# Images of Egypt: A Human Experience

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I wearily stumbled off of the plane, down the ramp, and into the Cairo International Airport. I was so tired that my body felt disconnected from my brain. Though I do not remember doing it, I somehow managed to grab my carry on and make my way to the baggage claim. As I wandered through the airport, I stopped to look out the window. The piercing desert sun blinded me for a moment; but once my eyes adjusted, I saw something I will never forget. I saw the booming city of Cairo through one window. Through the other, I saw sand as far as my eyes could see. I felt a smile slowly spread across my exhausted face; I was in Egypt, a land of great history and controversy.

I received the news of my World Food Prize internship shortly before the war broke out in Iraq. Upon receiving the news, my eyes were constantly glued to every media source I could find. I heard and read all about the Arab opposition to the war, and how President Mubarak (President of Egypt) said that this war would cause more problems than it would solve. I also saw the news clips of the riots through the streets of downtown Cairo, and I wondered what I would find when I arrived in Egypt. My friends kept asking me if I was afraid. My response would always be, "Yes. I'm terrified; terrified that I will not be able to go." I could not think of a more opportune time to venture to the Arab World than a time when the United States perception of this area was somewhat disconcerted. I was anxious to learn about the similarities and differences between American Society and Arab Society. I hoped to gain a better understanding of the human experience in Egypt, as well as the work being done at the World Fish Center in Abbassa, Egypt that contributes greatly to global food security.

"Go there with out any expectations," an Egyptian friend told me a week before my departure, "that way you will be surprised at nothing." I later found this to be the best advice anyone had given me in preparation for my trip. Traveling with an open mind allowed me to clearly and objectively observe my surroundings. I wanted to take home a clear picture of life in Egypt to better inform the people at home. Before I left for Egypt in early June, I came to the realization that this experience would shape me both as a person and as a future scientist.

I was introduced to the World Food Prize Foundation and the internship program at the end of my junior year in high school. Mr. Bill Reed is the World Food Prize representative at Newton High School and he gave a small presentation in one of my classes. He told my fellow classmates and myself about the World Food Prize and the work of Dr. Borlaug. He also showed the "Student Voices" video of interns from previous years. I was able to watch students like myself speak excitedly about their summer experiences as interns where they were able to have a small impact on the solution to the world hunger issue. It was then that I knew that this was a program that I wished to be involved in.

I must admit that I am currently not pursuing a career in agriculture. I am focusing on a career in the medical sciences, but I became interested in the work of the World Food Prize Foundation because I believe world hunger is everybody's problem, and I also believe that a solution to this issue will come entirely from people like Dr. Borlaug and other scientists working tirelessly on it; but it will also come

from global interest and concern. I also know that the overall health and well-being of a country is dependent on the nutrition and income of the people, so I began looking at the health aspects of the hunger issue.

I enjoyed the Youth Institute immensely and was anxious to apply for an internship. I was elated to receive the news about my internship in March. I learned that I was to be sent to the World Fish Center in Abbassa, Egypt. I could not have been more excited to go. I was to learn about aquaculture research, and I would be able to see for myself the hunger problems in a developing country that I had only read about up to this point. Like many of the other interns, I spent the next few months reading everything I could find about Egypt. I wanted to know all about the people I would be working with and the center I would be working at.

The World Fish Center (formerly known as ICLARM) was established in 1997 in Abbassa, Egypt. The center was placed in Egypt in response to the growing need of aquaculture education in rural areas in Africa, West Asia, and the Middle East. Egypt was the ideal location for a center because the country was responsible for more than sixty percent of the total recorded aquaculture in Africa during the late 1990s. Projections indicate that the demand for fish production in this part of the world will continue to increase at an alarming rate over the next twenty years. In order to attack this problem head on, the World Fish Center has four main goals:
1. To support the role played by riverine systems in sustaining rural and urban food security and livelihoods.
2. To realize the total potential value of coastal fisheries.
3. To realize the total potential value of lake and reservoir systems.
4. To increase fish production and to optimize water use for the benefit of urban and rural food security.

Fish supplies twenty-five percent of the total animal protein in developing countries, and it is considered to be the principal source of animal protein for over one billion people. Currently in Africa, the regional fish supply is falling short of demand. This is unfortunate, but there is work being done at the World Fish Center in Abbassa to solve this growing problem. I was assigned to the production department at the center during my internship. I was attached to doctoral student, Patricia Muendo. Ms. Muendo is conducting experiments using different pond fertilization techniques to enhance pond productivity, as well learning more about aquaculture methods that may prove to be very effective to the rural farmer.

The branch of the World Fish Center in Egypt specializes in aquaculture. Aquaculture is the cultivation of aquatic animals and plants for the purpose of human consumption. In the near future, aquaculture may prove to be a leading source of food for developing nations. The World Fish Center in Abbassa works with the cultivation of fish in ponds. There are several different types of ponds that may be used for fish production. Watershed ponds are formed by building a dam across a natural watercourse where the land permits water storage behind the dam. The dam is constructed between two hills that constrict watershed. This type of pond may store overland flow, stream flow, and groundwater flow. Excavated ponds are a little less complicated because they are basically holes in the ground that may be filled by

groundwater inflow. Levee ponds are the last type of ponds that may be used. With these ponds, water is impounded in an area surrounded by levees. Little runoff may enter these ponds, and they must be filled by water from wells, storage reservoirs, or streams. The type of pond a farmer should have is dependent on the resources available to him (2).

Pond productivity is a general term used to describe the many chemical and biological processes dependent on each other to produce a successful pond. These are factors that should be measured frequently. Through my attachment to Ms. Muendo, I was able to gain a basic understanding of how to measure these factors and what they mean to the productivity of a pond. After observing Ms. Muendo for several weeks, I was given two ponds of my own to monitor. One of my daily tasks was to measure the temperature, dissolved oxygen, and pH levels in the ponds twice a day.

In ponds, water temperature is directly related to solar radiation and air temperatures. Throughout the day, water is heated by the absorption of solar energy. This energy is absorbed within the upper layer of water. Based on this fact, the upper waters are typically warmer than the deeper waters. Warmwater species, such as Tilapia, which is the choice fish of the World Fish Center in Egypt, grow the best at temperatures between twenty-five and thirty-two degrees Celsius. Temperature has a profound effect on the biological and chemical processes occurring in a pond. The rates of occurring chemical and biological reactions double for every ten degree Celsius increase in temperature (2).

Dissolved oxygen occurs if air is in contact with water; oxygen will enter the water from the air until the pressure of oxygen in the water is equal to the pressure of the oxygen in the air. It is more convenient to express the solubility of oxygen in milligrams of oxygen per liter of water than to deal with the pressure of dissolved oxygen. Dissolved oxygen requirements for aquatic creatures are more critical in warmer water than in cooler water. Temperature plays an important role here because aquatic organisms will use twice as much dissolved oxygen at thirty degrees Celsius then at twenty degrees Celsius. Chemical reactions also will progress twice as fast at thirty degrees Celsius then at twenty degrees Celsius. Also fertilizers will dissolve faster and herbicides will act quicker, thus making the rate of oxygen consumption by decaying organic matter greater (2).

It is essential for dissolved oxygen levels to be monitored in a pond every day because there are certain cutoff rates that could be life threatening to the fish. Warmwater fish will die if exposed to less than 0.3mg/l of dissolved oxygen for a few hours. According to most research, anything below 1.0mg/l of oxygen is dangerous for warmwater fish. When the oxygen levels are below comfortable for the fish, they will come closer to the surface to breathe. In fact if one is in the presence of this happening, one will see the fish with their mouths open breathing air from the surface. Even though it is possible for fish to survive in low concentrations of dissolved oxygen, prolonged exposure is dangerous (2).

Dissolved oxygen is of dire importance to a fish because the blood contains hemoglobin. The hemoglobin combines with oxygen to be loaded and unloaded

throughout the body. This loading and unloading of hemoglobin with oxygen is governed by oxygen tension. Oxygen tension represents the partial pressure of oxygen in the atmosphere required to hold a certain concentration of oxygen. At the gills, oxygen tension is higher than it is in the blood, and oxygen is loaded into the hemoglobin. Inside the tissues of the fish, oxygen is used rapidly. Because of this, the tissue fluids have a lower oxygen tension than the blood entering the tissues from the arterial system. Here, oxygen is unloaded by the hemoglobin to the tissue fluids. The presence of hemoglobin in the blood enhances the oxygen carrying capacity of blood (2).

The pH scale, from zero to fourteen, is a way of measuring the acidity of liquids. A pH of seven is considered neutral. Anything below seven is acidic, and anything above seven is basic. pH is very important to fish because the gill tissue in fish is the target of acid stress. Exposure to a low pH creates excessive amounts of mucus on the gills. This causes interference with the exchange of respiratory gases across the gills. The symptoms of acid stress are failure in blood acid-base balance, which results in respiratory stress, and the decreasing blood concentrations of sodium chloride; which causes osmotic disturbance. The pH of most freshwater ponds is between six and nine. Within any given pond there is a daily fluctuation of pH of about one or two units. This daily fluctuation is a result of changes in the rate of photosynthesis occurring by plankton and other aquatic plants. Carbon dioxide and pH have an inverse relationship. In a pond, a low pH is more common than a high pH. When pH decreases too much, lime may be added to the pond. Liming has many advantages, the first being that it has the ability to raise the pH of acidic waters to a desirable level. However, it also increases the availability of Carbon in the water for the process of photosynthesis. It also acts as a disinfectant for the pond and is a good source of soluble calcium for pond food organisms (1).

Water turbidity is the cloudiness of the water, and it is also measured daily because it is a good indicator of a pond's progress. Plankton is the main source of water turbidity. By measuring the cloudiness of the water everyday, a person gets a pretty good idea of plankton abundance in the pond. Clear water tends to favor weed problems, so it is important that the water be a little cloudy. Water turbidity is tested everyday using the secchi disk. A secchi disk is a device that consists of a long pole marked with centimeter markings connected to a disk that is painted with black and white sections. The tester places the disk into the water and pushes it down until he or she can no longer see the black and white disk. The tester then must take note of the centimeter mark at which the disk disappeared. Then the tester pushes the secchi disk down further and pulls it up slowly until he or she can see the disk again. The tester then must take note of the point at which the disk reappeared. These two numbers are then averaged, and that is how the secchi disk is read. Lower readings may indicate that plankton blooms are so dense that the dissolved oxygen concentration may be a problem. A higher reading may indicate that there is insufficient plankton for a good food base. A declining reading shows that plankton is increasing. A stable or increased reading shows that the fertilizer is not achieving the desired effect (1).

Photosynthesis is a life-giving process in all ponds. All energy, nutrients, and structural materials needed by living creatures originate in plants. Photosynthesis is a

process where solar energy is converted into nutrients and oxygen for the plants. The leaves of the plants that contain a green substance called chlorophyll absorb the light energy. The process of respiration is the exact opposite of photosynthesis. When photosynthesis is progressing faster than respiration, oxygen will accumulate. The accumulation of oxygen during the day causes a decrease in carbon dioxide, however at night photosynthesis stops while respiration continues; this of course causes a decline in oxygen and an increase in carbon dioxide. This explains why the dissolved oxygen in ponds is much lower in the morning but steadily increases throughout the day (2).

The presence of ammonia in a pond is common, but an ammonia content that is too high may be harmful for the fish. The primary mechanism for ammonia toxicosis is yet to be found; however the physiological effects of ammonia on fish are well known. Ammonia is excreted directly from the fish; but as ammonia content in the water raises the ammonia excretion by the fish declines. This causes the ammonia levels in the blood and tissues of the fish to increase. This results in an elevation of blood pH and adverse effects on enzyme-catalyzed reactions in membrane stability. The presence of too much ammonia also causes an increase in oxygen consumption by the tissues, damages the gills, and reduces the availability of blood to transport oxygen throughout the body. Histological, or microscopic changes may occur in the kidneys, spleen, and the blood of the fish if there is exposure to subleathal concentrations of ammonia. Chronic exposure to high levels of ammonia increases a fish's susceptibility to disease and reduces growth (3).

Planktons are microscopic, aquatic life forms that have little to no resistance to currents. They live free-floating or suspended in open or pelagic waters. There are two types of plankton: phytoplankton and zooplankton. Phytoplankton is the plant form of plankton; they are basically microscopic algae. They may be seen in unicellular, colonial, or filamentous forms. Zooplankton is the animal form of plankton. They may exist in the form of protozoan, rotifers, cladocerans, and copepods. Plankton is an excellent indicator of water quality. Some types flourish in eutrophic waters, and others are sensitive to organic and chemical wastes. Plankton has a strong impact on nonbiological aspects of water quality, i.e. pH, odor, color, and taste (1).

Chlorophyll a and plankton have a direct relationship. A productive pond will have a chlorophyll a concentration of fifty to two hundred micrograms per liter. Through my attachment to Patricia, I learned how to collect and analyze chlorophyll samples. Here is the exact procedure:

Materials: Millipore filters, Millipore filtration apparatus, small electric drill, tissue grinder, centrifuge, and spectrophotometer

Reagents: Acetone, 90%. Add 50ml of distilled water to 450ml of reagent grade acetone.
Magnesium Carbonate Suspension, 1%. Place 1g of powdered magnesium carbonate in a 100-ml volumetric flask and dilute to volume with distilled water. Only a small amount of the magnesium carbonate will dissolve.

Procedure: Place a Millipore filter on the filter holder and attach the funnel. Shake the magnesium carbonate suspension and pipet 1ml over the filter. Apply vacuum to remove the liquid from the filter. Transfer 50 or 100ml of the well-mixed sample to the funnel. After the sample has filtered through, remove the Millipore filter and trim away the edges that are not coated with the residue. Crumple the filter and place it in the tissue grinder. Add 2ml of 90% acetone and grind for one minute, then add 8ml of 90% acetone and grind for 30 seconds. Transfer the contents of the tissue grinder to a 15-ml screw cap glass centrifuge tube, and refrigerate overnight in the dark. Centrifuge the acetone extract at 3000 revolutions per minute for 10 minutes. Carefully decant the supernatant into a cuvette and measure the absorbency at 664nm, 665nm, and 750nm with a spectrophotometer set at 0.00 absorbency at each wavelength with 90% acetone. Chlorophyll a then must be calculated using the following equation:

11.9 (A665-A750) V/L * 1000/S

A665= absorbency at 665nm
A750= absorbency at 750nm
V= acetone extract in millimeters
L= length of light path in the spectrophotometer in centimeters
S= the volume in millimeters of sample filtered (1)

Ponds, like all habitats thrive on a specific food chain. In ponds, the food chain begins with the fertilizer that is put into the pond. This develops into phytoplankton and zooplankton. Zooplankton and fish both consume the phytoplankton, but fish also consume the zooplankton. More specifically, ponds thrive on two linked food chains. The autotrophic food chain relies on solar energy and green plants. New organic matter is produced through the process of photosynthesis. These plant organisms are then consumed by grazing animals. Phytoplankton are the principal autotrophs within a pond ecosystem. The heterotrophic food chain is the exact opposite of the autotrophic food chain because it relies on the microbiological degradation of non-living organic matter into new matter; and with this, comes the release of inorganic nutrients like carbon dioxide. Both food chains are needed for a pond to function successfully (3).

There are many different ways for a farmer to raise fish. The use of fertilizer may be employed, or perhaps no fertilizer is used at all. The amount of effort put into a pond is dependent upon the farmer, his resources, and his income. Extensive farming is by far the cheapest way. This type of farming requires no food or feed input. The fish survive on live food organisms and plants that naturally occur within the pond. In this type of situation, fish growth is dependent on the natural productivity of the pond, the density, and the total biomass of the cultured species present. Here, growth with increase in the natural product and a decrease in stocking density. This technique is employed in farming systems with low fish stocking densities (3).

Under most circumstances, fertilizers are applied to the pond. These fertilizers may either consist of chemical or organic compounds. The purpose of the use of fertilizers is to increase the production of live food organisms and plants that are

naturally growing within the pond. Semi-intensive fertilizing is the use of fertilizer that consists of farm products. This method is used when the pond alone cannot sustain adequate fish growth. Currently, ninety percent of fish and shrimp aquaculture production occurring in the third world is done using the methods of semi-intensive farming. This is a convenient way for farmers with limited means to raise fish because it is of low cost, and the farmer may use manure from cows, sheep, chickens, etc as the fertilizer (3).

The most productive form of feeding is known as complete diet feeding. Under these circumstances, fish are kept on a high quality diet. They are feed dry or moist pellets that contain many beneficial nutrients. The problem with this method is that pellets are often unaffordable for many families. Many factors come into play when a choice must be made about a feeding regimen for the fish. The financial resources of the farmer must be taken into account as well as the farming conditions available to the farmer (3).

Subsistence rural farming is a possible solution when it comes to money and resources for the farm families of developing nations. The goal of subsistence rural farming is to produce enough fish for home consumption using the locally available resources at minimum costs. The pond to be used would be a single earthen pond that may be operated by one or more farms part-time. Because the costs to purchase fry, feeds, and equipment are so high, farming strategy must be simple to manage. It also must be at a low cost and require very little input. The most appropriate strategy is a low cost, semi-intensive regimen that uses a combination of fertilizers (3).

During the last few weeks of my internship at the World Fish Center in Abbassa, I was given two ponds to monitor using the methods I had learned from Ms. Muendo. One pond was fertilized with chicken manure and in the other; the fish were on a pellet diet. By monitoring these two ponds, it was my hope that I would be able to notice a slight difference in the productivity of each pond. I monitored the pH, temperature, and dissolved oxygen twice a day. I also used the secchi disk every afternoon to monitor the water turbidity. I collected water samples once a week to check the chlorophyll amounts. Along with the chlorophyll analysis, I also tested the water for nitrates, nitrites, and ammonia weekly. Please refer to figures 1, 2, and 3 for my data.

Even though my time was mostly spent in the production department, I was able to witness other activities around the center to get a general view of what else goes on at the World Fish Center in Abbassa. My first week in Egypt I learned about the separating of eggs and fry, very young fish, from the adult fish. Nets are used to catch the fish and remove the eggs from the female's mouth. The difference between the male and female fish is that females have three openings on their underside, while males only have two. There are twenty females and eight males per breeding tank. There are five or six eggs per one gram of body weight in a female's mouth. The female incubates the eggs in her mouth until they are hatched. If she senses danger, she pulls the hatched fry back into her mouth for protection. For the purposes of research at this center, the eggs are removed from the female's mouth and put in a

bucket of water to be taken to the hatchery. The eggs are stored in the hatchery for twenty-eight days.

The fry must also be separated from the adult fish. The fry are put into a net inside a bucket of water. Fry that is smaller than eleven or twelve millimeters will escape through the holes in the net into the bucket. These fry will be put on male hormone feed for twenty-eight days to develop testes. Fry that are too large to fit through the holes will be taken to a separate tank because their size indicates that they have already begun to develop male/female organs. These fry will be used for breeding when they reach their full size. Fish are transported in a large plastic bag. The bag is filled with water, and then the fish are dumped in. It is important not to feed the fish at least one day before they are to be transported because the metabolic process of digestion uses up large amounts of oxygen, and the fish will produce more carbon dioxide. The water should also be at a low temperature. After the fish are dumped into the bag, oxygen is added; and the bag is tied.

While I was interning at the World Fish Center in Abbassa, I was able to learn about work that the genetics department is currently doing. I spent several days observing their work and trying some of the procedures myself. The genetics department is concerning themselves with using applied genetics to produce improved fish in larger quantities. The research is being done without the use of genetically modified organisms, but instead using the process of natural selection. Currently, there are two different techniques being used. The simplest and most cost-effective technique being applied is called “mass selection”. For this form of research, all fish are put into the same pond regardless of their sizes. Then at the end of the season the best fish are selected and bred. This is a good method for countries that lack scientific knowledge and technologies (4).

The second technique is called “family selection”. This form of research involved more sophisticated technology and is more time consuming. Fish are grouped into families and then tagged to monitor their growth processes. I was able to assist the genetics department in tagging the fish. The fry are put into a large bowl of water with a sedative inside to keep the fish from moving in every direction while being tagged. The needle attached to the tag is dipped into potassium permanganate and then put through the fish between the lateral line and the spinal cord. A knot is then tagged and any access thread is cut, and then the fish is returned to the water. This is a process that must be done quickly so that the fish does not suffer from a lack of oxygen. The results from family selection research are much more accurate, making it the preferred choice of research for countries with the means to support it (4).

The scientists in the genetics department hope that the projects they are working on will lead to food security in Africa, West Asia, and the Middle East. They hope that their current research will later be applied to other breeds of fish. They hope to have an impact on farmers. In fact, some of the strains of Tilapia they have produced are being tested by farmers in neighboring communities. Dr. Mahmood Rezk, head of the genetics department in Abbassa, realizes that they have a long way to go in terms of progress; but he is hopeful that with the help of other organizations,

food security will be met in Africa. He says, “Africa is the poorest continent, and it needs all the help it can get (4).”

I must admit that my fist impressions of Egypt were not at all what I had thought they would be. I expected the country to be more like India with the poor covering the streets begging for money. At first glance, Egypt was not like this at all. Cairo was a booming metropolis just like New York or Los Angeles. The first weeks I was there I really hadn’t seen any evidence of food insecurity. I had only seen the ritzy parts of Cairo, and I had not been to the villages yet. Then one weekend I discovered the reason I there, and I found it in the most unexpected place. Patricia and I were in Cairo for the weekend, and we were making the long awaited trip to the pyramids.

The pyramids were the most incredible sight I have ever seen. To actually stand on the sacred grounds where so much history had occurred thousands of years prior to my arrival was a breathtaking experience. What is strange about Giza is that directly across the street from the sphinx and the pyramids, there is a Kentucky Fried Chicken and a Pizza Hut. This eerie paradox made me feel like I was in an episode of “The Twilight Zone” as I sat in the KFC eating my chicken and staring out the window into the eyes of the sphinx. The eeriness continued as I left the restaurant with Patricia. While we were trying to get a cab carrying our leftovers a little girl approached me; and the world seemed to stand still. She looked as though she was about six years old. She was very small and had a broken arm. She looked like she hadn’t had a decent meal or a bath for several days. She looked at me with these pleading brown eyes and pointed to my bag of food. She then tugged on my pants and pointed to her mouth. I felt like my heart was breaking; I gave her the bag. She said, “Shuk ran” (thank you). I stared at her for what seemed like forever and replied, “afwan” (you’re welcome); but by the time I had enunciated the words she had gone. From that moment on, I saw my purpose.

After that compelling moment at the pyramids, my observations had a much larger impact on me. Before I left for Egypt, eight weeks seemed like an incredibly long time. I realized that eight weeks was not long enough. I wanted to learn everything in such a short amount of time. I began documenting everything I saw and heard through pictures and journal entries and mass emails sent to friends and family. Patricia and I would go for walks to watch the sunsets each night; I still maintain that the most beautiful sunsets I have ever seen I saw in Abbassa, Egypt.

It would be impossible for me to write a paper about my experiences in Egypt without mentioning the impact of Islam on the Egyptian people. Beginning at sunrise each day, music is broadcast over loudspeakers; and it can be heard from every direction. It is a dissonant sound but peaceful and beautiful in it’s own way; it calls Muslims from all over to come and pray. Praying happens five times a day, and when it is time to pray followers stop whatever they are doing to practice their faith. It is a pretty amazing sight to see them kneel to show devotion to God. I am sorry to say that when I came home I was actually approached by people wanting to know if I met any terrorists while I was in Egypt. The amount of ignorance made my heart sink. It is not

a religion that spawns terrorism. The seeds of terrorism are found inside hate and intolerance.

People often ask me what my favorite part of my summer in Egypt was, expecting the answer to be, “the pyramids”, or “dipping my feet in the Mediterranean”. They also expect this to be a hard question for me to answer, looking at me as though I should ponder the question for several minutes. Contrary to what they expect, that question is the easiest question for me to answer. My answer is also not the typical answer. Although the pyramids are amazing and the Mediterranean is beautiful, the best parts of my trip were the people I met.

My close group of friends and colleagues consisted of Patricia and Harrison, who were both from Kenya; and Yonas, who was from Eritria, and Mathieu, who was from Belgium. The five of us became very close because we did everything together. I learned about Kenyan food. I had a favorite dish that Patricia would make for me once a week. I learned about the various ways of cooking Eritria fish. Matheiu, being the only one there my age was kind enough to teach me some French. I also contributed to the group. I had brought a deck of poker cards with me; and on slow days and long car trips, I would teach everyone a new card game. I left the deck of cards with Patricia as a birthday gift, and she tells me they still play the games I taught them.

Driving through the village of Abbassa, I am sure that I will never forget the images that I saw. The roads were mostly made of dirt, which created a great deal of dust as people drove by. Farmers would lead their cattle through town with little boys riding donkeys, while cars sped by. There were little shops selling American products in the windows as well as fresh fruits and vegetables that were locally grown. The women were dressed in simple cotton dresses that went past their ankles, and they all had their heads covered. They washed clothes and hung them out to dry in front of their brightly colored houses.

When one enters an Egyptian home, it is customary to remove one's shoes. This is because the floor is covered with intricately woven and brightly colored prayer mats, and it is disrespectful to wear shoes. The first time I entered a home I was shocked when I noticed a tremendous lack of "stuff", this is the word we in America use to mean unnecessary objects. There is very little furniture. Dining and watching television and having a conversation is typically done sitting on pillows on the floor.

Food is a major component of the Egyptian culture. I loved going to worker's homes for dinner. We were treated like royalty when we entered. We sat on pillows on the floor and gathered around a large silver plater that was brought out by the women. The food was neatly arranged, and there were no individual plates and no silverware. Sharing a meal with someone changes everything. When I first met these people there were several barriers that I was afraid I would never break. We come from completely different worlds, religious beliefs, and languages. All of that was pushed aside when I was invited to their homes, and sat on what they consider to be sacred, and shared their food. Everything became so simple, and the barriers were broken. We were just people sitting down to dinner; and we found ways to speak. This made me wonder if there were any barriers to begin with. Perhaps it was just my imagination.

My experience in Egypt was priceless, and it will remain a part of me for the rest of my life. The lessons I learned there are unforgettable, and it is my hope that others may learn from my experience. The World Fish Center is doing amazing work to aid the hungry; and they will one day, with our help and support, achieve food security in Africa, West Asia, and the Middle East. The research going one with pond fertilizers will make aquaculture more affordable, and this will help so many. The genetics team will provide farmers with breeds of fish that will thrive, giving them the ability to provide for their

children and their children's children. It was my honor to be a part of such an honorable organization.

I learned so much about people while I was in Egypt. Those who seem different, are not. We all want the same things in life, and those things are to be loving, prosperous people, and most of all to be happy. There are no barriers between people; they exist only in the minds of the ignorant. We need to rid the world of ignorance, and work together for the common good. As author Gary Zukav said in his book *The Seat of the Soul*, "We have much to do together. Let us do it in wisdom and love and joy. Let us make this the human experience."

Fig. 1

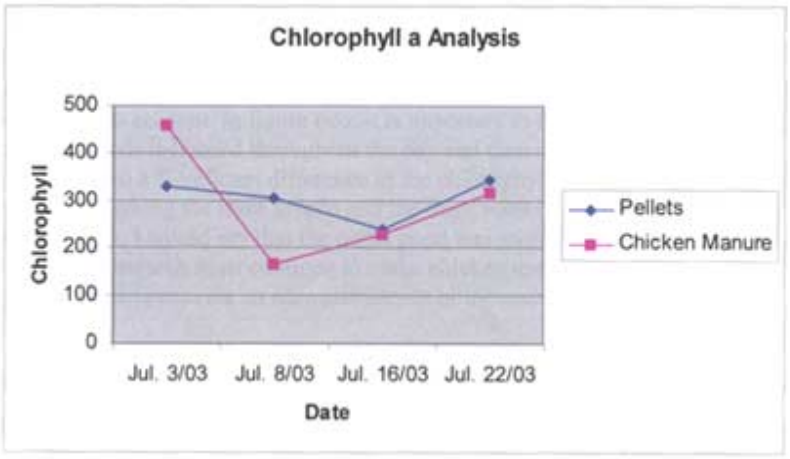



Fig. 2

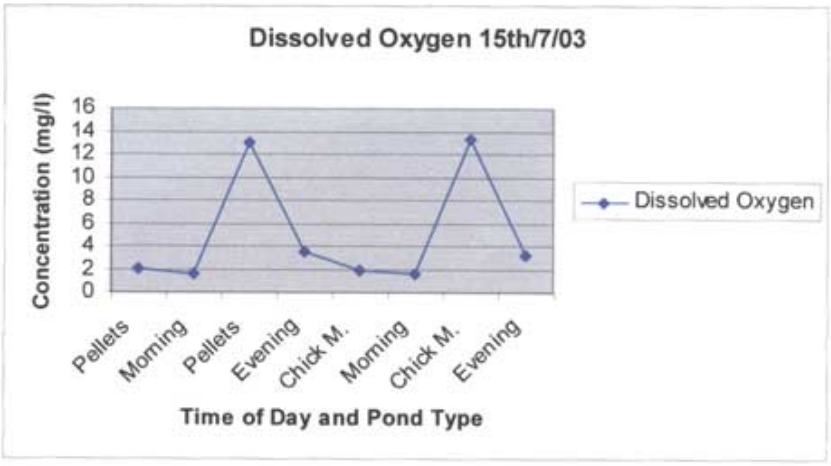
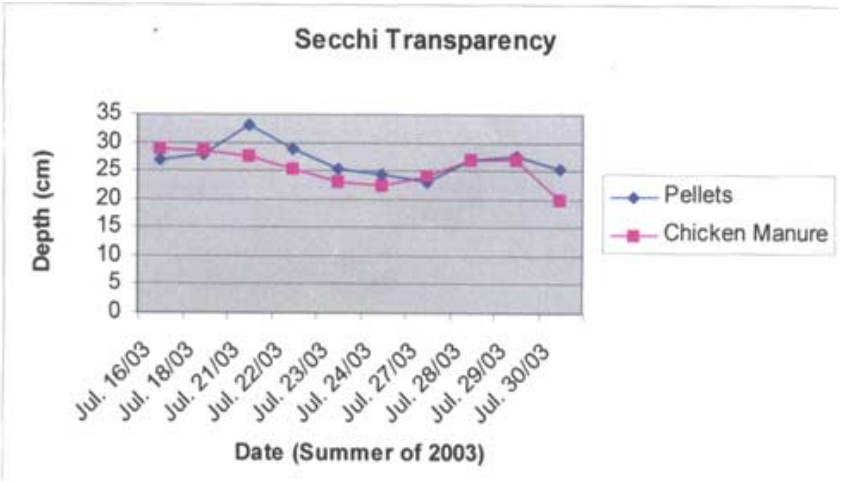



Fig. 3



It is very difficult to accurately say which pond (chicken manure or pellets) was more productive because I only have three weeks of data. To make such an assumption would require five to six months of data. It is also important to remember that in order to judge the productivity of a pond, all factors must be taken into account. In figure two, it is important to notice that the oxygen in the ponds increased throughout the day and then decreased at night. There is also a significant difference in the chlorophyll content for the two ponds. Only taking the three graphs and the three weeks worth of data into consideration, I would say that the pellet pond was more productive. This means that research must continue to make chicken manure ponds equally productive to provide an adequate source of income and food for the rural farmer.

Acknowledgments

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