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

Bridgetown, Barbados
16–18 March 2011
Caribbean Regional Workshop on Integrated Coastal Zone Management

Courtyard Marriott, Hastings, Christ Church, Barbados

March 16-18, 2011
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).

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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)

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 Wiggins’ 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 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 lead 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 thought the website 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.
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 IAMSLIC (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 on 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 of 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.
# AGENDA

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

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

**Day 2 Thursday 17th March 2011**

<table>
<thead>
<tr>
<th>Time</th>
<th>Item</th>
<th>Presenter</th>
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<tbody>
<tr>
<td>8:45</td>
<td>Review of previous day</td>
<td>Dr Leo Brewster Director CZMU</td>
</tr>
<tr>
<td>9:00</td>
<td>Overview of coastal engineering section – instrumentation requirements for oceanographic assessment, data collection and analysis and the application review process</td>
<td>Mr Ricardo Arthur Coastal Engineer CZMU</td>
</tr>
<tr>
<td>9:30</td>
<td>Selecting the right type of engineering structure for coastal segments</td>
<td>Mr Antonio Rowe Project Manager CZMU</td>
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<tr>
<td>10:00</td>
<td>Break</td>
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<tr>
<td>10:10</td>
<td>Marine Meteorology and managing coastal hazards in a mature ICZM programme</td>
<td>Dr Lorna Inniss Deputy Director CZMU</td>
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<tr>
<td>10:40</td>
<td>Coastal Investment Programme – Pilot Projects and testing options</td>
<td>Mr Antonio Rowe Project Manager CZMU</td>
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<tr>
<td>11:10</td>
<td>Emergency management within an ICZM Framework</td>
<td>Mr Simon Alleyne Department of Emergency Management</td>
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<tr>
<td>11:30</td>
<td>Rapid vulnerability assessment of the Barbados West and South Coasts</td>
<td>Dr Leo Brewster Director</td>
</tr>
<tr>
<td>12:00</td>
<td>Development of the coastal risk assessment and management programme</td>
<td>Dr Leo Brewster Director</td>
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<tr>
<td>12:30</td>
<td>Lunch</td>
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<tr>
<td>13:30</td>
<td>Site visits to completed capital works and approved ongoing private development: Rockley Boardwalk, Holetown walkway and CRAMP site, Tent Bay, Merricks, Crane, Welch</td>
<td>Staff of CZMU</td>
</tr>
<tr>
<td>1630</td>
<td>Return to hotel</td>
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<tr>
<td>1700</td>
<td>End of session</td>
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</table>
Day 3 Friday 18th March 2011  
Round Table Session with Delegates and Trainers

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

OPENING STATEMENTS

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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.
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 300C) 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 300 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
In recent years, many artificially constructed waterways and major artificial waterways have been built 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

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### ANNEX IV

#### LIST OF ACRONYMS AND ABBREVIATIONS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>CZMU</td>
<td>Coastal Zone Management Unit</td>
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<tr>
<td>CARICOM</td>
<td>Caribbean Community</td>
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<td>CEHI</td>
<td>Caribbean Environmental Health Institute</td>
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<td>CLME</td>
<td>Caribbean Large Marine Ecosystems</td>
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<td>CMA</td>
<td>Caribbean Marine Atlas</td>
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<tr>
<td>CRAMP</td>
<td>Coastal Risk Assessment and Management Programme</td>
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<td>CVA</td>
<td>Coastal Vulnerability Assessment</td>
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<td>CVI</td>
<td>Coastal vulnerability index</td>
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<td>CZMU</td>
<td>Coastal Zone Management Unit</td>
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<td>DEM</td>
<td>Department of Emergency Management</td>
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<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>EPD</td>
<td>Environmental Protection Department</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GEF</td>
<td>Global Environment Facility</td>
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<td>GLOSS</td>
<td>Global Sea-level Observing System</td>
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<td>GOOS</td>
<td>Global Ocean Observing System</td>
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<td>IAMSLIC</td>
<td>International Association of Aquatic and Marine Science Libraries and Information Centers</td>
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<td>ICAM</td>
<td>Integrated Coastal Area Management</td>
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<td>ICG-CARIBE-EWS</td>
<td>Intergovernmental Coordination Group for the Caribbean Early Warning System</td>
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<td>ICM</td>
<td>Integrated Coastal Management</td>
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<td>ICZM</td>
<td>Integrated Coastal Zone Management</td>
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<td>IDB</td>
<td>Inter-American Development Bank</td>
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<td>IMA</td>
<td>Institute of Marine Affairs</td>
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<td>IOC</td>
<td>Intergovernmental Oceanographic Commission</td>
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<td>IOCARIBE</td>
<td>IOC UNESCO Sub-commission for the Caribbean and Adjacent regions</td>
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<td>IWCAM</td>
<td>Integrating Watershed and Coastal Area Management</td>
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<td>LAC</td>
<td>Latin America and the Caribbean</td>
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<td>LBS</td>
<td>Land Based Sources</td>
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<td>MEWRD</td>
<td>Ministry of Environment Water Resources and Drainage</td>
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<td>Acronym</td>
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<td>MPCA</td>
<td>Marine Pollution Control Act</td>
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<td>NEPA</td>
<td>National Environment and Planning Agency</td>
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<td>OECS</td>
<td>Organization of Eastern Caribbean States</td>
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<td>SIDS</td>
<td>Small Island Developing States</td>
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<td>UN</td>
<td>United Nations</td>
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<td>UNEP</td>
<td>United Nations Environment Programme</td>
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<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
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<td>WSSD</td>
<td>World Summit on Sustainable Development</td>
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No. Title
64 Second IOC/WESTPAC Workshop on Co-Operative Study of the Continental Shelf Processes in the Western Pacific; Bangkok, Thailand, 31 January - 5 February 1989.
66 Second IOC Workshop on Supporting Archival Record Project (SARP) in the Southwest Atlantic; Montevideo, Uruguay, 21-23 August 1989.
67 IOC ad hoc Expert Consultation on SARP - Archival Record Project Programme; La Jolla, California, U.S.A., 11-14 September 1989.
68 Interdisciplinary Seminar on Regional: Problems in the IOCARIBE Region; Caracas, Venezuela, 1 December 1989.
69 International Seminar on Marine Acoustics; Beijing, China, 26-30 September 1989.
70 IOC-SCAR Workshop on Sea-Level Measurements in the Antarctica; Leningrad, USSR, 28-29 September 1989.
71 IOC-SCAR Workshop on Sea-Level Measurements in the Arctic; Leningrad, USSR, 28-29 May 1989.
72 IOC-SAREC-UNEP-FAO-IAEA Workshop on Regional Aspects of Marine Pollution; Tokyo, Japan, 30 October - 9 November 1990.
73 Interdisciplinary Workshop on the Identification of Penaeid Prawn Larvae and Postlarvae; Cleveland, Australia, 23-25 September 1990.
74 IOC/WESTPAC Scientific Steering Group Meeting on Co-Operative Study of the Continental Shelf Circulation in the Western Pacific; Kuala Lumpur, Malaysia, 8-11 October 1990.
75 External Consultation for the IOC Programme on Coastal Ocean Advanced Science and Technology; Amsterdam, The Netherlands, 11-13 May 1991.
77 IOC/SCOR Workshop on Global Ocean Change: Monitoring and Quality Control; Malaysia, 15-18 May 1990.
79 Symposium on Marine Science and Oceanography in Relation to Coastal Erosion, Sea Level Changes and Their Impacts; Zanzibar, United Republic of Tanzania 17-21 January 1994.
82 Workshop on Coastal Ocean Advanced Science and Technology (COASTS); First IOC Workshop on Coastal Ocean Advanced Science and Technology (COASTS); Paris, France, 12-13 October 1992.
83 IOC/WESTPAC Regional Workshop on River Inputs of Nutrients to the Marine Environment; the WESTPAC Region; Penang, Malaysia, 28-29 November 1991.
85 Joint IOC/WESTPAC Workshop on Sea Level Measurements; Melbourne, Australia, 12-13 October 1992.
86 First IOC Workshop on Coastal Ocean Advanced Science and Technology (COASTS); Meeting for an International Conference on Coastal Ocean Advanced Science and Technology (COASTS); Bordeaux, France, 5-9 March 1994.
87 IOC Workshop on GIS Applications in the Coastal Zone; Darlington, Canada, 18-22 September 1990.
88 BORDOMER 90: Conference on Coastal Ocean Advanced Science and Technology (COASTS); France, 6-10 February 1995.
89 Conference on Coastal Ocean Advanced Science and Technology (COASTS); Proceedings; Bordeaux, France, 6-10 February 1995.
90 5th IOC/WESTPAC Workshop on the Coastal Ocean Advanced Science and Technology (COASTS); Conference on Coastal Ocean Advanced Science and Technology (COASTS); Proceedings; Bordeaux, France, 6-10 February 1995.
91 Joint IOC/WESTPAC Workshop on the Coastal Ocean Advanced Science and Technology (COASTS); Conference on Coastal Ocean Advanced Science and Technology (COASTS); Proceedings; Bordeaux, France, 6-10 February 1995.
94 First IOC-UNEP-CECS Workshop on Environmental Processes in the Gulf of Guinea; Obninsk, Russia, 4-5 August 1990.
95 First IOC-UNEP-CECS Regional Workshop for Member States of Mediterranean - GODAR-IV (Global Oceanographic Data and Research Project) Foundation for the CTU Studies, University of Malta, Valletta, Malta, 15-18 October 1990.
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<td>211</td>
<td>Ocean Surface pCO2, Data Integration and Database Development (IOCCP Reports, 2), Tsukuba, Japan, 14–17 January 2004</td>
<td>E (electronic copy only)</td>
<td>Ocean/DataPortal (SG-ODP-I) 20–22 September 2010, Ostend, Belgium</td>
<td>In preparation</td>
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<td>212</td>
<td>International Ocean Carbon Stakeholders’ Meeting, Paris, France, 6–7 December 2004</td>
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<td>213</td>
<td>International Repeat Hydrography and Carbon Workshop (IOCCP Reports, 4), Shonan Village, Japan, 14–16 November 2005</td>
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<td>215</td>
<td>Surface Ocean Variability and Vulnerability Workshop (IOCCP Reports, 7), Paris, France, 11–14 April 2007</td>
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<td>217</td>
<td>Changing Times: An International Ocean Biogeochronological Time-Series Workshop (IOCCP Reports, 11), La Jolla, California, USA, 5–7 November 2008</td>
<td>E (electronic copy only)</td>
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<td>218</td>
<td>Second Joint GOSUD/SAMOS Workshop, Seattle, Washington, USA, 10–12 June 2009</td>
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<td>219</td>
<td>International Conference on Marine Data management and Information Systems (MDIS), Athens, Greece, 31 March–2 April 2009</td>
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<td>220</td>
<td>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</td>
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<td>221</td>
<td>Surface Ocean CO2 Atlas Project Pacific Regional Workshop, Tsukuba, Japan, 18–20 March, 2009 (IOCCP Report Number 12)</td>
<td>E (electronic copy only)</td>
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<td>223</td>
<td>Advisory Workshop on enhancing forecasting capabilities for North Indian Ocean Storm Surges, Indian Institute of Technology (IIT), New Delhi, India, 14–17 July 2008</td>
<td>E (electronic copy only)</td>
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<td>225</td>
<td>Reunión subregional de planificación del ODINCARSA (Red de Datos e Información Oceanográficos 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 2008, 2010</td>
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<td>226</td>
<td>OBIS (Ocean Biogeographic Information System) Strategy and Workplan Meeting, IOC Project Office for IODE, Ostend, Belgium, 18–20 November 2009</td>
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<td>227</td>
<td>ODINAFRICA-IV Project Steering Committee, First Session, Ostend, Belgium, 20–22 January 2010. 2010</td>
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<td>228</td>
<td>First IODE Workshop on Quality Control of Chemical Oceanographic Data Collections, Ostend, Belgium, 8–11 February 2010. 2010</td>
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<td>SCOR/IODE/MLWHO Library Workshop on Data Publication, Paris, France, 2 April 2010</td>
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<td>First ODINAFRICA Coastal and Marine Atlases Planning Meeting, Ostend, Belgium, 12–14 October 2009</td>
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<td>232</td>
<td>Eleventh International Workshop on Wave Hindcasting and Forecasting and Second Coastal Hazard Symposium, Halifax, Canada, 16–23 October 2009</td>
<td>E (electronic copy only)</td>
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<td>233</td>
<td>2010 Meeting of the Joint IODE-JCOMM Steering Group on the Global Temperature-Salinity Profile Programme, Ostend, Belgium, 5–7 May 2010</td>
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