April 2005	E
139	Sistemas Oceanográficos del Atlántico Sudoccidental, Taller, TEMA;Furg, Rio Grande, Brasil, 3-11 de noviembre de 1997	S	166	IOC-SOA International Workshop on Coastal Megacities: Challenges of Growing Urbanization of the World's Coastal Areas; Hangzhou, P.R. China, 27-30 September 1999	E	199	International Conference for the Establishment of a Tsunami and Coastal Hazards Warning System for the Caribbean and Adjacent Regions, Mexico, 1-3 June 2005	E
140	IOC Workshop on GOOS Capacity Building for the Mediterranean Region; Valletta, Malta, 26-29 November 1997.	E	167	IOC-Flanders First ODINAFRICA-II Planning Workshop, Dakar, Senegal, 2-4 May 2000	E	200	Lagoons and Coastal Wetlands in the Global Change Context: Impacts and Management Issues — Proceedings of the International Conference, Venice, 26-28 April 2004 (ICAM Dossier N° 3)	E
141	IOC/WESTPAC Workshop on Co-operative Study in the Gulf of Thailand: A Science Plan; Bangkok, Thailand, 25-28 February 1997.	E	168	Geological Processes on European Continental Margins; International Conference and Eight Post-cruise Meeting of the Training-Through-Research Programme, Granada, Spain, 31 January - 3 February 2000	E	201	Geological processes on deep-water European margins - International Conference and 15th Anniversary Post-cruise Meeting of the Training-Through-Research Programme, Moscow/Zvenigorod, Russian Federation, 29 January-4 February 2006	E
142	Pelagic Biogeography ICoPB II. Proceedings of the 2nd International Conference. Final Report of SCOR/IOC Working Group 93; Noordwijkerhout, The Netherlands, 9-14 July 1995.	E	169	International Conference on the International Oceanographic Data & Information Exchange in the Western Pacific (IODE-WESTPAC) 1999, ICWP '99, Langkawi, Malaysia, 1-4 November 1999	E (electronic copy only)	202	Proceedings of 'Ocean Biodiversity Informatics': an international conference on marine biodiversity data management Hamburg, Germany, 29 November-1 December 2004	E
143	Geosphere-biosphere coupling: Carbonate Mud Mounds and Cold Water Reefs; Gent, Belgium, 7-11 February 1998.	E	170	IOCARIBE-GODAR-I Cartagena, Colombia, February 2000	under preparation	203	IOC-Flanders Planning Workshop for the formulation of a regional Pilot Project on Integrated Coastal Area Management in Latin America, Cartagena de Indias, Colombia, 16-18 January 2007	E (electronic copy only)
144	IOC-SOPAC Workshop Report on Pacific Regional Global Ocean Observing Systems; Suva, Fiji, 13-17 February 1998.	E	171	Ocean Circulation Science derived from the Atlantic, Indian and Arctic Sea Level Networks, Toulouse, France, 10-11 May 1999	E	204	Geo-marine Research along European Continental Margins, International Conference and Post-cruise Meeting of the Training-through-research Programme, Bremen, Germany, 29 January-1 February 2007	E
145	IOC-Black Sea Regional Committee Workshop: 'Black Sea Fluxes' Istanbul, Turkey, 10-12 June 1997.	E	172	(Under preparation)		205	IODE/ICAM Workshop on the development of the Caribbean marine atlas (CMA), United Nations House, Bridgetown, Barbados, 8-10 October 2007	E (electronic copy only)
146	Taller Internacional sobre Formacion de Capacidades para el Manejo de las Costas y los Océanos en le Gran Caribe. La Habana, - Cuba, 7-10 de Julio de 1998 / International Workshop on Management Capacity-Building for Coasts and Oceans in the Wider Caribbean, Havana, Cuba, 7-10 July 1998	S/E	173	The Benefits of the Implementation of the GOOS in the Mediterranean Region, Rabat, Morocco, 1-3 November 1999	E, F	206	IODE/JCOMM Forum on Oceanographic Data Management and Exchange Standards, Ostend, Belgium, 21-25 January 2008	(Under preparation)
147	IOC-SOA International Training Workshop on the Integration of Marine Sciences into the Process of Integrated Coastal Management, Dalian, China, 19-24 May 1997.	E	174	IOC-SOPAC Regional Workshop on Coastal Global Ocean Observing System (GOOS) for the Pacific Region, Apia, Samoa, 16-17 August 2000	E	207	SCOR/IODE Workshop on Data Publishing, Ostend, Belgium, 17-18 June 2008	(Under preparation)
148	IOC/WESTPAC International Scientific Symposium - Role of Ocean Sciences for Sustainable Development Okinawa, Japan, 2-7 February 1998.	E	175	Geological Processes on Deep-water European Margins, Moscow-Mozhenka, 28 Jan.-2 Feb. 2001	E	208	JCOMM Technical Workshop on Wave Measurements from Buoys, New York, USA, 2-3 October 2008 (IOC-WMO publication)	(Under preparation)
149	Workshops on Marine Debris & Waste Management in the Gulf of Guinea, 1995-97.	E	176	MedGLOSS Workshop and Coordination Meeting for the Pilot Monitoring Network System of Systematic Sea Level Measurements in the Mediterranean and Black Seas, Haifa, Israel, 15-17 May 2000	E			
150	First IOCARIBE-ANCA Workshop Havana, Cuba, 29 June-1 July 1998.	E	177	(Under preparation)				
151	Taller Pluridisciplinario TEMA sobre Redes del Gran Caribe en Gestión Integrada de Areas Costeras Cartagena de Indias, Colombia, 7-12 de septiembre de 1998.	S	178	(Under preparation)				
152	Workshop on Data for Sustainable Integrated Coastal Management (SICOM) Maputo, Mozambique, 18-22 July 1998	E	179	(Under preparation)				
153	IOC/WESTPAC-Sida (SAREC)	E	180	Abstracts of Presentations at Workshops during the 7 <sup>th</sup> session of the IOC Group of Experts on the Global Sea Level Observing System (GLOSS), Honolulu, USA, 23-27 April 2001	E			
			181	(Under preparation)				
			182	(Under preparation)				
			183	Geosphere/Biosphere/Hydrosphere Coupling Process, Fluid Escape Structures and Tectonics at Continental Margins and Ocean Ridges, International Conference & Tenth Post-cruise Meeting of the Training-through-Research Programme, Aveiro, Portugal, 30 January-2 February 2002	E			
			184	(Under preparation)				
			185	(Under preparation)				
			186	(Under preparation)				
			186	(Under preparation)				

No.	Title	Languages	No.	Title	Languages
209	Collaboration between IOC and OBIS towards the Long-term Management Archival and Accessibility of Ocean Biogeographic Data, Ostend, Belgium, 24–26 November 2008	(Under preparation)	234	Southern and Indian Surface Ocean CO <sub>2</sub> Atlas (SOCAT) Workshop, CSIRO Marine Laboratories, Hobart, Tasmania 16–18 June 2010	E (electronic copy only)
210	Ocean Carbon Observations from Ships of Opportunity and Repeat Hydrographic Sections (IOCCP Reports, 1), Paris, France, 13–15 January 2003	E (electronic copy only)	235	The Caribbean Marine Atlas (CMA) Review and Planning Workshop and Saint Lucia National Coastal Atlas Stakeholder Event, Bay Gardens Inn, Rodney Bay, Saint Lucia, 2–6 August 2010	E (electronic copy only)
211	Ocean Surface pCO <sub>2</sub> Data Integration and Database Development (IOCCP Reports, 2), Tsukuba, Japan, 14–17 January 2004	E (electronic copy only)	236	First Session of the IODE Steering Group for the IODE OceanDataPortal (SG-ODP-1) 20–22 September 2010, Ostend, Belgium	E (electronic copy only)
212	International Ocean Carbon Stakeholders' Meeting, Paris, France, 6–7 December 2004	E (electronic copy only)	237.	In preparation	
213	International Repeat Hydrography and Carbon Workshop (IOCCP Reports, 4), Shonan Village, Japan, 14–16 November 2005	E (electronic copy only)	238.	In preparation	
214	Initial Atlantic Ocean Carbon Synthesis Meeting (IOCCP Reports, 5), Reykjavik, Iceland, 28–30 June 2007	E (electronic copy only)	239.	In preparation	
215	Surface Ocean Variability and Vulnerability Workshop (IOCCP Reports, 7), Paris, France, 11–14 April 2007	E (electronic copy only)	240.	Ocean Biogeographic Information System (OBIS) Infrastructure Meeting, INCOIS, Hyderabad, India, 2–4 March 2011.	E (electronic copy only)
216	Surface Ocean CO <sub>2</sub> Atlas Project (SOCAT) 2nd Technical Meeting Report (IOCCP Reports, 9), Paris, France, 16–17 June 2008	E (electronic copy only)	241.	In preparation	
217	Changing Times: An International Ocean Biogeochemical Time-Series Workshop (IOCCP Reports, 11), La Jolla, California, USA, 5–7 November 2008	E (electronic copy only)	242.	Integrated Coastal Area Management (ICAM) Training Workshop for the English Speaking Caribbean States, 16–18 March 2011, Bridgetown, Barbados	E (electronic copy only)
218	Second Joint GOSUD/SAMOS Workshop, Seattle, Washington, USA, 10–12 June 2008	E (electronic copy only)			
219	International Conference on Marine Data management and Information Systems (IMDIS), Athens, Greece, 31 March–2 April 2008	E			
220	Geo-marine Research on the Mediterranean and European-Atlantic Margins, International Conference and TTR-17 Post-cruise Meeting of the Training-through-research Programme, Granada, Spain, 2–5 February 2009	E (electronic copy only)			
221	Surface Ocean CO <sub>2</sub> Atlas Project Pacific Regional Workshop, Tsukuba, Japan, 18–20 March, 2009 (IOCCP Report Number 12)	E (electronic copy only)			
222	Surface Ocean CO <sub>2</sub> Atlas Project Atlantic and Southern Oceans Regional Meeting, Norwich, UK, 25–26 June, 2009 (IOCCP Report Number 13)	E (electronic copy only)			
223	Advisory Workshop on enhancing forecasting capabilities for North Indian Ocean Storm Surges, Indian Institute of Technology (IIT), New Delhi, India, 14–17 July 2009	E (electronic copy only)			
224	2009 International Nutrients Scale System (INSS) Workshop Report, Paris, France, 10–12 February 2009	E (electronic copy only)			
225	Reunión subregional de planificación de ODINCARSA (Red de Datos e Información Oceanográficas para las Regiones del Caribe y América del Sur)/ ODINCARSA (Ocean Data and Information Network for the Caribbean and South America region) Latin America sub-regional Planning Meeting, Universidad Autónoma de Baja California (UABC), Ensenada (México), 7–10 December 2009, 2010	E/S (electronic copy only)			
226	OBIS (Ocean Biogeographic Information System) Strategy and Work plan Meeting, IOC Project Office for IODE, Ostende, Belgium, 18–20 November 2009	E (electronic copy only)			
227	ODINAFRICA-IV Project Steering Committee, First Session, Ostend, Belgium, 20–22 January 2010.	E (electronic copy only)			
228	First IODE Workshop on Quality Control of Chemical Oceanographic Data Collections, Ostend, Belgium, 8–11 February 2010, 2010	E (electronic copy only)			
229	Surface Ocean CO <sub>2</sub> Atlas Project Equatorial Pacific, North Pacific, and Indian Ocean Regional Workshop, Tokyo, Japan, 8–11 February 2010, 2010 (IOCCP Report Number 18)	E (electronic copy only)			
230	SCOR/IODE/MBL/WHOI Library Workshop on Data Publication, Paris, France, 2 April 2010	E (electronic copy only)			
231	First ODINAFRICA Coastal and Marine Atlases Planning Meeting, Ostend, Belgium, 12–14 October 2009	E (electronic copy only)			
232	Eleventh International Workshop on Wave Hindcasting and Forecasting and Second Coastal Hazard Symposium, Halifax, Canada, 18–23 October 2009	E (electronic copy only)			
233	2010 Meeting of the Joint IODE-JCOMM Steering Group on the Global Temperature-Salinity Profile Programme, Ostend, Belgium, 5–7 May 2010	E (electronic copy only)			