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MASTER OF ADVANCED STUDIES IN

MARINE BIODIVERSITY AND CONSERVATION PROGRAM

Capstone Advisory Committee Final Capstone Project Signature Form

“Little Fishes”

Rebecca Morales

Spring 2009

MAS Marine Biodiversity and Conservation

Capstone Project



Capstone Advisory Committee

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“Little Fishes”- Jamaican Film Shoot

Original Schedule, April 3rd-15th

- Fri. April 3rd Josh Hays flies in to Montego Bay
- Sun. April 5th Martin and Therese Moran fly into Montego Bay
- Mon. April 6th Becky and Victoria Morales fly into Montego Bay
- Pick up Josh at his location.
 - Money Exchange and Grocery Shop for the week.
 - Settle in and REST.
- Tues. April 7th Montego Bay Marine Park Dive/Shoot
- Glass Bottom Boat Ride- Therese & Martin
 - Beach Shooting
 - Side Mountain Excavation Shot.
- Wed. April 8th Pedro Banks Shoot
- Habitat Pollution/Fish/Algae etc.
- Thurs. April 9th Nagril Shoot
- Snorkeling
 - Comparative Habitat/Reef/Algae/fish
- Fri. April 10th Ochos Rios
- Various Location Shooting
 - Overnight Accommodations at the Discovery Bay Marine Lab
- Sat. April 11th Discovery Bay Marine Lab Dive/Shoot
- Dairy Bull (first dive)
 - Rio Bueno (second dive)
 - Judith Mendez/Peter Gayle Interviews

- Sun. April 12th Martin and Therese Fly Home/Kingston Shoot
- Dive
 - Spend the Night in Kingston
- Mon. April 13th Jamaican Environmental Trust
- Christine O'Sullivan/Dale Webber interviews
 - Christopher Tufton/Zachary Harding/Daryl Vaz/Ainsley Henry/Sean Green interviews
- Tues. April 14th Falmouth Shoot
- Trelawney Fisherman Association Meeting 4pm
- Wed. April 15th Various Last Minute Shots
- Shoot Hotels/ Pool/ Cook Interview
 - Rebecca, Victoria and Josh Fly Home

Jamaica's fisheries and coral reefs are in serious decline, and fish stocks are nearly to the point of no recovery. Jamaica's coral reefs have been depleted of fish as a result of the Jamaican governments failure to sustainably regulate the fishing communities access to them. The country's community is impoverished, and some of the lowest income places on the island are fishing villages. These villages are blamed for unsustainable fishing practices, and for the depletion of fish on the reef. This may be true, however the Jamaican government is also to blame for damage to the coral reefs that lie off the coasts of hotel developments. Jamaica's main economic basis is tourism, and the government has no qualms about selling off prime, beachfront property to generate revenue. However, the runoff into the ocean from silt and developmental debris has a major impact on the coastal marine environment.

In 1983 *Diadema antillarum*, the spiny black sea urchin, was devastated by an unknown pathogen, and killed ~98% of the population in the Caribbean. Since then, almost all of the grazing predators such as parrotfish have been fished off of the reef, leaving nothing to graze algae and seaweed that grow on corals. As a result, the Jamaican reefs on the North side of the island have completely been overgrown and covered by slime, seaweed and algae. The most prominent place for this overgrowth is in Mooring one, just off of the coast of the Discovery Bay Marine Lab (DBML). However, even the best corals around Jamaica such as in Negril and Montego Bay Marine Park, both of which are protected, have overgrowth on many parts of their reefs.

While visiting Discovery Bay I asked Peter Gayle, Chief Scientist at the DBML, what they had tried to do in attempt to clean up the reefs, he said they had tried to transfer urchins from different parts of the reef to Mooring one, but urchins prefer shallow water, no more than thirty feet most of the time. Peter said,

when they took the urchins to Mooring one, about forty-five feet, “they turned right around and walked back towards the shallow water closer to shore”. Last summer, Nancy Knowlton told our class, that when she was doing research in the Caribbean, the spiny urchins were so dense, they were a nuisance, and she and her colleagues had to pick up and move them to avoid kneeling on them. If the urchins were that abundant, competition for space would have been fierce, since there is now little competition and plenty of space, the urchins can probably live where they choose. Some scientist tried raising the urchins from a larval state, they did well until they reached a certain size, then before they could take them out of their tanks and transfer them, they died. According to the DBML and the Jamaican Environmental Trust, this experiment has been tried a couple times and the outcome was the same each try. Others at the lab have also tried to do research on raising urchins, but have run out of money.

While diving at the DBML, I was very surprised to see so many fish pots in different areas of the reef. I suppose I was under some preconceived notion that the DBML would not allow such practices in “their” waters. Peter Gayle told me that it is not the onus of the DBML to regulate and patrol these waters, and there is also no laws disallowing fishing pots on the fore reef, but they try to keep fishing off of the back reef where there are catch regulations. As I dove, I saw many fish pots and hardly any fish, the most abundant species in the pots were blowfish, each pot I examined at Mooring one had at least two of them, sometimes up to five. There was nothing to look at on the reef except traps, with beautiful “porcupine” fish in them, the name I called these fish as a child. Two dolphins swam by slowly and looked as if they were sadden by the state of their once gorgeous environment, now filled with algae and fish pots. The only other kind of fish we saw off of the DBML while diving, were two small schools of about twenty five or so bright blue, tiny fish. When I saw these tiny schools, I said to myself, “if the reef looked like it should, these fish would be camouflaged.” as it

was, they looked oddly out of place. These fish looked like targets for prey, because their color was so bright up against the ugly, drab slime that had overgrown their backdrop.

Jamaican people love to eat parrotfish and thus a large market for them exists, but because of this there are very few on the reef. I dove six times in Jamaica and I saw only two parrotfish, one in a trap and the other was right outside the same trap mirroring each move that the one inside made, like a dance back and forth, it made my heart sink to see them this way. I also saw a few parrotfish that had been caught farther out to sea at the Trelawney fishing village in Falmouth, the fishermen that caught them told me that there are none close by, so they had to travel far out to catch the them. Unfortunately these fish are one of the most important grazers on the coral, and they are practically none existent on Jamaican reefs. The absence of parrotfish and urchins is the second reason the reefs are in such decline, silt, runoff and sewage are also causing terrible destruction.

Jamaica is relatively new to the tourist industry, and booming development from foreign hotel construction companies is noticeable from the moment one flies in. Skeletons of hotel buildings in the mist of being constructed line the coastline, and the land they occupy have been sold to them cheaply. The Jamaican government is giving away land like candy, but if they sold it with sustainable provisions, the government could make more money and the reefs would not suffer so badly. Land and property could be sold at a higher price if the surrounding environment and natural resources such as the coral reefs, the coast water and marine life and beaches, were taken into account and charged for. However this is not the case. The intrinsic value of the land and surrounding environment is not taken into account when the beachfront property is sold, nor is the damage that will ensue when construction starts, or damage by guests to the reef from sewage runoff and litter.

The National Environmental Provisions Agency's (NEPA) purpose is to protect the integrity of the environment and the natural resources therein. Each property sold in Jamaica is theoretically under provisions to keep up with the codes and mission statement of NEPA. Like most regulations in Jamaica, there are no enforcement agencies or authorities to regulate laws, and developers are free to construct and destruct as they wish. What's worse is, the corruption and deregulation of the government allows, perhaps, even encourages developers to construct without these provisions, at a cheaper cost. Unfortunately this deregulation and corruption is not unique to the Jamaican government and is prominent in most developing countries.

A hotel soon to start construction on the island is Pear tree bottom. As in the United States, each developer must file an environmental impact assessment report with NEPA, and theoretically NEPA will consult the different governmental ministries having to do with the construction. The agriculture and fisheries sector, or the tourist boards are examples of these ministries and they are to approve, deny or modify the construction plan. In the case of the Pear tree bottom development, the report was filed, and in one business day the application was approved. Clearly this was not enough time for the report to have passed from NEPA into the hands of each individual ministry branch, and is an identifiable example of government corruption. What makes the construction of this hotel so tragic, are the implications of the building site.

The fishermen who work at the Trelawney fishermen's association site in Falmouth practically live there, and the site has been established for hundreds of years. This site is historic, and one of the oldest villages in Jamaica, it is also one of the poorest villages, and is subsidized by an organization called Food For The Poor. Since the Pear tree beach property has been sold, and construction is soon to take place, the people who call this village home will have to be relocated. These fishermen and their livelihoods were not taken into account in the one-day, which

NEPA took to approve this development site. Though construction is pressing, the fishermen have yet to receive a definite word about where they will move to, and this will not be a small feat, the inconvenience for these men is enormous.

The beach of Falmouth where these men live is littered with nets, fish pots, tools, shacks, small boats, and dilapidated makeshift huts for upkeep on their gear. I was amazed at the state of tiny dinghies these men used to go miles out on to the open sea, the bottom of the barrel as far as quality goes by American standards. I was also amazed to see that some of them could even float. These men seem to be fearless and determined, however worry and uncertainty was painted on the faces of every Falmouth fisher, and I could feel the frustration in the air as they pondered about what would happen after the move. A little more than one hundred people were there the day we visited, all working together with a distinct sense of loyalty to each other.

The Falmouth village is a tightly knit community, but was very open and welcoming to us intruding on their lives. Each man had a specific role to play within the group, seemingly to maximize the efficiency of their effort, like a well-oiled machine. At seven in the morning boats would start arriving from a twelve hour-all night expedition with a meager catch, caught at night while the fish were sleeping. As soon as the boats hit the shore someone else took the fish for cleaning, to be gutted or sliced in steak-like cuts (such as kingfish), for smaller, individual sales. Finally the loudest most socially savvy person of the group was at the head of the “assembly line”, shouting out the finest points of the fish to potential buyers; I felt like I was at a small-scale auction. Very small fish people call “doctor fish” were simply submerged in a bucket of water, still clinging to the line for the poorest customers to purchase; they helped themselves and didn’t get the privilege of an auctioneer. These poor people take these doctor fish home to make “fish tea”, a drink that I found revolting, but for them a warm morning drink. Each village I visited was the same, tight knit and efficient save for the men on

breaks designated to the mechanics shacks to smoke their well deserved ganja. The air around the shacks was so thick with the smell of marijuana, I literally almost passed out when I walked up to a man to talk to him, I tried my hardest not to start coughing violently, but this only forced me to suppress the need to vomit. I didn't want to insult these men, so I walked away quickly. Of all fishermen in Jamaica, it is my opinion that these Pear tree Bottom men, are worst off.

In general, fishing as a profession is at the bottom of the totem pole, resources have been depleted and much of the income they earn from the catch goes back into their equipment to allow them to keep fishing. A large amount of money is spent on fuel, and because they need to travel farther for fish, profit dwindles. Upkeep on equipment is another expense, and improvements to gear continue the downward spiral.

It is easy for someone from a rich country to ask, "Why don't these people cut back on the fishing and conserve for the future?" What many of us don't realize is that these people are not privileged enough to be able to make that decision. These people are poor and survive on the fish they catch daily for food, if they decided to stop fishing for tomorrow, for them, the question would then be "so what am I going to eat today?" This means that the "discount rate" of the people of Jamaica is high. To be sustainable, ultimately the best situation would have to be a low discount rate, where a community cares enough, or is privileged enough to care about the future to conserve. Since the coastal resource is an open access fishery, there have not been strong or any, property rights established by the government, ironically, the only property rights that exist are the ones established by developers. Also, these people are mostly stuck in a niche; they can do nothing else other than fish. Fishermen are isolated, highly specialized and not well educated, they are not integrated into the rest of the economy, and many of them have grown up in this lifestyle, a profession that has been passed down from father to son over generations.

Driving down the coast on the North of Jamaica, stand massive fortress-walls built by hotels, which seem to go on for miles. These are all-inclusive resorts, designed for the tourist who never has to see the “real”, impoverished side of Jamaica or leave the lavish comfort of the resort. Beautiful, secluded beaches are reserved for tourists and segregated from the locals who must pay a fee, or are completely banned from using them. While I was in Jamaica, I ask my driver to take me to one of these amazing, turquoise Caribbean beaches. For a good while he did not know where to take me, and we drove for a half an hour before he remembered a small strip of beach I could walk on. This goes to show how many beaches are locked off from common people who wish to enjoy them. When confronting the government about secluding it’s own people from their rightful resources, they simply deny that they endorse any such blockades. Public hearings on issues such as these can be fruitless, with no admittance by the government of any wrongdoing, very little can be accomplished to rectify the situation. Jamaica has a small amount of coastline and limited natural resources and the continuance of beach development, will ultimately lead to the depletion of the little environment they have.

Some marine areas in Jamaica are protected such as Negril and Montego Bay Marine Park, however the term “protected” is relative and can only apply to the amount of regulation a park is given. At the Montego Bay Marine Park, there is only one ranger, his name is Lenroy Muir and he is very enthusiastic about helping the environment. Lenroy is dedicated to the protection of the park, and I asked him what obstacles he faced as a sole ranger. The usual answers about the lack of funding and support from the government were mentioned, but he said he did not have a problem patrolling because he has respect for the fishermen. These men make their living poaching, but because Lenroy has identified with them, they respect him and the park. Lenroy realizes he has to work and live near these people, and if he were to use a forceful demeanor towards them, he believes the

park would probably suffer worse for it. Instead, Lenroy gives out his personal phone number and asks his friends and law abiding fishermen, to call him if they see anyone poaching in his area, he then will issue a warning and give them a chance to stop before calling the police. "This process works best for everyone" he says, and he told me that the reefs in his park are starting to improve, however the efforts of one man are not enough to save the Jamaican environment and it is difficult to sympathies with a country that does not value the importance of the resource, which makes it rich. Of all islands in the Caribbean, Jamaica is by far the worst over fished, but finally, a new Minister of Agriculture and Fisheries has been appointed to the government, who actually seems to care about Jamaica's resources. In the last year Christopher Tufton has implemented a new fishing act, and for the past three months has managed to prioritize funding to support it. Four to Five million Jamaican dollars will be dispersed to NGO's, to run and regulate eight new fish sanctuaries around the island. Since NGO's and not the government will have authority over funds, Jamaican's such as Peter Espeut, are confident that the fish sanctuaries will be successful. Mr. Espeut told me that though the funds are not much by American standards, simply the concept for protection, is a massive step in the right direction for conservation. Others, such as Diana McCauley has different idea, and believes that the government has such a poor track record for upholding laws and distributing funds, she is doubtful the sanctuaries will make a positive difference.

There are setbacks to these sanctuaries, which are probable in regards to their success; for example, a change in Ministry appointment could lessen the conservation priorities of the sanctuaries. Also, Lenroy Muir told me that the government has never continued funding for protection, for more than a year, so the sanctuaries initially may be successful, but could shortly thereafter fail. If that were to happen, people who were offered the opportunity for sanctuary employment, would loose their jobs and, with no regulation, a progressive

fishstock decline would be eminent. A point that shocked me, is that tourist spots such as cruise docks, which intersect Jamaica's marine protected areas, are exempt to "pollution" laws. The term pollution, when applied to revenue generated from the tourist industry, is relevant. At a public meeting, Diana McCauley asked one of the Ministers if there would be hotels in these protected areas, the Minister replied, "There will be hotel's everywhere."

Jamaica has incredible potential and in most parts it is beautiful, but litter lines the streets, coastline and ocean from every direction. Litter is a relatively simple to fix, but is obviously not a problem pounding on the door of the governments priorities, and may be the least of the countries worries. The environment could be saved if sustainable provision and covenants were implemented and regulated in the contracts of land sales for development, but for this to happen, the government would have to lesson their blatant corruption. Revenue generated by higher development prices would support the country, and fees for the use of Jamaica's natural resources could support their preservation. Ranger Lenroy Muir's idea, is to charge people on cruises, two American dollars each, for traveling through Montego Bay Marine Park; with the dock receiving three to four cruise ships a week, I agree with Mr. Muir that the money could be beneficial. Why some sort of fee has not been implemented to tourist for using such natural resources, I don't know.

While it is clear to me that something drastic needs to be done to protect the coral reefs and ecology surrounding Jamaica, it is not clear to most. Diana McCauley suggested that most tourists like to look at the ocean, but they do not like to go into it and SCUBA divers are only a tiny percent of people who visit the island. Without seeing the degradation and lack of fish for oneself, it is difficult for people to have sympathy with the marine environment, or take measures to protect it.

Jamaican NGO's are contributing a great effort to the preservation of Jamaica, and the new sanctuaries are proof that their message, along with efforts from others, is getting through to the government. Unlike some, I cannot be pessimistic about the sanctuaries success, nor can I hold too much excitement that they will yield a positive outcome. I must have hope however, that the Jamaican government will live up to their promise to fund the preservation of their marine ecosystem, and start appreciating the precious natural resources they have.

Obstacles

My sister Victoria and I had been planning a dual thesis project since just after I was accepted to Scripps. We figured because she is a graduate student at Boston University in cinematography, and I have experience in television and radio, a film was our obvious choice for a project. I could not have directed this film without her expertise in cinematography.

Until I came to Scripps, I had no idea that an over fishing problem existed throughout all ocean waters. The biology weeks of the summer course was an eye opener about the state of ocean life and its fish stocks. Information about fishing became more disturbing when speakers from Non-governmental organizations (NGO's) came to speak to us about what they were trying to do about this situation. When The Nature Conservancy talked about the size of 2.5 km drift nets, I felt sick, and knew that my film would be focused on some aspect of over fishing. My decision to film in Jamaica was solidified after Jeremy Jackson told stories of the fishermen and poverty of this country, which he learned about while doing his research there. I concluded that this small country's over fishing problem was a specific enough subject for me to document.

Jamaica

The first time I went to Jamaica was to scout for locations and was productive and a pleasant experience. I got a few shots of the people at the fishing

village in Montego Bay, and traveled to Kingston to shoot an interview with Diana McCaulay from the Jamaican Environmental Trust, an NGO for the protection of Jamaica's natural resources. This was an important interview because she was a main source on over fishing information. She also gave us the contact information for the person we hired to be our driver, Hough Drummond. Hough had an entire floor of his large house reserved for rent, which we ended up staying at and he would turn out to be the most important connection that we would meet. We could not have gotten this project done without him.

Hough drove us anywhere we wanted to go, and was extremely protective. He took us to fishing villages, and asked us to stay in the bus while he ensured location safety before we interviewed strangers. If Hough would not have investigated before we got out of the bus, we could have put ourselves in precarious situations with our expensive film equipment. Because of he was local, I felt confident that our second trip a week later would also be successful.

On the second trip to Jamaica I brought a crew. I took an assistant camera cinematographer, a colleague of my sister at Boston University named Josh Hayes, and both my parents, Martin and Therese Moran who helped with various tasks. Immediately I had problems with Josh, he did not know how to act in social situations, completely dominated conversations in a louder than normal voice and would not let other people speak without including himself. My sister and I tried to brief my parents on what the workflow would be like while in Jamaica; this was almost impossible since Josh was consistently interrupting.

Josh became SCUBA certified a month and a half before Jamaica, and was supposed to do his open water dive test before then. He decided however, that he wanted to do his test in Jamaica, and flew there two days earlier to do so. I did not want him to do this, we were on a tight schedule, and from experience I knew something could go wrong. As predicted, situation after situation came up, from choppy water to unverifiable previous certification and so on. Because of each

situation and the relaxed Jamaican culture, four days later Josh had not been open water certified, and I had lost my patience. The fourth day on which Josh was denied his test, I called the dive master and demanded she get him in the water immediately; I could not wait any longer. I told her I had paid Josh's scuba fee in advance and fully intended to collect on services or I would demand a refund. This made Josh uncomfortable, and he told me to carry on without him as he was slowing us down-I told Josh I needed him certified to stabilize Victoria with the buoyant camera, and the under water housing-after the phone call to the dive master, she agreed to certify Josh that day. Finally after I had rearranged my schedule for the fourth time, he was able to dive at Montego Bay Marine Park but on this dive, Josh was given a leaky tank. Thankfully, our dive master Lenroy Muir is an expert at air inhalation control, found a small tank, and was able to dive on this for 45 minutes using ~800 psi, which was impressive.

Josh was supposed to travel with Victoria and I to Kingston on our last day, but after spending seven and a half days together, I would not be able to handle a four and a half hour drive both ways with him, and did not wish to fight about my workflow. I told Josh that in case I didn't get all the interviews done, I might have to stay the night in Kingston, and he would miss his plane back to the U.S if he came with us. He stayed in Montego Bay at Hough's house by himself, and we had a relaxing day and I got to interview the director of fisheries by surprise.

Post-production

The problems we ran into in Boston during post-production are incalculable. To list any of those problems, is to go into detailed accounts about intricate technicalities; P2 card format, uploading footage problems, software compatibility difficulty, frame rate differences, corrupt sound files on different tracks and so on. I was in Boston for a week before I even got to look at the footage.

Finally, we were able to get the film lined up for editing, we started reviewing separate interviews and noticed another problem that Josh had handed us. One of the most important interviews was with Peter Gayle, Chief Scientist at the Discovery Bay Marine Lab. Peter gave us information about fishermen and their scuba practices, which I had never before heard about, as well as information on what his facility was doing about their problems. When I saw the interview, I was shocked to hear that Peter's voice was unusually loud and crackly.

Sound is hands down the most difficult part of shooting a film, so many uncontrollable variables are amplified onto the recording, planes flying overhead or music from the surrounding area are examples of this. The microphones we used picked up noise easily, so it was important to make sure all the settings on each mic were correct, Victoria was trying to synch them but it was taking a while to get all four matched. I could hear Victoria telling Josh that something was wrong with the sound and he needed to stop rushing and fix it, but he looked annoyed and said it was fine. Progressively, Victoria had told Josh four times that something with the sound didn't seem right, each time he dismissed her saying it would be fine.

It took us only days to layout the time line of footage we shot, but it took us incalculable hours to fix the sound and get the film transferred to a media source. The final version of the film was finished a week before the presentation date, however transferring it to a DVD took more time than any other problem we had previously encountered. Victoria and I were consumed by fixing the sound, which would distort or become omitted during the transfer, and Victoria had to fly to San Diego to continue working on it. We anticipated that I might have to show the film on her laptop, in case it would not transfer, but four hours before I was scheduled to present, it worked. We had sacrificed much sleep to make it perfect.

The entire spring quarter of school was dedicated to this film, and a month and a half after we started editing, a fifteen-minute version of our "Little Fishes"

film was complete. In the end, it came out better than I could have anticipated it would.