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ENVIRONMENT AND DEVELOPMENT IN COASTAL REGIONS AND IN SMALL ISLANDS

N° 6
August 1998

Coast and beach stability in the Caribbean Islands

COSALC Project Activities 1996-97

UNESCO

Sea Grant
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Coast and beach stability in the Caribbean Islands

COSALC Project Activities 1996-97

by G. Cambers

UNESCO

Sea Grant
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PREFACE

On the eve of the 21st century, much of the world's population is concentrated along the borders of the sea, and these numbers are expected to rise dramatically during the coming decades. Of the world's 23 megacities, 16 are in the coastal belt. Many of the Earth's most diverse, complex and productive ecosystems are coastal, and as coasts have always served as crossroads for human population movement and cultural exchange, they have come to harbour intricate social and cultural mosaics. Despite this enormous ecological and socio-cultural wealth, coastal resources are nonetheless finite and rapidly increasing pressures have made many coastal areas flashpoints for conflict.

Addressing the diverse problems facing coastal regions and small islands is a transdisciplinary challenge requiring the careful formulation of policies for integrated action. In response to these needs, the UNESCO endeavour 'Environment and Development in Coastal Regions and in Small Islands' (CSI) was launched in 1996. Its goal is to serve as a platform for cross-sectoral action in order to assist Member States towards coastal development which is environmentally sound, socially equitable and culturally appropriate. The *CSI info* series provides an informal vehicle to disseminate information to stakeholders, coastal managers, decision-makers and other actors confronted with coastal region and small island problems. Coastline instability is one of the key problems faced by many countries.

Recognizing that coastline instability is a crucial concern of many countries, UNESCO has continued its support of the 'Coast and Beach Stability in the Caribbean Islands' (COSALC). Also sponsored by the University of Puerto Rico Sea Grant College Program (UPR-SGCP), the project's activities focus on three main goals: institutional strengthening, promoting public awareness and education, and dealing with issues in the socio-cultural domain. The project assists especially the island Member States of the region in their pursuit of a more sustainable development of their coasts.

Included in this report is a summary of the status of the beach monitoring programme up to the end of the reporting period (1996-1997), as well as information on concrete activities undertaken in the various above-mentioned programme areas - in the region and by country.

PRÉFACE

À la veille du XXIème siècle, une forte proportion de la population mondiale se trouve concentrée sur le littoral marin et ce pourcentage devrait augmenter considérablement dans les prochaines décennies. Sur les 23 mégalopoles du monde, 16 sont situées dans la bande côtière. Une grande partie des écosystèmes, parmi les plus divers, les plus complexes et productifs de la Planète, appartiennent au domaine côtier. Du fait que les littoraux marins ont toujours joué le rôle de carrefours des mouvements de population et des échanges culturels, ils ont fini par abriter de véritables mosaïques humaines, au point de vue social et culturel. Mais malgré cette remarquable richesse écologique et socio-culturelle, les ressources côtières ne sont pas inépuisables. De plus, les pressions croissantes qui s'exercent sur bon nombre de ces régions en font des foyers de tension.

Pour relever le défi que constitue la solution des divers problèmes auxquels sont confrontées les régions côtières et les petites îles, il faut élaborer de judicieuses politiques d'actions intégrées faisant appel à l'interdisciplinarité. Pour répondre à une telle demande, l'UNESCO a lancé, en 1996, une initiative intitulée 'Environnement et développement dans les régions côtières et les petites îles (CSI)'. Elle sert de plate-forme pour coordonner des activités transsectorielles visant à aider les États membres à réaliser un développement de leurs côtes écologiquement rationnel, socialement équitable et culturellement adapté. La collection *CSI info* constitue un support commode pour la diffusion d'informations sur ces questions auprès des parties prenantes, des gestionnaires, des décideurs et des autres acteurs concernés par les problèmes des régions côtières et des petites îles.

Sachant que l'instabilité du littoral inquiète sérieusement un grand nombre de pays, l'UNESCO a continué à soutenir le projet sur la stabilité des côtes et des plages des îles des Caraïbes (COSALC). Parrainées également par le Sea Grant College Program de l'Université de Porto Rico, les activités menées dans le cadre de ce projet visent trois objectifs principaux: renforcer les institutions, sensibiliser et instruire le public, résoudre les difficultés d'ordre socio-culturel provoquées par ce phénomène. Le projet aide tout spécialement les États membres insulaires de la région à réaliser une mise en valeur plus durable de leurs côtes.

Le présent rapport analyse les résultats du programme d'observation du littoral jusqu'à la fin de la période de mesures (1996-1997) et fait état des activités pratiques entreprises dans les divers domaines du programme, au niveau de la région et pays par pays.

PREFACIO

En el alba del Tercer Milenio, alrededor del 60% de la población mundial vive a menos de 60 km del mar y probablemente alcanzará al 75% hacia al año 2025. Dieciséis de las 23 megaciudades del mundo están ubicadas en zonas costeras. Las regiones costeras son lugares de encuentro de pueblos de orígenes diversos, estableciendo así intricados mosaicos sociales y culturales. Muchos de los ecosistemas más diversos, complejos y productivos del planeta se encuentran en regiones costeras. A pesar de esta enorme riqueza sociocultural y ecológica, muchas zonas costeras se han convertido en focos de conflicto debido a la creciente demanda por recursos en disminución.

La solución de la variedad de problemas que afectan a las regiones costeras e islas pequeñas requiere una investigación interdisciplinaria y la cuidadosa formulación de políticas para una acción integrada orientada a una mejor gestión de sus recursos. La iniciativa 'Medio Ambiente y Desarrollo en Regiones Costeras e Islas Pequeñas' (CSI) de la UNESCO, lanzada en 1996, responde a estas necesidades. El objetivo principal es servir de plataforma para asistir a los Estados Miembros a través de acciones trans-sectoriales a alcanzar un desarrollo de sus regiones costeras que sea ecológicamente sano, socialmente equitativo y culturalmente apropiado. La serie *CSI info* ofrece así un vehículo informal de difusión de información pertinente, dirigida a los responsables de la gestión en búsqueda de soluciones a problemas en regiones costeras e islas pequeñas.

Reconociendo que la inestabilidad de la línea costera es una preocupación crucial de muchas naciones, la UNESCO ha continuado apoyando el proyecto 'Estabilidad de Las Costas y Playas en Islas del Caribe' (COSALC). Auspiciado también por el Sea Grant College Program de la Universidad de Puerto Rico (UPR-SGCP), las actividades del proyecto se centran en tres áreas principales: reforzamiento institucional, promoción de la educación y de la concienciación del público, y aspectos socio-culturales. El proyecto asiste especialmente a los Estados Miembros insulares de la región en sus tentativas de lograr un desarrollo más sustentable de sus costas.

En este informe se incluye un resumen del estado del programa de vigilancia de playas hasta el final del periodo considerado (1996-1997), así como información sobre actividades concretas llevadas a cabo en las variadas áreas programáticas mencionadas, en la región y por país.

TABLE OF CONTENTS

Executive Summary

The present report outlines the work undertaken by the 'Coast and Beach Stability in the Caribbean Islands' (COSALC) project during 1996 and 1997. The project is jointly sponsored by UNESCO under its Environment and Development in Coastal Regions and Small Islands (CSI) endeavour, and the University of Puerto Rico Sea Grant College Program (UPR-SGCP). The three main programme areas for the project are: institutional strengthening, public awareness and education, and the socio-cultural domain. A regional workshop, held in 1996 for the countries/territories involved, provided a forum to discuss beach management issues in the region and to determine specific needs and subject areas within the three main programme areas.

Institutional strengthening activities have concentrated on beach monitoring programmes, utilization of beach change databases in coastal planning, and development of wise management practices. The beach monitoring programmes provide a mechanism for continual training and information transfer as well as a database for management. During 1996-1997, they have been strengthened by the provision of further training and support as well as the supply of new equipment. The status of the individual programmes is reviewed and while no programme is yet self-sufficient, it is hoped that with the provision of new data analysis software, which will include data quality control and analysis procedures, this goal can be achieved in the future in some of the islands.

The beach change databases have been used in the assessment of the 1989 and 1995 hurricanes, which affected the eastern Caribbean islands, as well as in the review of coastal planning applications in specific islands. Wise management practices have concentrated on designing a methodology for coastal development setbacks such that beaches, as well as coastal infrastructure, can be conserved. Specific islands are being assisted with the design and implementation of new coastal development setback guidelines.

Public awareness activities have concentrated on the development of awareness materials (pamphlets, slide presentations, posters, coastal erosion handbook) for use within the islands. Future activities will focus on the provision of training in the preparation of video clips which it is hoped can be used to get information on beach management issues out to the public.

Within the socio-cultural domain, the project conducted an assessment of the social and cultural components of beach management in the islands. Key areas of concern were beach access and user conflicts. Another initiative focused on the incorporation of the beach change database into an environmental indicator to be used alongside traditional economic indicators to assess a country/territory's development.

Future activities will focus on ensuring the continuity and self-sufficiency of the beach monitoring programmes, the development of new beach analysis software, the use of video clips as a medium for awareness, and the implementation of wise management practices. The geographical scope of the project will also be expanded to include the U.S. Virgin Islands.

Against a background of natural forces such as hurricanes, increasing development adjacent to beaches, and the continued growth and economic dependence on the tourism industry, there is a need to strengthen the islands' capabilities to effectively manage their beach resources.

1. INTRODUCTION

At a regional meeting for Latin American and Caribbean countries, held in Caracas, Venezuela, 15-19th November, 1982, the representatives of the smaller Caribbean islands requested assistance from UNESCO to help with the problems they were experiencing with beach erosion, especially as it affected their vital tourist industries. In response to this request the 'Coast and Beach Stability in the Caribbean Islands' (COSALC) project was started. The overall goal of the project is to develop the in-country capability within the small island countries/territories of the Caribbean to measure, assess and manage their beach resources within an overall framework of integrated coastal management.

The project is jointly sponsored by UNESCO, under its Environment and Development in Coastal Regions and Small Islands (CSI) endeavour, and the University of Puerto Rico Sea Grant College Program (UPR-SGCP).

The islands currently involved in the project are: Anguilla, Antigua and Barbuda, British Virgin Islands, Dominica, Grenada, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, and Turks and Caicos Islands.

After a series of in-country consultations in 1985, the project focused on two main areas: awareness activities and the establishment of beach monitoring programmes on the islands. The beach monitoring activity fulfilled two major functions: firstly it provided a database which was needed for the management of beach resources and the search for solutions to erosion problems, and secondly it provided a mechanism for continual training in beach dynamics and erosion control methods and for technology/information transfer. At a regional workshop (1996), the project was further focused and, to strengthen its transdisciplinarity, three main programme areas were developed:

- Institutional strengthening (this includes the activities involved in beach monitoring),
- Public awareness and education,
- Socio-cultural domain.

This report outlines the work undertaken by the COSALC project in the three areas during 1996 and 1997. While annual reports have been produced for each year for limited distribution to the participating countries/territories, the present report attempts to combine and consolidate the activities undertaken over the above two year period. (All the specific activities undertaken in 1996-1997 are itemized in Appendix I). This report is not a technical one, the specific results and outcomes of many of the activities are to be found in other, more substantive reports referenced in the text.

2. PROJECT PLANNING

In 1996, a regional workshop entitled 'Integrated framework for the management of beach resources within the smaller Caribbean Islands' was held for the countries/territories involved in the project to exchange information about beach management problems and practices and to determine the project's future programme areas. This workshop provided a forum for physical planners and environmental scientists from each island, as well as educators, researchers and members of the private sector from the Wider Caribbean, to meet and exchange ideas in a transdisciplinary manner. It was held at the Mayagüez campus of the University of Puerto Rico from 21 to 25 October, 1996. Participants came from all the countries/territories involved and other Caribbean nations including Barbados, Belize, Trinidad and Tobago, the continental USA, Puerto Rico and the US Virgin Islands. Several regional organizations were also repre-

sented. The workshop was sponsored by UNESCO (CSI and the Intergovernmental Oceanographic Commission) and the UPR-SGCP. The workshop report (1), and the papers presented at the workshop (2), were published and distributed in 1997. The workshop also marked a decade of existence of the regional project on Coast and Beach Stability in the Caribbean Islands.

The keynote addresses, which included environmental, planning and community perspectives emphasized the multi-disciplinary 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. Management issues were the focus of the majority of the presentations. These issues included: beach sand mining; community, traditional and modern approaches to beach management, the dependence of tourism on beaches; planning guidelines and wise management practices for beaches. Regional and international agencies provided a background for their programmes and perspectives on beach management and the sustainability of island development.

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 should provide vital information for management. They should be maintained and expanded to include other parameters like wave height, sea level fluctuations and marine debris.
- Information flow between government departments needs to be improved, inter-agency committees were the proposed mechanism.
- Increased work to raise 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 should be brought into the classroom at the primary and secondary level. There is also a need for short courses for persons already working on the project; these could be provided by national and regional tertiary organizations.
- Existing coastal development setbacks should be reviewed with a view to establishing specific setbacks for individual beaches in each island.
- Legislative review of existing beach protection laws is necessary.
- Enforcement is one of the weakest areas of beach management, its success requires that the socio-cultural aspects of beach management be addressed at the community and national level, so that local residents can police their natural resources. Greater cooperation between enforcement agencies is also required at the national level.

The workshop concluded that in order to achieve effective coastal area management, there is a need for greater cooperation and collaboration at the local, national, regional and international levels.

Following the mandate given by the workshop, the COSALC programme is focusing on five main subject areas. These are as follows:

- Institutional strengthening such that the existing monitoring programmes are maintained and expanded, so that at least in some countries they become fully self-sufficient;
- Increasing the level of awareness by targeting coastal stakeholders;
- Increasing the attention given to beach and coastal resources at the primary and secondary school level;
- Reviewing existing coastal development setbacks and assisting the islands to revise such wherever necessary using improved methodology;
- Reviewing beach protection legislation and assisting the islands to revise such wherever necessary.

The five subject areas of the programme were included in a new memorandum of understanding, which was negotiated between UNESCO and the UPR-SGCP in 1997. This memorandum remains in effect until 31st December, 1999.

3. INSTITUTIONAL STRENGTHENING

Several activities of the project are helping Caribbean institutions to manage their beach resources in a sustainable manner. The specific activities are:

- beach monitoring programmes,
- utilization of beach change databases in coastal planning,
- development of wise management practices.

3.1 BEACH MONITORING PROGRAMMES

The beach monitoring programmes represent one of the important foundations of the project. They provide a mechanism for continual training and information transfer and they also provide a much needed database on beach changes.

Staff from government agencies and non-government organizations on each island have been trained to measure profiles or cross sections at selected beaches in their countries/territories. The monitoring is conducted every three months and the data are analyzed using specially designed software. The databases are stored on each island and a regional database is stored as a back-up at the UPR-SGCP in Mayagüez, Puerto Rico.

The beach monitoring programmes were started at different times, so the various countries/territories are at different stages of implementation. Appendix II summarizes the details regarding the beach monitoring programme in each country/territory as of 31 December 1997. The ultimate goal is to ensure that the beach monitoring programmes become self- sufficient and therefore continue without outside assistance. A statement as to each country's likely attainment of that goal is made under the heading 'Assessment' in Appendix II.

3.1.1 DESCRIPTION OF ACTIVITIES

The islands were supplied with one set of monitoring equipment at the onset of the monitoring programmes. During 1996, additional sets of monitoring equipment were supplied to most of the islands, see Appendix III. A full set of equipment consists of an Abney level, 30 m tape measure, and two ranging poles. In addition cameras were supplied to most islands.

During 1996 and 1997 visits were made to the islands by the project coordinator with a view to assisting the ongoing management of the beach monitoring programmes.

Assistance was provided to Anguilla in 1996 and 1997 to maintain and update the beach change database. In September, 1995, Hurricane Luis had destroyed more than 50% of the profile reference points, so new points had to be established and the database re-organized. Training was provided in using an updated version of the BEACH analysis software. In conjunction with a hurricane assessment project funded by the Dependent Territories Regional Secretariat, assistance was provided in the preparation of a technical report (3), summarizing beach changes between 1992 and 1995.

Antigua and Barbuda were also impacted by Hurricane Luis in 1995. During 1996 assistance was provided in compiling a technical report assessing the impacts of the hurricane on the beaches (4). This involved meetings and collaboration with several government agencies. During 1997, Antigua and Barbuda were the focus of a pilot project to determine the necessary steps for making the beach monitoring programme self-sufficient. While the field data collection and computer entry are well established in Antigua and Barbuda, there is a need for further training in data quality control and data analysis. As part of the pilot project, a manual was prepared which contained data summaries and procedures for data quality control and analysis. Training was provided in the use of this manual.

During a visit to the British Virgin Islands in 1996, the Conservation and Fisheries Department indicated that they wished to use more sophisticated instrumentation (theodolites) for

their beach monitoring programme. Unfortunately such equipment is beyond the scope of the budget of the project. As of 1997 the Conservation and Fisheries Department had not purchased the necessary equipment. They had stopped all monitoring in the interim, so there is a data gap of three years, see Appendix II.

Dominica was another island impacted by the 1995 hurricanes and some of the damage was assessed during a visit early in 1996. The beach monitoring programme is continuing in Dominica, as there is a need to establish a computer database there.

Visits were made to Grenada in 1996 and 1997. Together with four government agencies, a technical report on beach changes (5) was produced in 1996 and was presented at a small workshop held at the National Science and Technology Council in July, 1996. Assistance with database development was provided in 1997.

The volcanic crisis in Montserrat has necessitated some serious decisions regarding beach management and the supply of sand aggregate. In order to assist with this process, assistance was provided to compile and analyze all the beach profile data in a technical report (6). The beach monitoring ceased in Montserrat at the end of 1996 due to a shortage of human resources and the serious nature of the volcanic crisis. However, the monitoring is planned to restart by mid 1998.

Visits were made to Nevis in 1996 and 1997. New data collectors from the Nevis Historical and Conservation Society were trained in 1996. Nevis was the focus of a pilot project in 1997, similar to that described above for Antigua and Barbuda, the goal of which was to determine the necessary steps to make the beach monitoring programme fully self-sufficient. In Nevis, training in the use of a manual for data quality control and data analysis was provided to persons from the Physical Planning Unit and the Fisheries Division.

Visits were made to St. Kitts in 1996 and 1997. Meetings were held with the main government agencies and further training was provided in data entry. A new Department of the Environment, established in 1996, has become the key focal point for the project.

Assistance was provided to St. Lucia in 1996 with the preparation of a technical report (7), which summarized the beach change data. During 1997, the Fisheries Department in St. Lucia was working on a beach inventory and temporarily ceased beach monitoring activities.

Visits were made to St. Vincent and the Grenadines in 1996 and 1997. Meetings were held with several government agencies to discuss the monitoring programme. Further training was provided in computer data entry in 1997 and the database was updated.

During a visit to the Turks and Caicos Islands in 1997, further training was provided in field techniques and in computer data entry.

3.1.2 Assessment

As can be seen from the preceding section the monitoring programmes are at different stages on the various islands. However, on no island can they yet be said to be completely self-sufficient. The results of the 1997 pilot projects in Antigua and Barbuda and Nevis showed that while field data collection and data entry are well established on these islands and that there are established databases covering more than five years, further training is needed in data quality control, analysis and interpretation.

One of the major recommendations of the pilot project in Antigua and Barbuda and Nevis is to revise the BEACH software, possibly using a spreadsheet programme such as Excel, and to include the data quality control and analysis procedures in the software. (The original BEACH software, developed in 1993, was based on Lotus for the DOS operating system, and although it was updated to work on the WINDOWS operating system in 1997, some functions were lost). Once the revision has been completed, it is hoped that with some further training, the monitoring programmes may become self-sufficient on at least some of the islands.

Furthermore it is hoped to ensure installation of beach change databases in several agencies in

each country/territory, e.g. planning, public works and environmental agencies. This will help to ensure continuity of the monitoring activities and the use and application of the databases during and beyond the life of the project. Annual reporting of data results to a regional agency for use as environmental indicators of economic development would also help to ensure continuity of the monitoring (see also Section 5.2).

3.2 Utilization of Beach Change Databases

Assistance has also been given to the islands in the area of interpretation of beach changes as well as to some individual countries/territories in the application of their databases to specific planning projects. One of the findings of the project is that extreme events such as hurricanes are the major cause of shoreline changes, these may be considered 'permanent' in a time scale of decades. In 1989, Hurricane Hugo passed over Montserrat, St. Croix and the eastern part of Puerto Rico before proceeding to the eastern seaboard of the USA. Prior to this event, beach change databases had been established and maintained in the British Virgin Islands, Dominica and Nevis. These were used to assess the impact and recovery from this event.

In 1995 three major storms passed through the eastern Caribbean islands:

Tropical Storm Iris	25-28 August
Hurricane Luis	4-6 September
Hurricane Marilyn	14-18 September

While affecting all the eastern Caribbean islands to some degree, the most severe impacts from the 1995 hurricanes were experienced in the northern islands, Dominica to the Virgin Islands. Beaches were measured immediately after these hurricanes and on a near-monthly basis as the beaches recovered. The project focused on these islands to analyze the databases to determine the magnitude of shoreline changes resulting from these hurricane events.

In collaboration with the islands, a technical report was prepared on the impacts of the hurricanes (8). While the purpose of this present report is not to discuss data results in detail, some of the major findings will be summarized below. In the Caribbean islands, hurricanes are the major events and result in shoreline erosion, that is retreat of the land edge or dune edge. While the beaches are re-established after the hurricane, their position is further inland than before the hurricane. The average shoreline retreat that took place behind beaches during Hurricane Luis (a category 4 hurricane) in 1995 ranged from 10 feet (3 m) in Dominica, 113 miles (180 km) from the storm center, to an average retreat of 60 ft (18 m) in Barbuda, which experienced the centre (eye) of the hurricane. Furthermore, these shoreline retreat figures were averages, the maximum shoreline retreat recorded was 100 ft (30 m).

The years 1996 and 1997 were relatively quiet 'hurricane years'. However, the beach change data indicated that there remained a certain amount of instability in the system after the severe 1995 hurricanes. The hurricane impact report (8) has been circulated to all COSALC countries/territories. Although the 1995 hurricanes had most impact in the northern islands, this will not always be the case and the southern islands also need to plan for future hurricanes.

Besides this regional activity, assistance in the use of the beach change database to review various coastal planning applications has been provided to some individual islands. Through this process, training is provided in actually using the beach monitoring data in the planning process. For instance in Anguilla, during 1996 and 1997, assistance was provided in reviewing planning applications and environmental impact assessments at Shoal Bay, Sandy Island, Prickly Pear Island, Meads Bay, Barnes Bay and Forest Bay. In Nevis assistance was provided in applying the beach change database to proposals for a port at Long Point and a marina at Jones Bay.

In Antigua and Barbuda, the beach monitoring data and especially the impact of the 1995 hurricanes were used to assess the nature of a serious beach erosion problem in Runaway Bay,

where several buildings and hotels were threatened by inundation by the sea in 1997 (9). In the same country, the beach monitoring data were used by the Fisheries Division in an assessment of climate change on the coastal zone of Antigua and Barbuda (10).

In Anguilla and Nevis the beach monitoring database was used to assess the effectiveness of the beach nourishment projects at Maunday's Bay and Pinney's Beach respectively.

In the Turks and Caicos Islands the project assisted government agencies with using the beach change database as well as experience from other islands to reach a decision concerning a proposed dredging and beach nourishment project at the northeastern end of Providenciales.

In Montserrat, the Physical Planning Unit used the beach monitoring database to prepare a case study updating the beach sand mining situation since the volcanic crisis (11).

Gradually as the databases become well established and cover longer time periods, they are being used and applied, particularly by planners, in the review of coastal planning applications.

3.3 Development of Wise Management Practices

One of the dominant characteristics of beaches is their constant change in form, shape and position. The best way to conserve beaches is to allow them space to move - in a seaward direction during accretionary phases and in a landwards direction during erosionary phases. Establishing a safe distance between buildings and the active beach zone (a coastal development setback) can ensure that space is provided for a beach to move naturally, both during normal events and infrequent hurricanes, thereby ensuring the beach is conserved for all to enjoy and that coastal infrastructure remains intact. A coastal development setback is defined as a prescribed distance to a coastal feature, such as the line of permanent vegetation, within which all or certain types of development are prohibited.

In 1995 Hurricane Luis caused tremendous damage to beaches and coastal infrastructure in many islands. In Anguilla, during the course of a study on the impacts of Hurricane Luis on beach resources, funded by the Dependent Territories Regional Secretariat, and conducted in conjunction with the project, guidelines for new coastal development setbacks were developed (12). These guidelines have been incorporated into Anguilla's Land Use Plan and are being implemented in Anguilla.

During 1996 and 1997, the methodology used in the Anguillan coastal development guidelines was developed in a generic form and reviewed by several Caribbean experts. The methodology consists of using the beach change database as well as other information sources to determine coastal development setbacks for individual beaches on an island. The setback calculation is based on historical shoreline changes, impacts likely to occur during a major hurricane, sea level rise and site specific planning and geographical factors. These guidelines have been published (13), and together with a poster entitled 'The sea at your doorstep' (14), were distributed in 1998.

During 1997, the project worked with the Physical Planning Department in Anguilla to prepare a case study on the implementation of the new coastal development setbacks (15).

4. PUBLIC AWARENESS AND EDUCATION

Within the framework of CSI, the COSALC project includes educational, social, cultural, economic and public awareness aspects of beach management.

For awareness activities to be successful they have to be sustainable, so the major goal within the project is to train 'trainers' on each island and to provide these 'trainers' with the necessary information and materials. During 1996 and 1997, the following materials were prepared and distributed:

- In collaboration with the island counterparts, pamphlets were prepared for six islands (Anguilla, Antigua and Barbuda, Dominica, Grenada, Nevis and St. Kitts) in 1996, (16-21). These described the nature of the beach erosion in each country/territory for the general public and school audiences. The aim was to present some of the technical information on beach changes and possible solutions in a reader friendly format. Each island was sent 800 pamphlets. In Grenada, the pamphlet was incorporated into environmental education packages for teachers there.
- The brochure describing the project was updated and reprinted in 1996 (22), and distributed throughout the region.
- A regional slide presentation on 'The effects of the 1995 hurricanes on the beaches of the Lesser Antilles' was prepared and distributed in 1997 (23). This consisted of 59 slides and a written commentary. Two sets were distributed to the main government agencies and key NGOs in each country/territory involved in the project. Some copies were also sent to regional organizations e.g. the Caribbean Development Bank, the Organization of Eastern Caribbean States Natural Resources Management Unit.
- Island specific slide presentations have been prepared. In 1996 a slide presentation on 'Beach changes in Nevis', consisting of 42 slides and a written commentary (24) was prepared and given to the Nevis Historical and Conservation Society for use in their awareness and school programmes. In Anguilla in 1996, slide presentations on 'Beach processes in Anguilla' (55 slides and a written commentary) (25) and 'The effects of Hurricane Luis on the beaches of Anguilla' (43 slides and a written commentary) (26), were prepared and distributed to two government agencies, as well as the Anguilla National Trust and the Environmental Club of the Albena Lake Hodge Comprehensive School.
- A poster entitled 'The sea at your doorstep' was produced in 1997 and given limited distribution in 1998 (see Section 3.3).
- Articles relating to beach management and the project are published every quarter in the newsletter 'Sea Grant in the Caribbean'. This newsletter is distributed free to all the COSALC countries/territories and throughout the Wider Caribbean. Articles in 1996 and 1997 (27-34), were entitled:

  When the beach disappears...
  Why manage the beach?
  Hurricanes: Minimizing the damage
  Integrated beach management
  New directions for sand mining
  Cooperative approaches to beach management
  Islands of sand: places of change
  Sand dunes: temporary features of paradise

- *Coping with Beach Erosion*, a manual for the public was prepared by Gillian Cambers in 1997 and will be published by UNESCO by the end of 1998. This will provide stakeholders in the Caribbean islands with the information necessary to make wise decisions about how to deal with coastal erosion problems. The manual has been organized around several specific themes, e.g. the beach has disappeared, factors to consider when buying coastal property etc.

Some of the above materials are available on the CSI home page: http://www.unesco.org/csi

Besides these materials, other awareness information has been distributed to specific islands on request, e.g. in 1997 pre-recorded videocassettes were supplied to Anguilla, Antigua and Barbuda and Grenada for use in their public awareness programmes. These included films on Hurricane Hugo, safe building for hurricanes, marine debris and a series of fifty short clips on environmental themes.

While most of the awareness activities are conducted by COSALC counterparts on each island, some specific activities were undertaken by the project coordinator during island visits in 1996 and 1997:

- Nevis, May 1996 – presentation on beach changes to some members of the Nevis Historical and Conservation Society;
- Antigua and Barbuda – July 1996, presentation on hurricanes and beaches in Antigua, shown on local television;
- Grenada, July, 1996 – presentation on beaches in Grenada to the National Science and Technology Council;
- June, 1997 – presentation to a meeting of government agencies on the need for beach management in Grenada;
- June, 1997 – presentation on beaches at a public meeting in Carriacou.
- Turks and Caicos Islands, 1997 – two presentations, one on hurricanes and another on the social issues of beach management at a workshop for the public organized by the Department of Environmental and Coastal Resources (35).

In 1997, pilot projects were conducted in Anguilla and Grenada to assess ongoing awareness activities relating to beach management in those countries/territories. The major findings from this pilot project are:

- Future awareness projects will have to be individually designed so as to best utilize a country/territory's human and media resources. For instance in some countries/territories local radio stations are still the main media resource, while in others local TV stations fulfill that role;
- Short video clips may be a useful means of getting 'the message into the living room' in many of the COSALC countries/territories. It is envisaged that such video clips would focus on a specific theme relating to beaches. Such clips could be repeated on the local TV stations. Training in video preparation would be required for this activity;
- In most countries, NGOs are the key agencies for the implementation of awareness programmes although such efforts should be undertaken in cooperation with government agencies.

Efforts have been made to get schools involved in the beach monitoring programme. Some success was achieved in Nevis through the programmes organized by the Nevis Historical and Conservation Society. In Grenada in 1996, the Science Club of the Hillsborough Secondary School in Carriacou started to conduct the beach monitoring in that island. However, unfortunately this effort ceased in 1997 when the teacher involved in the activity left the school. In St. Vincent and the Grenadines, COSALC is working with the UNESCO Caribbean Sea Project to get the students in two coastal schools involved in the beach monitoring.

5. SOCIO-CULTURAL DOMAIN

Social, cultural and economic aspects have also been considered among the priorities of the project. To this end two major activities were conducted in 1996-1997:

- Assessment of the social and cultural components of beach management;
- Use of the beach database as an environmental/economic indicator of a country/territory's development.

5.1 SOCIO-CULTURAL SURVEY

A preliminary assessment of other beach management issues besides erosion, was conducted in 1996. A questionnaire was prepared which covered issues dealing with beach maintenance, public access to beaches, safety issues, user conflicts and noise. A direct interview approach was used with government and non government agencies in Anguilla, Antigua and Barbuda, British Virgin Islands, Grenada, Nevis, St. Kitts, and St. Vincent and the Grenadines. In the remaining islands, Dominica, Montserrat, St. Lucia and the Turks and Caicos Islands, the questionnaire was mailed. The results were compiled, and after their presentation at the COSALC regional workshop (1996), a report was prepared (36).

The survey showed some interesting results. User conflicts and a lack of beach access were viewed as major problems in most islands. Conflicts between different groups of beach users, such as fishermen and hotel managers, jet ski operators and divers, emerged on most islands.

After discussion with several social scientists in 1997, it was decided that the sample surveyed was too limited to make the reported results the basis of future action. Several ways to enhance the original survey were discussed, including a much wider survey to sample different beach users.

5.2 ENVIRONMENTAL INDICATORS

Within the Caribbean, national income is used as an indicator of a country's development performance. This indicator alone does not make any allowance for the fact that future income generation may be jeopardized by current activities which damage the natural environment. Several regional agencies are working on the development of environmental indicators, to be used alongside traditional economic indicators, to evaluate a country's development performance.

In 1997, the project participants worked together with the Caribbean Development Bank to determine whether the beach change database could be used to provide an indicator of environmental change (37). Three islands were selected for the project activity, the main criteria upon which their selection was based were:

- Continuous beach change database exists for more than four years;
- Impacted by a major hurricane during the period of monitoring;
- The selected islands represent a mixture of geological conditions (i.e. flat limestone islands and volcanic islands).

The three islands selected were Anguilla, Antigua and Montserrat. A beach change index based on changes in beach volume was developed. The index proved to be a useful way to compare beach changes amongst these three islands. The data-sets were sub-divided into groups based on the extent of development behind a beach, the presence or absence of sand mining activities, the existence of beach enhancement structures such as groyne fields and offshore breakwaters. Preliminary analysis showed that developed beaches experienced more serious erosion during hurricanes and were slower to recover after hurricanes. Future work will involve testing the index in other islands.

The beach change index has the potential to be used as one indicator of environmental change which could be combined with existing economic indices. However, some additional steps would have to be added to existing beach analysis procedures so that the data are produced in the required format.

6. PROJECT DIRECTIONS 1998-1999

The major focus of the project in 1998-1999 is to further develop activities in the three main programme areas: institutional strengthening, public awareness and the socio-cultural domain.

Given sufficient funding, the major focus is on the goal of making the beach monitoring programmes completely self-sufficient in at least half of the countries/territories involved in COSALC. This is perceived as the most critical element of the entire project. This will involve re-writing the BEACH software and expanding it to include data quality control and data analysis functions. Assistance will also be given in helping to apply the beach monitoring databases to coastal planning in the islands.

In addition, the islands are being assisted in the adoption of wise beach management practices, such as coastal development setbacks. This involves specific projects in some of the countries/territories to design and implement new coastal development setbacks for their beaches.

In the awareness field a future approach may be to provide training in the preparation of video features on beach management. Such a training approach could be through regional or national workshops and would bring together people from the project, other environmental agencies, NGOs, government information services and local TV stations.

In the socio-cultural domain, it is proposed to test the beach change index in other COSALC countries and to continue to work with regional agencies to promote its use and reporting on an annual basis. This activity works towards the goal of making the beach monitoring programmes fully self-sufficient.

The geographic scope of the project will be expanded in 1998-99 to include the United States Virgin Islands. Discussions are also taking place with the 'Fondation pour la Protection de la Biodiversite Marine' in Haiti and it is hoped that a monitoring programme on the west coast of Haiti will be started.

7. CONCLUDING REMARKS

A few decades ago, Caribbean beaches were deserted areas, used occasionally for recreation but avoided for building because of flooding and other dangers. However, in the Caribbean, as in other parts of the world, there has been a geographical shift in recent decades as activities have become concentrated adjacent to the coast.

As a result, pressures facing the region's beaches, from natural forces such as storms and hurricanes, and from man's activities such as building new beachfront development and mining beach sand, continue to increase. Furthermore, local populations and numbers of visitors increase annually. Tourism continues to be the mechanism powering the growth of economies of the small islands of the Caribbean. Projected growth for Caribbean tourism is estimated at 35% over the next decade (38). Thus it is likely that new problems will emerge and existing ones will worsen. The need to properly manage the region's beach resources has never been greater.

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ACTIVITIES AND PARTICIPANTS IN THE COSALC PROJECT DURING THE PERIOD 01.01.96 – 31.12.97

Project code : *COSALC*

Activity : ***A quantitative assessment of the effects of Hurricane Luis on the coastal and marine resources of Anguilla (COSALC Report)***

Location: USA/Puerto Rico **Date begin :** 01/01/96 **Date End :** 31/03/96

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
Cambers	Gillian	USA/Puerto Rico	Anguilla - UK dep't	0	1	1
				Total M	**Total F**	**TOTAL**
				0	1	1

Activity : ***Beach monitoring activities in the British Virgin Islands***

Location: British Virgin Is - UK dep't **Date begin :** 01/01/96 **Date End :** 31/12/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		British Virgin Is - UK dep't	British Virgin Is - UK dep't	5	0	5
		USA/Puerto Rico	British Virgin Is - UK dep't	0	1	1
				Total M	**Total F**	**TOTAL**
				5	1	6

Activity : ***Beach monitoring programme in Anguilla (COSALC project)***

Location: Anguilla - UK dep't **Date begin :** 01/01/96 **Date End :** 31/12/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Anguilla - UK dep't	Anguilla - UK dep't	5	1	6
		USA/Puerto Rico	Anguilla - UK dep't	0	1	1
				Total M	**Total F**	**TOTAL**
				5	2	7

Activity : ***Beach monitoring programme in Antigua and Barbuda (COSALC project)***

Location: Antigua & Barbuda **Date begin :** 01/01/96 **Date End :** 31/12/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
JAMES	Ph	Antigua & Barbuda	Antigua & Barbuda	1	0	1
CAMBERS	Gillian	USA/Puerto Rico	Antigua & Barbuda	0	1	1
GREGORY	Keith	Antigua & Barbuda	Antigua & Barbuda	1	0	1
O'MARDE	C.	Antigua & Barbuda	Antigua & Barbuda	1	0	1
LOBBY	G.	Antigua & Barbuda	Antigua & Barbuda	1	0	1
JEFFREY	Cheril	Antigua & Barbuda	Antigua & Barbuda	0	1	1

Total M	**Total F**	**TOTAL**
4	2	6

Activity : ***Beach monitoring programme in Dominica (COSALC project)***

Location: Dominica **Date begin :** 01/01/96 **Date End :** 31/12/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Dominica	Dominica	3	0	3
		USA/Puerto Rico	Dominica	0	1	1

Total M	**Total F**	**TOTAL**
3	1	4

Activity : ***Beach monitoring programme in Grenada (COSALC project)***

Location: Grenada **Date begin :** 01/01/96 **Date End :** 31/12/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Grenada	Grenada	7	2	9
		USA/Puerto Rico	Grenada	0	1	1

Total M	**Total F**	**TOTAL**
7	3	10

Activity : ***Beach monitoring programme in Montserrat (COSALC project)***

Location: Montserrat - UK dep't **Date begin :** 01/01/96 **Date End :** 31/05/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Montserrat - UK dep't	Montserrat - UK dep't	2	0	2
		USA/Puerto Rico	Montserrat - UK dep't	0	1	1

Total M	**Total F**	**TOTAL**
2	1	3

Activity : ***Beach monitoring programme in St. Kitts & Nevis (COSALC project)***

Location: Saint Kitts & Nevis **Date begin :** 01/01/96 **Date End :** 31/12/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Saint Kitts & Nevis	Saint Kitts & Nevis	9	3	12
		USA/Puerto Rico	Saint Kitts & Nevis	0	1	1
				Total M	**Total F**	**TOTAL**
				9	4	13

Activity : ***Beach monitoring programme in St. Lucia***

Location: Saint Lucia **Date begin :** 01/01/96 **Date End :** 31/12/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Saint Lucia	Saint Lucia	4	2	6
		USA/Puerto Rico	Saint Lucia	0	1	1
				Total M	**Total F**	**TOTAL**
				4	3	7

Activity : ***Beach monitoring programme in St. Vincent and the Grenadines***

Location: Saint Vincent & the Grenadines **Date begin :** 01/01/96 **Date End :** 31/12/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Saint Vincent & the Grenadines	Saint Vincent & the Grenadines	3	0	3
		USA/Puerto Rico	Saint Vincent & the Grenadines	0	1	1
				Total M	**Total F**	**TOTAL**
				3	1	4

Activity : ***Beach monitoring programme in Turks and Caicos Islands (COSALC project)***

Location: Turks & Caicos Is - UK dep't **Date begin :** 01/01/96 **Date End :** 31/12/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Turks & Caicos Is - UK dep't	Turks & Caicos Is - UK dep't	3	2	5
		USA/Puerto Rico	Turks & Caicos Is - UK dep't	0	1	1
				Total M	**Total F**	**TOTAL**
				3	3	6

Activity : ***Delivery of slide presentations on Beach Processes and the Effect of Hurricane Luis on the Beaches of Anguilla (COSALC) to government agencies***

Location: Anguilla - UK dep't **Date begin :** 14/01/96 **Date End :** 14/01/96

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
PROCTOR	Orris	Anguilla - UK dep't	Anguilla - UK dep't.	1	0	1
CAMBERS	Gillian	USA/Puerto Rico	Anguilla - UK dep't	0	1	1
HADGE	Roland	Anguilla - UK dep't	Anguilla - UK dep't.	1	0	1

Total M	**Total F**	**TOTAL**
2	1	3

Activity : ***Visit to Dominica to assess damage to coast and beaches from 1995 hurricanes***

Location: Dominica **Date begin :** 26/01/96 **Date End :** 27/01/96

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
Cambers	Gillian	USA/Puerto Rico	Dominica	0	1	1
JAMES	Percy	Dominica	Dominica	1	0	1

Total M	**Total F**	**TOTAL**
1	1	2

Activity : ***Delivery of audiovisual presentation on beach changes in Nevis to Nevis Historical and Conservation Society***

Location: Saint Kitts & Nevis **Date begin :** 01/04/96 **Date End :** 16/05/96

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Saint Kitts & Nevis	Saint Kitts & Nevis	3	4	7
		USA/Puerto Rico	Saint Kitts & Nevis	0	1	1

Total M	**Total F**	**TOTAL**
3	5	8

Activity : ***Training on beach management in Nevis (COSALC project) and meeting with governmental agencies re. beach monitoring***

Location: Saint Kitts & Nevis **Date begin :** 01/04/96 **Date End :** 31/08/96

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Saint Kitts & Nevis	Saint Kitts & Nevis	4	2	6
		USA/Puerto Rico	Saint Kitts & Nevis	0	1	1

Total M	**Total F**	**TOTAL**
4	3	7

Activity : ***Training on beach monitoring in Saint Vincent and the Grenadines and advise to governmental agencies concerned***

Location: Saint Vincent & the Grenadines **Date begin :** 01/04/96 **Date End :** 31/08/96

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Saint Vincent & the Grenadines	Saint Vincent & the Grenadines	4	0	4
		USA/Puerto Rico	Saint Vincent & the Grenadines	0	1	1
				Total M	**Total F**	**TOTAL**
				4	1	5

Activity : ***Beach management in the Eastern Caribbean islands -a cultural and socio-economic assessment (COSALC project report)***

Location: USA/Puerto Rico **Date begin :** 01/05/96 **Date End :** 31/12/96

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Saint Lucia	Saint Lucia	1	1	2
		Turks & Caicos Is - UK dep't	Turks & Caicos Is - UK dep't	0	1	1
		Saint Kitts & Nevis	Saint Kitts & Nevis	5	0	5
		Montserrat - UK dep't	Montserrat - UK dep't	2	0	2
		Dominica	Dominica	2	0	2
		Saint Vincent & the Grenadines	Saint Vincent & the Grenadines	2	0	2
		British Virgin Is - UK dep't	British Virgin Is - UK dep't	5	0	5
		Anguilla - UK dep't	Anguilla - UK dep't.	2	1	3
		Antigua & Barbuda	Antigua & Barbuda	1	2	3
		Grenada	Grenada	5	2	7
		USA/Puerto Rico	LAC	0	1	1
				Total M	**Total F**	**TOTAL**
				25	8	33

Activity : ***Preparation of public awareness materials (pamphlets) on beach erosion in the COSALC countries***

Location: USA/Puerto Rico **Date begin :** 01/05/96 **Date End :** 31/10/96

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Saint Kitts & Nevis	Saint Kitts & Nevis	5	0	5
		Dominica	Dominica	2	0	2
		Grenada	Grenada	5	2	7
		Anguilla - UK dep't	Anguilla - UK dep't.	2	1	3
		Antigua & Barbuda	Antigua & Barbuda	1	1	2
				Total M	**Total F**	**TOTAL**
				15	4	19

Activity : *Visit to the British Virgin Islands to provide guidance on the COSALC beach monitoring programme and briefing to the governmental agencies concerned*

Location: British Virgin Is - UK dep't **Date begin :** 03/05/96 **Date End :** 04/05/96

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		British Virgin Is - UK dep't	British Virgin Is - UK dep't	5	1	6
		USA/Puerto Rico	British Virgin Is - UK dep't	0	1	1
				Total M	**Total F**	**TOTAL**
				5	2	7

Activity : *Donation of audio-visual materials on Beach Processes and The Effect of Hurricane Luis to Anguilla Nat'l Trust and Albena Comprehensive school*

Location: Anguilla - UK dep't **Date begin :** 05/05/96 **Date End :** 05/05/96

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Anguilla - UK dep't	Anguilla - UK dep't	4	10	14
		USA/Puerto Rico	Anguilla - UK dep't	0	1	1
				Total M	**Total F**	**TOTAL**
				4	11	15

Activity : *Briefing to local schools and NGOs at Anguilla on the ways the schools and the public could become involved in the coastal management (COSALC)*

Location: Anguilla - UK dep't **Date begin :** 07/05/96 **Date End :** 07/05/96

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Anguilla - UK dep't	Anguilla - UK dep't.	4	8	12
		USA/Puerto Rico	Anguilla - UK dep't.	0	1	1
				Total M	**Total F**	**TOTAL**
				4	9	13

Activity : *Visit to Saint Kitts to assist with its beach monitoring programme (COSALC project): training and advise*

Location: Saint Kitts & Nevis **Date begin :** 16/05/96 **Date End :** 19/05/96

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Saint Kitts & Nevis	Saint Kitts & Nevis	3	0	3
		USA/Puerto Rico	Saint Kitts & Nevis	0	1	1
				Total M	**Total F**	**TOTAL**
				3	1	4

Activity : *Analyses of beach changes in Antigua & Barbuda between 1992 and 1995 (COSALC project report)*

Location: USA/Puerto Rico **Date begin :** 01/06/96 **Date End :** 01/12/96

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
BLACK	D.	Antigua & Barbuda	Antigua & Barbuda	0	1	1
FARQUHAR	D.	Antigua & Barbuda	Antigua & Barbuda	0	1	1
LOOBY	G.	Antigua & Barbuda	Antigua & Barbuda	1	0	1
JEFFREY	C.	Antigua & Barbuda	Antigua & Barbuda	0	1	1
Cambers	Gillian	USA/Puerto Rico	Antigua & Barbuda	0	1	1
O'MARDE	C.	Antigua & Barbuda	Antigua & Barbuda	1	0	1

Total M	**Total F**	**TOTAL**
2	4	6

Activity : *Cooperation with the UNESCO programme of Associated Schools*

Location: Saint Vincent & the Grenadines **Date begin :** 01/06/96 **Date End :** 31/12/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Saint Vincent & the Grenadines	Saint Vincent & the Grenadines	0	1	1
		USA/Puerto Rico	Saint Vincent & the Grenadines	0	1	1

Total M	**Total F**	**TOTAL**
0	2	2

Activity : *Hurricane impact on beaches in the Eastern Caribbean Islands, 1989-1995 (COSALC project report)*

Location: USA/PUERTO RICO **Date begin :** 01/06/96 **Date End :** 31/12/96

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Anguilla - UK dep't	Anguilla - UK dep't.	2	1	3
		Antigua & Barbuda	Antigua & Barbuda	1	1	2
		Saint Kitts & Nevis	Saint Kitts & Nevis	5	0	5
		Montserrat - UK dep't	Montserrat - UK dep't	2	0	2
		British Virgin Is - UK dep't	British Virgin Is - UK dep't.	1	0	1
		USA/Puerto Rico	USA/Puerto Rico	0	1	1
		Dominica	Dominica	1	0	1

Total M	**Total F**	**TOTAL**
12	3	15

Thomas	H.	Grenada	Grenada	1	0	1
O'Brien-Delpesh	C.	Trinidad & Tobago	Trinidad & Tobago	1	0	1
Joseph	G.	Antigua & Barbuda	Antigua & Barbuda	1	0	1
Barrett	A	Saint Kitts & Nevis	Saint Kitts & Nevis	1	0	1
JEFFREY	Cheni	Antigua & Barbuda	Antigua & Barbuda	0	1	1
Christopher	W	Montserrat - UK dep't	Montserrat - UK dep't	1	0	1
James	A.	Dominica	Dominica	1	0	1
Lettsome	B.	British Virgin Is - UK dep't	British Virgin Is - UK dep't.	1	0	1
Handler Ruiz	A	USA/Puerto Rico	USA/Puerto Rico	0	1	1
Porter	M.	Saint Vincent & the Grenadines	Saint Vincent & the Grenadines	1	0	1
Isaak	C.	Grenada	Grenada	1	0	1
Gunne-Johns	A	Montserrat - UK dep't	Montserrat - UK dep't	1	0	1
CORBIN	C.	Saint Lucia	Saint Lucia	1	0	1
PROCTOR	O.	Anguilla - UK dep't	Anguilla - UK dep't.	1	0	1
FULFORD	M.	Turks & Caicos Is - UK dep't	Turks & Caicos Is - UK dep't	0	1	1
Bateson	R.	Barbados	Barbados	1	0	1
Lloyd	P.	Saint Kitts & Nevis	Saint Kitts & Nevis	1	0	1

Total M	Total F	TOTAL
30	6	36

Activity : ***CONTRACT TO ORGANIZE A COASTAL MONITORING PROGRAM IN THE E.CARIBBEAN ISLANDS (COSALC'96)***

Location: USA/PUERTO RICO **Date begin :** 30/08/96 **Date End :** 01/02/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
VALDEZ-PIZZINI	M.	USA/Puerto Rico	Caribbean	1	0	1

Total M	Total F	TOTAL
1	0	1

Activity : ***Equipment for the coastal monitoring program (COSALC)***

Location: USA/PUERTO RICO **Date begin :** 01/10/96 **Date End :** 31/12/96

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		British Virgin Is - UK dep't	British Virgin Is - UK dep't	1	0	1
		DOMINICA	Dominica	1	0	1
		GRENADA	Grenada	1	0	1
		Montserrat - UK dep't	Montserrat - UK dep't	1	0	1
		Saint Vincent & the Grenadines	Saint Vincent & the Grenadines	1	0	1
		Antigua & Barbuda	Antigua & Barbuda	0	1	1

Saint Kitts & Nevis	Saint Kitts & Nevis	2	0	2
Turks & Caicos Is - UK dep't	Turks & Caicos Is - UK dep't	0	1	1
Saint Lucia	Saint Lucia	0	1	1
		Total M	**Total F**	**TOTAL**
		7	3	10

Activity : ***Workshop on management of beach resources in small Eastern Caribbean islands***

Location: USA/PUERTO RICO **Date begin :** 21/10/96 **Date End :** 25/10/96

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
FLEMING	W.	Anguilla - UK dep't	Anguilla - UK dep't.	1	0	1
MERCADO	A.	USA/Puerto Rico	USA/Puerto Rico	1	0	1
ST. AIMEE	D.	Trinidad & Tobago	Trinidad & Tobago	1	0	1
CHAPARRO	R.	USA/Puerto Rico	USA/Puerto Rico	1	0	1
Cambers	Gillian	USA/Puerto Rico	USA/Puerto Rico	0	1	1
AVELLA	E.	BELIZE	Belize	1	0	1
CARLO	M.	USA/Puerto Rico	USA/Puerto Rico	1	0	1
TOWLE	E.	USA/US Virgin Is	USA/US Virgin Is.	1	0	1
CORDERO	R.	USA/Puerto Rico	USA/Puerto Rico	1	0	1
VALDES PIZZINI	M.	USA/Puerto Rico	USA/Puerto Rico	1	0	1
VELEZ ARROCHO	J.	USA/Puerto Rico	USA/Puerto Rico	1	0	1
COTTE	L.	USA/Puerto Rico	USA/Puerto Rico	0	1	1
HANDLER RUIZ	A.	USA/Puerto Rico	USA/Puerto Rico	0	1	1
CORBIN	C.	Saint Lucia	Saint Lucia	1	0	1
NICHOLS	K.	Saint Lucia	Saint Lucia	1	0	1
HUGGINS	L.	Saint Kitts & Nevis	Saint Kitts & Nevis	1	0	1
O'BRIEN DELPECH	C.	Trinidad & Tobago	Trinidad & Tobago	1	0	1
GROVE	K.	USA/Puerto Rico	USA/Puerto Rico	1	0	1
HALL	K.	USA/Puerto Rico	USA/Puerto Rico	0	1	1
GUNNE JONES	A.	Montserrat - UK dep't	Montserrat - UK dep't	1	0	1
HERNANDEZ GUZMAN	G.	USA/Puerto Rico	USA/Puerto Rico	1	0	1
RIVERA	G.	USA/Puerto Rico	USA/Puerto Rico	1	0	1
PARES JORDAN	D.	USA/Puerto Rico	USA/Puerto Rico	0	1	1
KUBARYK	J	USA/Puerto Rico	USA/Puerto Rico	1	0	1
PORTER	M.	Saint Vincent & the Grenadines	Saint Vincent & the Grenadines	1	0	1
BATESON	R.	BARBADOS	Barbados	1	0	1
HYMAN	L.	USA/Puerto Rico	USA/Puerto Rico	0	1	1
ROBINSON	D.	Saint Kitts & Nevis	Saint Kitts & Nevis	1	0	1
FARRELL	B.	Saint Kitts & Nevis	Saint Kitts & Nevis	1	0	1
FULFORD	M	Turks & Caicos Is - UK dep't	Turks & Caicos Is - UK dep't	0	1	1
ROBINSON	C.	Turks & Caicos Is - UK dep't	Turks & Caicos Is - UK dep't	1	0	1
PROCTOR	O.	Anguilla - UK dep't	Anguilla - UK dep't.	1	0	1

BARRETT	A.	Saint Kitts & Nevis	Saint Kitts & Nevis	1	0	1
WILTSHIRE	W.	UNESCO	USA/Puerto Rico	1	0	1
CHRISTOPHER	W.	Montserrat - UK dep't	Montserrat - UK dep't	1	0	1
HODGE	Roland	Anguilla - UK dep't	Anguilla - UK dep't	1	0	1
SUZYUMOV	A.	UNESCO	USA/Puerto Rico	1	0	1
PHILLIP	P.	Saint Lucia	Saint Lucia	0	1	1
VOLONTE	C.	USA	USA/Puerto Rico	1	0	1
HENDRY	M.	BARBADOS	USA/Puerto Rico	1	0	1
SIMMONS	D.	BARBADOS	USA/Puerto Rico	0	1	1
COLLYMORE	J.	BARBADOS	Barbados	0	1	1
BARCLAY	T.	GRENADA	Grenada	1	0	1
JOSEPH	G.	Antigua & Barbuda	Antigua & Barbuda	1	0	1
RAMOS	M.	USA/Puerto Rico	USA/Puerto Rico	1	0	1
RODRIGUEZ LUGO	M.	USA/Puerto Rico	USA/Puerto Rico	1	0	1
CALERO	N.	USA/Puerto Rico	USA/Puerto Rico	1	0	1
BARRETO ORTA	M.	USA/Puerto Rico	USA/Puerto Rico	0	1	1
HAU	M.	USA/Puerto Rico	USA/Puerto Rico	0	1	1
DIXON	C.	BARBADOS	USA/Puerto Rico	0	1	1
JEFFREY	C.	Antigua & Barbuda	Antigua & Barbuda	0	1	1
OXMAN	B	USA/Puerto Rico	USA/Puerto Rico	1	0	1
BASCOM	R.	BARBADOS	Barbados	1	0	1
BOURNE	L.	BARBADOS	Barbados	1	0	1
LETTSOME	B.	British Virgin Is - UK dep't	British Virgin Is - UK dep't.	1	0	1
POTTER	L.	British Virgin Is - UK dep't	British Virgin Is - UK dep't.	1	0	1
JAMES	A.	DOMINICA	Dominica	1	0	1
LLOYD	P.	Saint Kitts & Nevis	Saint Kitts & Nevis	1	0	1
ISAAC	C.	GRENADA	Grenada	1	0	1
LINDEMAN	K.	USA	USA	1	0	1
THOMAS	H.	GRENADA	Grenada	1	0	1

Total M	Total F	TOTAL
47	14	61

Activity : ***CSI INFO 1: Integrated Framework for the Management of Beach Resources within the Smaller Caribbean Islands (COSALC workshop results)***

Location: UNESCO **Date begin :** 01/11/96 **Date End :** 28/02/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Barbados	Barbados	3	0	3
		USA/US Virgin Is	USA/US Virgin Is	1	0	1
		Saint Lucia	Saint Lucia	2	1	3
		Anguilla - UK dep't	Anguilla - UK dep't.	3	0	3
		Dominica	Dominica	1	0	1
		Belize	Belize	1	0	1

British Virgin Is - UK dep't	British Virgin Is - UK dep't.	2	0	2
USA/Puerto Rico	USA/Puerto Rico	14	7	21
USA	USA	1	0	1
Montserrat - UK dep't	Montserrat - UK dep't	2	0	2
Saint Kitts & Nevis	Saint Kitts & Nevis	4	0	4
Saint Vincent & the Grenadines	Saint Vincent & the Grenadines	2	0	2
Turks & Caicos Is - UK dep't	Turks & Caicos Is - UK dep't	1	1	2
Antigua & Barbuda	Antigua & Barbuda	1	1	2
United Kingdom	USA/Puerto Rico	0	1	1
Grenada	Grenada	3	0	3
Trinidad & Tobago	Trinidad & Tobago	0	1	1

Total M	Total F	TOTAL
41	12	53

Activity : ***Finalization of proceedings of the UNESCO/IOC/UPR-SGCP workshop in the Caribbean***

Location: USA/PUERTO RICO **Date begin :** 30/11/96 **Date End :** 30/12/96

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
Cambers	Gillian	USA/Puerto Rico	LAC	0	1	1

Total M	Total F	TOTAL
0	1	1

Activity : ***Coast and beach stability in the Lesser Antilles (COSALC 1996 report)***

Location: USA/PUERTO RICO **Date begin :** 01/12/96 **Date End :** 31/01/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Dominica	Dominica	2	0	2
		Saint Lucia	Saint Lucia	1	1	2
		Turks & Caicos Is - UK dep't	Turks & Caicos Is - UK dep't	1	1	2
		Saint Kitts & Nevis	Saint Kitts & Nevis	5	0	5
		Grenada	Grenada	5	2	7
		British Virgin Is - UK dep't	British Virgin Is - UK dep't.	3	0	3
		Antigua & Barbuda	Antigua & Barbuda	1	1	2
		Montserrat - UK dep't	Montserrat - UK dep't	2	0	2
		Anguilla - UK dep't	Anguilla - UK dep't.	2	1	3
		USA/Puerto Rico	USA/Puerto Rico	0	1	1
		Saint Vincent & the Grenadines	Saint Vincent & the Grenadines	1	0	1

Total M	Total F	TOTAL
23	7	30

Activity : ***Preparation and distribution of audiovisual materials on beachs and hurricanes: 1995 in the Eastern Caribbean (COSALC PROJECT)***

Location: USA/PUERTO RICO, MAYAGUEZ **Date begin :** 01/01/97 **Date End :** 31/01/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Saint Kitts & Nevis	Saint Kitts & Nevis	4	0	4
		Anguilla - UK dep't	Anguilla - UK dep't.	1	1	2
		Antigua & Barbuda	Antigua & Barbuda	0	2	2
		British Virgin Is - UK dep't	British Virgin Is - UK dep't	2	0	2
		Montserrat - UK dep't	Montserrat - UK dep't	1	1	2
		Saint Lucia	Saint Lucia	1	1	2
		Dominica	Dominica	2	0	2
		Grenada	Grenada	2	0	2
		Turks & Caicos Is - UK dep't	Turks & Caicos Is - UK dep't	1	1	2
		Saint Vincent & the Grenadines	Saint Vincent & the Grenadines	2	1	3
		USA/Puerto Rico	LAC	0	1	1
				Total M	**Total F**	**TOTAL**
				16	8	24

Activity : ***Consultancy mission to Anguilla (COSALC project) re. Beach monitoring and planning application***

Location: Anguilla - UK dep't **Date begin :** 25/01/97 **Date End :** 26/01/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
CAMBERS	G.	USA/Puerto Rico	Anguilla - UK dep't	0	1	1
				Total M	**Total F**	**TOTAL**
				0	1	1

Activity : ***Montserrat Beach Monitoring Programme. Beach Data Assessment, 1990-1996 (COSALC Report)***

Location: USA/Puerto Rico **Date begin :** 01/02/97 **Date End :** 31/10/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Montserrat - UK dep't	Montserrat - UK dep't	2	0	2
		USA/Puerto Rico	Montserrat - UK dep't	0	1	1
				Total M	**Total F**	**TOTAL**
				2	1	3

Activity : ***Mission to Trinidad re. cooperation with the Caribbean Schools project (ASP project of UNESCO) and socio-cultural component of COSALC***

Location: Trinidad & Tobago **Date begin :** 22/02/97 **Date End :** 14/03/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
CAMBERS	G.	USA/Puerto Rico	Caribbean Region	0	1	1
				Total M	**Total F**	**TOTAL**
				0	1	1

Activity : ***COSALC mission to Antigua***

Location: Antigua & Barbuda **Date begin :** 11/03/97 **Date End :** 12/03/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
CAMBERS	G.	USA/Puerto Rico	Antigua & Barbuda	0	1	1
				Total M	**Total F**	**TOTAL**
				0	1	1

Activity : ***Consultancy mission to Antigua, public meeting and presentation to cabinet***

Location: Antigua & Barbuda **Date begin :** 18/03/97 **Date End :** 19/03/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Antigua & Barbuda	Antigua & Barbuda	20	5	25
		USA/Puerto Rico	Antigua & Barbuda	0	1	1
				Total M	**Total F**	**TOTAL**
				20	6	26

Activity : ***Report on institutional strengthening in Turks and Caicos islands (COSALC project)***

Location: TURKS & CAICOS IS - UK dep't **Date begin :** 01/04/97 **Date End :** 31/12/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Turks & Caicos Is - UK dep't	Turks & Caicos Is - UK dep't	3	2	5
		USA/Puerto Rico	Turks & Caicos Is - UK dep't	0	1	1
				Total M	**Total F**	**TOTAL**
				3	3	6

Activity : ***COSALC mision to Turks and Caicos Islands***

Location: Turks & Caicos Is - UK dep't **Date begin :** 05/04/97 **Date End :** 12/04/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
CAMBERS	G.	USA/Puerto Rico	Turks & Caicos Is - UK dep't	0	1	1
				Total M	**Total F**	**TOTAL**
				0	1	1

Activity : ***Training in beach erosion monitoring and management in Turks & Caicos Is.***

Location: Turks & Caicos Is - UK dep't **Date begin :** 07/04/97 **Date End :** 10/04/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Turks & Caicos Is - UK dep't	Turks & Caicos Is - UK dep't	3	2	5
		USA/Puerto Rico	Turks & Caicos Is - UK dep't	0	1	1
				Total M	**Total F**	**TOTAL**
				3	3	6

Activity : ***Workshop on Beach Management in the Turks and Caicos Islands***

Location: Turks & Caicos Is - UK dep't **Date begin :** 11/04/97 **Date End :** 11/04/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Turks & Caicos Is - UK dep't	Turks & Caicos Is - UK dep't	15	5	20
		USA/Puerto Rico	Turks & Caicos Is - UK dep't	0	1	1
				Total M	**Total F**	**TOTAL**
				15	6	21

Activity : ***Contract to develop activities under the COSALC project***

Location: USA/PUERTO RICO **Date begin :** 15/04/97 **Date End :** 31/01/98

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
VALDEZ-PIZZINI	M.	USA/PUERTO RICO	Caribbean region	1	0	1
				Total M	**Total F**	**TOTAL**
				1	0	1

Activity : ***COSALC mission to Nevis***

Location: Saint Kitts & Nevis **Date begin :** 15/06/97 **Date End :** 20/06/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
CAMBERS	G.	USA/Puerto Rico	Saint Kitts & Nevis	0	1	1

Total M	**Total F**	**TOTAL**
0	1	1

Activity : ***Institutional strengthening pilot project (within COSALC) for Nevis***

Location: Saint Kitts & Nevis **Date begin :** 15/06/97 **Date End :** 31/12/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Saint Kitts & Nevis	saint Kitts & Nevis	5	3	8
		USA/Puerto Rico	Saint Kitts & Nevis	0	1	1

Total M	**Total F**	**TOTAL**
5	4	9

Activity : ***Training in data collection and analyses (Nevis, COSALC project)***

Location: Saint Kitts & Nevis **Date begin :** 18/06/97 **Date End :** 19/06/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
HUGGINS	Leonard	Saint Kitts & Nevis	Saint Kitts & Nevis	1	0	1
CAMBERS	G.	USA/Puerto Rico	Saint Kitts & Nevis	0	1	1
BARRETT	Audra	Saint Kitts & Nevis	Saint Kitts & Nevis	1	0	1
ARTHURTON	Patricia	Saint Kitts & Nevis	Saint Kitts & Nevis	0	1	1

Total M	**Total F**	**TOTAL**
2	2	4

Activity : ***COSALC mission to St. Kitts***

Location: Saint Kitts & Nevis **Date begin :** 20/06/97 **Date End :** 20/06/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
CAMBERS	G.	USA/Puerto Rico	Saint Kitts & Nevis	0	1	1

Total M	**Total F**	**TOTAL**
0	1	1

Activity : ***Awareness pilot activities (within COSALC) in Grenada***

Location: Grenada **Date begin :** 23/06/97 **Date End :** 31/12/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Grenada	Grenada	39	22	61
		USA/Puerto Rico	Grenada	0	1	1
				Total M	**Total F**	**TOTAL**
				39	23	62

Activity : ***COSALC mission to Grenada***

Location: Grenada **Date begin :** 23/06/97 **Date End :** 27/06/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
CAMBERS	G.	USA/Puerto Rico	Grenada	0	1	1
				Total M	**Total F**	**TOTAL**
				0	1	1

Activity : ***Provision of six public awareness video films to National Science and Technology Council, Grenada***

Location: Grenada **Date begin :** 24/06/97 **Date End :** 24/06/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
CAMBERS	Gillian	USA/Puerto Rico	Grenada	0	1	1
				Total M	**Total F**	**TOTAL**
				0	1	1

Activity : ***Data analysis manual for Nevis***

Location: USA/Puerto Rico **Date begin :** 01/07/97 **Date End :**

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
Cambers	Gillian	USA/Puerto Rico	saint Kitts & Nevis	0	1	1
				Total M	**Total F**	**TOTAL**
				0	1	1

Activity : ***Advisory mission on coastal erosion and coastal developmemt matters in Turks and Caicos Is.***

Location: Turks & Caicos Is - UK dep't **Date begin :** 06/07/97 **Date End :** 09/07/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
Cambers	Gillian	USA/Puerto Rico	Turks & Caicos Is - UK dep't	0	1	1
				Total M	**Total F**	**TOTAL**
				0	1	1

Activity : ***Provision of six public awareness video films to Fisheries Division, Antigua and Barbuda (COSALC project)***

Location: Antigua & Barbuda **Date begin :** 27/07/97 **Date End :** 31/07/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
Cambers	Gillian	USA/Puerto Rico	Antigua & Barbuda	0	1	1

Total M	Total F	TOTAL
0	1	1

Activity : ***Institutional strengthening pilot project (within COSALC) for Antigua and Barbuda***

Location: Antigua & Barbuda **Date begin :** 28/07/97 **Date End :** 31/12/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Antigua & Barbuda	Antigua & Barbuda	4	2	6
Cambers	Gillian	USA/Puerto Rico	Antigua & Barbuda	0	1	1

Total M	Total F	TOTAL
4	3	7

Activity : ***Awareness pilot project (within COSALC) for Anguilla***

Location: Anguilla - UK dep't **Date begin :** 11/08/97 **Date End :** 15/08/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Anguilla - UK dep't	Anguilla - UK dep't	5	2	7
Cambers	Gillian	USA/Puerto Rico	Anguilla - UK dep't	0	1	1

Total M	Total F	TOTAL
5	3	8

Activity : ***Provision of six public awareness video films to National Trast Anguilla***

Location: Anguilla - UK dep't **Date begin :** 11/08/97 **Date End :** 11/08/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
CAMBERS	Gillian	USA/Puerto Rico	Anguilla - UK dep't	0	1	1

Total M	Total F	TOTAL
0	1	1

Activity : ***Proceedings of a workshop on Beach Management in the Turks and Caicos Islands (11 April, 1997)***

Location: Turks & Caicos Is - UK dep't **Date begin :** 01/09/97 **Date End :**

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Turks & Caicos Isds - UK dep't	Turks & Caicos Is - UK dep't	2	2	4
CAMBERS	G.	USA/Puerto Rico	Turks & Caicos Is - UK dep't	0	1	1
LINDERMANN	K.	USA	Turks & Caicos Is - UK dep't	1	0	1
				Total M	**Total F**	**TOTAL**
				3	3	6

Activity : ***Proceedings of a workshop on Beach Management in the Turks and Caicos Islands (11 April, 1997)***

Location: Turks & Caicos Is - UK dep't **Date begin :** 01/09/97 **Date End :**

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Turks & Caicos Is - UK dep't	Turks & Caicos Is - UK dep't	2	2	4
CAMBERS	G.	USA/Puerto Rico	Turks & Caicos Is - UK dep't	0	1	1
LINDERMANN	K.	USA	Turks & Caicos Is - UK dep't	1	0	1
				Total M	**Total F**	**TOTAL**
				3	3	6

Activity : ***COSALC mission to St. Vincent & the Grenadines***

Location: Saint Vincent & the Grenadines **Date begin :** 21/09/97 **Date End :** 25/09/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
CAMBERS	G.	USA/Puerto Rico	Saint Vincent & the Grenadines	0	1	1
				Total M	**Total F**	**TOTAL**
				0	1	1

Activity : ***Institutional strengthening in St. Vincent & the Grenadines***

Location: Saint Vincent & the Grenadines **Date begin :** 21/09/97 **Date End :** 31/12/97

Name	*Firstname*	*Country*	*Benef country*	*No. Male*	*No. Female*	*Total*
		Saint Vincent & the Grenadines	Saint Vincent & the Grenadines	3	0	3
		USA/Puerto Rico	Saint Vincent & the Grenadines	0	1	1
				Total M	**Total F**	**TOTAL**
				3	1	4

SUMMARY OF THE STATUS OF THE BEACH MONITORING PROGRAMMES AS OF 31.12.97

Country/territory:	**ANGUILLA**
Date monitoring established:	September, 1992
Advisory visits undertaken in:	93, '94, '95, '96, '97
Main executing agency:	Department of Fisheries and Marine Resources (DFMR)
Education level of chief counterpart:	Postgraduate-degree
Other involved agencies:	Physical Planning Department (PPD), Anguilla National Trust (ANT). PPD and the Ministry of Public Works (MPW) are interested in having the database installed.
Persons trained in beach monitoring:	4 persons (DFMR) trained in field techniques, 1 person (DFMR) trained in data entry.
Database:	Established at DFMR using version 2.2 of the BEACH software. Quarterly data sets exist for 35 sites in Anguilla for 1992 - 1997. Infrequent data sets exist for 6 sites in Prickly Pear Island and Sandy Island for 1994-1997. Back-up database stored at UPR-SGCP.
Major problems:	The main weakness is that only one person (from DFMR) is trained in computer data entry.
Assessment:	Programme has a sound foundation. This is a territory where programme sustainability by the year 2000 is an achievable target. Training is required in data quality control, analysis and application. The database also needs to be established in PPD and MPW.

Country/territory:	**ANTIGUA AND BARBUDA**
Date monitoring established:	October, 1991
Advisory visits undertaken in:	'92, '93, '94, '95, '96, '97
Main executing agency:	Fisheries Division (FD)
Education level of chief counterpart:	Post-graduate degree
Other involved agencies:	Development Control Authority (DCA), Environment Division (ED). DCA is involved in the field monitoring. The DCA and the ED are interested in having the beach database installed.
Persons trained in beach monitoring:	6 persons (5 from FD and 1 from DCA) trained in field techniques, 4 persons from FD trained in data entry, data quality control and data analysis.
Database:	Established at FD, using version 2.3 of the BEACH software. The Antigua database consists of quarterly data sets for 42 sites from 1991 to 1997. The Barbuda data sets consist of quarterly measurements for 8 sites over the period 1995 to 1997. A manual has been prepared detailing the quality control and data analysis procedures and summarizing the data trends for all the sites in Antigua & Barbuda. Back-up database stored at UPR-SGCP.
Major problems:	None
Assessment:	Programme has a sound foundation. This is a country where programme sustainability by the year 2000 is an achievable target. Further follow-up is required regarding data analysis and support is needed to provide further training and to establish the database in DCA, ED and possibly MCW.

Country/territory:	**BRITISH VIRGIN ISLANDS**
Date monitoring established:	February, 1989
Advisory visits undertaken in:	('90-'93 Coordinator resident in territory), '94, '96
Main executing agency:	Conservation and Fisheries Department (CFD)
Education level of chief counterpart:	Post-graduate degree
Other involved agencies:	Town and Country Planning Department (TCPD), National Parks Trust (NPT), Survey Department (SD). SD are involved in assisting CFD in establishing permanent monuments for the reference points.
Persons trained in beach monitoring:	3 persons (CFD) trained in field and data entry techniques.
Database:	Established at CFD using version 2.1 of BEACH software. Quarterly datasets exist for 17 sites on Tortola, 10 on Virgin Gorda, 4 on Peter Island, 2 on Jost van Dyke, 3 in North Sound for 1989-1994. Data collection re-commenced in 1997. Permanent monuments are being established to mark the reference points. CFD plan to use more sophisticated instrumentation for monitoring, and are in the process of acquiring a theodolite.
Major problems:	Monitoring was stopped in 1994 before the equipment for more accurate measurement was in place.
Assessment:	The programme has a sound foundation. Further support is required regarding data analysis (data quality control, analysis and application). The database needs to be established in other agencies e.g. TCPD.

Country/territory:	**DOMINICA**
Date monitoring established:	August, 1987
Advisory visits undertaken in:	'88, '89, '90, '91, '94, '95, '96
Main executing agency:	Forestry and Wildlife Division (FWD)
Education level of chief counterpart:	Post-graduate degree
Other involved agencies:	ENCORE project of the Ministry of Agriculture was involved as an active partner until 1995. ENCORE project staff were fully involved in the field monitoring. However the ENCORE project is scheduled to end in 1998. The Ministry of Communications and Works (MCW) have expressed interest in the monitoring and having the database installed there.
Persons trained in beach monitoring:	Six persons (2 from FWD and 4 from the ENCORE Project) were trained in field and data entry techniques.
Database:	The first database from 1987-1991, although analyzed is not stored on computer (due to a system failure when files were lost). This database exists only as a paper copy. Since the programme was re-started in 1994, a database has not been permanently established in Dominica. Quarterly datasets exist for 23 sites for 1987-1991 and for 24 sites for 1994-1997, although these latter datasets have some significant gaps. Back-up database for 1994 onwards, which is at present incomplete, is stored at UPR-SGCP.
Major problems:	There is a need to establish a permanent database at FWD.
Assessment:	Considerable further training is required to make this programme fully sustainable, the first step must be to establish a computer database at the FWD. Other agencies e.g. MCW and the Physical Planning Division need to be directly involved in the programme.

Country/territory:	**GRENADA**
Date monitoring established:	August, 1985
Advisory visits undertaken in:	'86, '87, '88, '91, '93, '94, '95, '96, '97
Main executing agency:	National Science & Technology Council (NSTC)
Education level of chief counterpart:	Post-graduate degree
Other involved agencies:	Fisheries Division (FD), Lands and Surveys Division (LSD), Land and Water Resource Unit (LWRU), all are fully involved in the programme.
Persons trained in beach monitoring:	8 persons (2 from NSTC, 2 from FD, 2 from LSD, 2 from LWRU) trained in field monitoring and data entry.
Database:	Established at NSTC using version 2.1 of the BEACH software. Quarterly data sets exist for 42 sites for 1985-1991 and for 30 sites for 1993-1997. Back-up database stored at UPR-SGCP.
Major problems:	None.
Assessment:	Programme has a sound foundation. This is a country where programme sustainability by the year 2000 is an achievable target. Training is required in data quality control, analysis and application. The database also needs to be established in other agencies e.g. Physical Planning Department, Ministry of Communications & Works.

Country/territory:	**MONTSERRAT**
Date monitoring established:	February, 1990
Advisory visits undertaken in:	'92, '94, '95
Main executing agency:	Ministry of Agriculture, Trade and Environment (MATE)
Education level of chief counterpart:	Post-graduate degree
Other involved agencies:	Physical Planning Unit (PPU) are involved in using the data for beach management. PPU have expressed interest in having the database installed.
Persons trained in beach monitoring:	2 persons from MATE trained in field monitoring and data entry. (The situation has changed since the volcanic crisis started in July 1995 and both these trained persons have left the island).
Database:	Prior to the volcanic crisis it was established at MATE using version 2.1 of the BEACH software. At present the database is not housed on the island due to the resettlement of government departments after the abandonment of Plymouth. Quarterly datasets exist for 14 sites for 1990-1996. Monitoring stopped after October, 1996 due to volcanic crisis and resettlement in the northern third of the island. Back-up database stored at UPR-SGCP.
Major problem:	The volcanic crisis has resulted in the main counterpart leaving the territory.
Assessment:	This programme needs to be re-started since the information is required for beach management and aggregate supply in the northern third of the island where the remaining population now lives. Whether the programme can become sustainable in view of the small population size is unknown at the present time.

Country/territory:	**NEVIS**
Date monitoring established:	August, 1988
Advisory visits undertaken in:	'89, '90, '91, '92, '93, '94, '95, '96, '97
Main executing agency:	Nevis Historical and Conservation Society (NHCS) and Physical Planning Department (PPD)
Education level of chief counterpart:	Post-graduate degree
Other involved agencies:	Fisheries Division (FD) are involved in the monitoring. The FD, Water Department and the Ministry of Communications and Works (MCW) are interested in having the database installed.
Persons trained in beach monitoring:	7 persons trained in field techniques (5 from NHCS, 1 from PPD, 1 from FD). 4 persons (1 from NHCS, 2 from PPD and 1 from FD) trained in data entry. 1 person from PPD trained in data quality control and data analysis.
Database:	Established at PPD, using version 2.3 of the BEACH software. A back-up database based on a Macintosh system exists at the NHCS. Quarterly datasets exist for 18 sites for 1988-1997. A manual has been prepared detailing the data control and analysis procedures and summarizing the data trends for all sites in Nevis. Back-up database stored at UPR-SGCP.
Major problems:	Small population size and the inevitable gaps when persons go away for studies.
Assessment:	Programme has a sound foundation. This is an island where programme sustainability by the year 2000 is an achievable target. Further follow-up is required regarding data analysis and support is needed to provide training and to establish the database in other agencies e.g. MCW.

Country/territory:	**ST. KITTS**
Date monitoring established:	December, 1991
Advisory visits undertaken in:	'92, '93, '94, '95, '96, '97
Main executing agency:	Department of the Environment (DE)
Education level of chief counterpart:	Post-graduate degree
Other involved agencies:	Fisheries Division (FD), Southeast Peninsula Board (SEPB). FD is fully involved in the field analysis and data entry, the involvement of the SEPB has stopped since DE took over coordination of the programme in January 1997.
Persons trained in beach monitoring:	6 persons (2 from DE, 2 from FD, 2 from SEPB) trained in field monitoring and data entry techniques.
Database:	Database stored at FD and SEPB using version 2.1 of the BEACH software. No database yet established at DE although version 2.3 of the BEACH software is installed here and some training has been provided. Quarterly datasets exist for 15 sites on the mainland for 1991-1997, these are stored at the FD. Quarterly datasets exist for 20 sites on the peninsula for 1991-1996, these are stored at SEPB. Back-up databases are stored at the UPR-SGCP.
Major problems:	Fragmentation of the database between different agencies.
Assessment:	This programme has the potential to become fully sustainable. However, firstly there is a need to consolidate the different databases at the DE and provide further training in the data entry to DE. The databases also need to be established at other agencies such as the Planning Department and the Ministry of Communications and Works.

Country/territory:	**ST. LUCIA**
Date monitoring established:	August, 1994
Advisory visits undertaken in:	'95
Main executing agency:	Fisheries Department (FD)
Education level of chief counterpart:	First degree
Other involved agencies:	St. Lucia National Trust (SLNT), Soufriere Marine Management Area (SMMA) are involved in the field monitoring. Starting from January 1998, the Young Roteract's Club will take over from the SLNT.
Persons trained in beach monitoring:	8 persons (2 from FD, 4 from SLNT and 2 from SMMA) trained in field techniques, 2 persons from FD trained in data entry.
Database:	Established at FD using version 2.1 of the BEACH database. Quarterly datasets exist for 18 sites for 1994-1996 (although with some data gaps). Monitoring suspended 1996-7 while an island-wide beach and mangrove baseline survey undertaken, monitoring to recommence January 1998. Back-up database stored at UPR-SGCP.
Major problems:	Significant gaps in the database which make interpretation of trends difficult.
Assessment:	This programme has the potential to become fully sustainable although with considerable further training. Database needs to be maintained on a regular basis and should be installed in other agencies such as the Ministry of Planning and Ministry of Communications and Works.

Country/territory:	**ST. VINCENT AND THE GRENADINES**
Date monitoring established:	February, 1995
Advisory visits undertaken in:	'96, '97
Main executing agency:	Seismic Unit (SU) of the Ministry of Agriculture
Education level of chief counterpart:	Non-degree
Other involved agencies:	Planning Department (PD), Ministry of Health, (MH), Caribbean Schools Project (CSP) know about the monitoring programme but are not directly involved. A direct involvement with CSP is planned for the future.
Persons trained in beach monitoring:	3 persons (from SU) trained in field techniques, 2 persons (from SU) trained in data entry.
Database:	Established at Seismic Unit, using version 2.3 of the BEACH software. Quarterly datasets exist for 20 sites in St. Vincent for 1995-1997 (with some gaps) and one set of data exists for 16 sites in Bequia, for 4 sites in Palm Island and for 4 sites in Union Island for 1996. A back-up database is stored at the UPR-SGCP.
Major problems:	High transport costs due to archipelagic nature of the country.
Assessment:	This programme requires considerable further support to fully establish the field monitoring and data entry procedures.

Country/territory:	**TURKS AND CAICOS ISLANDS**
Date monitoring established:	July, 1995
Advisory visits undertaken in:	'97
Main executing agency:	Department of Environment & Coastal Resources (DECR)
Education level of chief counterpart:	Post-graduate degree
Other involved agencies:	Department of Planning (DP) is fully involved in the field monitoring and data entry.
Persons trained in beach monitoring:	3 persons (2 from DECR, 1 from DP) trained in field techniques and computer data entry.
Database:	Established at DECR, using version 2.1 of the BEACH software. Annual datasets exist for 6 sites in Grand Turk for 1995-1997 and for 10 sites in Providenciales for 1995-1997. Back-up database at UPR-SGCP.
Major problems:	High transport costs due to archipelagic nature of the country.
Assessment:	This programme requires further support to fully establish the field monitoring and data entry techniques.

LIST OF EQUIPMENT SUPPLIED TO EACH COUNTRY/TERRITORY IN 1996-1997

Country/Territory	Equipment Supplied
Anguilla*	No equipment
Antigua and Barbuda	One set of equipment, one camera
British Virgin Islands	One Abney level
Dominica	One set of equipment, one camera
Grenada**	One camera
Montserrat	One set of equipment, one camera
Nevis	One set of equipment, one camera
St. Kitts	One set of equipment, one camera
St. Lucia**	One camera
St. Vincent and the Grenadines***	Two sets of equipment and one camera
Turks and Caicos Islands***	Two sets of equipment and one camera

** Anguilla was supplied with additional beach monitoring equipment and two cameras under the Hurricane Impact Study in 1996 (funded by the Dependent Territories Regional Secretariat).*

*** Grenada was supplied with two full sets of monitoring equipment in 1993 and 1995, while St. Lucia was supplied with two additional sets of equipment in 1995.*

**** In the case of St. Vincent and the Grenadines and the Turks and Caicos Islands, two additional sets of equipment were supplied since both these countries consist of many different islands rather than just one main island.*

LIST OF ABBREVIATIONS

COSALC	Coast and Beach Stability in the Caribbean Islands project
CSI	Environment and Development in Coastal Regions and Small Islands
NGO	Non-governmental Organization
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPR-SGCP	University of Puerto Rico Sea Grant College Program