

No. 1
February 1997

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**INTEGRATED FRAMEWORK
FOR THE MANAGEMENT OF
BEACH RESOURCES WITHIN THE
SMALLER CARIBBEAN ISLANDS**

Workshop results



ENVIRONMENT AND DEVELOPMENT IN COASTAL REGIONS AND IN SMALL ISLANDS

No. 1
February 1997

**INTEGRATED FRAMEWORK
FOR THE MANAGEMENT OF
BEACH RESOURCES WITHIN THE
SMALLER CARIBBEAN ISLANDS**

Workshop organized by

- UNESCO and its Intergovernmental Oceanographic Commission
- University of Puerto Rico and its Sea Grant College Program

on the Coastal Regions and Small Islands platform

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PREFACE

The *CSI info* series was launched in 1997 by the UNESCO platform for cross-sectoral cooperation concerning 'Environment and Development in Coastal Regions and in Small Islands' (CSI). Information on CSI activities can be obtained via the Internet by selecting 'programmes/science/csi' at <http://www.unesco.org>. The contact address is:

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EXECUTIVE SUMMARY

A workshop entitled 'Integrated Framework for the Management of Beach Resources within the Smaller Caribbean Islands' was convened at the Mayaguez campus of the University of Puerto Rico from 21-25th October, 1996. It marked a decade of existence of the regional project on Coast and Beach Stability in the Lesser Antilles (COSALC), which was initiated by UNESCO in the mid 1980s in response to a request from small-island Member States for assistance with the serious problems associated with beach erosion.

The workshop brought together physical planners and environmental scientists, as well as educators, researchers and members of the private sector from the Lesser Antilles and the adjacent regions. A number of regional and international agencies were also represented.

The keynote addresses emphasized the transdisciplinary and management-oriented approach of the workshop. Presentations on beach erosion and hurricane impacts provided a quantitative picture of the changes taking place on the beaches of the region. Other issues included: beach sand mining; community, traditional and modern approaches to beach management; the dependence of tourism on beaches; planning guidelines and best management practices for beaches. Regional and international agencies provided a background to their related programmes. Group discussions led to the development of a strategy for 'Sustainable beach management by the year 2001'. The key elements of this strategy focus on the following:

- The beach monitoring programmes developed by COSALC provide useful information for management; however, this should be expanded to include more monitoring parameters.
- Information flow between government departments needs to be improved; inter-agency committees were the proposed mechanism.
- Increased awareness is required to ensure that all groups, especially senior administrators and politicians, have a better understanding of the various issues relating to beach management.
- Beach resources and their management needs to be brought into the classroom at the primary and secondary level.
- Existing coastal development setbacks need to be reviewed and included in national development plans.
- Legislative review of existing beach protection laws is necessary.
- Enforcement measures should be applied; its success requires that the socio-cultural aspects of beach management be addressed at the community and national levels.
- A cross-sectoral cooperation and collaboration at the local, national, regional and international levels is needed to achieve effective coastal management.

Subject to the decisions of the UNESCO General Conference and the outcome of various funding initiatives, the COSALC program will be maintained. Following the mandate given by the workshop, it will concentrate on the following five main subject areas:

1. institutional strengthening so that the existing monitoring programs are maintained and expanded, and that at least in some countries they become fully independent;
2. increasing the level of awareness by targeting coastal stakeholders;
3. increasing the attention given to beach and coastal resources at primary and secondary school level;
4. reviewing existing coastal development setbacks and assisting the islands to revise such wherever necessary using a variable setback methodology;
5. reviewing beach protection legislation and assisting the islands to revise such wherever necessary.

1. INTRODUCTION

A workshop entitled 'Integrated Framework for the Management of Beach Resources within the Smaller Caribbean Islands' was convened at the University of Puerto Rico in Mayagüez, Puerto Rico, from 21-25 October, 1996. It was organized in accordance with the workplan of the Coastal Regions and Small Islands (CSI) endeavour, approved by the 28th session of the UNESCO General Conference (November, 1995) and as a follow up to the endorsement by the Fifth Session of the IOC Sub-Commission for the Caribbean and Adjacent Regions, SC-IOCARIBE-V (Barbados, December 1995) of the regional Framework Strategy for Integrated coastal zone management. The workshop programme is given in Annex I, and the list of participants in Annex II.

The workshop marked a decade of existence of the regional project on Coast and Beach Stability in the Lesser Antilles (COSALC). This project was initiated by UNESCO in the mid-1980s in response to a request from small island Member States for assistance with the serious problems associated with beach erosion, especially as it affects their vital tourist industries.

Furthermore the project had revealed that there was a wealth of local knowledge and experience relating to beaches, associated problems and management practices. Thus a major objective of this meeting was to exchange information, promote networking and facilitate and coordinate further planning.

The workshop was co-sponsored by UNESCO and its Intergovernmental Oceanographic Commission, on the CSI platform; the Caribbean Development Bank; and the University of Puerto Rico and its Sea Grant College Program.

2. OPENING CEREMONY

The meeting was opened by Dr. Manuel Valdés Pizzini, Director of the University of Puerto Rico Sea Grant College Program.

Dr. Stuart Ramos Biaggi, Chancellor of the University of Puerto Rico Mayagüez Campus, welcomed the participants to Puerto Rico. He highlighted the University's focus on scientific, cultural and political issues in the Caribbean and Latin America.

Dr. Manuel Valdés Pizzini informed the participants of the commitment of the Sea Grant Program to the conservation and wise use of marine and coastal resources. He emphasized that we are all in a constant process of learning about resource management and that workshops such as this one serve to widen our horizons.

Dr. Alexei Suzyumov, of UNESCO, thanked the University of Puerto Rico for hosting the workshop. He welcomed the participants from the Caribbean Islands and the participating organizations and informed them that the meeting also commemorated the 50th anniversary of UNESCO. This workshop represented a starting point with respect to the CSI theme of coastline instability.

Dr. Manuel Hernández Avila, Director of the Research and Development Center, University of Puerto Rico Mayagüez Campus, welcomed the participants and informed them that this workshop was a partial fulfillment of a dream whereby the University of Puerto Rico could work with the islands of the Caribbean to seek solutions to their coastal problems.

3. TECHNICAL PRESENTATIONS

Keynote addresses

Chairperson: Mr. Orris Proctor
Rapporteur: Mr. Robert Bateson

Dr. Gillian Cambers discussed the importance of environmental monitoring as a planning tool in the Caribbean Islands. The methodology and databases developed by the COSALC program were outlined. These databases now provide quantitative predictive tools for normal beach changes as well as those resulting from tropical storms and hurricanes. These tools provide vital information for coastal development setback guidelines, thereby ensuring that future coastal developments are sustainable and in harmony with beach conservation principles.

Against a background of small islands with limited natural, human and economic resources, Mr. David Robinson outlined several ways in which the scientific collection of beach change information had assisted in the determination of realistic answers to beach management problems in Nevis. He emphasized that the application of scientific data is one of the best ways to educate the political directorate and the general public.

Mr. Luthur Bourne presented a historical background to physical planning in Barbados from its inception in the 1950's to the present. He maintained that prior to the advent of international tourism there were no beach problems. Successful physical planning must be a dynamic process capable of responding to constantly changing circumstances. The adoption of Geographical Information System (GIS) technology can assist in providing the rapid responses demanded.

Beach management

Chairperson: Mr. Alan Gunne-Jones
Rapporteur: Mrs Patricia Phillip

Mr. Keith Nichols and Mr. Christopher Corbin advocated a community-based approach to beach management. In St. Lucia an action plan for the management of beaches and mangroves has been developed and the government is in the process of establishing Local Management Authorities (LMAs). These LMAs will consist of government agencies and local coastal stakeholders who will collect data, develop and implement management plans and provide a mechanism for conflict resolution. It is hoped that the LMAs will result in improved management of beach resources.

The question of whether traditional beach uses should be given priority over 'modern' uses was discussed by Miss Cheryl Jeffrey and Mr. Griffith Joseph. A case study at Lignumvitae Bay, Antigua, was presented wherein the establishment of a major hotel and marina had displaced the fishermen from their traditional landing sites. While several proposals of solutions had been tried, none had been successful. This paper raised important questions concerning who should pay for the conflict-resolution process.

A regional assessment of beach management issues, based on a 1996 questionnaire survey, was presented by Dr. Gillian Cambers. This covered issues such as beach cleaning, user safety, public access to beaches, user conflict and noise. Conflicts between different user groups were common to all islands. None of the islands surveyed had yet developed a comprehensive beach management programme.

Turning to the management of turtle nesting beaches, Miss Kathy Hall described the natural and anthropogenic threats facing sea turtles in the Caribbean Islands. These ranged from poaching to the use of recreational vehicles on beaches. While education has proved the best means to combat poaching, other threats, such as those related to increased coastal development, appear to be increasing.

Mr. Trevor Barclay, in his presentation, described some of the conflicts between different user groups on the beaches in Grenada. Various groups such as bathers, small boat operators, fishermen and beach vendors have conflicting interests and needs. He proposed that a land use zoning approach combined with community involvement is the most feasible way to maintain the ambiance of the beach environment.

Providenciales in the Turks and Caicos Islands has been designated as the center for future tourist development. Mr. Clyde Robinson and Miss Michelle Fulford described the problems resulting from recent tourism developments, particularly at Grace Bay. These included beach erosion, loss of public beach access, pollution and environmental degradation. A programme combining institutional support with the full integration of environmental concerns into the planning process was proposed.

Sand mining

Chairperson: Dr. Edward Towle
Rapporteur : Mr. Leonard Huggins

The construction industry in Puerto Rico could be facing a sand crisis by the end of this century. In a presentation prepared by Mr. Pedro Gelabert and given by Ms. Lisbeth Hyman, the existing sand sources were assessed. These include rivers, beaches, dunes, nearshore and offshore supplies, as well as importation and manufactured sand. It was recommended that in the future offshore sand reserves and manufactured sand should be promoted for construction purposes.

Figures relating to the volume of sand extracted from the beaches of the British Virgin Islands were presented and discussed by Mr. Bertrand Lettsome and Mr. Louis Potter. The use of existing legislation had proved inadequate. Application of the Mining Ordinance was proposed as a more effective means of controlling beach sand mining than the Beach Protection Ordinance.

Mr. Crafton Isaac reported on the current status of sand mining in Grenada. Despite several recent attempts to address this problem by various agencies or ad hoc committees, the problems resulting from legal and illegal sand mining continued. Against a background of overlapping jurisdiction and an absence of any clear policy, it is inevitable that sand mining will continue. Recommendations were put forward to reduce the degradation. Public awareness and concern about the sand mining issues is increasing in Grenada; the task ahead is to channel this support towards effective management of sand mining.

The problems resulting from sand mining in St. Vincent & the Grenadines were discussed by Mr. Maxwell Porter. Sand consumption figures doubled between 1985 and 1990. In December 1994 the government announced that sand imported from Guyana would be used for all government projects. This announcement was interpreted locally as a ban on beach sand mining and resulted in a massive stockpiling of sand throughout the country. While local residents may not be prepared to pay for imported sand, they will inevitably pay in the long term through remedial sea defense works which become necessary as beach sand mining continues.

Sand mining practices in Puerto Rico were discussed by Mrs. Andrea Handler-Ruiz. While it is policy in Puerto Rico to ban sand mining from the beaches, very occasionally permits are granted for

beach sand mining at specific locations and short periods of time. Most of the sand is extracted from the back dune, inland and river bed areas. Mining practices and restoration methods were described.

In Tobago rapid development in the tourism sector over the last twenty years has resulted in a shortage of building aggregates and increased sand mining. In a presentation by Mrs. Charmaine O'Brien-Delpesh it was shown that several beaches, which had been heavily mined for sand, had failed to recover once the mining had stopped. It was suggested that a cultural change has to take place in order to resolve the problem of sand mining since beach sand is regarded as a 'free resource'. Alternatives to beach sand are available in Tobago although at a higher cost to the consumer.

An effort had been made in Montserrat to use the COSALC beach monitoring data to control beach sand mining. Mr. Alan Gunne-Jones and Mr. Walter Christopher described the system whereby crushed rock had been substituted for beach sand, while one east coast beach had been kept open for mining to provide finer sand for plastering and finishing. This had alleviated mining on west coast recreational beaches. However, the onset of volcanic activity in July 1995 has confronted Montserrat with the prospect of increased construction in the safe area while the beach that is open for mining is in the unsafe area. This has demonstrated the precarious nature of the control system.

Dr. Malcolm Hendry presented an evaluation of sand resources in Anguilla. Currently dune sand is mined for construction and reserves at the designated quarry will be depleted in one to two years. The two main alternatives under consideration consist of imported sand or dredged sand. A recent study has shown that it is technically and economically feasible to mine these offshore reserves.

The environmental effects of beach nourishment using offshore dredge-based sand in Florida was discussed by Mr. Kenyon Lindeman. Impacts on fish, particularly the early life stages, and invertebrates have been documented and assessed. At one site, dredge operations had significantly lowered abundances. The use of techniques such as ecological risk assessment and decision support systems was demonstrated.

Mr. Jeremy Collymore described some of the damage caused by hurricanes in the Caribbean Islands. He presented some general recommendations for reducing coastal vulnerability and pointed out that their implementation would involve significant adjustments in policy development and decision making.

Beaches and tourism

Chairperson: Mr. Louis Potter
Rapporteur: Mr. Clyde Robinson

Examples of poor development practices in Anguilla, such as lowering sand dunes, building on beaches and sand mining were demonstrated by Mr. Orris Proctor and Mr. Roland Hodge. The passage of Hurricane Luis in 1995 accentuated the impacts of these practices. Anguilla is in the early stages of development and while some of the beaches are degraded, this has not reached a crisis situation and many beaches are still in the pristine state. It was recommended that measures such as sound development setbacks, dune conservation and the use of sand alternatives, combined with the involvement of the general public, be implemented to ensure the economic survival of Anguilla.

Dr. Edward Towle sought to address several newer categories of generic Best Management Practices (BMPs) for beach systems. These included: utilising a watershed management approach; a 'paired' beach monitoring approach to evaluate the effectiveness of various management practices;

and risk assessment, policy framework for integrated coastal management, economic valuation of coastal resources, and economic/regulatory proposals.

Past and planned activities of the Organization of Eastern Caribbean States Natural Resources Management Unit (OECS-NRMU) were outlined by Mrs. Patricia Phillip. The Unit has adopted an Island Systems Management approach which is reflected in the Coastal Resources Management Initiative. One of the future activities is the preparation of detailed coastal inventories which will provide a quantitative baseline measurement of coastal resources for improved management.

Dr. Alexei Suzyumov described the holistic approach of UNESCO's CSI platform which seeks to assist Member States in achieving integrated coastal planning and management. Through four pilot project themes, CSI supports cross-sectoral initiatives with environmental, cultural and socio-economic dimensions. This includes: traditional resource management practices; technical and scientific analyses; training, community education and public awareness.

Dr. Malcolm Hendry described the role of the Marine Resource and Environmental Management Program (MAREMP) at the University of the West Indies, particularly the Masters programme and its role in providing environmental training to professionals throughout the region.

Dr. Boris Oxman of the Puerto Rico Department of Natural & Environmental Resources described the role of the coastal zone management program and its close research linkages with the University of Puerto Rico.

Coastal erosion

Chairperson: Mrs. Andrea Handler Ruiz
Rapporteur: Mr. Arlington James

Mr. Hugh Thomas described coastal erosion and accretion as normal processes within a geological framework. He described the various geological and oceanographic processes causing beach changes and pointed out that there is an equilibrium between erosional and depositional forces. However, sand mining disturbs this equilibrium by permanently removing sediments from the coastal system.

Mr. Robert Bascom outlined the development and achievements of the Barbados Coastal Zone Management Unit from its inception in 1983 to the present. Through a series of diagnostic, feasibility and design projects, and with financial assistance from the Inter American Development Bank, the Unit has developed a coastal zone management plan for the south and west coasts. Within the next two years this plan will be expanded to include the entire island. Results from many of the studies are applicable to other island states.

Data showing beach erosion between 1992 and 1996 were presented for three beaches in St. Kitts by Mr. Bryan Farrell and Mr. Paul Lloyd. At the three sites: Conaree, South Frigate Bay and Cockleshell Bay, the erosion was mainly due to natural forces, especially the hurricanes of 1995. Anthropogenic changes, primarily seawalls and sand mining, had accentuated the natural erosion.

A presentation by Mr. Robert Bateson and Dr. Malcolm Hendry highlighted the decline of west coast nearshore fringing reefs in Barbados. Studies during the last twenty years showed that reef calcification had declined whilst bio-erosion had remained constant. This imbalance had led to a decline in sediment generation which combined with a loss of reef structure could result in significant changes in the beach cells.

Hurricane impacts

Chairperson: Mr. Bertrand Lettsome
Rapporteur: Mr. Robert Bascom

Recent hurricanes have caused significant erosion on the beaches of Nevis. Mr. Audra Barrett and Mr. Leonard Huggins presented a series of beach change data covering the period 1988 to 1996 which showed the impacts of two major hurricanes. The hurricanes caused permanent loss of land and it was suggested that existing coastal development setbacks should be revised.

The effects of hurricanes in Dominica between 1979 and 1995 were discussed in a presentation by Mr. Arlington James. The nine storms which had affected the island over the sixteen-year period had all impacted the island's beaches. In most cases erosion had occurred but at least one beach had shown accretion. In view of recent predictions regarding Atlantic hurricane activity, it was suggested that it may be an opportune time to re-examine the Beach Control Ordinance and to adequately enforce setback limits for developments in the coastal zone.

4. PROGRAMME PLANNING FOR SUSTAINABLE BEACH MANAGEMENT

Following the panel discussion on 'Regional initiatives relating to beach management and coastal zone management', three working groups were established during the afternoon session of 23rd October, 1996, to consider the goal 'Sustainable beach management by the year 2001 – What needs to be done'. Group 1 consisted of participants from island archipelagos (British Virgin Islands, St. Vincent & the Grenadines, Turks & Caicos Islands). Group 2 was made up of participants from islands heavily dependent on tourism (Anguilla, Antigua-Barbuda, Nevis, St. Lucia). Group 3 included participants from those islands relatively less dependent on tourism, (Dominica, Grenada, Montserrat, St. Kitts). Representatives from the agencies and other countries present at the workshop were assigned to the three groups.

A set of deliberation guidelines was given to each group, see Annex III.

The groups produced written reports which were presented to a plenary session on the afternoon of 25 October 1996.

Within the overall framework goal of 'Sustainable beach management by the year 2001 – What needs to be done' six main subject areas were considered at the national level (this includes the community level) and at the regional level (this includes the sub-regional level). The six areas were: additional information, institutional strengthening, awareness, education, planning and legislation, and enforcement. The following represents a summary of the reports from the three groups.

Information needs

The groups universally endorsed the concept that the beach monitoring programmes established by the COSALC programme should be continued. The present methodology could be improved by including the positions of high water marks and offshore sand bars. The monitoring programme should be expanded to include other parameters: waves, tides, currents, sea level fluctuations, storm surges, marine debris including tarballs, size and condition of primary and secondary sand dunes, and water quality. Increased involvement of NGOs could assist with the collection of these additional data sets.

In order to provide a historical perspective on recent coastal changes, aerial photographs, old maps and charts should be accessed and analyzed.

One group pointed out the need to provide safety at sea information to the populace in order to reduce drowning incidents at the beaches.

All groups agreed that existing information on beaches and their changes is not being fully used. Geographical Information System (GIS) technology is being developed in the islands, but most islands are at an early stage regarding this technology and it does not yet exist in some islands. Additional equipment and training in GIS and its applications is needed. Furthermore the beach change databases need to be integrated into the GIS technology; however, first the reference points for the beach profiles need to be tied into existing data in each island.

At the regional level, it was recommended that regional depositories of information should be established. It was also pointed out that there was a need for more collaboration between the different agencies and projects regarding beach management initiatives.

Institutional strengthening

Improved information flow between government departments was identified as a primary prerequisite in order to achieve the goal of sustainable beach management. It was generally felt that this could be achieved through the establishment, at country level, of inter-agency committees, although one agency would need to take the lead/coordinating role.

There should be increased environmental input to economic planning since economic planning was a key agency in most countries with its direct links to national budgets and overseas assistance projects. The establishment of environmental desks in this agency was recommended.

One group proposed that the environmental impact assessment (EIA) process needs to be strengthened in terms of scientific thoroughness and administrative significance. Ecological risk assessment and decision support systems might help achieve this goal.

At the regional level it was proposed that further strengthening should be provided to the COSALC programme.

Awareness building

All the groups agreed that people in the islands are not sufficiently aware of the problems associated with beaches nor indeed of the need for beach management. In some islands there had been public resistance in the past to concepts such as coastal development setbacks. The groups recommended that all coastal stakeholders be included in the management process while at certain times targeting special interest groups such as fishermen, insurance companies, etc.

It was recommended that inter-agency committees, set up to facilitate information flow, could provide the mechanisms for networking as well as education and awareness activities. Their membership should be widened to include coastal stakeholders and NGOs. These committees could develop a directory of human resources in each island who could be called on for specific activities. All forms of media – electronic and otherwise – should be utilized. Slide sets and videos were especially identified and these could also be used in the schools.

One of the major problems experienced in all islands was how to make senior administrators and politicians more aware of beach management problems. Solutions must be sought using existing means such as field trips, seminars, community intermediaries, newspapers and other forms of media, and development guidelines.

At the local and country levels it was felt that there was a need to provide certain specific types of information:

- for coastal stakeholders about their rights and responsibilities;
- information sheets on subjects such as how to report problems, how to stay within the law, how to conserve wetlands, etc.;
- relating to environmental do's and don'ts for tourists.

These types of information are best supplied at the local or national levels. Small grants are needed for local NGOs, who working together with the inter-agency committees, could prepare and distribute this type of information through newsletters and fact sheets.

Education needs

While some consideration is given to beaches and coastal resources at the primary and secondary school levels, this needed to be increased and more time and emphasis should be given to local resource management problems in the classroom. The use of field trips, lectures, competitions, high school internships were the suggested mechanisms for this re-focused emphasis in the schools.

Short-term training courses are needed for persons already involved in the project. This could be in various forms such as attachments, short courses, internships, and mentor programmes. National and regional tertiary educational institutions could provide this training, as well as advanced national coastal management units.

Planning and legislation

All the groups recommended that existing coastal development setbacks should be reviewed with the overall goal of establishing variable setbacks for beaches in each island. This information would then be available to all coastal stakeholders and planning boards. Such a project might be expanded into an overall coastal zoning plan which would include water quality, coastal structures, and sand mining policy.

There was consensus that legislative revision of the beach protection laws in each island was necessary. In particular, beaches, dunes, and public and private property need clear definition for property owners, planners and courts. Manuals explaining the rationale behind beach management were also needed.

The need for more NGO and community input to planning and the legislative process was identified.

At the regional level it was recommended that funding be sought for a regional legal audit with a view to upgrading environmental laws. In this context the OECS harmonized legislation should be analyzed for relevance and application to local situations.

Enforcement needs

There was a consensus that enforcement is one of the weakest areas of beach management and that education and awareness are vital components of enforcement. Successful enforcement requires that

the socio-cultural aspects of beach management are addressed at the community and national levels; only in this way can local residents help 'police' their natural resources.

Besides public involvement, inter-agency cooperation is required. In each country there are usually several different enforcement agencies (police, coastguard, immigration, customs, fisheries, national parks and others). One starting point is to coordinate the activities of these different agencies so that they do indeed help each other.

One group raised the point that court officials such as magistrates and judges are not generally well informed about the need to protect coastal resources. As a result heavy fines and penalties are rarely imposed. As with so many issues this relates directly back to education and awareness.

In conclusion, the participants identified needs in all six areas. Some of the needs can be fulfilled at the national level with no outside assistance, others have already been included in the programme planning for regional projects, and still others have not yet been addressed at any level. Without doubt, improved collaboration and cooperation at national and regional levels is needed in order to achieve the goal of 'Sustainable beach management by the year 2001'.

Mr. Keith Nichols made a statement on behalf of the OECS countries, in which he informed the workshop participants on various initiatives and approaches by OECS/NRMU and invited COSALC to enlarge its scope to meet specific OECS Member-State needs.

From the floor it was commented that not all of the countries participating in COSALC are members of OECS, but that COSALC, as a component of UNESCO's CSI, has been approved by the UNESCO Member States, of which OECS countries are a part. The need for an inter-agency collaboration was further confirmed.

5. EXCURSION TO THE NORTH COAST OF PUERTO RICO, BAJURAS, ISABELA

On 24th October, 1996, the participants visited the northern coast of Puerto Rico (see Annex IV for an outline of the field excursion). The purpose of the excursion was to show the participants several different sand mining techniques and restoration methods, as well as a variety of coastal developments.

Different coastal users were on hand to explain the individual projects from their perspectives, these persons included sand miners, hotel managers, developers and a local environmental NGO.

The first stop at a commercial mining operation generated considerable discussion. All the stages of the mining were demonstrated, these included the mining of the back dune down to the phreatic zone, the restoration of mined areas with backfill, the source of the backfill, and dune restoration attempts. Since the excursion co-incided with severe swells generated by Hurricane Lili, it quickly became evident that the width of unmined primary dune left as a protective barrier was insufficient.

A visit to a beachfront cabin development generated discussion about beach access, the use of recreational vehicles on beaches, as well as beach erosion and coastal development setbacks.

After a lunch break, the group visited another dune restoration project, this time using discarded pine trees. Discussion centered around various methodologies for dune restoration and dune stabilization with plants and grasses.

The final stop of the day was to an upscale housing development on the coast where some new construction techniques were described as well as the overall planning concepts of the development.

6. CLOSURE

Dr. Alexei Suzyumov, on behalf of UNESCO and its IOC, and Dr. Gillian Cambers, on behalf of COSALC, thanked the University of Puerto Rico and the Sea Grant College Program for the excellent facilities and support provided for the meeting. Special thanks were directed to the Caribbean Development Bank for their support of the meeting, and to the Department of Natural and Environmental Resources in Puerto Rico for their help in planning and organizing the field excursion. Finally, thanks were extended to all the participants for their enthusiastic sharing of ideas and information which had ensured the success of the meeting.

The workshop was closed at 4.00 p.m. on Friday, 25th October, 1996.

**INTEGRATED FRAMEWORK FOR THE MANAGEMENT OF BEACH
RESOURCES WITHIN THE SMALLER CARIBBEAN ISLANDS**

PROGRAMME

Eugene Francis Conference Room,
University of Puerto Rico,
Mayagüez, Puerto Rico.

21st October, 1996

9.00 a.m. - 10.00 a.m. Opening ceremony

Welcome Remarks

Dr. Stuart Ramos-Biaggi,
Chancellor,
University of Puerto Rico Mayagüez Campus.

*Welcome on behalf of the University of Puerto Rico Sea Grant College
Program (UPR/SGCP)*

Dr. Manuel Valdés Pizzini,
Director, UPR/SGCP

*Welcome on behalf of the United Nations Educational, Scientific & Cultural
Organization (UNESCO)*

Dr. Alexei Suzyumov,
Coastal Regions and Small Islands Unit,
UNESCO

Feature Address

Dr. Manuel Hernández-Avila,
Director,
Research & Development Center,
University of Puerto Rico Mayagüez Campus.

10.30 a.m. - 12.00 m. Keynote addresses

Environmental monitoring as a planning tool: fact or fiction?

Dr. Gillian Cambers,
COSALC,
University of Puerto Rico Sea Grant College Program.
Puerto Rico.

Baseline data spells relief

Mr. David Robinson,
Nevis Historical and Conservation Society,
Nevis.

Beaches and tourism in Barbados - a physical planner's perspective

Mr. Luthur Bourne,
Athelstan King Architects Ltd.,
Barbados.

1.30 p.m. - 5.00 p.m. Beach management

Community based approach to beach management

Mr. Christopher Corbin,
Ministry of Planning, Development & Environment,
Mr. Keith Nichols,
Fisheries Department,
St. Lucia.

Modern versus traditional uses in the coastal zone of Antigua and Barbuda. A case for the establishment of permanent landing sites - the Lignumvitae Bay experience

Miss Cheryl Jeffrey,
Fisheries Division,
Mr. E. Griffith Joseph,
Development Control Authority,
Antigua - Barbuda.

Beach management issues: a regional assessment

Dr. Gillian Cambers,
COSALC,
University of Puerto Rico Sea Grant College Program,
Puerto Rico

Management of marine turtle nesting beaches on Caribbean Islands

Ms. Kathy Hall,
Proyecto Tortugas Marinas,
La Liga Ecologica Puertorriquena del Noroeste,
Puerto Rico.

Social issues affecting beaches in Grenada

Mr. Trevor Barclay,
Lands & Surveys Division,
Grenada.

Grace Bay revisited, Providenciales

Mr. Clyde Robinson,
Planning Department,
Miss Michelle Fulford,
Department of Environment & Coastal Resources,
Turks & Caicos Islands.

6.30 p.m. - 8.00 p.m. Welcome reception at Joyuda Beach Hotel

22nd October, 1996

9.00 a.m. - 3.00 p.m. Sand mining

Sand mining policy in Puerto Rico

Mr. Pedro Gelabert and Ms. Libeth Hyman,
Department of Natural and Environmental Resources,
Puerto Rico.

Sand mining in the British Virgin Islands - a second look

Mr. Louis Potter,
Town & Country Planning Department,
Mr. Bertrand Lettsome,
Conservation & Fisheries Department,
British Virgin Islands.

Sand mining in Grenada
Mr. Crafton Isaac,
Fisheries Division,
Grenada.

*Sand mining in St. Vincent and the Grenadines
following the landmark decision of 1994*
Mr. Maxwell Porter,
Seismic Unit,
Ministry of Agriculture & Industry,
St. Vincent & the Grenadines.

Sand mining in Puerto Rico
Mrs. Andrea Handler Ruiz,
Department of Natural Resources and Environment,
Puerto Rico.

Effects and implications of sand mining in Tobago, West Indies
Mrs. Charmaine O'Brien-Delpesh,
Institute of Marine Affairs,
Trinidad & Tobago.

Sand mining: a position paper from Montserrat
Mr. Alan Gunne-Jones,
Physical Planning Unit,
Mr. Walter Christopher,
Ministry of Agriculture, Trade and the Environment,
Montserrat.

Seeking sand source alternatives: an island case study
Dr. Malcom D. Hendry,
Marine Resources & Environmental Management Program,
University of the West Indies,
Barbados.

*Environmental effects of dredge based beach management
in southeast Florida and comparative analyses of policy alternatives*
Mr. Kenyon Lindeman,
University of Miami,
U.S.A.

*Hazard impacts in the Caribbean: interactions of human-use and natural
systems*
Mr. Jeremy Collymore,
Caribbean Disaster Emergency Response Agency,
Barbados.

3.15 p.m. - 5.00 p.m. Beaches and tourism

Destroying the goose that lays the golden eggs
Mr. Orris Proctor,
Physical Planning Unit,
Mr. Roland Hodge,
Department of Fisheries & Marine Resources,
Anguilla.

Beaches and the tourism industry - best management practices
Dr. Edward Towle,
Island Resources Foundation,
St. Thomas,
U.S. Virgin Islands

Beach management from the private sector's perspective
Mr. Wilbert Fleming,
Anguilla Great House Beach Resort,
Anguilla.

Protecting our coastal resources: who will pay the financial cost
Mr. David Simmons,
Caribbean Tourism Organization,
Barbados.

23rd October, 1996

9.00 a.m. - 09.10 a.m. Field trip overview

Mrs. Andrea Handler Ruiz,
Department of Natural & Environmental Resources,
Puerto Rico.

9.10 a.m. - 12.00 m. Panel discussion : Regional initiatives relating to beach management and coastal zone management

Presentations by :

Ms. Cheryl Dixon, Caribbean Development Bank (CDB)
Dr. Donatus St. Aimee, Caribbean Council for Science & Technology (CCST)
Dr. Malcolm Hendry, Intergovernmental Oceanographic Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)
Mr. Claudio Volonte, Organization of American States - Caribbean Planning for Adaptation to Climate Change Project (OAS-CPACC)
Dr. Manuel Valdés Pizzini, University of Puerto Rico - Sea Grant College Program (UPR-SGCP)
Ms. Patricia Phillip, Organization of Eastern Caribbean States - Natural Resources Management Programme (OECS-NRMU)
Dr. Alexei Suzyumov and Dr. Winthrop Wiltshire, United Nations Educational, Scientific & Cultural Organization (UNESCO)
Dr. Malcom Hendry, University of the West Indies, Marine Resource and Environmental Management Program (MAREMP)
Dr. Boris L. Oxman, Department of Natural & Environmental Resources, Puerto Rico, Coastal Zone Management Program

1.30 p.m. - 4.30 p.m. Programme planning for: "Sustainable beach management by the year 2001 - What needs to be done"

Group sessions and written reports

24th October, 1996

Field trip to the Isabela coast of northwest Puerto Rico

25th October, 1996

9.00 a.m. - 10.30 a.m. Coastal erosion

Coastal erosion
Mr. Hugh Thomas,
Grenada National Museum,
Grenada.

Coastal erosion management in Barbados - a methodological approach
Mr. Robert Bascom,
Coastal Zone Management Unit,
Barbados.

Natural and anthropogenic causes of beachfront erosion on St. Kitts
Mr. Bryan Farrell,
Department of Environment,
Mr. Paul Lloyd,
Fisheries Division,
St. Kitts.

Land based pollution, reef health and nearshore sediment production on oceanic islands: a Barbados case study
Mr. Robert Bateson,
Marine Resources & Environmental Management Program,
University of the West Indies, Barbados.

10.45 a.m. - 12.00 m. Hurricane impacts

Hurricane impacts in Nevis
Mr. Leonard Huggins,
Planning & Development Unit,
Mr. Audra Barrett,
Fisheries Division,
Nevis.

The impacts of recent hurricanes on the beaches of Dominica
Mr. Arlington James,
Forestry & Wildlife Division, Dominica.

12.00 m. - 2.00 p.m. Demonstration of CD-ROMS, software, films

2.00 p.m. - 3.00 p.m. Presentation of group reports on programme planning for "Sustainable beach management by the year 2001 - What has to be done ?"

Presentations and discussion.

3.15 p.m. - 4.00 p.m. Adoption of draft workshop report and recommendations

Closing remarks
Dr. Alexei Suzyumov,
UNESCO.

Vote of thanks
Dr. Gillian Cambers,
COSALC,
University of Puerto Rico Sea Grant College Program.

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**PROGRAMME PLANNING FOR
SUSTAINABLE BEACH MANAGEMENT BY THE YEAR 2001 –
WHAT NEEDS TO BE DONE?**

GROUP GUIDELINES

Logistics

Each group should appoint a chairperson and rapporteur. These two individuals will be responsible for compiling the group's written report and for presenting the group's report on the afternoon session of Friday 25th October, 2 - 3 pm. Group written reports must be given to the workshop coordinator (Gillian Cambers) by 9 am on Friday morning, 25th October, 1996.

Deliberation guidelines

The overall purpose of this session is to assist COSALC, UNESCO and other agencies/projects with their programme planning for improved beach management in the region within the overall framework of integrated coastal management (ICM). We recommend a very practical approach, drawing from ongoing and planned projects, about which you have heard this morning, and integrating your needs into these projects and vice versa.

Please consider improved beach management at several levels, over a five-year time span (although obviously in some areas you may wish to extend your deliberations to cover a longer time period):

- local/community level
- national
- sub-regional e.g. OECS
- regional e.g. Caribbean Islands

You are asked to define specific goals (that can be achieved both with and without external assistance) and how to reach those goals. Particularly, consider cooperation with other Caribbean countries through mechanisms such as 'Technical cooperation between developing countries'. Please do not provide an ideal, 'wish list' approach, in these days of reduced external aid this is not practical.

The following is a list of subject areas and questions which you might find useful in your deliberations:

1. Additional information needs

- Do we need to start/continue measuring beach changes?
- Are there other parameters that we need to measure to achieve our goal – If yes, what are they?
- Is existing information being used fully, if not how can we improve on its application?
- Is existing information fully integrated into our GIS (Geographical Information Systems), if not what needs to be done to ensure that it is?
- Are there any areas where we need more information to manage our beaches – what are they?

2. National institutional strengthening needs

- Does there have to be a lead agency in this effort? If so what type of agency? Is further cooperation with other agencies required, which ones and how are you going to achieve this?

3. Awareness needs

- Are people sufficiently aware of the problems?
- Have you experienced public resistance to solutions you have developed in the past?
- Do you need to target special interest groups, or the public in general?
- What mechanisms will you use to create awareness?
- Who will do the awareness work?
- How do you propose making senior administrators and politicians more aware of the problems and solutions?

4. Education needs

- Look at primary and secondary school levels – is sufficient emphasis being given to beach and coastal resources and problems, can this be improved, increased?
- At the tertiary level what is needed – perhaps special short courses?
- Consider less formal training eg. on-the-job training, attachments and technical cooperation between developing countries?
- What special skills/experience can your country contribute to a regional pool of expertise?

5. Planning and legislative needs

- Are there measures you could take within existing planning and legislative instruments to improve beach management, eg. in an area such as coastal development setbacks?
- Are there laws or ordinances in your country relating to beach management that are obsolete/useless and need improvement or revision?
- What is the status of ICM legislation in your country?

6. Enforcement needs

- What needs to be done to improve enforcement of existing laws/ordinances relating to beach management? Consider enforcement at a local level by communities and resource users.

**EXCURSION TO THE NORTH COAST OF PUERTO RICO
BAJURAS, ISABELA**

Thursday 24th October, 1996

Purpose of the field trip

To observe en route and during various stops a variety of coastal developments and activities including active sand mining sites, restored and un-restored mining sites, dune restoration efforts, tourism and residential developments.

Field trip leader:

Mrs Andrea Handler Ruiz,
Geology Division,
Department of Natural and Environmental Resources,
Puerto Rico.

Stop 1

Active sand mining operation

(Roland Cordero, Cordeco – Arenas del Oeste Tel: 787 872 1425).

North of the road – Wet pit sand mining; site of past dune restoration effort using limestone boulders; future restoration efforts will use discarded wooden pallets.

South of the road – Dry pit backfill mining area.

Stop 2

To the east – Beachfront cabin development

(Mirna Hau, Villas Del Mar, Hau, Tel: 787 872 2045).

Evaluation of site location, beach erosion, beach access, security, recreational facilities and overall compatibility with the natural environment.

To the west – View of a depression behind the dune line left by a sand mining operation.

Stop 3

To the north – Eolionite outcropping.

To the east – Dune restoration effort with discarded pine trees; site of future restoration effort with used wooden pallets; site of inland sand extraction.

Stop 4

Visit to an upscale housing development on the coast, Villa Montana
(Tel: 787 852 8904).

LIST OF ACRONYMS AND ABBREVIATIONS

CARICOM	Caribbean Community
CCST	Caribbean Council for Science and Technology
CDB	Caribbean Development Bank
CDERA	Caribbean Disaster Emergency Response Agency
COSALC	Coast and Beach Stability in the Lesser Antilles
CPACC	Caribbean: Planning for Adaptation to Climate Change
CSI	'Environment and Development in Coastal Regions and in Small Islands' platform (of UNESCO)
CTO	Caribbean Tourism Organization
GIS	Geographical Information System
ICZM	Integrated Coastal Zone Management
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IOCARIBE	IOC Sub-Commission for the Caribbean and Adjacent Regions
MAREMP	Marine Resource and Environmental Management Program - University of the West Indies
NGO	Non-governmental organization
OAS	Organization of American States
OECS-NRMU	Organization of Eastern Caribbean States - Natural Resources Management Unit
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPR-SGCP	University of Puerto Rico Sea Grant College Program

