



CINDAQ

Centro Investigador del Sistema Acuifero de Quintana Roo

# NEWS FROM THE FIELD

## WINTER 2011

El Centro Investigador del Sistema Acuifero de Quintana Roo AC  
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December  
2010: Global  
Underwater Explorers  
gives its annual  
Conservation Award to  
CINDAQ and MCEP

## EXPLORATION CONTINUES IN QUINTANA ROO

Over 17,000 meters of new exploration in Sistema Ox Bel Ha and the Sian Ka'an Biosphere Reserve. Scientific collaboration, new projects and exciting discoveries are keeping us busy.

### A word from Sam Meacham

I am writing to you from my desk at the University of New Hampshire, where outside the temperatures are below freezing! It is hard to believe that just last week I was in sunny Mexico, wrapping up a week of activity with our team and attending the annual Global Underwater Explorers (GUE) conference.

This last year has been very productive on many fronts, and I first want to thank all of you for your continued support. None of the important work we are doing in Mexico would be possible without it. We have met or exceeded our goals for 2010, and 2011 is shaping up to be a very exciting year for us as we continue to explore and study the underwater caves of Mexico's Yucatan Peninsula.

Our work has us constantly discovering and learning about the complex nature of these caves. This newsletter will give us the



opportunity to share with you some of the exciting things we are finding out.

To further that end, I am pleased to announce that a short video about our efforts has been made by JP Bresser of Holland. JP donated his time and energy to the project and we are very grateful to have had him do it. If you are interested in owning a copy please contact us at [info@cindaq.org](mailto:info@cindaq.org). All proceeds from the video go towards CINDAQ's projects.

I am also very pleased that CINDAQ and The Mexican Cave Exploration Project ([www.mcep.org.mx](http://www.mcep.org.mx)) were awarded the Global Underwater Explorers Conservation award at this year's GUE conference in Xpu Ha, Mexico. It is an honor to receive this award and only reaffirms our commitment to conservation in this area.

Thank you and enjoy!

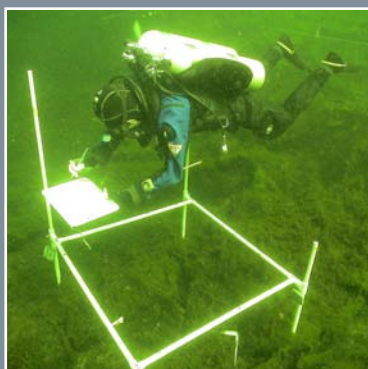
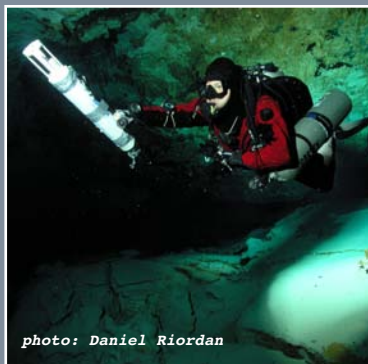


photo: Daniel Riordan

### Exciting Discoveries

Divers Christophe Le Maillot and Sam Meacham inspect a recently discovered deposit of bones deep in the Ox Bel Ha cave system.

# SCIENCE



## Science answers questions

(Top) Diver Per Thompsen uses a hydrolab to profile the water column in the Entrada Caapechen Cave located in Sian Ka'an.

(Center) A remipede (*Speleonectes tulumensis*) one of the life forms that Biologist Olmo Torres Talamante studies.

(Bottom) Diver Christophe Le Maillot practices survey techniques for underwater archeology.

## Cave Check

This year has seen the introduction of a new program for CINDAQ called Cave Check. The purpose of Cave Check is to provide scientists with baseline information on cave hydrology by using depth and temperature sensors that are placed in the caves. This is achieved with your help and the help of volunteers. Interested individuals are invited to "adopt" a sensor through our website. Sensors are installed, removed, downloaded and re-installed every few months. Scientists are consulted in order to properly place the sensors in relevant locations. The sponsors of the sensors are recognized online with the installed sensors position marked on Google Earth. All data collected is accessible online. We now have 15 sensors in the water with 10 more on the way. To 'Adopt a Sensor' please contact us at [info@cindaq.org](mailto:info@cindaq.org), the cost is \$98 per sensor.

## Underwater Archeology

Over the many years that we have been involved in exploration, perhaps the thing that keeps us going back into the caves again and again is the prospect of discovering archeological artifacts. There is now irrefutable evidence that the caves of our area were visited by humans and animals well over 10,000 years ago. Within Ox Bel Ha, we have a growing number of Pleistocene fauna sites that need to be properly studied and protected. In May of this year, with the help of NGS/Waite Grants

Program, National Geographic Magazine, The Nautical Archeology Society (NAS) and INAH's Underwater Archeology Unit, our team was trained to survey and document underwater cultural sites and remains. It is a first step in our quest to fully understand the significance of the sites we have discovered over the years. We appreciate the assistance of Arq. Pilar Luna and Arq. Elena Barba of INAH, Chris Underwood from NAS and Chris Sloan and Christina Elson at National Geographic.

## Biology

CINDAQ continues to support Mexican cave biologist Olmo Torres Talamante as he works towards his doctorate. Olmo's masters degree was focused on remipedes, one of the more than 40 creatures that inhabit our caves. His studies are essential to developing conservation strategies for these vulnerable ecosystems. There are only a handful of researchers like Olmo in the world and their research is in its infancy. Olmo's current research focuses on differences in water quality (nutrients, dissolved oxygen) and biodiversity between pristine caves and those which show signs of human disturbance. Thanks to your donations, we are able to help cover some of the costs of Olmo's work. We also helped Olmo out by recommending him in a contest held by Halcyon Dive Equipment. We are pleased to say that Olmo won the contest and, as a result, has a new set of cave diving gear! We will continue to support Olmo and his important work in 2011.



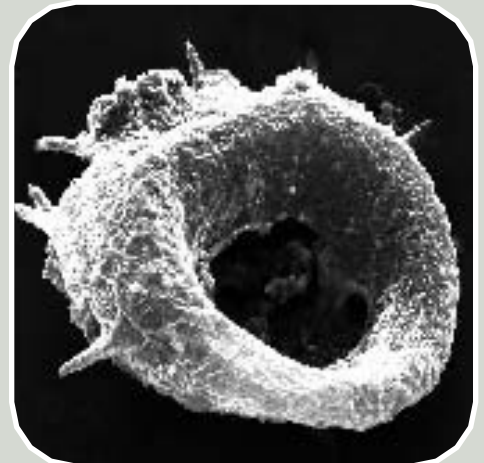
NAS underwater archeology class with Pilar Luna and Elena Barba from INAH and Chris Underwood from NAS

# WILL OUR CAVES HELP SOLVE THE MYSTERY OF THE COLLAPSE OF THE MAYA?



## Microfossils help reconstruct water quality.

(left) Dr. Ed Reinhardt and Blake Wilson collect and record a sediment sample in Carwash Cave. (Below) A Thecamoebian (*Centropyxis aculeata*) one of the microfossils that Dr. Reinhardt uses to reconstruct salinity levels in groundwater.



## Dr. Eduard Reinhardt explains his research...


I use microfossils (thecamoebians and foraminifera) to understand how sea-level and related climate change have affected coastal systems during the late Holocene. My recent work focuses on the Yucatan peninsula and the effects of droughts on groundwater resources in this karstic environment.

Recent paleoclimate research has suggested that Maya civilizations in the Yucatan peninsula have been adversely affected by droughts, resulting in famine and disease on the Maya lowlands although the causal climate trigger is not universally accepted. We are adding to this body of paleoclimate research by examining how climate affected the potability of groundwater in the Maya lowlands during the

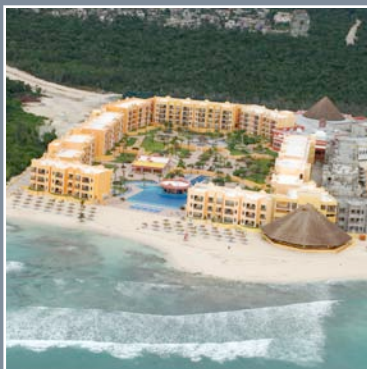


late Holocene (last 5000 yrs). We are developing a unique paleoclimate archive from the vast submerged cave network that underlies most of the Yucatan peninsula. By studying sediment cores recovered from this network of caves and documenting their microfossil content we are able to reconstruct the salinity of the groundwater and its potability through time. We hope that the results of this work will help better understand the waxing and waning of Maya civilizations on the Maya lowlands and help understand future climate perturbations.

*Dr. Reinhardt is a professor in the School of Geography and Earth Sciences at McMaster University, ereinhar@mcmaster.com*

TIMELINE OF THE MAYA CIVILIZATION	PRECLASSIC	CLASSIC	TERMINAL CLASSIC	POSTCLASSIC
	<b>1000 BC- AD 250</b> Earliest villages arise. Construction of civic-ceremonial centers. Birth of the calendar.	<b>AD 250- AD 800</b> Flourishing of art and writing. Height of the southern lowland Maya civilization.	<b>AD 800 - AD 950</b> Collapse of the southern lowland super powers. Rise of the Puuc Region of Yucatan.	<b>AD 950- AD 1519</b> Dominance of the Itza polity in Yucatan. Coastal centers thrive at the eve of the conquest.

# OUTREACH



## Making waves...

Tourism along its Caribbean coast contributes 10% to the GDP of Mexico, yet it comes at a cost. Development threatens the ecological balance of the areas aquifer and the health and economic well being of the population at the surface. CINDAQ works at the local and global level to raise awareness about these threats.

## Why we do what we do...

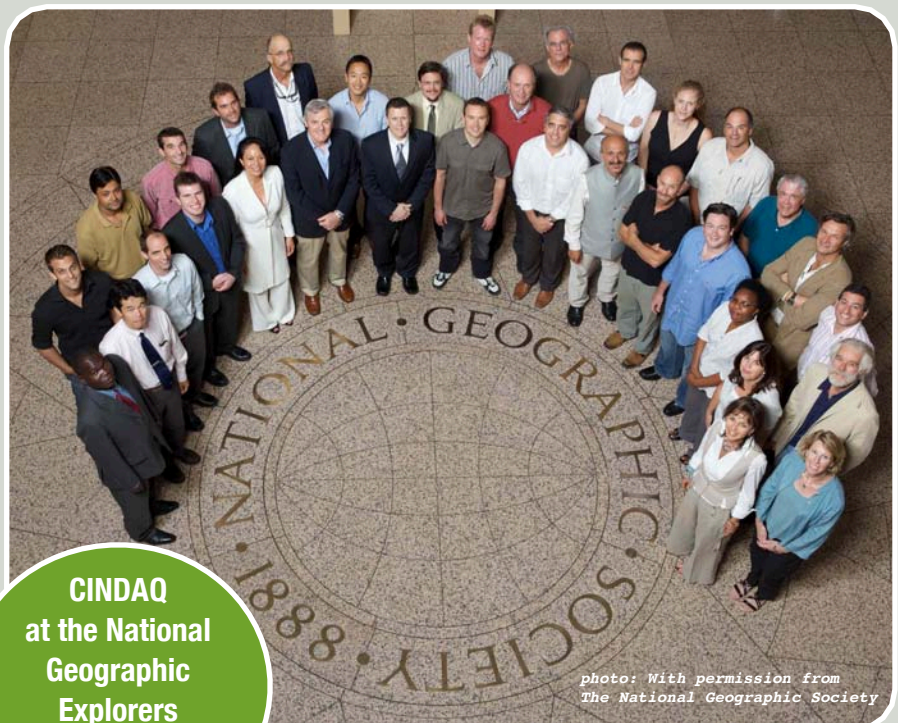
Many people do not realize that only 0.65% of all the water on our planet is available for human consumption. What they also do not realize is how much of the world's human population depends on groundwater. Of the 2.8% of the water on our planet that is freshwater, the majority, 77%, is concentrated in glaciers and ice sheets and is unavailable for human consumption. Of the remaining 23%, only 1% is concentrated in lakes, rivers and our atmosphere. Therefore, 22% of the freshwater found on the planet is concentrated in groundwater, making it the single most important source of this vital liquid for all of us. Out of sight and mind, groundwater is easily overlooked despite its great importance. It is also very easily contaminated.

Mexico's Yucatan Peninsula contains an aquifer that flows through solution cave systems. These caves transport freshwater from the jungle interior to the Mesoamerican Barrier Reef, the second longest barrier reef system in the world, at velocities between 500 meters to two kilometers a day. Since the early 1980's cave diving explorers have revealed close to 900 kilometers of submerged passageway along the Yucatan Peninsula's Caribbean coast. The exploration of these caves is considered one of

the final frontiers of physical human exploration on our planet and offers explorers the opportunity to show the world what groundwater looks like. Additionally, the exciting archeological discoveries that cave divers have made in these cave systems and their entrances known as 'cenotes' easily engage public interest which can then be refocused on the real treasure that is found within the caves: water.

Sadly, the underground rivers are under assault from unchecked development that threatens not only the ecological balance of this area but also the health and economic well being of the population at the surface. The discoveries of cave divers have helped to turn the tide of opinion making the underground rivers key elements for conservation in the region. There is still much work to do to ensure that these wonders of nature are protected for generations to come.

Part of CINDAQ's success to date is due to the quality of the reports that we have produced and presented to all stakeholders, from the general public to government officials, about the underground rivers. Discovery is a valuable tool to motivate, educate and involve stakeholders, thus increasing their understanding and commitment to water conservation.



**CINDAQ  
at the National  
Geographic  
Explorers  
Symposium  
2009**

*photo: With permission from  
The National Geographic Society*

## Sian Ka'an has great potential for future exploration and research

Even after four years of exploration and over 14,000 meters of cave exploration, it still feels like we are just beginning to explore the Sian Ka'an Biosphere Reserve.

The caves of Sian Ka'an are full of new challenges that have made us rethink the way in which we explore both at the surface and underwater. Due to the high flow of the caves, we have sought out more reliable diver propulsion vehicles (DPV's). Italian designed and made Suex DPV's allow our team to penetrate further and faster into the caves, while the Halcyon RB-80 semi-closed circuit rebreather gives divers the advantage of an eight to one ratio of tank use over traditional open circuit equipment. This means longer bottom times, decreased time pressure and increased productivity underwater. We are currently exploring two very large caves at the north end of the reserve.

At the surface, the use of satellite imagery and our two Trimble Navigation GPS units have allowed us to efficiently locate and assess cenote entrances deep within the reserve for future projects. Due to the remoteness of many of these cenotes, future projects within the

reserve will require helicopter support to get us and our gear to the ends of our lines.

There is no doubt in our minds that Sian Ka'an holds enormous potential not only for continued exploration, but also for scientific study. We are very grateful for the continued support of Director Francisco Ursua and the personnel of the reserve.

### Ox Bel Ha, 182,000 meters and still growing!

Close to 16,000 meters of cave has been explored recently in Ox Bel Ha. Our objective over the last year and a half has been to return to areas of the cave that we explored over 10 years ago and look at them with new eyes. We have not been disappointed with the results. By revisiting the cave we are able to 'close the book' on some areas, while discovering whole new areas we were unaware of. Just this November, Fred Devos, Christophe Le Maillot, Daniel Riordan and Chris Werner were able to open a new area of cave exploration in the historic Yax Chen section of Ox Bel Ha. It proves to us the value of taking the time to check all of our options. Ox Bel Ha continues to be a tremendous platform to inform the world about the issues of groundwater contamination and the need for sustainable development.



Thanks to NGS/Waite  
Grants Program and CONANP  
for their support

## EXPLORATION



photo: Daniel Riordan

### Sian Ka'an Exploration

We consider Sian Ka'an to be a new frontier for exploration. Since 2006 we have been dedicating part of our field season to exploration in the 1.6 million UNESCO World Heritage Site. We are currently exploring two large cave systems in the reserve and assessing cenotes for potential exploration. It is a privilege to work there.

# FUTURE PROJECTS...2011

## 2011 will be a productive year with new opportunities to apply our expertise

### La Fundación Selva Maya

In early December, CINDAQ signed a collaborative agreement to begin coordinating underwater exploration and science on a privately owned 400 hectare property behind Akumal. La Fundación Selva Maya is committed to protecting this area by studying it from top to bottom. We will be working hard to help them reach this goal with the Ecological Center of Akumal (CEA), the Mexican Center for Environmental Rights (CEMDA) and an interdisciplinary team of scientists. This project is unprecedented for its vision, and it is our hope that the experience we gain here will allow us to apply it to other areas in the future.

### Cave Archeology of Early Americans

In March of 2008, an incredible discovery was made in a local cave system by our friends and fellow divers Franco Attolini, Alejandro Alvarez and Alberto Nava of El Proyecto Espeleológico de Tulum (PET). After traversing 1,000 meters of cave while exploring one day, they encountered a deep pit. With a maximum depth of over 60 meters (200 feet), the pit is only the third of its kind to have been found in the region. What is truly remarkable is what lies at the bottom of it. There is compelling evidence of human habitation and perhaps even interactions between humans and pleistocene megafauna from the last ice age. In the coming year CINDAQ will be assisting Franco, Alex and Beto and INAH in anyway possible to help better

understand, and more importantly, protect this valuable and important site.

### Ox Bel Ha, Sian Ka'an

We will continue to focus our efforts in both Ox Bel Ha and Sian Ka'an in 2011, with a focus on Sian Ka'an. We intend to expand the western limits of both Entrada Boca Paila and Entrada Caapechen to the limits of our equipment and capabilities. With the RB-80 rebreathers and SUEX scooters we now have a greatly extended range for exploration. In addition, we will continue to locate and assess cenotes within the reserve for their exploration potential. We will also continue to work with the reserve to develop a strategy for helicopter supported access to the more remote cenotes we need to explore. In addition, there is still much work to be done in Ox Bel Ha. We will continue to push the limits of the cave and also hope to begin documenting and registering the pleistocene deposits within the cave.

### We need your help to achieve these goals

To reach these ambitious goals will require that CINDAQ stays healthy as an organization and that our team has access to the equipment and training we need in order to continue our mission. In addition, your donations allow us to



photo: Daniel Riordan

Looking forward to continued exploration in 2011

get out into the field to further explore, understand and educate about the freshwater caves of Quintana Roo, Mexico. Consider making a tax deductible contribution today!

### DONATE TO CINDAQ TODAY

El Centro Investigador del Sistema Acuífero de Quintana Roo A.C. is an officially registered Mexican non-profit organization. We are able to issue tax deductible receipts both in Mexico and the United States thanks to the support of The Friends of Mexican Development Foundation in New York City.

Please contact us at [info@cindaq.org](mailto:info@cindaq.org) if you wish to support our efforts.

### THANK YOU FOR YOUR SUPPORT:

The National Geographic/Waite Grants Program  
National Geographic Magazine  
The Mayakoba Golf Classic  
Haciendas de Bacalar S de RL de CV  
The Foundation for Environmental Solutions  
Will Harte  
Joyce and Lester Coleman  
Jeremy Simpson  
Alexander Angell and Eva Manessiotis  
Louisa Meacham and John Faraguna  
The Mexican Cave Exploration Project

JP Bresser  
La Fundación Selva Maya  
Global Underwater Explorers  
Halcyon Mexico  
Zero Gravity SA de CV  
Río Secreto SA de CV  
Alltournative SA de CV  
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The Sian Ka'an Biosphere Reserve  
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Alanis, Serrano and Doblado Attorneys  
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Proyecto Espeleologico de Tulum  
Razonatura A.C.  
Quintana Roo Speleological Survey  
The Nature Conservancy