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Caribbean Coastal Pollution Project (CCPP)

Assessment, Monitoring and Management of Persistent Organic Pollutants (POP) and Persistent Toxic Substances (PTS) in the Coastal Ecosystems of the Wider Caribbean Region

Progress report

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UNU-INWEH

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BACKGROUND

The Caribbean Coastal Pollution project (CCPP) aims at the assessment, monitoring and management of Persistent Organic Pollutants (POPs) and Persistent Toxic Substances (PTS) in the Coastal Ecosystems of the Wider Caribbean Region and commenced in September 2007. It is being funded by the World Bank through the Canada Persistent Organic Pollutants Fund from the Canadian International Development Agency (CIDA) as well as by UNU-INWEH.

RATIONALE

Past studies show POP and other PTS pollution is of ecological and human health concern in many locations within the coastal environment of Wider Caribbean countries, but that there is a lack of knowledge and capacity to monitor and manage PTS. In particular, coastal marine managers do not have jurisdiction, nor adequate inter-departmental connections to ameliorate this pollution, most of which arises from on-shore activities, sometimes some distance inland. The UNEP GEF PTS Regional Assessment for Latin America and the Caribbean (2002) reported that data gaps for PTS are considerable, and that reliable inventories of sources and monitoring of emissions, transmission and deposition of PTS, are needed if effective amelioration is to be realized. Furthermore, it concluded that 1) monitoring capacity for PTS varies among countries across the region, 2) internationally accredited labs are few, and 3) enhancement of lab capacity, updating of equipment, and improvement in analytical QA/QC are all urgently needed.

PARTICIPATING COUNTRIES

The project currently includes eight countries, in all of which selected POPs and other PTS have been identified as an issue. The four mainland countries -- Belize, Guatemala, Honduras and México -- were selected because of their participation in the Mesoamerican Barrier Reef System (MBRS) and the Coral reef Targeted Research (CRTR) GEF projects aimed at improving management of their coastal marine ecosystems. The four island countries -- Dominican Republic, Jamaica, St Lucia and Trinidad & Tobago -- are participants in the UNEP GEF Integrating Watershed & Coastal Areas Management Project (IWCAM) project which seeks to build integrated management of watersheds and coastal areas of these countries. By engaging these eight countries, CCPP builds upon the evident success of the South-South partnerships already developed in previous efforts, while working collaboratively with these larger projects to further enhance the capacity of these nations to manage POP and other PTS pollution effectively.

OBJECTIVES

The purpose of CCPP is to build a network among environmental managers, analytical laboratories, and other appropriate governmental agencies in countries of the WCR that will be effective in measuring, evaluating and then reducing pollution from POPs and other PTS in the coastal marine environment. These reductions will be achieved through changes to behavior that stem releases of pollutants into the environment in upstream agriculture and industry.

ANTICIPATED OUTCOMES (Phase 1 and 2)

By the end of the two years of Phases One and Two, CCPP will have accomplished the following:

1. A South-South network involving coastal marine managers and environmental laboratory personnel, spanning 8 countries in the WCR, will have been established.
2. That network will have sampled fish (White grunt) in their coastal marine environments at a set number of sites and obtained baseline-level data on the prevalence of POPs and other PTS in the coastal marine environment in these countries. Data will be maintained in an open-access online database.
3. The 10 participating laboratories will have had a portion of their capacity-building needs fulfilled, through training workshops on analytical rigor, QA/QC, and data management, through provision of new equipment, and through close mentoring by a North-South expert team. Further, they will have assisted each other in undertaking needed analyses, and may see the benefit in specialization and regional collaboration.
4. Several research projects will have been initiated or conducted on POPs and other PTS identification, contamination sampling and analysis methods, and possible source tracing.
5. Participating countries will have had their obligations under the Stockholm Convention furthered, through the monitoring effort and through the enhancement to laboratory capacity. Further, through the network, they will have access to technical expertise that may be available if needed as they proceed in developing their NIPs under the SC.
6. The groundwork will have been set for i) further upgrading of laboratory capacity at the participating laboratories, ii) implementation of a region-wide, continuing monitoring program for POP and other PTS pollution, and iii) an explicit effort to trace two or more particularly worrisome cases of PTS pollution to their upstream, terrestrial sources, planned for Phase Three, and for the eventual amelioration or cessation of those particular instances of environmental pollution.

PARTNERS

A list of the 10 laboratories involved in this project is given in table A and a list of other individuals and institutions participating, and other initiatives, programmes, agencies etc. with cognate interests in the Caribbean region is given in table B of annex 1 to this report.

An affiliated network includes researchers and individuals who have been recruited to become involved in developing and implementing activities related to the project objectives. This list is evolving as the project network expands.

- Dr. KG Drouillard, University of Windsor (consultant)
- Dr. C Metcalfe, Trent University (consultant)
- Dr. D.G. Haffner, University of Windsor (participant in both workshops)
- Dr. Gerardo Gold, CINVESTAV Unidad Merida, Mexico (consultant)

PROGRESS ON PROJECT COMPONENTS

Phase 1 - Planning Workshop

The sole objective in Phase One was to hold a planning meeting at UNU-INWEH in Hamilton, Canada, involving potential participants from the identified WCR countries, representatives of the MBRS and IWCAM projects, and a number of Canadian experts. This Planning Workshop was held in Hamilton, Canada from 25-27 November 2007 and included 25 participants from 10 laboratories and 4 management agencies in the region, 4 experts from Canada, 2 experts from other locations, and 3 UNU-INWEH personnel.

It reviewed the status of POPs and PTS pollution in the marine environment and rivers and other water bodies close to coastal areas of the WCR of the eight countries covered by the project (Belize, Dominican Republic, Guatemala, Honduras, Jamaica, México, St Lucia and Trinidad & Tobago). It also discussed the obligations of these countries under the Stockholm Convention, and presented an overview of other initiatives/partners dealing with similar issues in the region. Finally, it discussed and refined the scope and implementation modalities of the project, and developed an initial list of possible laboratories to include in the lab assessment exercise planned for 2008.

Following this workshop official consensus was sought through letters from UNU-INWEH addressed to the agency and laboratory heads to participate in the activities of the project, including commitment of in kind support in the form of staff time to collect samples and analyze data. The responses to these letters and official commitments from these agencies and laboratories were received during the first 5 months of the project.

Phase 2

Regional Initiation Workshop

This three-day regional workshop was held in Trinidad from 10-12 June 2008 and aimed to consolidate commitment to join a regional network including the eight participating countries and to finalize the detailed program of activities to be undertaken commencing this summer. The activities agreed upon at this workshop, in the form of a unanimously endorsed Consensus Statement were:

- a) The collection of white grunt samples from one or more agreed coastal locations in each country to develop a baseline of PTS pollution of coastal waters;
- b) The delivery of those samples to identified labs, either for preliminary treatment and onward shipping, or for final analysis for a range of PTS;
- c) Formal evaluation of capacity in PTS analysis for each of the laboratories participating in the project;
- d) Some augmentation of that capacity through a combination of training and provision of new infrastructure; and
- e) Initiation of regular monitoring for PTS in coastal waters to build from the baseline data.

Within the consensus statement participants committed to the provision of technician time to monitor and to evaluate samples, identified the sampling sites in each country and reached agreement on who is responsible for what in each country.

A. Capacity Building

Laboratory Evaluation

A team of three experts was selected to execute the laboratory evaluation exercise. The three experts were contracted to play a lead role in the project, serve as the evaluation team to visit ten designated laboratories and report on current analytical capacity with respect to POP and other PTS pollutants in coastal marine ecosystems (water, sediment, biota), advise UNU-INWEH on most effective use of project funds for upgrade of laboratory facilities, and/or mentoring of laboratory technical staff at each designated laboratory and play a major role in preparation of proposals from UNU-INWEH seeking support for continuation of the project. The experts contracted are:

- Dr. Chris Metcalfe, Environmental and Resource Studies, Trent University
- Dr. Gerardo Gold Bouchot, Departamento de Recursos del Mar, CINVESTAV Unidad Merida
- Dr. K.G. Drouillard, Great Lakes Institute for Environmental Research, University of Windsor

During May-June 2008, questionnaires were sent to all the participating laboratories assessing their current capacity in terms of staff, infrastructure, laboratory equipment and capacity needs to sample and analyze POPs and other PTS. The questionnaires were developed using an existing similar questionnaire developed by the IWCAM project (and CEHI in St Lucia). The responses from these questionnaires were synthesized by the expert team and used as preliminary information for their evaluation report.

The experts conducted their first laboratory visits during 12- 22 June 2008. Five laboratories were visited (2 laboratories in Trinidad, 2 laboratories in Jamaica and 1 laboratory in St Lucia). The second set of visits took place from 17-26 August 2008. Four Laboratories were visited (2 in Mexico, 1 in Honduras and 1 in Guatemala). The remaining laboratory in the Dominican Republic was visited during the second week of September. The Final Laboratory Evaluation Report was submitted in October 2008.

This evaluation exercise revealed that there is a wide range in the capacity of the 10 laboratories involved in the project to participate in a monitoring and research program on POPs and other PTS in the marine environment of the WCR. The assessment showed that the Pesticide Laboratory at the UWI in Mona, Jamaica, and the Marine Geochemistry Laboratory at CINVESTAV in Merida, Mexico, have the greatest capacity to take lead roles in regional POPs and PTS monitoring networks. This is because of their access to appropriate facilities, equipment and technical expertise, and institutional capacity to manage and implement a monitoring program.

The evaluation proposes the creation of a laboratory network for POPs and PTS monitoring and research in the WCR with the Pesticide Laboratory at UWI, Mona taking a lead role among English speaking partners in the Caribbean (i.e. "AngloPOPs" group) and the Marine Geochemistry Lab at CINVESTAV taking a lead role among Spanish speaking partners in

the Caribbean (including Belize) (i.e. “HispanoPOPs” group). The project participants have been divided into partner institutions that operate in Spanish and those that operate in English, with the exception of Belize. The geographical proximity and history of collaboration with Guatemala, Honduras and Mexico in the MBRS project, make it easier for Belize to collaborate with the Spanish-speaking countries.

For the white grunt monitoring survey, the UWI Mona and CINVESTAV labs will rely on partner institutions in the WCR to collect and provide samples for POPs analysis, and will conduct all subsequent analyses. A significant component of the project will involve reporting results to all partners within the network. There will also be opportunities to involve partner labs in specific research projects.

Laboratory Equipment Upgrades

The laboratory evaluation developed a proposal for laboratory equipment needs for each of the laboratories that was evaluated to enhance their capacity for POPs and PTS analysis to a required level for the project. Due to budget constraints during this phase of the project, the initial laboratory infrastructure investments will be targeted at the two leading Regional Analysis laboratories (CINVESTAV and UWI lab in Jamaica). If additional funds become available after 2009, then further investments will be made for equipment upgrades of the remaining satellite laboratories. Negotiations are currently underway for purchasing the necessary equipment from SHIMADZU Inc. Purchasing is expected to commence in January 2009.

Laboratory Inter-comparison

This exercise commenced in October 2008 and aims at doing an inter-comparison between the two regional Analysis Laboratories (CINVESTAV and UWI Jamaica) and the two Canadian laboratories (University of Windsor and Trent University Laboratories). The inter-laboratory comparison exercise will provide an initial quality check to ensure consistency in analytical results between laboratories and to harmonize selection of standards and certified reference materials (CRMs) used for quality assurance purposes.

The IAEA Marine Laboratory in Monaco provided the project with the certified reference materials (CRMs). UNU-INWEH distributed certified analytical standards purchased in Canada (Organochlorine pesticides and PCB Standards), a spiking internal standard (2,4,6-trichlorobiphenyl) and a certified reference material (a IAEA tuna homogenate was selected) to the two regional analytical laboratories and the two participating Canadian laboratories. Each laboratory will perform sample extractions, clean-up and chemical analysis of 8 replicate samples of the supplied CRM. The supplied spiking internal standard will be added to each sample and blank prior to extraction to generate a sample recovery. Instrumental analysis of the blanks and replicate CRM samples will be completed by GC-ECD. Electronic reports from each of the 4 participating laboratories will be combined and analyzed. Each laboratory will then be given a report documenting the analytical results and comparability of the 4 laboratories.

Staff Secondments

The original plan included secondments of 2-4 identified lab staff to Canadian labs for 3 months. This activity has been moved to Phase Three of the project (after 2009) because it

was decided that at this point in time it would be more effective and more economical for the project to first focus on holding targeted training sessions in the region on specific capacity needs in the laboratories.

Training

Specific training needs were identified during the laboratory evaluation exercise and included sample preparation and analysis, risk assessment, quality assurance and control.

The first training for laboratory analysts and managers is planned for 19-21 January 2009 in Merida Mexico and will focus on POPs in Biological Tissues and will include sessions on QA and QC procedures, examples of different extraction and clean-up methods, instrument detection limits and method quantization limits and POPs extraction methods. The training involves 21 participants (with at least 2 representatives from each project country) and 4 trainers.

B. Environmental Monitoring

Sample collection and analysis

The sampling scheme and details on sampling sites and the sample material, as well as the responsible agencies/laboratories were agreed upon by all project participants in a consensus statement adopted during the regional initiation workshop in Trinidad and Tobago in June 2008. Participants agreed to sample a coastal fish species called the white grunt (*Haemulon plumieri*) which has also been sampled within the MBRS project. Sampling commenced in the months following the Regional workshop in Trinidad in June 2008, and one round of baseline sampling has been conducted in almost all 8 countries at 6-8 sites in each country sampling 3 fish at each site. A sampling and sample analysis protocol was developed which all agencies/laboratories will follow.

The countries will send their samples to the 2 lead regional laboratories following the interim reporting workshop in January 2009, and the regional analysis laboratories will then start analyzing these samples. The regional laboratories will receive white grunt samples (2-5 g, skin-off, dorsal muscle fillet) from each of the participating laboratories and member countries. A document was developed outlining the roles of the regional labs and the analytical requirements and procedures.

Research projects

During phase 2 of the project 2 research projects are being initiated:

1. Passive Sampler Monitoring for Contaminants in the Caribbean Coastal Zone of the Yucatan Peninsula, Mexico. Principle investigator: Dr. Chris Metcalfe
2. Quantitative Bio monitoring of POPs in Caribbean Coastal Zones Using Oysters. Principle investigator: Ken Drouillard.

Project 1: The Caribbean coast of the Yucatan peninsula is highly susceptible to contamination of groundwater and the coastal zone as a result of the unique Karst geology and the rapid development in the region. This study evaluates whether contamination is currently occurring in the area by monitoring selected areas using passive sampler technologies. Permeable membrane devices (SPMD) and Polar Organic Chemical Integrative

Sampler (POCIS) passive samplers will be deployed in selected locations along the Caribbean coastal zone of the Yucatan peninsula, Mexico in order to assess whether there is currently contamination of these water resources from municipal wastewater, urban runoff, livestock production and pesticide use in the region. This project commenced in December 2008 and samplers were deployed at 4 sites. In the initial deployment, the passive samplers were placed in: i) caves that discharge into Carwash cenote near Tulum, ii) an underground cave system that passes under Tulum, and iii) at sites in the marina and near the golf course at Puerto Aventuras near Playa del Carmen. During January 2009 the samplers will be retrieved from the monitoring sites and extracted at the Marine Sciences Laboratory of CINVESTAV in Merida, with the cooperation of Dr. Gerardo Gold Bouchot. Instruction in the deployment, retrieval and extraction of the passive samplers will be provided to CINVESTAV personnel by Dr. Metcalfe and his research staff from Trent University.

Project 2: This project aims to implement an oyster biomonitoring survey and to calibrate Caribbean oyster species as POP biomonitors for the region. Researchers, and their respective graduate students, will be trained in biomonitoring methods and toxicokinetic modelling techniques to interpret POPs bioavailability and bioaccumulation in each of their respective regions. The data will also provide calibration of chemical toxicokinetics in oysters that will facilitate better interpretation of spatial scale biomonitoring data sets implemented according to classic biomonitoring approaches as well as provide information on site-specific seasonal changes in bioavailable residues. Surveys will be completed in regional waters of Trinidad, Jamaica and Mexico. During the first year, a classic biomonitoring survey will be implemented, where investigators will collect native mussels from each study location and submit them for chemical analysis (OC-pesticides, PCBs, PAHs and PBDEs). During the 2nd year, a quantitative biomonitoring survey will be implemented, whereby pre-dosed mussels will be transplanted in regional waters in each country and destructively sampled over time. This project is expected to commence in February 2009.

C. Information Dissemination

Table 1 summarizes documents and reports prepared as part of the project so far. More focus on outreach will be given during 2009, including outreach to public and policy makers.

PROJECT DOCUMENTS

Table 1. List of Project Documents.

Document	Date
Report of the Planning Workshop, Hamilton Nov. 2007	January 2008
Laboratory Evaluation Questionnaire	May-June 2008
Consensus Statement on activities in the project	June 2008
Sampling Protocol for White Grunt (<i>Haemulon plumieri</i>)	July 2008
DRAFT Overview of past studies and data on POPs and PTS in coastal ecosystems of eight project countries	Nov 2008
Report of the Regional Workshop, Trinidad June 2008	July 2008
Final Laboratory Evaluation Report	October 2008
Caribbean Regional Analytical Laboratories – Roles and Participation in the Analysis of POPs Samples	Nov 2008

ANNEX 1

List of participating laboratories

A. *List of laboratories*

Country	Contact Name	Project Contact	Laboratories selected	Address
Belize			NONE AVAILABLE	
Dominican Republic	Ramon Antonio Delanoy de la Cruz	Ramon Antonio Delanoy de la Cruz	Lab. Ciencias Nucleares Instituto de Fisica	Lab. Ciencias Nucleares Instituto de Fisica Universidad Autonoma de Santo Domingo Santo Domingo. Republica Dominicana Tel.: 1 809 689-7184
Guatemala	Bessie Oliva	Bessie Oliva and Marta del Cid	Facultad de Ciencias Químicas y Farmacia - Universidad de San Carlos de Guatemala	Laboratorio de Investigacion. Facultad de CCQQ y Farmacia de la Universidad de San Carlos de Guatemala. Ciudad Universitaria Zona 12. Ciudad Guatemala Tel (502) 52026232; 22887808
Honduras	Danellia Sabillon	Francisco Garcia	Centro de Estudios y Control de Contaminantes (CESCCO) - Secretaria de Recursos Naturales y Ambiente (SERNA)	Centro de Estudio y Control de Contaminantes, Secretaria de Recursos Naturales y Ambiente , Barrio Morazan frente Central de Bomberos, Edificio CESCCO, Tegucigalpa M.D.C. Honduras, C.A.
Jamaica	Dr Leary Myers	Paulette Kolbusch and Mrs. Winsome Townsend	NEPA Lab	Pollution Control and Assessment Branch (NEPA) 191 Old Hope Road Kingston 6, Jamaica
Jamaica	Tara Dasgupta	Raymond Reid	Pesticide Residue Laboratory, University of the West Indies, Mona	Pesticide Residue Lab University of the West Indies, Mona Kingston 7, Jamaica W.I.
Mexico	Gerardo Gold	Gerardo Gold and Victor Ceja	CINVESTAV	CINVESTAV Unidad Merida, Km 6 Antigua Carretera a Progreso Merida, Yucatan 97310 Mexico
Mexico	Dr. Alberto De Jesus Navarrete	Ariana Zavala and Ma. Guadalupe Nieto López	Resp. Lab. Institucional de Química ECOSUR	ECOSUR-Unidad Chetumal, El Colegio de la Frontera Sur, Unidad Chetumal, Av. Centenario km 5.5, Apdo. Postal 424, Chetumal, Quintana Roo. 77000 Mexico
St Lucia	Patricia Aquing	Allison Astwood	Caribbean Environmental Health Institute (CEHI)	Caribbean Environment Health Institute The Morne, P.O. Box 1111 Castries, St. Lucia
Trinidad and Tobago	Dr. Lebert Grierson	Denise Beckles	University of West Indies (UWI) - St. Augustine - Chemistry Department 1-868-662-6013	University of the West Indies, St. Augustine Department of Chemistry St. Augustine, Trinidad and Tobago

Trinidad and Tobago	Commodore Anthony Franklin	Wendy Norville, Daryll Banjoo	Institute of Marine Affairs (IMA) - Marine Chemistry Department	Institute of Marine Affairs Marine Chemistry Department P.O. Box 3160, Carenage Trinidad and Tobago
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B. *List of other project contacts*

Participant	Organization/institute
Guatemala:	
Jose Robledo	La Autoridad para el manejo sustentable de la Cuenca Hidrográfica del Lago de Izabal y Río Dulce (AMASURLI), Ministerio de Recursos Naturales
Belize:	
Dwight Neal	Friends of Nature Main Road, Placencia Belize
Isaias Majil	Fisheries Department, Ministry of Agriculture, Fisheries & Cooperatives P.O. Box 148, Princess Margaret Drive Belize City, Belize
Mexico:	
José Juan Dominguez Calderón	José Juan Domínguez Calderón Subdirector Técnico Región Península de Yucatán Calle Venados 71 y 73 SM 20 MZ 18 Centro, Cancún, Q. Roo, MÉXICO
Alejandra Fregoso Domínguez	Coordinacion programa conservacion de agua dulce Amigos de siaan ka'an Calle Fuego # 2, Mza 10, SM. 4, Cancún, Q. Roo, México. C.P. 77511, Apartado Postal 770 T: +52 (998) 892 29 58 y 59
Albert Franquesa	Coordinacion programa conservacion de agua marinas Amigos de siaan ka'an Calle Fuego # 2, Mza 10, SM. 4, Cancún, Q. Roo, México. C.P. 77511, Apartado Postal 770 T: +52 (998) 892 29 58 y 59
Honduras:	
Roberto Rivas	Gulf of Honduras Project Puerto Cortes, Honduras Tel: (504) 665 23 43 Tel/fax: (504) 665 3072
Cintya Pamela DeLeon Planta Honduras	UGAM (Unidad de Gestión Ambiental Municipalidad de Puerto Cortes) Barrio Copen 5 calle, 9 avenida Estadio Excelsior Segunda

Dominican Republic:	
Nancy Valdez Guerrero	Head of the Monitoring Department Subsecretaria de Gestion Ambiental (SGA) Santo Domingo, Dominican Republic
Juan José Arias Dipré	Director Instituto de Química de la Universidad Autónoma de Santo Domingo (UASD)
Jamaica	
Tony Greenaway	Senior Lecturer Applied Chemistry The University of the West Indies Mona, Kingston 7 Jamaica Tel: 876 9271919, 876 5123029 Fax: 977 1835
St Lucia:	
Yaneldis Boullon Anthony	Chemical Engineer Pesticides and Toxic Chemicals Board Ministry of Agriculture, Lands, Forestry and Fisheries Graham Louisy Administrative Building Waterfront, Castries Saint Lucia Tel: (758) 468 5600/4 Fax: (758) 450 3206
Guy Mathurin	Senior Research Officer Pesticides and Toxic Chemicals Board Graham Louisy Administrative Building Waterfront, Castries Saint Lucia Tel: (758) 468 5600/4 Fax: (758) 450 3206 Tel: 758 450-2375
Others:	
Chris Corbin	UNEP CAR RCU AMEP programme UNEP CAR /RCU 14-20 Port Royal Street Kingston Jamaica WI
Nadia-Deen Ferguson	AMEP Assistant Programme Officer UNEP CAR /RCU 14-20 Port Royal Street Kingston Jamaica WI
Alex Cooman	GEF-REPCar Project Reducing Pesticides Runoff to the Caribbean Sea
Jean Marc Racine	Sound Management of Chemicals (SMC) Department of Sustainable Development (DSD) Organization of American States (OAS)
Vincent Sweeney	UNEP GEF - IWCAM project c/o Caribbean Environmental Health Institute P.O. Box 1111, Castries, St. Lucia Tel 758-452-1412/2501 Fax 758-453-2721
Karen Morisson	Assistant Professor Environment & Resource Science/Studies a.115 Environmental Studies Trent University Peterborough, Ontario

	K9J 7B8 Canada
Dr. Eric Dewailly	Unité de recherche en santé publique CRCHUL-CHUQ Édifice Delta 2, bureau 600 2875, boul. Laurier, 6e étage Québec (Québec) G1V 2M2 Canada Tel: 418 525-4444 poste 46518 Fax: 418 654-2726
Miguel Garcia	Monitoring Specialist MBRS Projects MBRS - Project Coordinating Unit Coastal Resources Multicomplex Building Princess Margaret Drive P. O. Box 93 Belize City, Belize
Luisa Espinosa	Marine and Research Institute, INVEMAR Cerro de Punta Betin Santa Marta, Colombia Tel. (57-5) 4214775, Fax: (57-5) 4315761