

# Caribbean Coastal Pollution Project (CCPP)

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



## Second progress report on activities Report 1.2

UNU-INWEH

(1 January 2009 – 31 July 2009)

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## Status of Project Activities

This second progress report covers the period January-August 2009. The first interim progress report covered the period 1 November 2007 to 31 December 2008 and is available at: <http://www.inweh.unu.edu/Coastal/POPs/ProgressReport2007-08.pdf>.

Overall the project is moving forward quite well despite some delays in the white grunt monitoring activities, the analysis of samples and the equipment upgrades of the laboratories.

We expect that most results will be available for our **Final Reporting Workshop** which is planned from **2-4 December 2009 at Montego Bay, Jamaica**.

You will note that we now have a **logo for our CCPP project** depicting our famous white grunt, thanks to the artistic talents of Dr. Chris Metcalfe at Trent University.

## Coordination

### Interim Reporting Workshop

An Interim Reporting Workshop which was held from 21-22 January 2009 in Merida, Mexico, aimed at providing an update on project activities, a discussion of problems encountered so far, and suggestions for improvement. It also provided an opportunity to present and discuss research projects, laboratory capacity enhancement, training and monitoring activities that will be taking place during 2009 and plans for extending the project beyond 2009.

### Partners Meeting

A Partners Meeting was also held in Merida, Mexico, after the Interim Workshop, from 23-24 January 2009. The purpose of this meeting was to explore the possibility of extending the project beyond this phase. A draft concept note for a follow up phase beyond 2009 was discussed and potential involvement and roles of partners were explored.

A final proposal for phase 3 (2010-2014) was developed as a follow up to this meeting and submitted to the World Bank, which has informally approved the project outline. The proposal has also recently been sent to partners in the eight project countries for their endorsement.

Representatives from UNU-INWEH and Trent University attended the Caribbean Eco Health Programme (CEHP) Partners Meeting in May 2009 in Rousseau, Dominica. The objective of the CEHP meeting was to take stock of the successes of the programme to date as well as to determine how best to move forward in the coming years and link with partners. UNU-INWEH presented the CCPP status and plans. There are clear links between the CCPP and CEHP projects and this meeting gave a further opportunity to define these links and decide on joint activities. A decision was made to expand the collection of white grunt if additional funds are found as well as the oyster bio monitoring and passive sampler research projects to other islands in the CARICOM region to ensure a more regional data set.

## Capacity Building

### Laboratory Equipment Upgrades

One of the outcomes of the 2008 laboratory assessment exercise was determining the laboratory equipment needs so that lab capacities for POPs and PTS analysis reach an acceptable level for the project. Due to budget constraints the initial laboratory infrastructure investments have been targeted at two Regional Laboratories (CINVESTAV in Mexico and UWI lab in Jamaica). In April 2009, two new Agilent 7890A Gas Chromatograph systems were purchased. The GC-ECD was installed in the UWI lab during June 2009 and is functioning well and was used for the inter-lab comparison exercise. The GC-ECD for Mexico is not yet installed due to delays in attaining a radio isotope license for Mexico.

### Laboratory Inter comparison

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

Tuna homogenate certified reference materials (CRMs) from the IAEA Marine Laboratory in Monaco were used in this exercise as well as certified analytical standards (Organochlorine pesticides and PCB Standards), and a spiking internal standard (2,4,6-trichlorobiphenyl) purchased in Canada.

Each laboratory performed sample extractions, clean-up and chemical analysis of 8 replicate samples of the supplied CRM. Instrumental analysis of the blanks and replicate CRM samples were completed by GC-ECD. Electronic reports from each of the 4 participating laboratories were combined and the results are nearly final. A presentation of results will be given at the final reporting workshop in December 2009. In the meantime the results will be sent to the 4 labs and necessary action will be taken to improve the methods and analytical outcomes.

### Training

#### Training Workshop on Laboratory Methods and Procedures

A Training Workshop on Laboratory Methods and Procedures for Persistent Organic Pollutants in Biological Tissues was held from 19-20 January 2009 at the Reef Yucatan Hotel, in Merida, Mexico. It included sessions on QA and QC procedures, examples of different extraction and clean-up techniques, instrument detection limits and method quantization limits and POPs extraction methods. A total of 15 participants from the eight project countries attended. Four trainers with extensive experience in environmental POPs issues conducted the training: Dr. Chris Metcalfe, Trent University; Dr. Ken Drouillard, University of Windsor; Dr. Gerardo

Gold, CINVESTAV Unidad Merida, Mexico; and Ms. Nargis Ismail, University of Windsor.

The training included a practical laboratory exercise at the CINVESTAV laboratory. It gave participants an opportunity to visit the laboratory and campus, and to see some hands on demonstrations of different extraction techniques, and practice some of these techniques.

#### Training of Lab staff in Canada

Three laboratory staff, 2 from the University of West Indies Pesticides Laboratory and 1 from the CINVESTAV Unidad Merida Laboratory, visited the laboratories at the University of Windsor and Trent University for 2 weeks during March 2009.



The main focus of this South visits North training at accredited laboratories in Canada, was to increase the capabilities of the laboratory staff in aspects of quality control, quality assurance and extraction, and clean up techniques and methods for determination of Organochlorine pesticides and PCBs in biological tissues.

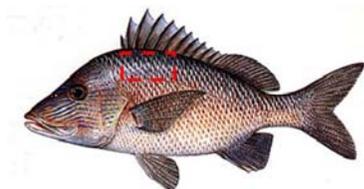
The training was coordinated by Dr. Chris Metcalfe, Director of the Institute for Watershed Science at Trent University and Dr. Ken Drouillard, Head of the Organic Analytical Laboratory at the Great Lakes Institute for Environmental Research, University of Windsor, and their lab staff.

#### Instructional video on POPS extraction methods in fish tissues for laboratories

This instructional video was prepared by Trent University, Peterborough, Canada and demonstrates

a standard method for the extraction of Persistent Organic Pollutants (POPs) from fish tissue samples. We hope that through the use of this video, all the laboratories involved in the Caribbean Coastal Pollution Project (CCPP) will be able to prepare extracts of fish tissues to send to regional laboratories for POPs analysis. This video also provides detailed information on the equipment required for this procedure. This video is available upon request: please email: [vanlav@inweh.unu.edu](mailto:vanlav@inweh.unu.edu).

## White Grunt Monitoring



### Sample collection and analysis

Sampling of the white grunt (*Haemulon plumieri*) commenced in the months following the regional workshop in Trinidad, in June 2008. Three fish were collected at each of the 6-9 sites in all 8 countries. The dorsal muscle of these fish (2-5 g, skin-off) was then dissected and stored on ice. Nearly all samples have now been sent to respective regional laboratories and analysis of these samples will hopefully start within the upcoming weeks. Annex 1 gives an update on the status of white grunt sampling in each country for the first sampling round.

Nearly all the countries have agreed to do a second round of sampling during this summer of 2009. This will provide us with a data set in time which will be useful in identifying temporal trends.

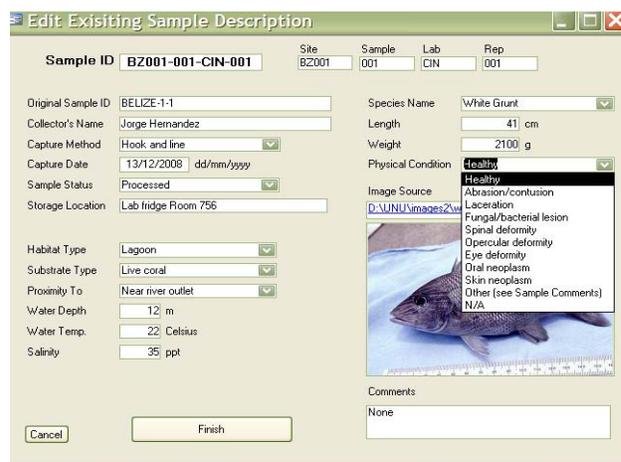
### Database

A relational database (DB) has been developed by the Institute for Watershed Science (IWS) at Trent University for efficient storage, retrieval, maintenance and reporting of the white grunt monitoring data and associated metadata.

The prototype database is currently embedded into a Microsoft Access 2003 DB file using Access' Visual Basic for Applications.

Once all the fish collection data are entered centrally by UNU-INWEH, this database will be distributed to the two laboratories that are currently responsible for analysis of the fish samples. The sample analysis results will be entered by the regional laboratories, then quality checked, processed and aggregated into a single master DB that will reside at the IWS and/or UNU-INWEH for the short-term.

This database will also serve to link participating labs and encourage the concept of data sharing and data comparison.



## Research

### Passive Sampler Monitoring for Contaminants in the Caribbean Coastal Zone of the Yucatan Peninsula, Mexico. Principle investigator: Dr. Chris Metcalfe

The Caribbean coast of the Yucatan peninsula is highly susceptible to groundwater and coastal zone contamination as a result of the unique Karst geology and the rapid development that is occurring in this region. Flooded caves provide a hydrological conduit that link inland recharge areas to springs which discharge into the coastal zone and sinkholes (cenotes), providing direct conduits from the surface



into these cave systems.

In order to evaluate contamination of groundwater and the coastal zone in the Riviera Maya region, we conducted a monitoring study (commenced in Dec 2008) of selected groundwater discharge zones along the Caribbean coast between Puerto Aventuras and Tulum. Passive samplers (both Permeable Membrane Devices (SPMD) and Polar Organic Chemical Integrative Sampler (POCIS) passive samplers) were deployed for a period of one month from early December 2008 to early January 2009 in cenotes and underwater caves at 5 sites. The samplers were then collected and analyzed for several different classes of contaminants. Analysis is being performed at Trent University, the GLIER lab of the University of Windsor, Environment Canada, and CINVESTAV, Unidad Merida, Mexico.

Preliminary results indicate that the freshwater resources at several locations have been contaminated by chemicals that could only have originated from domestic sewage. Final results will be presented at the final reporting workshop in Dec 2009.

**A workshop organized by the Amigos de Sian Ka'an on September 1, 2009 in Cancun** will provide an opportunity for members of the study team to present their research results to regional stakeholders and to discuss the probable sources of contamination. The workshop will also be an opportunity to discuss best management practices for reducing the likelihood of contamination of the aquifer, such as changes to sewage disposal

practices, installation of impermeable liners, and protection of recharge areas.

#### Quantitative Biomonitoring of POPs in Caribbean Coastal Zones Using Oysters. Principle investigator: Ken Drouillard.

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.

During the 1<sup>st</sup> 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).

Surveys will be done in regional waters of Trinidad, Jamaica and Mexico. So far, oysters have been collected in all three countries. In Jamaica, oysters were collected at 2 sites. At one of these, multiple species were collected. An additional site will be sampled soon. A student is in charge of this sampling. In Mexico and Trinidad, oysters were collected from 3 locations. In Barbados (additional site), Dr. Emma Smith of UWI will provide oysters from 3 locations.

During the 2<sup>nd</sup> 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.

#### **Information Dissemination**

Table 1 summarizes the documents, outreach materials, posters and reports prepared as part of

the project so far. More focus on outreach will be given during the last part of 2009, including outreach to public and policy makers.

As a way to present some results of the project, the following posters were presented at the Ross University Research Day Theme: *Public Health in Developing Countries: Challenges and Solutions*, 22<sup>nd</sup> May 2009 in Dominica.

- Hanneke Van Lavieren, UNU-INWEH, Enhancing capacity to assess and manage persistent organic pollutants in coastal areas of the Wider Caribbean region.
- Chris Metcalfe, Trent University, Domestic wastewater as a source of contaminants in freshwater aquifers in the Mayan Riviera tourism region of Mexico.

Our website is updated on a bi-weekly basis and provides links to project documents and other outputs.

**Table 1. Project Documents**

Document	Date
Planning Workshop Report, Hamilton Nov. 2007	Jan 2008
Laboratory Evaluation Questionnaire	Jun 2008
Consensus Statement on activities in the project	Jun 2008
Sampling Protocol for White Grunt ( <i>Haemulon plumieri</i> )	July 2008
Regional Workshop Report, Trinidad , June 2008	July 2008
Final Laboratory Evaluation Report	Oct 2008
Lab equipment upgrade cost estimate (phase 1 & 2)	Sept 2008
Caribbean Regional Analytical Labs- roles and participation in POPs analysis	Nov 2008
First Interim Progress Report Report 1.2	Nov 2008
Training Workshop on POPs in biological tissues Report, Merida, Mexico	March 2009
Sampling Protocol for White Grunt ( <i>Haemulon plumieri</i> ) Version 2- Preparation of muscle tissue samples	April 2009
Poster: Enhancing capacity to assess and manage persistent organic pollutants in coastal areas of the Wider Caribbean region	May 2009
Poster: Domestic wastewater as a source of contaminants in freshwater aquifers in the Mayan Riviera tourism region of Mexico.	May 2009
Partners Meeting Report, Merida, Mexico	May 2009

## NEWS

At the fourth meeting of the Conference of the Parties (COP 4) of the Stockholm Convention (SC), meeting in Geneva from 4-9 May 2009, 160 Governments adopted amendments to include nine new persistent organic pollutants (POPs) to the list of the existing list of 12 SC POPs.

The nine new chemicals added to the list are:

1. Alpha hexachlorocyclohexane;
2. Beta hexachlorocyclohexane;
3. Hexabromodiphenyl ether and heptabromodiphenyl ether;
4. Tetrabromodiphenyl ether and pentabromodiphenyl ether;
5. Chlordecone;
6. Hexabromobiphenyl;
7. Lindane;
8. Pentachlorobenzene;
9. Perfluorooctane sulfonic acid and Perfluorooctane sulfonyl fluoride.

## Annex 1

Country	Samples Collected	Samples Sent to Regional Lab?	Problems	Data sheets submitted	Sampling Report
<b>Belize</b>	yes	yes	The first set of samples from Jan 2009 were thrown away accidentally by others at fisheries ministry but fish have been resampled	yes	yes
<b>Dominican Republic</b>	yes	yes	Samples sent by fed ex and it took 4 days to arrive in Merida- samples were rotten despite ice packs. However still usable.	yes	yes
<b>Guatemala</b>	some	not yet	Grunt cannot be found at 4 sites. Only 2 sites sampled so far. The marine field station burned down by rebels against the government - no boats available.	no	yes
<b>Honduras</b>	yes	no	Fish are collected at all sites - the problem is sending them to Mexico (Fed ex problems) - probably this month (Aug)	yes	yes
<b>Jamaica</b>	yes	yes	One site missing - Kingston harbour no fish found	yes	yes
<b>Mexico</b>	yes	yes	The first set of samples from 2008 was thrown away accidentally by others at ECOSUR - were resampled and resent to CINVESTAV lab	yes	yes
<b>St. Lucia</b>	yes	yes	One site missing	yes	yes
<b>Trinidad</b>	yes	yes (but samples lost - need to be re-sent)	Samples were sent and got stuck in Miami customs for a week then resent to Trinidad rotten. Fish still in freezer so additional muscle tissue can be dissected - planned for Aug 09.	yes	yes