



INSTITUTO VILELO POTERO  
ESCUELA AGRICOLA PANAMERICANA  
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Translator  
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Creating **Coastal**  
**Management Experts**  
in Latin America


A

rie Sanders, the director of the Socioeconomic Development and Environment (DSEA) department at Zamorano University, started the coastal studies program because, "Latin America needs its own experts." More than 70 percent of the Latin American population lives in coastal zones and depends on marine resources to survive. At the same time many Latin American countries lack the capacity to sustainably manage these areas. In particular, Latin America has few regional scientists or policy makers with expertise in marine ecology or coastal resource management. "There's still time to protect these ecological systems and ensure the long-term economic prospects for the people depending on them," Arie explains, "but time is running out."

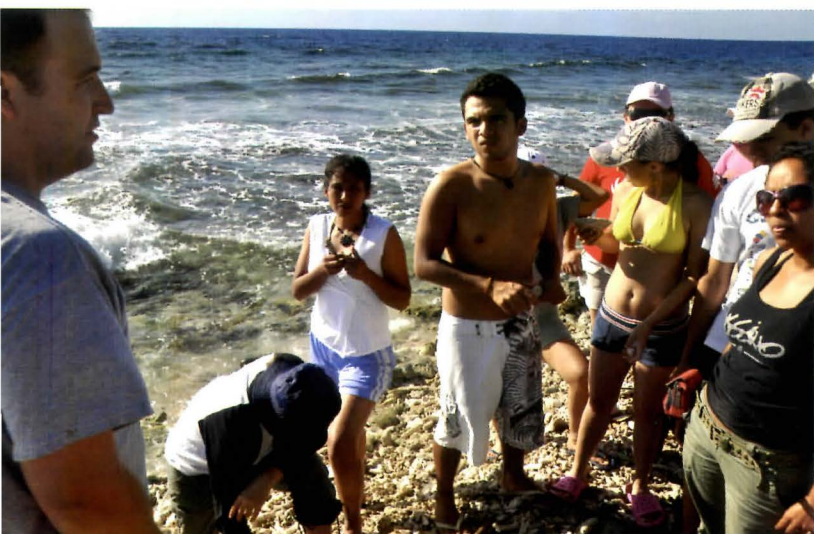
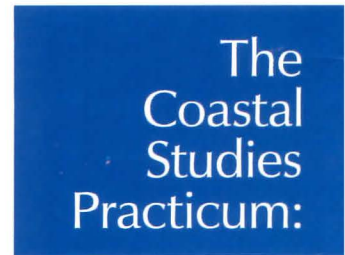
Zamorano is constantly searching for new and better ways to fulfill its mission to create the leaders and experts needed to improve Latin America and the world beyond. Thus the DSEA department has undertaken the challenge of building a coastal studies program to respond to this critical need. In addition to the three-week intensive coastal studies class and field course for seniors (see main article), third-year students participate in a three-day Learning-by-Doing fieldtrip to the Gulf of Fonseca (see sidebar) to meet with fishermen, fish wholesalers, community leaders, and conservation groups, and to tour the mangroves and see first-hand the concentration of biodiversity in the coastal zone and the threats to its longterm sustainability. DSEA also supports three to five students a year who undertake internships and theses focused on coastal-related themes. "These are the students who are likely to seek careers that will benefit coastal areas," reports Sanders.

In the future, Zamorano hopes to establish a more formal relationship with Dr. Steve Box and his organization, the Utila Center for Marine Ecology (UCME), and collaborate in establishing a state-of-the-art marine science laboratory in the Gulf of Fonseca. "This would allow us to provide tremendous scientific learning opportunities for our students, on par with marine science programs at universities in the developed world," says Arie. "It would also provide valuable data for Honduras and Central America and training facilities for Hondurans working in coastal management."

In addition to the physical site, the laboratory would need small boats, water quality analysis equipment, scuba diving gear, underwater cameras, and GPS, among other equipment. Zamorano is currently seeking funders to support this effort.

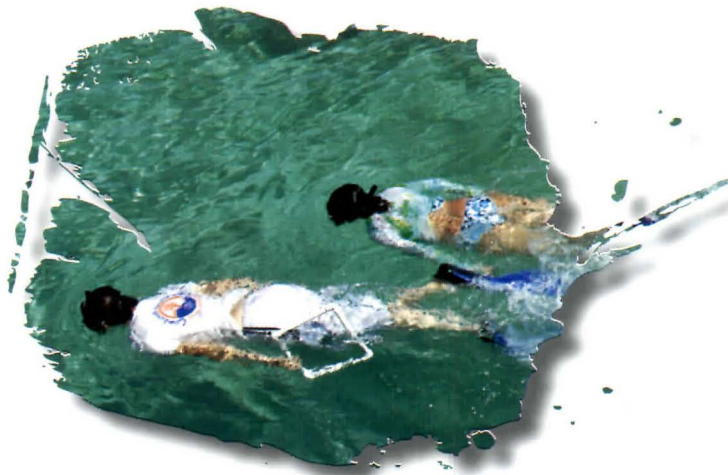
"Zamorano and UCME are in a unique position to help local communities effect positive changes in coastal management and conservation," notes Arie. "And Zamorano students are known for their ability to tackle complex problems and come up with effective solutions. With the help of partners and funders we can really make a difference here." 







# Hands-On Learning on the Caribbean Coast



*In 2009, fourth-year Socioeconomic Development and Environment (DSEA) majors undertook a three week intensive course on Marine and Coastal Resource Management. Taught by Dr. Steve Box, special instructor at Zamorano and founder of the Utila Center for Marine Ecology, the course is divided into a two week period of day-long classroom lectures and workshops on Zamorano campus, and a third week of practical study "out in the field," or, in this case, on a small cay off the northern coast of Honduras.*



In the first two weeks students studied core concepts and components of coastal water systems focusing on the ecology of coral reefs, sea grass beds and mangrove habitats. Students learned about the biology, importance, and interconnected health and wellbeing of species including “common menu items” such as grouper, conch and lobster, marine mega fauna including whale sharks and turtles; and at the other end of the scale, microfauna and simple organisms such as the pervasive and increasingly problematic macro algae. Students used various conceptual frameworks to analyse coastal ecosystems in terms of biodiversity, goods and services, resource exploitation, climate stabilization, development value, genetic richness and natural beauty. Significant time was spent discussing the economic, political and practical aspects to managing such systems, and students undertook exercises manipulating industry standard modelling software, simulation tools, and other technologies used by researchers and policy makers to study and manage these complex areas and resources.

In the third week, students journeyed to Little Cay, a small, privately owned island off the southern coast of the Bay island of Utila, and joined instructors from the Utila Center for Marine Ecology (UCME) for a Learning-by-Doing practicum. For six days the students participated in a variety of marine activities and undertook experiments and field research aimed at giving them a practical knowledge and understanding of marine ecology and coastal zone management. Students learned how to snorkel (some learned how to swim!), map underwater terrain, identify, sample and inventory species using transects and other methods, recognize and identify the impacts of temperature, wind, waves, and weather on various micro habitats, and how to identify and predict impacts from changes brought about by human activities including fishing, pollution, tourism and development.

The course was a resounding success. Steve Box and DSEA department head Arie Sanders, both rated highly the level and quality of participation by the students including their reports generated at the conclusion of their week in Utila. The students meanwhile ranked the coastal studies course as one of their most satisfying and valuable classes. Plans are already underway to expand and improve the program for the coming year, in particular by adding more activities with fisheries and



the local population, and more laboratory work related to ocean chemistry.

“That was amazing!” said Ninfa Ardón (Honduran) as she pulled herself onto the dive boat, snorkel, mask and fins in hand.

Accompanied by lead instructor, Dr. Steve Box, Ninfa had just swum out over a drop off where underneath her the coral disappeared from sight to a depth of 200 meters. She had literally just swum over a cliff. Ninfa grinned at the thought. “I have never been so afraid! I can’t believe I just did that.”

One of 24 seniors in the Socioeconomic Development and Environment (DSEA) major at Zamorano, Ninfa was also one of a handful who could barely swim when they arrived in Utila. Some students who had never swum before took lessons on campus prior to the trip. Others knew how to swim but had never been in the ocean. Still others had never been on a boat. And for the majority of students in attendance, the closest they had come to a fish was on a plate. “My people are Garifuna, and we have a strong historical relationship with the ocean,” related Nestor Guity (Honduran). “I grew up near the sea. But I’m sorry to say that until I took this class, I didn’t understand very much about life under the ocean.”

Zamorano’s coastal studies course is the first ever to be offered in Honduras on tropical coastal zone management. Long a leader in undergraduate education, Zamorano specializes in agricultural and food sciences, sustainable natural resource use, environmental conservation, and poverty reduction. The coastal





studies program incorporates elements related to all these areas, and utilizes the “learning-by-doing” methodology for which Zamorano is famous. “We got out there and saw up close beautiful fish, sea sponges, and corals,” explained Michelle Sabillon (Guatemalan). “We also saw coral bleaching, a lot of human trash and pollution and algae that’s out of control. I don’t think I really understood how much trouble the ocean is in before seeing that.”

Vilma Zuniga, a Honduran who spent her senior internship working and studying with UCME (see article), understands particularly well the need for this kind of educational program. “We Hondurans don’t know very much about our oceans, what they contain, why we need them, and how we can keep using their resources in sustainable ways. We have to understand them better, and change our ways, or there will be nothing left.”

In Honduras the lack of essential information is particularly acute. There are no reliable statistics for how much seafood Hondurans fish out of the oceans every year, how much they eat in country, or what percentage of the population is reliant on the oceans for their livelihood. One of the few reliable statistics available found that in 2006, the southern coastline supplied 6.2 million pounds of seafood for the domestic market. Unfortunately, there are no comparable statistics for the northern coast, nor does this figure differentiate between farmed and ocean caught seafood.

Now Zamoranos are taking the first steps to become the very experts needed in Latin America. As Steve

explained, “this class is designed so that students come away with an understanding of the core concepts of marine ecology, and the issues and complexities involved with sustainable coastal zone management.” Arie Sanders added, “Our goal in designing this course was to give the students as strong an introduction to coastal studies as they get in watershed management or vegetable production. Now they have the foundation to go on to further study in marine ecology, or they can immediately start working in the field and applying the knowledge they gained in this course.”

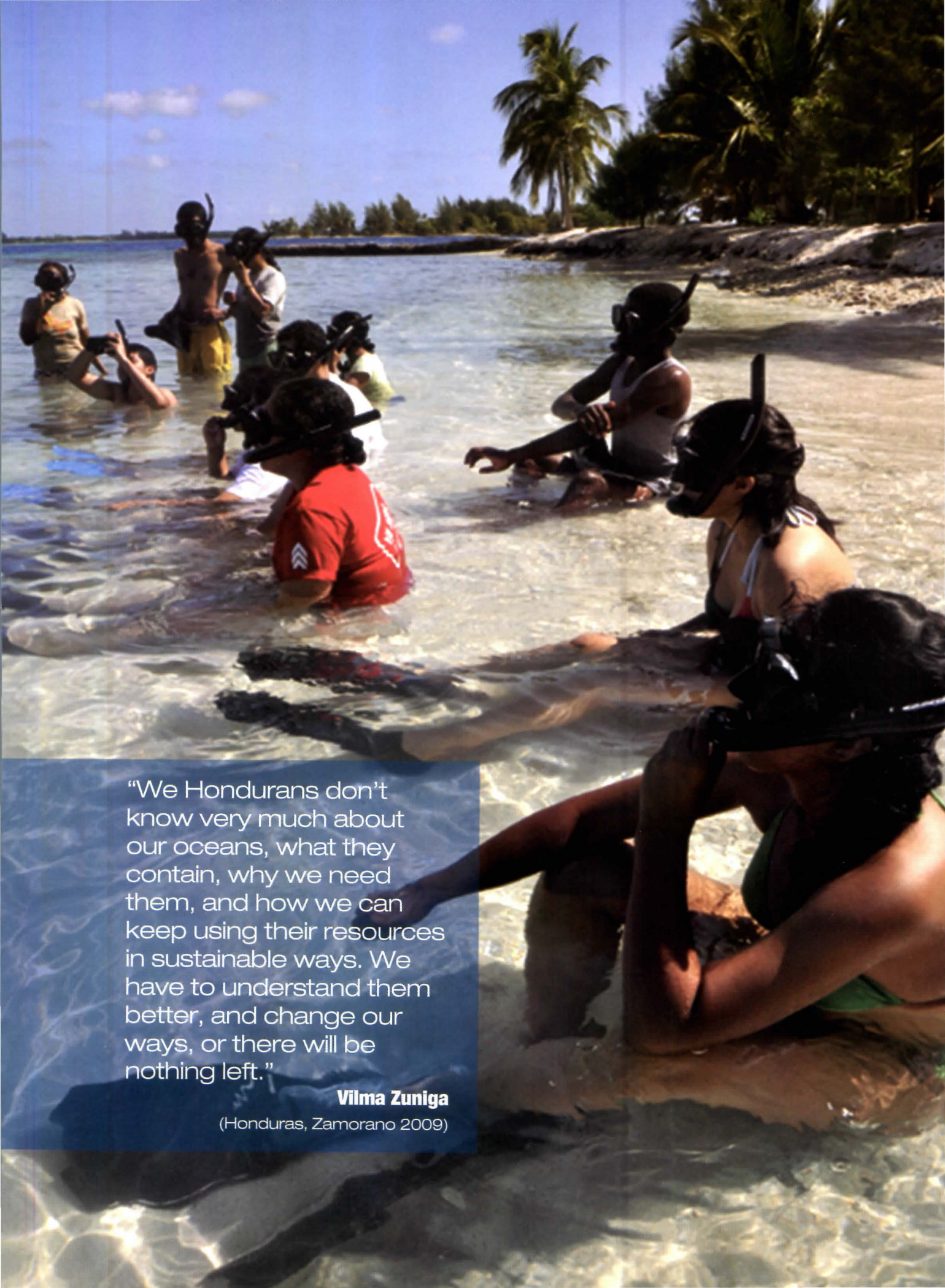
It was during the field course in Utila that students got to apply their knowledge in the real world. Steve started the first day on Little Cay with a tour of the small island, discussing the geology and plant life, wind and currents, and indentifying different corals that make up the sands on the beaches. The rest of the day was spent learning the safe and proper use of the snorkel gear and giving swimming lessons to those with less experience in the water. All students swam in pairs at all times, and the less accomplished ones “buddied up” with those who had more experience.

Mornings thereafter often started with a lecture by Dr. Box, after which students split into three groups each accompanied by 2 to 3 instructors. All students were required to create a complete map of the different micro habitats that surrounded the island, including detailed notations on the type and density of species found. They used transects and squares to sample population densities, and learned how to write and draw underwater using special pencils and boards.

During lunch and in the late afternoons students were often huddled around guidebooks and species maps learning how to effectively identify the corals, crustaceans, and 222 species of fish found in the waters of the Bay Islands.

When not snorkeling in the area around Little Cay, student groups went on expeditions to swim around mangroves and eel grass beds, snorkel in deep water at a popular dive location, and cruise in search of whales and dolphins. For Baleshka Brenes (Nicaraguan), one of the highpoints was swimming along the edges of the mangroves. “The water looked dirty, but we knew where we were swimming it was all organic material. To look through the roots and the cloudy water and see schools of tiny fish, it really brought home that mangroves are nurseries for much of the life in the ocean.”





"We Hondurans don't know very much about our oceans, what they contain, why we need them, and how we can keep using their resources in sustainable ways. We have to understand them better, and change our ways, or there will be nothing left."

**Vilma Zuniga**


(Honduras, Zamorano 2009)



A trash collecting contest sponsored on the second night of the visit brought home the impact of human activities on the marine environment. In 45 minutes students had cleaned up most of Little Cay and filled more than a dozen trash bags with garbage. Prizes were offered for the greatest amount of garbage, the most little bits collected, and the most unusual item found -- in this case a solar panel. Some students were surprised the next day to see how much trash was redeposited on the beach. This prompted a lively morning discussion about wind and water currents, as well as the infamous Great Garbage Patch, an immense vortex of human garbage in the Pacific Ocean which they were told is multiple times the size of Honduras. "The garbage patch sounds pretty scary," said Dilenia Duran Chavez (Nicaraguan). "But I think we need to learn about these problems on a global level, so we can better act in our home communities."

Students also had surprise visitors one night when a nest of turtles hatched on Little Cay, and the babies were attracted by the lights on the buildings. Gerardo Montes de Oca, who had spent his senior internship in Brazil working with sea turtles, led the effort to collect the hatchlings and release them in the ocean. "It showed how human populations have to do things to coexist with other creatures," explained Jackie Vilchez (Peruvian). "If we hadn't been on the island, the lights wouldn't have been on, and the baby turtles would have headed into the sea as they are supposed to."

On the final day, the students visited a housing area developed as cheap accommodation for migrants from the mainland who work in construction and other jobs that support the "cheap" tourism industry. Although they had studied the impacts of tourism and development, many Zamoranos were still stunned to see the damage done to the environment, and the poor living conditions of the community.

In a week where students challenge themselves physically and mentally in a new and exciting environment, they reaffirmed their abilities and strengths. As Steve remarked, "one of the things I was most impressed with was their ability to work as a team, problem solving, and taking care of one another. I also admire how willing most of them were to challenge themselves." Zamorano University values character building and personal growth as much as academic and practical learning, and the coastal studies field course provided opportunities for all of the above. Ninfa, who not only "swam over a cliff" but also learned how to hold her breath and dive down to get closer to fish and corals, puts it this way. "There are things that will limit you if you don't try them. If you learn how to overcome your fears then you better succeed at your goals in life. The coastal studies course taught me this, and Zamorano teaches this. I'm a better person for it." 

Students worked in pairs in a competition to pick up all the garbage on Little Cay. The teams pictured won first and second place prizes for the most garbage collected, the most little bits collected, and the most unusual item found — in this case a solar panel (later reclaimed for repair by the island's owner).





Field trip:

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Gulf of  
onseca






**I**n August 2009, 36 third-year students who are majoring in Socioeconomic Development and Environment (DSEA) at Zamorano traveled to the Gulf of Fonseca, on the southern coast of Honduras, for a three-day field trip. The gulf encompasses 3,200 square kilometers, including 18 islands, six main watersheds, and over 1,100 square kilometers of mangrove swamps. It has wetlands designated as areas of global importance as wintering grounds for migratory birds, and spawning areas for fish, turtles, and other wildlife. It is also home to more than 800,000 people who live in adjacent municipalities in Honduras, Nicaragua, and El Salvador.

As is true for many coastal habitats around the world, the Gulf of Fonseca is threatened by pollution, unregulated development, and an escalating demand for natural resources. This also makes the gulf an ideal “living laboratory” for students learning about sustainable coastal zone management.

During the three-day trip, students visited a fish market and a fish processing plant, met with artisanal fishermen, attended presentations by two prominent local conservation organizations, and took a guided tour into the mangroves. In a session at the end of each day, students discussed what they had learned, debated the merits of the management programs they experienced, and suggested ways of solving the problems they saw.

Classroom study prior to arrival included classes in hydrology, sustainable resource management, biodiversity, geographical information systems and mapping, and statistics for the social sciences. DSEA professors coordinated their classes to include components that supported this field trip and required students to gather data and make observations for later use in classes. Afterward, students were required to submit reports examining the complex issues and competing interests involved with managing the area to the benefit of people and the environment alike.

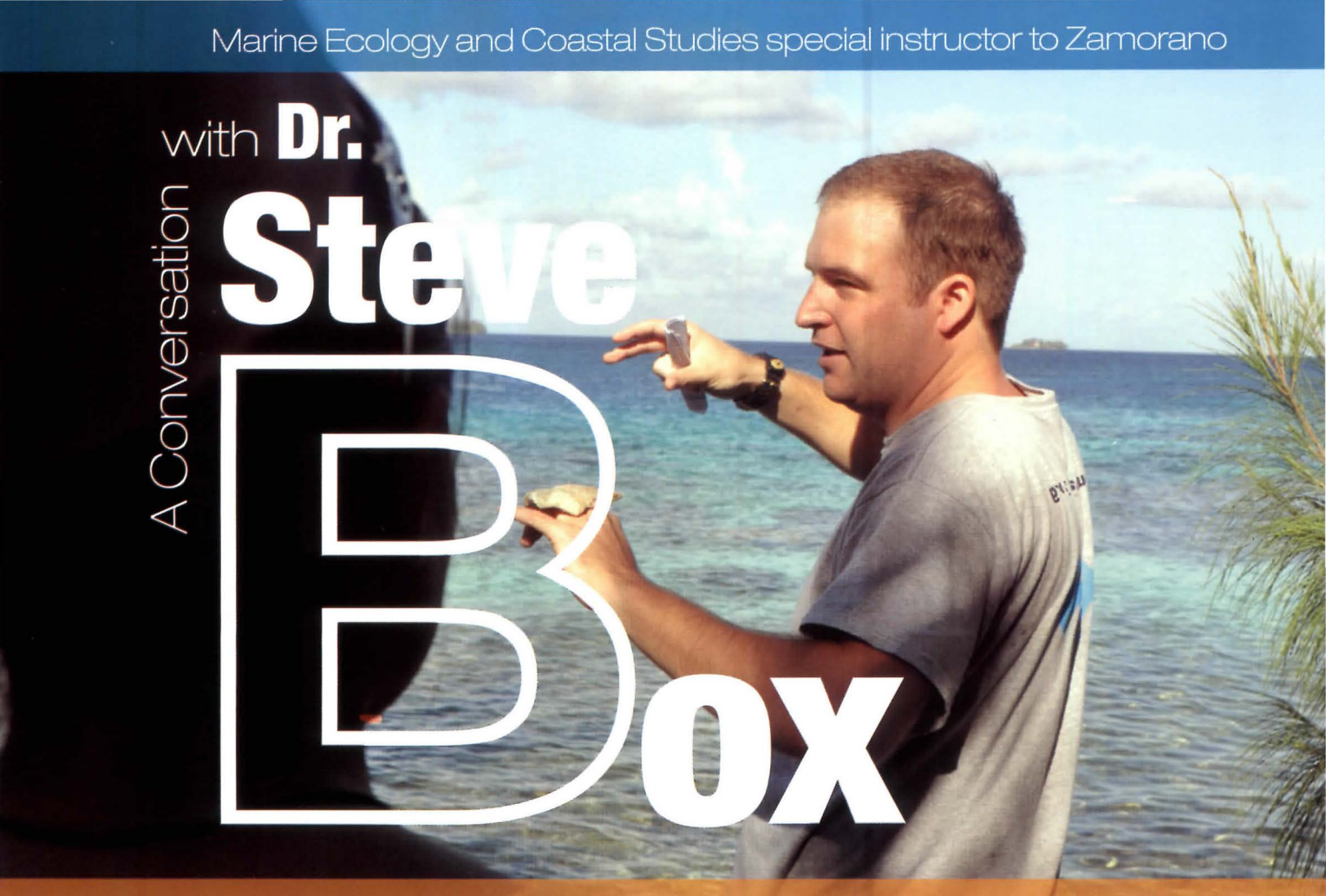
In the coming year, DSEA plans to expand the field trip to include visits to an established shrimp producer, as well as a pilot project for environmentally integrated shrimp farming. There will also be a visit to a sea turtle rescue and rehabilitation facility, and, as part of an effort to model biodiversity in the Gulf of Fonseca, the students will undertake an inventory of migratory bird populations. 





# with **Dr. Steve Box**

A Conversation



Dr. Steve Box has spent most of the past decade studying the coastal ecology of Honduras and developing sustainable management practices for the reefs, marine life, and mangroves upon which coastal communities depend. A native of England with a Ph.D. in Biology from University of Exeter, United Kingdom, Steve has been associated with Zamorano since 2007 when he began working with students doing their pasantías (work-study trimester).

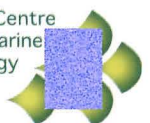
A childhood love of swimming and snorkeling sparked Steve's interest in the oceans. He earned an undergraduate degree in marine biology from the University of Wales, Swansea, and during his time at the university he spent three and a half months conducting research at Lizard Island Research Station, a world renowned facility on the Great Barrier Reef of Australia. After graduating, he spent eight months working as a project director on an expedition to document and map the marine biodiversity around one of the Philippines's many islands. The job was pivotal in his career, as Steve discovered an affinity for management, as well as an appreciation for the importance of grassroots outreach in developing nations. When Coral Cay Conservation, the international marine conservation organization that spon-

sored the expedition, offered to provide financing and logistical support for his Ph.D. studies in Honduras, he quickly accepted.

In 2003, Steve moved to Roatan, Honduras and began his thesis research examining the impact of macroalgae ("fleshy seaweed") on juvenile coral populations around the Bay Islands. As one of the only marine biologists working in Honduran waters, he quickly began to accumulate a unique and intimate knowledge of the ecosystems and biodiversity in the area, and the complex problems Honduran coastal communities face trying to survive, while not destroying the resources on which they depend.

At the completion of his research, Steve recognized that if he left Honduras, the country would lose a critical source of expertise. So when an association of Utila dive shop owners approached him with an offer of seed capital to create a non-profit organization that would identify the causes and provide solutions for the degradation of Utila's world-famous diving locations, Steve realized he had an important opportunity to make a difference. In 2005, he founded The Utila Centre for Marine Ecology (UCME) to "bridge the gap between

Utila Centre  
For Marine  
Ecology





applied scientific research and community based conservation."

That same year, Steve was introduced to Zamorano University by his father-in-law, Jorge Ivan Restrepo (Colombian, Zamorano 1980), the founder of Zamorano's Center for Biodiversity. It seemed a logical fit to incorporate learning opportunities for Zamorano students into UCME activities, and in 2007, UCME began accepting students for their pasantías (independent work-study trimesters) and senior thesis research projects.

In 2008, Zamorano's Socioeconomic Development and Environment department (DSEA) forged a partnership with UCME to provide a coastal studies class and field course practicum to fourth year DSEA students -- the first course on coastal zone management ever to be offered in Honduras.

#### **How did you become interested in marine science?**

My dad's company moved us to Indonesia when I was three years old, and my parents took me swimming and snorkeling. I loved it and still have strong memories of the time. Later, I attended University of Wales, Swansea, because they had a very good reputation in the field of marine biology. In my second year my fate was sealed because I spent three and a half months doing dissertation research on Lizard Island on the Great Barrier Reef in Australia. That's where some of the world's best coral reef scientists go to conduct research, and I got to know some of them and saw how you could develop a career studying things that are fascinating and also useful.

#### **I understand that your Ph.D. thesis research brought you to Honduras. What did you study?**

Yes, I came to study the competition between juvenile corals and macro algae, and I evaluated how the algae impacts the growth and survival rates of young coral. Algal dominance is a major problem for coral in the Caribbean, as the algae inhibits coral growth and can directly kill coral. I was the first to publish a study on algal impact on the growth and survival of juvenile corals.

#### **Tell me how you first came to know Zamorano and began working with the university.**

In late 2003, I met my future wife, Dana, and soon after met my future father-in-law, Jorge Ivan Restrepo. He's a graduate of Zamorano and has been a profes-

sor here for many years. He's an incredible ambassador for Zamorano, and sometime probably in early 2005 he showed me around campus. I was very impressed by the place, its infrastructure and mission, and the teachers and the academic program.

Jorge introduced me to Dr. Maria Mercedes Roca, who teaches and does applied scientific research on diseases. She saw the connections between our disciplines and we eventually arranged to have a student do her thesis work with me. Lucia Orantes (Guatemalan, Class of 2007) came during her pasantía in 2007 to study the impact of the overfishing of conch on the marine habitat. Conch are cleaners who remove algae, detritus, and bacteria from the environment, so the hypothesis was that overfishing creates a dirty environment.

#### **Tell me a bit about how it was done and what the results were.**

We had areas that excluded conch, and cages where the conch could move around and clean the sand, and we used a special machine that could test for enterococci, a bacteria associated with human waste. It hadn't been proved before that conch clean the habitat, and our study showed that conch do reduce the amount of enterococci in the sand. Lucia produced very good data, so if we ever replicate the study for verification we could publish the findings.

#### **What happened next?**

We did some work with Dr. Roca on coconut lethal yellowing disease, taking samples and helping with the analysis. Given coconuts were one of the few resources coastal people had -- at least before this disease devastated the trees -- it made sense for us to collaborate. At the same time, Arie Sanders, head of the DSEA department, and I began talking. There is a logical fit between our work and environmental studies and community development, so in 2008 we took two DSEA students for their pasantías. Both were Bolivian women -- ironic given that Bolivia is a land-locked nation. They were both quite keen, but they knew little about marine environments. One couldn't swim and had never been in the ocean before she arrived. By the end of their 15 weeks with us, they were both not only expert swimmers but also practiced scuba divers. They learned how to collect a full spectrum of scientifically sound ecological data in a variety of marine habitats, and we trained them in statistics and showed them how to take the data and



analyse and apply it. One woman focused on sea grass and the other on mangroves, and both based their theses on the information they collected.

**That was the same year the Coastal Studies class started, although I understand the field trip to Utila didn't work out.**

No, sadly the trip had to be cancelled that November because Honduras had an extraordinary amount of rain and bad weather. I gave the students field data which was similar to what they would have produced during the trip, and they wrote reports based on that.

**This year in the first week of October, we succeeded in going to Utila with the DSEA students, and from my vantage it seemed pretty successful. Tell me about it.**

The field course was fantastic. We were unsure how the students would react to such a new environment, but they rose to the challenge and learned a significant amount of information in a short period of time. They really exceeded our expectations. And the students gave the class and the field course very high marks in their end-of-the-year evaluations for DSEA, so it was quite a success.

We conducted the course on "Little Cay," a small island off the Southern coast, near East Harbour, Utila. The students learned about zonation, and observed directly that within a thirty meter radius around the island there are a number of different habitats. When they arrived they would have thought everything under the waters around the island was the same, but by the end of the course they understood how exposure, depth, water movement, and other factors can create very different environments just a few meters apart. They learned how to go to an area and identify the different species of coral, algae, sponges, and marine life in the area and why each favors particular areas. They now understand, for example, why one area has certain types of coral and another has seagrass, and what will be impacted if environmental factors change.

**What were the most successful activities from a learning perspective?**

Snorkeling in the mangroves for one. They learned about the reef habitats around the island for a few days, then we took groups to snorkel over turtle grass beds and then also to explore an area of the mangroves. They were reluctant to get into the water that seemed "dirty," but I think a lot of them found it very

rewarding after they saw first-hand how so many fish species and crustaceans use the habitat as a nursery.

Seeing the flip side of tourism and development was also a big learning moment for them. We visited an area of mangroves where the workers live who support the cheap tourism. They have very serious problems there with pollution, rubbish and habitat degradation. After spending several days looking at nice reefs and undisturbed mangroves the students saw how tourism and development can beget poverty, unmanaged pollution and habitat destruction. The students reacted with a kind of shock, saying they didn't realize quite how dramatic the impact can be. We broke up into two groups to talk about what the drivers are for this problem and what possible solutions are out there. They learned that there is no easy fix and that with development there is always a trade-off.

The last thing I'd mention is that they definitely understood by the end how harmful marine litter and plastic are. The island clean-up contest you sponsored gave them a context when they saw that a tiny island had accumulated what amounted to a huge pile of trash -- and more garbage arrived on the beaches the next day. We discussed plastics at length in class, and they decided to do an awareness campaign on campus. They staged the campaign at their cafeteria on one of the last days of school, and they put a lot of effort into it.

**You seem to like working with Zamorano students.**

Seeing their passion and commitment to learning was something completely new to me. Here in Central America it's not like in the U.K. or the U.S. or Europe where people go to university because that's what you do. But students seem to come to Zamorano because they genuinely want an education, they want the knowledge.

During our time in Utila they also demonstrated that they are very good at working together in groups. And they help each other; the ones who are better at something help those who have greater difficulty. When the 24 students arrived, about a third of them couldn't swim very well at all. You and I and the team were teaching them, but so were the other students. And you saw how Cesar and Vilma who had been with us for their pasantias at the start of the year, spent a lot of time with the less experienced students,





Steve Box talks about the ecology of mangroves to a group of students shortly before they get in the water to see mangroves up close.

showing them how to collect data and identify species. Being able to work as a team is going to serve them for the rest of their lives.

#### **What's next for Zamorano and UCME?**


Well we will certainly present the course to fourth year DSEA students in 2010. And we have a pasantía student joining us this January. Almost a dozen students were interested in coming, but we have a limited capacity to take them on right now. We have had a volunteer program for tourists, wherein foreigners pay a fee and visit with us for four weeks. We train them in scientifically sound data collection and diving, and they work on a number of our projects. This helps fund our work and it subsidizes taking students for their pasantías. Unfortunately, the program was severely impacted by the Honduran coup and the resulting collapse of the tourism industry. While we are going to be able to continue the volunteer program later in the season as tourism comes back, the political situation certainly impacted our work in the short term. Fortunately we had managed to diversify our funding sources and expand our projects to new areas, managed to weather the turmoil, and we are set for an exciting 2010.

Meanwhile, we are developing other projects that Zamorano students will hopefully be able to work on

with us. One is Fair Fish or Pescado Justo, a company I just founded which aims to link fishermen to high-end markets. It's not just about the sustainability of the fish resources but also the fishing communities. One of the goals of Fair Fish is to prove you can change market chains. We have a lot of interest from hotels and restaurants, because ironically, they have to buy either poor quality fish from the South or fish that is imported, because the best fish is exported from the country.

We are looking into having Zamorano students work with us to say, improve shipping and packaging so the fish arrives quickly and in good condition. Or students can work with us on the business development side, or in the outreach to chefs and consumers or in the training of the fishermen. They could be from any of the four majors, depending on where in the supply chain they wish to focus.

#### **Anything else you'd like to add?**

Many of the Zamorano students who study with us express an interest in continuing to learn about marine and coastal ecology and intend to have careers in science, public policy, and conservation areas. These Zamorano students may someday be the experts their countries need to save their fisheries, coastal communities, and marine biodiversity. That gives me hope. 







*We Are Zamorano:*

# Gerardo Montes de Oca Sierra

Class of 2009

*"The biggest way I've changed since I came to Zamorano is that before I didn't understand why we had to help the people in the forests and natural places. I thought they should just leave things alone. By studying in DSEA I realized the people have to live, too. And if you help the people and you teach them, they will become protectors of the environment, too."*



Gerardo Montes de Oca knew from childhood that he wanted to study animals and the environment.

Born and raised in Toluca, Mexico, he dreamed of being a veterinarian, but realized in his early adolescence that he wanted to

have a greater impact on policy

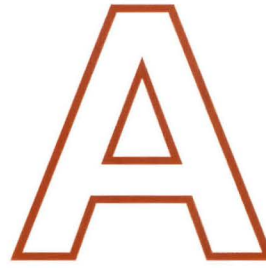
and the environment. Since Gerardo's early teens, his father, an agricultural engineer by training, had worked for PROBOSQUE, a federal government department devoted to the protection and sustainable management of Mexico's forests. Many of his father's superiors spoke admiringly to Gerardo about the "extraordinary" school called Zamorano, but they only mentioned agricultural studies. After much encouragement, however, Gerardo decided to look at Zamorano's website. "I looked at the list of departments, and viewed each of their sections. The fourth and last one was Socioeconomic Development and the Environment (DSEA). The minute after I clicked on the DSEA link, I decided to come to Zamorano."



Gerardo quickly grew to love Zamorano and as anticipated, he entered the DSEA major and spent as much time as possible studying animals and ecology. His two favorite professors were Erika Tenorio, who taught watershed and water resource management, and Dr. Jose Mora, who taught courses on biodiversity and on environmental resource management. "When Dr. Mora explains something, he discusses many aspects because he sees connections and goes on many tangents explaining how each creature or plant is interconnected to several others. And Erika Tenorio is quite similar because you can tell she sees the big picture, and knows that effectively preserving a water source for people to drink will benefit the ecology, the air, and the trees as well. I like teachers that see the big picture and help us do the same."

With Dr. Mora as thesis advisor, Gerardo teamed with fellow senior Baleshka Renée Brenes Mayorga, of Nicaragua, to investigate the ecology of an animal previously unstudied in Honduras: the Mephitis macroura, or hooded skunk. Gerardo and Baleshka obtained special permission to spend many long nights on the Zamorano campus trapping the animals, fitting them with radio collars and then tracking their movements multiple times a week for several weeks.

"Even though it's a small animal, we learned it can travel long distances. One of our subjects had a 30 hectare home range." They also confirmed that there were differences among their study population and skunks documented in past research. "Although the studies from the Southwestern U.S. and Mexico say these skunks should have kits in April and May, we found a mother with babies in September. It was exciting to discover something new and also to realize that there is so much left to learn. We shouldn't assume that because something is true for an animal in one place, it remains so in another."



highlight of Gerardo's academic experience at Zamorano was his internship (work-study trimester), which all Zamorano seniors undertake at the start of their final year. Gerardo traveled to Brazil and

interned with TAMAR (Tartarugas Marinhas), a non-profit environmental organization dedicated to the conservation of sea turtles and other marine life. He worked on the main island in the Fernando de Noronha archipelago -- a UNESCO world heritage site and national park -- supporting research and tourism activities. His work included capturing turtles to tag them, monitoring nesting beaches and marking egg clutches, and answering questions in the visitor's center and museum.

"I learned so much. I earned my diving certification while I was there-- it was required of interns so we could safely capture the male turtles in the ocean. Of course I learned all about the ecology and the lives of the sea turtles. I practiced Portuguese and used my English a lot with the tourists. And I also came because I was interested in how an island community functions. Brazil is very strict in protecting the islands -- Brazilians aren't allowed to just move there, and the number of tourists visiting is strictly limited. But the local people respect this because Brazil does a good job explaining the area's importance for fisheries and tourism."

Regarding the complex problems that matter the most to him, Gerardo believes his time at Zamorano has given him a more complex perspective. "The biggest way I've changed since I came here is that before I didn't understand why we had to help the people in

With thesis advisor, Dr. Jose Mora, and thesis partner Baleska Brenes, Gerardo takes measurements and places a radio collar on a young hooded skunk.







Gerardo watches a group of recently hatched sea turtles make their way to the ocean.

the forests and natural places. I thought they should just leave things alone. By studying in DSEA I realized the people have to live, too. And if you help the people and you teach them, they will become protectors of the environment, too.”

Gerardo was able to attend Zamorano thanks to generous support from the school’s scholarship fund, which covered approximately 60% of his tuition for his four years of study. The rest of Gerardo’s funding came from loans guaranteed by Zamorano. “My education here leaves me in debt, but it gave me the tools to get a good job that will help me pay it off. I think that’s a fair trade.”

Gerardo, who graduated in the top twenty percent of his class, plans to attend graduate school in Mexico and then hopes to pursue a career in the Mexican government’s National Commission to Protect Natural Places (CONANP). “CONANP works directly with the plants and animals, and also with local communities to create new economic opportunities and incentives to help them want to protect these places, too. I love Mexico and I don’t want us to lose our natural places.”

While Gerardo knows his plans may change, he also believes he is now able to pursue the career he has wanted since childhood.

“Professionally speaking, Zamorano gives you a lot of tools, especially for helping you figure out how to get things done. When you look for your pasantía or you develop your thesis you get practical experience learning how to follow a bureaucratic process, how to strategize, how to prepare. You need to work with many people, but if you really want to do something you can usually figure out how.”

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# Socioeconomic Monitoring



## Along the Coast

amorano professor Arie Sanders has

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been conducting socioeconomic monitoring (SocMon) research along the Central American coastlines for several years. SocMon research seeks to lay the foundation for integrating local community needs and interests into sustainable resource management plans. In 2006, with funding support

from the U.S. National Oceanic and Atmospheric Administration (NOAA), two Zamorano students spent their pasantías in a coastal town in Mexico gathering data for a baseline study. The students documented the different ways the coastal community of Punta Allen depends on the marine habitat and recorded the community's opinions about marine resource use and management strategies. The research was the basis for their senior thesis, in which they analyzed the data. In 2008, Arie Sanders incorporated their data into a chapter of a published report, Socioeconomic Conditions Along the World's Tropical Coasts, and into a presentation at the 11th annual Coral Reef Symposium.











# *Internships in* **Coastal** **Science and** **Management** **Zone**

*Pasantías (senior internships) provide Zamorano students with valuable real world experience. For the first trimester (15 weeks) of their senior year, students may study at a university, join a research project, or take jobs in fields in which they wish to pursue careers. Many students travel beyond Latin America for the first time for their pasantías, and many have profound experiences that change their perspective on the world, and their place in it.*

For Vilma Zuniga Lopez and Cesar Figueroa Torres, working as research assistants for the Utila Center for Marine Ecology (UCME) was an entirely new and exciting experience. Both are Honduran – Vilma grew up in Tegucigalpa, while Cesar’s family lives an hour south of San Pedro Sula in Lima Cortes – and both were unfamiliar with marine ecology and coastal communities before beginning their internships. As Cesar relates, “I knew that the ocean is very important to the well-being of Honduras, but I had little understanding of it. Paul Stufkens (a Zamorano English teacher) volunteered to teach me how to swim in the Zamorano pool, so that I could do my pasantía in Utila. So I really started out as a complete beginner learning about marine science. But then I fell in love with it.”



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hile in Utila, Vilma and Cesar participated in UCME's volunteer program, which provides one-month internships for individuals from around the world who wish to gain practical marine research experience; the Zamorano

students worked alongside young people from Canada, Europe, and the United States. Both Vilma and Cesar also obtained their scuba diving certification, became adroit at identifying hundreds of fish, corals and other marine life, and participated in a number of research projects in which they learned scientifically-sound data collection methodologies and analysis techniques. They worked on a conch rehabilitation program, a Lion Fish awareness and eradication program (a dangerous and invasive species from the Pacific), and a coral health analysis survey, among other research projects.

"We saw many things I could not have imagined before," explains Vilma. "For example, we saw parrotfish reproducing. A pair comes together and swim near the water's surface, where they release their eggs and sperm together. I had no idea that fish reproduce in such unusual ways. These are the kinds of processes that coastal managers need to understand to better protect fish stocks. If you know how and where they reproduce you can protect those areas, and then the fishermen will continue to have mature fish to capture."

Both Zamoranos also pursued original research as a basis for their senior thesis projects. Cesar investigated the potential use of yellowtail snapper as a sustainable seafood product. There are two types of fishermen on the Cays, the "Cayans" (white settlers) and the Garifuna (African descendents). Cesar interviewed many individuals from each group and documented their distinct fishing practices, examining how each group's fishing methods impacted yellowtail snapper stocks. He discovered, for example, that while fishermen were catching yellowtail at a size above maturity -- which was good for the fish and their reproductive rates-- the fishermen were, in fact, trying to catch smaller or "plate-sized" fish which local restaurants desired. Cesar's research pointed to the need to train restaurants in how to buy and prepare



larger fish, so market demand removed the pressure to catch smaller, juvenile fish.

Vilma engaged in market research analysis, interviewing restaurant owners and chefs throughout Utila to better understand the commercial seafood business. She documented what restaurants bought and what they knew about laws on endangered species. She identified how they evaluated their purchases in regards to price, availability, and quality. To evaluate the consumer angle, she also interviewed tourists in dive shops and restaurants about what they were buying and why. UCME is using data and analysis produced by both Cesar and Vilma's theses in its outreach and investigation projects, including "Fair Fish" a new for-profit initiative that links fishermen, restaurants, and fish sellers to promote sustainable fishing stocks, quality products and fair prices.

And what do Vilma and Cesar want to do in the future? Vilma says she would like to found a non-governmental organization to provide education and training to impoverished communities in Honduras. She expects her study of coastal zone management will help. "I know now how interrelated these systems





are. Our food production, environmental health, and the quality of life of fishermen and farmers are all interlinked. Improving a local coastal community by finding better sources of income for the people, or providing better sewage and waste treatment, for example, will ultimately help the environment where they live, too.”

In the next couple of years Cesar hopes to attend graduate school in marine ecology and then pursue a career working to sustainably manage the coastlines of Honduras. “The fishing people won’t survive without understanding this ecosystem better, and I can help teach them while protecting these beautiful creatures. I want to learn about everything that has to do with conserving these ecosystems, and perhaps even learn ways to help them become healthier.” Cesar considers and then offers an even shorter answer. “Really, I want to become exactly like Steve.”

“I knew that the ocean is very important to the wellbeing of Honduras, but I had little understanding of it. Paul Stufkens (a Zamorano English teacher) volunteered to teach me how to swim in the Zamorano pool, so that I could do my pasantía in Utila. I really started out as a complete beginner learning about marine science. But then I fell in love with it.”

**César Figueroa Torres**

(Honduras, Zamorano 2009)

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**Vilma Zúniga**

(Honduras, Zamorano 2009)



# DSEA

Zamorano would not thrive without the support of individuals and institutions that believe in our mission.  
To find out more about our programs and how you can help, please contact:

Arie Sanders, Director  
The Socioeconomic and Environmental  
Studies Department:  
[asanders@zamorano.edu](mailto:asanders@zamorano.edu)

Mary Ellen Flather, Director  
Institutional Advancement, USA  
Washington, D.C. Office:  
[meflather@zamorano.edu](mailto:meflather@zamorano.edu)

Juan Carlos Hernandez, Major Gifts Officer  
Institutional Advancement:  
[jchernandez@zamorano.edu](mailto:jchernandez@zamorano.edu)

[www.zamorano.edu](http://www.zamorano.edu)