NMMU – SAASVELD CAMPUS

Experiential Training with the ORCA Foundation in Plettenberg Bay

Conservation Practical Year

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Conservation Organisation: **The ORCA Foundation**

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1. INTRODUCTION

Luigi Lottino, a student currently studying at the Nelson Mandela Metropolitan University, George, completed 52 weeks, or 260 working days of experiential training at a Nature Conservation organisation (Erasmus, 2010). The Natural Resource Management Department (at SAASVELD, George) expected the student to achieve the following three objectives: 1) receive the opportunity to grasp and evaluate theory as applied in the real world situation, 2) gain experience and acquire the necessary skills for successful management within the conservation industry, and 3) receive the opportunity to work alongside experienced persons who can act as role models and mentors for the student (Erasmus, 2010).

The student's place of employment was at the ORCA (Ocean Research Conservation Africa) Foundation, situated in Plettenberg Bay. The student was employed as the house coordinator for a volunteer program that was created by ORCA. This foundation works alongside the government, private sectors and NGO's (Non-Governmental Organisations) to develop a sustainable and professional method of marine research through volunteering and eco-tourism. This report describes the practical experience and knowledge that the student gained from ORCA Foundation during his time with them in 2010 and discusses the different projects carried out throughout the practical year. A description of the conservation organisation, where the student worked, is given. An outlay of the management, including administrative duties, human and natural resource management and maintenance is discussed. Research and specialised services are covered under research and monitoring of projects, including a results and discussion of projects completed. Environmental Education was implemented by involving the community and local schools through various programmes. The student names the

various short courses successfully completed, and finally concludes on the report and gives personal recommendations concerning the conservation in the Plettenberg Bay area, which has been the base for his experiential year.

The following report contains the information and knowledge gathered, assimilated and applied by the student during this experiential year.

2. CONSERVATION ORGANISATION

Tony Lubner founded a company consisting of 3 fundamental bodies: Ocean Blue Adventures (OBA), Qolweni Community Development Trust (QCDT), and Ocean Research Conservation Africa (ORCA).

OBA was founded in 1996, and is primarily a “boat based whale and dolphin encounters” tourism company which seeks to develop professional and responsible marine eco-tourism (Meintjes, T.E. 2010). This is based on non-consumptive, non-invasive, sustainable utilization of marine resources (Meintjes, T.E. 2010).

OBA then formed a new organisation: the Qolweni Community Development Trust (QCDT). The dire need for human development and community upliftment initiated this trust; the organisation therefore focuses its attention and funding on realistic human development projects such as pre-school education, arts and cultural enterprise (Meintjes, T.E. 2010).

A final organisation, the ORCA Foundation, was fused with QCDT in 1998. It now strives, alongside the government, to develop and implement realistic resource management strategies to ensure long-term sustainability and focuses primarily on research and conservation of natural resources (Meintjes, T.E. 2010). Meintjes (2010) also includes the vision that ORCA Foundation has adopted from Senegalese philosopher Baba Dioum: “We protect only what we love” (Orcafoundation, 2010). ORCA Foundation has adapted and broadened this vision as follows:

ORCA foundation is “a conservation model in Plettenberg Bay… that ensures the sustained utilization of marine and coastal resources through improved Management, Research and Education.” (Meintjes, T.E. 2010)

These three entities form the “Potjie Pot” philosophy, which states that no true conservation organisation can succeed without equally involving eco-tourism, the community, and conservation research/ education. If one of these “legs” is short or broken, the “pot” will topple over and kill the fire (Meintjes, T.E. 2010). Together, ORCA, the QCDT and OBA are closely aligned with coastal care projects (Meintjes, T.E. 2010). This has been

done by the implementation of partnerships between the government, the private sectors, and NGOs. Their commitment is further supported by their involvement in the “Theta Initiative,” and, as the winner of the Green Trust Award 2001, has taken the lead in marine tourism and conservation (Meintjes, T.E. 2010).

The volunteer program is part of the ORCA Foundation entity and allows visitors from abroad to make a contribution by assisting in the many projects the program has to offer. The volunteers are managed by staff coordinators who transport them to projects which involve marine field work, maintenance, community work, education, conservation and resource management.

Photo 1: The ORCA Foundation Logo (ORCA Foundation, 2010)

The ORCA Foundation is predominately managed and coordinated by Tracy Meintjes, who is directed by the Chairmen of the foundation, Tony Lubner. Tracy is the foundation manager, volunteer coordinator, and also acts as a mentor for the student, Luigi Lottino, during his practical year. Luigi Lottino acts as the house coordinator and as an assistant volunteer coordinator for ORCA foundation. As Tracy’s assistant, Luigi is fully involved in all aspects of the foundation and receives a well-rounded experience in all the necessary fields required for his practical year.

2.1. Location

The ORCA Foundation is situated in Plettenberg Bay, South Africa, coordinated at 34°3’0”S and 23°22’0”E. This town is the jewel of the garden route and is characterised by its sweeping, unspoiled golden beaches and its dramatic rocky Peninsula, which is situated on the southern side of the bay (Saexplorer, 2008), sheltering it from the Indian Ocean (known locally as “the wild side”). This shelter provides Plettenberg Bay with amazing water conditions for most of the year. Plettenberg Bay is also host to incredible estuaries and rivers weaving their way up into the towering indigenous Tsitsikamma forest, home to many endemic fauna and flora (Saexplorer, 2008).

2.2. Climate

Plettenberg Bay has a maritime Mediterranean climate with hot summers and mild winters (Wordtravels, 2010). The Garden Route, where this town is situated, experiences the most rainfall within South Africa (Wordtravels, 2010). The reason for Plettenberg Bay’s mild, comfortable weather is a combination of the warm Agulhas current meeting the temperate Benguela current and the Tsitsikamma/Langkloof mountain range, which defines the Garden Route of Southern Africa (Travellersworldwide, 2010). These conditions result in mild temperatures on the southern side of the mountain with very little rainfall and infrequent temperature extremes Jacana Maps (2006).

2.3. Temperature and Annual Rainfall

The temperature in the Plettenberg Bay area ranges on average from 19°C in July to 27°C in February and receives an annual rainfall of approximately 700mm, with June being the lowest rainfall month and October being the highest on average (Saexplorer, 2008). The following graph (Figure 1) displays the annual rainfall of the area.

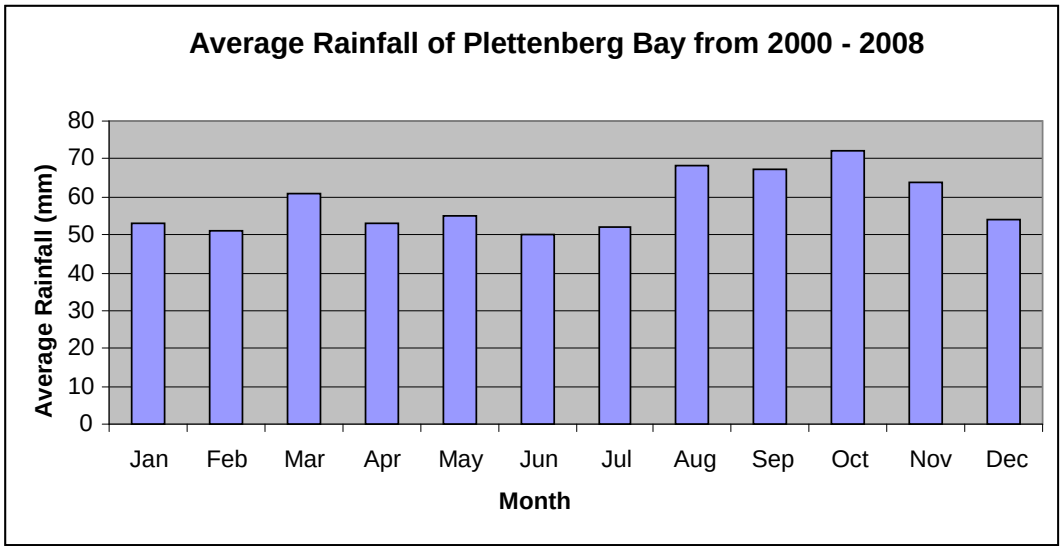


Figure 1: The Annual rainfall for Plettenberg Bay per month from 2000 to 2008. (Adapted from Saexplorer, 2008)

2.4. Geology and Soils

The South African Coast came into existence during the Cretaceous Period (140 Ma) as Gondwana was pulled apart by the powerful force of tectonic plates shifting (Jacana Education, 2000). As Africa and South America continued to move apart, the Indian Ocean was formed and thus began the slow formation of the South African coast, namely the Garden Route (Jacana Education, 2000). Research shows that before and after these events took place, the water level fluctuated significantly. During the high water level periods, sand and mud was washed into the Cretaceous bays by rivers; such bays include Plettenberg Bay, Knysna and Mossel Bay (Jacana Education, 2000). Over time the mud and sand sediments settled, but due to constant water keeping the sediments cool, they were never pressurised and heated to the same degree as that of the Table Mountain Quartzite (TMQ), resulting in a mudstone and sandstone more susceptible to weathering (Jacana Education, 2000). With these elements in place, the Indian Ocean's wave action increasingly approached from the

Southwest, causing the softer mudstone and sandstone to erode away faster than the more resistant TMQ. This resulted in bays forming along the coast with the TMQ remaining, shaping the headlands (Jacana Education, 2000). Because of this, the bay now continues to reshape from refracted waves produced by the heads, and to curve around into the bay in a spiral motion. This precise mathematical curve is called a logarithmic spiral, or "log-spiral," and repeats itself many times in nature. Whirlwinds, whirlpools, pinecones, spiral galaxies and seashells are all examples of this spiral (Jacana Education, 2000). The Figure below shows the formation of these "half-heart" or "log-spiral" bays:

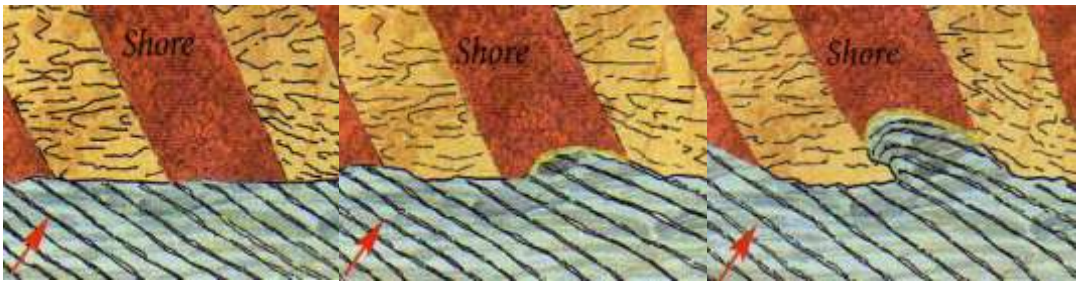


Figure 2: showing the formation of Log-spiral bays (Jacana Education, 2000):

2.5. Significance of Robberg Peninsula

One of the main attractions of Plettenberg Bay is the Robberg Peninsula. The Afrikaans name "Robberg," directly translated to English, means Seal Mountain ("Rob" meaning "seal" and "berg" meaning "mountain") (Wikipedia, 2008). The Robberg Peninsula is a nature reserve of about 150 ha. It was established as a reserve in 1980 and was declared a national monument in 1999.

Photo 2: Luigi Lottino giving a lecture on the Significance of Robberg (Julie Weisrantz, 2010)

Robberg Peninsula is unique in the sense that some of the oldest and youngest rocks in the world occur in very close proximity to one another; this is known as the Robberg Formation (Meintjes, T.E. 2010). Robberg consists of 3 distinct layers: the bottom layer, TMQ, is about 250 million years old (Meintjes, T.E. 2010). The middle layer consists of river stone conglomerate, which proves that the peninsula was at some point a river bed. The top layer consists of a very young layer of sandstone, and is approximately 45000 years old (Meintjes, T.E. 2010).

Robberg is well known for its archaeological significance, as there are approximately 20 caves found throughout the peninsula. People described as “Stone-Aged Men” by researchers inhabited these caves for more than 19 thousand years, and archaeologists have found many artefacts within them (Meintjes, T.E. 2010). Currently, researchers are working with Cape Nature, who maintain and preserve the nature reserve, to excavate another cave situated on the wild side of Robberg, where it is believed more of these stone-aged tools will be found. Today, the nature reserve is visited by hundreds of tourists everyday; several different hiking routes have been set out by Cape Nature where an easy to moderate walk to the centre of the peninsula, located just above the seal colony, can be enjoyed (Meintjes, T.E. 2010). Park patrons are able to walk down the great dunes on the wild side and relax on the golden sands of the Tombolo Beach, which links the Peninsula with the Island (Jacana Education, 2000). The Tombolo Beach is very rare, due to its creation via the refraction of waves, which cause the

Photo 3: Tombolo Beach on “Wild Side” of Robberg (Luigi Lottino, 2010)

surf to curl around the island and result in the waves approaching each other from opposite sides (Jacana Education, 2000).

2.6. Vegetation

Plettenberg Bay, as with most of the Garden Route, is known for its vegetation diversity. The two major factors playing a role in both vegetation determination and diversity are the climate and geology of the area (Jacana Education, 2000). Due to the high rainfall received annually, forests that hug and dominate the valleys have formed along the Outeniqua and Tsitsikamma mountain range (Jacana Education, 2000). These forests form the indigenous Forest Biome and are commonly seen while travelling through the area along the N2 (Jacana Education, 2000). Western Keurboom *(Virgilia oroboides)* is commonly found where the forests are closer to the coast and along river edges. This species is so abundant in the Plettenberg Bay area that the Keurbooms River was named after this tree (Jacana Education, 2000). When travelling deeper into the forests, one will find the giant trees burgeoning in these areas, some of which include: Cape-beech *(Rapanea melanaphloes),* Forest Elder *(Nuxia floribunda),* White Ironwood *(Vepris lanceolata),* Outeniqua Yellowwood *(Podocarpus falcatus)* and the Black Witch-hazel *(Trichocladus crinitus)* (Jacana Education, 2000; Venter and Venter, 2005).

Closer to the coast and on the upper reaches of the mountain tops, climate conditions change greatly and are less suitable for forest species. In these areas, Cape Fynbos thrives, as it has adapted to the harsh conditions caused by being in close proximity to the ocean (Jacana Education, 2000). The primary indicators of Fynbos are the Ericas, Restios and Proteas, all of which are found within the Plettenberg Bay area. Species, for example the Erica *(Erica versicolor)* (Jacana Education, 2000), are commonly found and are readily visited by sunbirds such as the

Southern (Lesser) Double-collared Sunbird *(Cinnyris chalybeus)* (Davidson and Sinclair, 2006)**.** The King Protea *(Protea cynaroides),* which is South Africa's national flower (Jacana Education, 2000)**,** is another species frequently found along the road to Natures Valley, a suburb near Plettenberg Bay.

Finally, one can only marvel at the site of the constantly moving dunes found all along the bays of the South Cape; these dunes are home to plants adapted to the harsh conditions introduced by the Indian Ocean (Jacana Education, 2000). They are specially adapted to withstand constant salty water, often blown onshore by the strong Easterly winds experienced throughout the year (Jacana Education, 2000). While hiking the Robberg Peninsula, one will regularly find species such as the Dune Olive *(Olea exasperata)* or the Crossberry *(Grewia occidentalis)* growing on the top of the peninsula near Witsand (Jacana Education, 2000; Venter and Venter, 2005). The Wild Camphor Bush (*Tarchonanthus camphoratus)* can also be found on Robberg and all along the dunes of the Plettenberg Bay, including Keurbooms Beach and "The Dunes" found closer to Arch Rock (von Breitenbach, 1974).

2.7. Fauna

The Garden Route is known for its diversity of marine mammals, as up to 40 different species occur along its coast (Jacana Education, 2000). Plettenberg Bay is often visited by many of these species for feeding, shelter from rough seas, or to mate. The most common visitors to the bay are the Common Dolphin *(Delphinus delphis)* and the Bottle Nose Dolphin *(Tursiops truncatus)*, both of which use the bay for mating, feeding and protection (Jacana Education, 2000). The Cape Fur Seal *(Arctocephalus pusillus pusillus)*, on the other hand, is a local to the bay and colonises the Robberg Peninsula with approximately 4500 resident seals (Meintjes, T.E. 2010). Humpback Whales *(Megaptera novaeangliae)* are frequently seen

during the months of June and November as they migrate from their feeding grounds in the Antarctic to their breeding grounds off of the coast of Mozambique (Jacana Education, 2000; Holliday, 1991). Southern Right Whales *(Eubalaena australis)* are also visitors to Plettenberg Bay's waters, and are found mostly between the months of August and September. They can be seen giving birth to their young in areas close to shore with sandy bottoms (Jacana Education, 2000; Holliday, 1991).

Photo 4: A Knysna Lourie in Birds of Eden (Luigi Lottino, 2010)

Plettenberg Bay, surrounded by a great diversity of vegetation, is also home to many birds, reptiles and land mammals (Jacana Education, 2000). The Knysna Lourie/Turaco *(Tauraco corythaix)* are the only known birds that have true green pigmentation in their feathers (Davidson and Sinclair, 2006; Absoluteastronomy, 2010). Vervet monkeys *(Cercopithecus aethiops)* and the Chacma Baboon *(Papio ursinus),* are commonly found alongside roads and within the forests in the surrounding area; they have become a major problem in the area as a result of people feeding them (Jacana Education, 2000; Carruthers, 2008). The leopard *(Panthera pardus)* is the most successful of all the big cats in adapting to its surrounding in southern Africa (Stuart and Stuart, 1993). It is, however, still a mammal rarely found in the area (Jacana Education, 2000). Jacana Education (2000) states that the leopard is extremely endangered and Landmarkfoundation (2010) believes that there are only about 25 adults left in the Garden Route due to culling by farmers to protect their livestock. Fortunately, there is now a great deal of research and conservation focusing on the well being of leopards (Landmarkfoundation, 2010). Tenikwa, a rehabilitation center located near the Crags, just outside Plettenberg Bay, incorporates

education into their big cat tour. A large part of this education involves lethal and non-lethal capture methods of these cats. Through these education sessions, people can be made aware of alternative ways of preserving livestock. This will ultimately be to the benefit of all parties involved: the cats, the livestock and people in general**.**

Photo 5: A Serval *(Leptailurus serval)* at Tenikwa Rehabilitation Centre (Stuart and Stuart, 2001), photo taken by Luigi Lottino, 2010.

3. MANAGEMENT

Luigi Lottino was appointed house coordinator and assistant volunteer coordinator of the ORCA foundation. During his practical year, Luigi was responsible for the general management of the ORCA house and assisting Tracy Meintjes with the volunteers program. As the house coordinator the responsibilities of Luigi were as follows: house management, administration of the house, financial management, along with maintenance of vehicles, stores, equipment, foundation buildings, and any animal husbandry (Erasmus, 2010). Luigi was also accountable for human resource management within the house, which involved dealing with any labour (housing, conflict management, and disciplinary hearings) and safety (including safety of staff) issues, the transporting of volunteers, and the productivity and training of staff (Erasmus, 2010). Luigi was also involved in natural resource management, primarily concerning: invasive species management and control, water management, patrols and law enforcement, and aquarium management. The following information explains the student's involvement in the aforementioned categories.

3.1. House Management (House Coordinator)

As house coordinator, it is the student's responsibility to ensure all matters pertaining to the house are in order. This includes but is not limited to: the buying of foods and beverages for the house, the setting up and preparing of the conference room for meetings,

Photo 6: The ORCA House situated in Poortjies, Plettenberg Bay (Luigi Lottino, 2010)

the general keeping of the house, security precautions, and any maintenance within the house. The management of the house is discussed in detail under the following headings.

3.2. Administration

During the practical year, it is expected that the student complete four weeks, or 160 hours, of administration work within the company (Erasmus, 2010). This includes: 1) conferences, briefings, or general staff meetings, 2) reception and bookings, where the student is responsible for general communications between clients and bookings for future customers, and 3) the documenting and filing of various items concerning finances of the foundation (Erasmus, 2010). The information that follows describes, the student's designated duties, and discusses with reference to the student's "Log Book", the general administration that was completed during the practical year.

3.2.1. Meetings

In any management situation, it is imperative that a constant form of communication between the managers, the coordinators and the volunteers on the program, is practised (Tony Lubner, personal communication, January 14th, 2010). This is to ensure that all matters run smoothly within the ORCA House during the program, as does any volunteer involvement with OBA. Between the months of January and June, informal meetings were held during weekdays by either Tracy Meintjes (foundation manager and volunteer coordinator) or Luigi Lottino (house coordinator and assistant volunteer coordinator). These meetings kept the volunteers aware of the any activities that were changed or cancelled, either due to weather conditions, emergencies or unforeseen social activities and educationals organised by other volunteer programs (Tracy Meintjes, personal communication, 2010). The meetings were

subject to change depending on the events occurring during that week. However, as of the beginning of July onwards, a new system was put into effect that presented a more formal, dependable method of communication. This became routine and proceeded as follows: Meetings held from Tuesday through to Friday were considered informal, and in many cases, were referred to as “briefings” within the students log book, for example on Friday the 23rd of July, 2010. These meetings were subject to change and depended, to a great extent, on unexpected external events. Monday mornings, on the other hand, were reserved for a more stable and constant meeting session. This weekly meeting was, and is still, held at 08:00 am and is the most important; during this time the week’s events are explained in detail (Tracy Meintjes, personal communication, 2010). Matters such as the weather and water conditions are discussed, and alterations are made to the week’s schedule to ensure that the hours of each day are utilised to their fullest extent.

On the 14th of January, 2010, the student took part in the first meeting of the year. During this time, an outline of the year was presented to the staff and primarily involved an open discussion concerning management methods within OBA, ORCA and QCDT. This meeting, to a great extent, habituated the student to the staff members and managerial methods, and accustomed the student to the duties expected for the year. Besides the aforementioned weekly meetings and briefings, there were several distinct and important meetings held throughout the year. On the 14th and 15th of April, 2010, meetings were held regarding ORCA Foundation and its projects. In these two meetings, Tracy and the student proposed a more effective method of managing the projects currently in operation to the chairmen (Tony Lubner). The student was directly involved in this meeting and played a pertinent role, recommending changes concerning future projects and activities. These recommendations included making weekly meetings more consistent and the elimination of certain activities so to

enhance the quality of more significant ones. On the 15th of July, 2010, Tony arranged for a meeting to discuss the student's duties concerning the administration of the house. The meeting was held at 09:00 a.m. at the ORCA House, while Tracy coordinated the volunteers. In this meeting, Tony expressed his satisfaction with the work carried out by the student thus far. The meeting also included notice of changes in filing and documentation methods to better coincide with the administration of OBA. The student learned a great deal from these personal meetings; he, for example, learned how to put forth an argument as well as back it up with relevant information and examples. These argumentative skills are essential for management and coordination of any a topic, and will play an important role in the future of the student.

3.2.2. Reception and Bookings

Bookings are initially made via the ORCA website, or through agents who incorporate ORCA foundation into their advertising. There are approximately 20 agents, which include: Enkosini, World Wide Experience, and Shumba Experience, who are the most readily used. The following concerns the procedure taken when a potential client makes a query, booking directly through ORCA foundation: the query is sent directly to Tracy Meintjes, who then sends the potential client the necessary documentation, costs involved, information concerning life in Plettenberg Bay and the equipment needed while on the program. When the potential client makes the decision to join the program, an invoice and the necessary forms required are sent via e-mail. The client can then pay though the website or directly into the ORCA account. The client also has the choice to pay the full amount, or a deposit to confirm the booking as long as it is paid in full a month prior to the client’s arrival. After this, the ORCA foundation then makes the necessary arrangements concerning the clients transport to the ORCA foundation. This can be via Gecko Tours, the Intercape bus or personal pick-up by ORCA Foundation staff.

After all of this has been organised, Tracy Meintjes sends the details to the student, who finally confirms the arrival dates and pickup times.

3.2.3. Documenting and Filing

The ORCA Foundation requires the student to keep an up-to-date file of all purchases and transactions concerning the house (Tracy Meintjes, personal communication, 2010). The student was therefore instructed to file and document all these transactions. The receipts received after purchases were filed within a lever-arch file and kept in a filing cabinet. Any changes to these files were documented, and at the end of each month, were presented to either Tracy Meintjes, or Tony Lubner.

The student was responsible for the accurate filing and documenting of any data collected during excursions with the volunteers (Tracy Meintjes, personal communication, 2010). These data sheets were stored in the assigned lever-arch files to ease retrieval by volunteers, who were instructed to add the information to the database on the house computer. Data collected mainly concerned, but was not limited to: dorsal fin identification of whales and dolphins within the bay, animal sightings, aquarium monitoring, biodiversity counts, tag and release fishing and SASS evaluation data sheets. This information was also readily checked by Tracy Meintjes, or the student, to prevent later confusion

3.3. Financial Management

The student was responsible for management of all of ORCA Foundation's finances during the practical year with ORCA Foundation (Tony Lubner, personal communication, 2010). Financial Management can be described as the efficient management of a business or organisation's finances in order to achieve set financial goals (University-essays, 2010). During the practical year it is expected that the student complete three weeks, or 120

hours, of duties concerning financial management, and has handled finances predominantly concerning the ORCA House (Erasmus, 2010). This included, 1) following a simple budgeting system, 2) handling all house purchases and income, and finally, 3) the management of the internet usage within the house (Erasmus, 2010). The information that follows explains these three categories in more detail.

3.3.1. Budgeting

A budget can be defined as “a list of all planned expenses and revenues” (Wikipedia, 2010)**.** The primary purpose of a budget is to predict both the income and expenses for the month (Tracy Meintjes, personal communication, 2010). This will provide an outline for the organisation that will ultimately provide control and better judgement (Wikipedia, 2010). In addition, it will help the business to understand its boundaries and reach its objectives (Wikipedia, 2010).

The student used a simple system to budgeting expenses within the ORCA House; this budget included food and miscellaneous purchases, along with the rent collected each month from tenants. At the beginning of each month, the student was required to type out a budget using Microsoft Excel. This budget included the volunteers, the renters within the house, and the employees. The budget displayed the month, which was split into 4 weeks (although this was subject to change depending on the month) and showed the number of weeks each person would be in the house. ORCA Foundation charges R33.00 per person per day; this includes the food and miscellaneous expenses for each week (Tony Lubner, personal communication, 2010). The table that follows is an example of the budget for the month of September, 2010:

Table 1: Budget showing the expenses for September 2010. (Luigi Lottino, 1st of September, 2010)

	Date				No weeks	
	31-May	07-Jun	14-Jun	21-Jun		
Volunteers						
	Chris	Chris	Chris	Chris	4	R 924
	Vicky				1	R 231
	Cassie	Cassie	Cassie	Cassie	4	R 924
		Rachel	Rachel	Rachel	3	R 693
		Ramnath	Ramnath		2	R 462
Renters						
Karlien	Karlien	Karlien	Karlien	Karlien	4	R 924
						R 0
						R 0
Shaun	Shaun	Shaun	Shaun	Shaun	4	R 924
Employees						
Luigi	Luigi	Luigi	Luigi	Luigi	4	R 924
Teliswa	Teliswa	Teliswa	Teliswa	Teliswa	4	R 476
TOTAL:					30	R 6,482.00

Table 1 illustrates the time each person will be living in the house, and specifies the number of weeks in the second last row on the right. The amount of weeks a volunteer is staying is then multiplied by R231.00, which is the sum of R33.00 multiplied by 7 days in a week. All the figures are then added up and the total is displayed on the bottom right corner. The total in this example adds up to R 6,020.00 for the month. This budget only displays the expenses of foods and miscellaneous purchases made for the tenants of each room within the house. (Tracy Meintjes, personal communication, 2010). This budget was then given to the management and money was deposited onto the debit card account used by the student to pay for the required monthly purchases.

This budget was also subject to change, as on some occasions unforeseen events caused for the budget to be overspent. On the 15th of July, an overspending of the budget by R989.99 was discussed with Tony

Lubner (Tony Lubner, personal communication, 2010). The reason for this was the student's failure to account for the expenses of the "Build a Bin" project that came into effect on the 24th of February, 2010 (Luigi Lottino, Log Book, 7th of April, 2010). This was a mistake, as the budget for the month was only sent to Tony Lubner on the 8th of April, 2010, meaning the student could have included the expenses, but did not. By trial and error, and by excellent communication between Tracy, Tony and the student, these mistakes were attended to immediately and the student was informed of a better, more dependable method to use while writing the budget. This was a positive learning experience, as the student gained a great deal from rectifying his faults.

3.3.2. Purchases and Income

The student was in charge of the purchasing of foods and miscellaneous for the house (Tracy Meintjes, personal communication, 2010). It was decided that a separate account would be opened, and a debit card would be entrusted to him. This card would then be used to do all purchases concerning the house (Tony Lubner, personal communication, 2010).

The volunteers living within the ORCA House are supplied with basic foods by the house coordinator (the student). Purchases are done according to a schedule in which foods are divided into two categories: fast going and slow going. Fast going foods, such as fruits, would be bought along with bread and milk two to three times a week. Slow going foods, such as frozen foods, meats, vegetables, and starches, are bought in bulk every two weeks or once a month. The student also researched where items can be bought at the best prices, and would stock up on foods such as meats, canned foods and starches at these locations. The volunteers are responsible for preparing their own breakfast and lunch, so it is the duty of the student to maintain a constant food supply. The house executive, Tilly, prepares supper from Monday to Saturday. She requires

replenished food supplies on a weekly basis in order to cook the house meals. On Sundays, and on Tilly's weekends off, it is the responsibility of the house coordinator to ensure the volunteers have a meal for the evening. The house coordinator is also responsible for the purchasing of any miscellaneous items concerning the house; this, however, does not include personal toiletries for volunteers.

The purchases for the house also include: replacement of any broken items, such as cutlery, light bulbs or appliances. Equipment used in the program such as nets, buckets and aquarium supplies are also replaced when needed.

During the year, the student was responsible for collecting the rent from tenants residing at the ORCA House. The ORCA Foundation, in many cases, will rent rooms to volunteers who have chosen to extend their stay with ORCA Foundation. These volunteers are charged a discounted rate, which includes water, electricity, food supplies and miscellaneous items. They are permitted to stay only if a contribution is made to the foundation. This could include, but is not limited to, aiding in data entry, finishing assigned projects and helping with projects where many hands are required. The rent was collected within the first week of the month. If any payments were late, it was the responsibility of the student to ensure that the matter was addressed. If these problems continued, they were reported to the foundation manager, Tracy Meintjes.

The ORCA house is equipped with an ADSL internet connection that can be used by staff and volunteers at any point for information or to keep in contact with friends and family. At the start of the year, the student was instructed to keep tabs on the internet usage, and it was the responsibility of the student to make sure volunteers paid for the hours used during their stay. The ORCA foundation charges R 30.00 per hour for internet use, but

does not charge for time spent researching on behalf of ORCA. The student typed up a table using Microsoft Word which included the date, name of volunteer, the time they logged in and out, the total minutes spent, and whether or not they paid for their hours used.

The student then instructed the volunteers to fill in the table every time they logged onto the internet. At the end of the month, the hours were added up and a notification of required payment was given to the volunteers. They were asked to pay their bill before using the internet again. The money collected was then added to an envelope and put into the house safe, situated within the house coordinators room. At the end of the month, the total collected money was given to Tony Lubner.

3.4. Human Resource Management

Human resource management is a term used to describe the entity or group of individuals who comprise the working force of an organisation or foundation. During the practical year of the student, it is expected that two weeks, or 80 hours, of human resource management be completed (Erasmus, 2010). The student was actively involved in this division and dealt with matters concerning: 1) the transportation of staff and volunteers to their designated areas, 2) the training of staff, students and volunteers in specialised areas, 3) the safety of staff, students and volunteers involved in the program, 4) productivity within the house, and finally, 5) labour resources within the foundation (Erasmus, 2010). In each of these areas, the student managed to successfully complete the required quota of hours needed and also obtained the necessary knowledge prerequisite for the practical year (Tracy Meintjes, personal communication, 2010).

3.4.1. Volunteer Transport

The ORCA Foundation has one vehicle that is used for transporting volunteers and staff to and from their destinations. It was referred to as the "ORCA van." A PDP (Professional Drivers Permit) was required and allowed the student to legally transport volunteers and staff to their required destinations (Tracy Meintjes, personal communication, 2010). The student's typical routine concerning transport included but was not limited to: fetching and dropping new volunteers to and from the airport/bus stop, taking the volunteers to OBA for the morning, transporting them back to the ORCA house, transporting them to Siyakula (a Pre-school within Qolweni for educationals) and transporting them to the Tenikwa Rehabilitation Centre to aid in any rehabilitation, cleaning, or maintenance on the centre. The fuel used for this transport is included in the volunteer program costs. However, for after hour activities, the student is required to charge the volunteers for fuel, as these activities are for their own leisure (Tracy Meintjes, personal communication, 2010). These after-hour activities include: bungee jumping, the elephant sanctuary, Monkeyland, Birds of Eden and skydiving. It is the responsibility of the student to plan and organise these activities and to ensure safe transportation of the volunteers to and from them (Tracy Meintjes, personal communication, 2010).

3.4.2. Volunteer Training

From the 15th of January until the 1st of March, the student was under the close supervision of Tracy Meintjes. During this time, the student accompanied Tracy and attended marine guiding, competent crew and management courses. These crash courses were compulsory for the student and intended to teach him skills needed to coordinate volunteer activities later in the year (Tracy Meintjes, personal, communication, 2010). After the learning period the student was ready to take charge of certain duties, such as orientation of volunteers, informing them of the

courses offered, preparing smaller projects and assisting in any of ORCA Foundation's affairs (Tracy Meintjes, personal communication, 2010). In order to maximize volunteer productivity at ORCA, it was imperative that they were trained as quickly as possible. This training was done to improve efficiency on the program (Tracy Meintjes, personal communication, 2010).

The two primary courses instructed by the student were the Marine Guiding course and the Competent Crew course. It was the responsibility of the student to go through the manuals with each of the volunteers completing the course (Tracy Meintjes, personal communication, 2010). The student was required to explain the terms and methods and to correct the volunteers of any misunderstood information (Tracy Meintjes, personal communication, 2010). The OBA Marine Guiding Course is a condensed summary of marine guiding regulations adapted from the online course offered by Comet Corporation (Cometcorp, 2010). It is offered to ORCA Foundation volunteers. Although theory that is taught during the course is limited to the Plettenberg Bay area, Comet Corporation has approved the practical. This means that if the volunteers wish to further their qualification, the practical done at OBA will be accepted (Tracy Meintjes, personal communication, 2010). When the student was sure that the volunteers understood the theory, they were given an exam on the information acquired during the course. The competent course gave briefings on how to be a competent crew member when out on a boat trip. The volunteers would then do practical examinations on both courses supervised by Tracy. Upon completion, passing volunteers received a certificate recognizing their qualifications.

3.4.3. Safety

Volunteer, client and employee safety is ORCA Foundation's top priority. When dealing with any situation, it was the responsibility of the student to ensure the safety of volunteers at all times. This means that the student was, at times, required to make independent decisions concerning the volunteer safety. Upon the arrival of a new volunteer, the student was instructed to give a briefing of the "do's and don'ts" on the program (Tracy Meintjes, personal communication, 2010). This included a safety briefing, which contained four fundamental "no go" areas. Firstly, volunteers were required to walk in Poortjies area in groups of two or more. This is due to Poortjies' high crime rate relative to other parts of Plettenberg Bay (Tony Lubner, personal communication, 2010) Secondly, the volunteers were not allowed to walk along the beaches or estuary after dark to avoid confrontation with people dwelling in the bushes alongside these areas. Thirdly, If a volunteer planned to leave the ORCA House after hours, the house coordinator was to be notified either by verbal communication, a sms or phone call, or by writing it on the white board installed at the entrance of the house. Finally, if a volunteer chooses to go swimming in the estuary after hours, the house coordinator must be notified. It is then the responsibility of the coordinator to inform the volunteers of the current tide, where it would be safe to swim, and whether or not it wise to go into the water at a given time. Volunteers were also strongly advised not to enter the water after dark as many of the nocturnal fish species could harm them, even in shallower waters.

On the 8th of March, 2010 a member of the OBA staff, who rented a room in the ORCA house, went fishing in the estuarine at sunset. The staff member was stung on the ankle by a Blue Sting Ray *(Dasyatis pastinaca)*, which has a protein base toxin that lines a sharp spine on the tail (van der Elst, 1985). First aid precautions were taken by the student immediately after notification of the event. The student secured the wound, treated

bleeding, set the foot in hot water to denature the protein based toxin and finally took the victim to the hospital for further treatment. This incident put even more emphasis on the importance of safety precautions set out for the volunteers; they are essential to follow and uphold, making the safety briefing crucial (Tracy Meintjes, personal communication, 2010).

3.4.4. Productivity

As the house coordinator, it was pertinent that the student ensures volunteer productivity within the house (Tracy Meintjes, personal communication, 2010). During the day, the program ran from 08:00 a.m. until 17:00 p.m., Monday to Friday. During program time, the volunteers are managed and directed to various activities concerning the program. However, many of the projects require extra effort and time in order to achieve the desired results (Tracy Meintjes, personal communication, 2010). The student was therefore required to encourage completion of such projects after hours. The volunteers were given various chores such as maintaining the recycling bins, making sure garbage is inserted into the correct bins, maintaining the aquariums of the house, working on the Build-a-Bin project and making their contribution to the volunteer scrapbook (Tracy Meintjes, personal communication, 2010). The volunteers were also assigned various proposals and reports to write during their stay, and were also required to enter collected data into the house computer. The student was responsible for encouraging productivity within the house and had to ensure the desired results were met at the set deadlines. The student, on many occasions, had to aid the volunteers with projects, as their knowledge was sometimes limited in certain areas.

3.4.5. Labour

Erasmus, 2010, states that the student is required to develop skills concerning labour within human resource management. Luigi Lottino achieved this during his practical year at ORCA Foundation, as the

student was primarily in charge of all staff within the house (Tony Lubner, personal communication, 2010). This includes the volunteers, who are in temporary employment of ORCA Foundation, and Teliswa, the house executive, who was primarily in charge of the cleaning and cooking for the house. It was the responsibility of the student to ensure that all matters concerning the staff were attended to. This meant that the student was on call seven days a week, 24-hours a day. Such matters include: grievance procedures, conflict management and disciplinary hearings (Erasmus, 2010). On the 14th of March, 2010, the student was required to have a disciplinary hearing for a volunteer. The volunteer did not comply with the rules of the house and was caught smoking in the rooms and toilets. This action was unacceptable and, after notifying Tracy Meintjes of the situation, the house coordinator issued a final warning to the volunteer. The volunteer was also asked to clean out the rooms and remove the smoke smell (at her own expense) as soon as possible. The student undertook this action, as it was the house coordinator's responsibility to think of a suitable punishment (Tracy Meintjes, personal communication, 2010).

The student learned how to handle many conflict matters within the ORCA House. In a communal environment, numerous conflicts can easily occur when a variety of personalities occupy the house. The student kept a neutral environment within the house, but on the rare occasion of occurring conflict, the student addressed the problem professionally and without a biased attitude. On the 9th of August, 2010, a matter was attended within the house concerning respect for one another. The coordinator of the house approached each volunteer individually to discuss the matter. A house meeting was then held to address everyone as a group and to openly talk about the problem. This was a successful procedure, as tension was reduced and everyone tried to act more respectfully after the discussion. Several other matters before also

occurred before this date and were handled in a similar way, as the communication between a coordinator and the staff or volunteers is essential to the success of a company or foundation (Tony Lubner, personal communication, 2010).

3.5. Maintenance/Technical

During the practical year, the student was required to complete at least four weeks, or 160 hours, of maintenance/technical (Erasmus, 2010). It is in the student's best interest to complete these hours and to broaden his knowledge of maintenance during the practical year (Erasmus, personal communication, 2010). The student was assigned to maintenance of the foundation's vehicles, the stores, the equipment, and the buildings (including infrastructure such as sewerage, electrical, plumbing and fences) (Erasmus, 2010). The student was also in charge of maintaining a form of animal husbandry within the house, which primarily involved maintenance of the aquariums in both the house and OBA, and taking care of the dog, Gymie (Tracy Meintjes, personal communication, 2010).

3.5.1. Vehicle Maintenance

Photo 7: The ORCA van (Luigi Lottino, 2010)

The ORCA Foundation has one vehicle to be used by the house coordinator throughout the year. This vehicle is a 1994 model, 2.6i litre Microbus and is maintained a by the student. It is the responsibility of the student to make sure the van remains in working order and is kept clean on a daily basis (Tracy Meintjes, personal communication, 2010). The ORCA van is filled with fuel at the start of every week; at this time, the house

coordinator must also check the oil and water. The student is also required to check the tyre pressure and adjust it if necessary. This is done mostly at the Total Garage in Plettenberg Bay, as an account for the ORCA Foundation has been opened there. Tony Lubner pays the fees charged to the ORCA account at the end of the month. If the van is filled with fuel at a different garage, the ORCA debit card or cash must be used. If the payment is done in cash, the transaction must be recorded onto the budget and the receipt filed until the end of the month. The van is scheduled for services during the year; these need to be completed every 35 000 km and are done by a local mechanic. If the van is damaged or needs emergency repairs, it is taken to a mechanic that specialises in the matter. On the 21st July, 2010, the student found that the van's exhaust had ruptured. The student arranged for it to be repaired and had this done at Hi-Q motors, which specialises in this area.

The student was also involved with the maintenance of the research boat, Gaia. This entailed checking the equipment on the boat and hosing down of the boat after a boat trip. A safety check, performed prior to each boat excursion, was standard procedure.

3.5.2. Stores and Equipment Maintenance

The ORCA foundation has two stores where equipment is kept. The first is the store within the ORCA house, which is situated at the back of the building. This room is used to store extra beds, mattresses, chairs, and equipment used for snorkelling and diving. It also contains an area for the storage of tools and other hardware used for maintenance of the house. Although the student appoints a volunteer to keep the store tidy, it is ultimately the student's responsibility to ensure that nothing is lost and that the store stays organised.

Any equipment used by the volunteers needs to be cleaned and stored correctly. Proper cleaning methods for different equipment are explained

to the volunteers, but it remains the responsibility of the student to ensure that it is done correctly.

3.5.3. Buildings (including: sewerage, electrical, plumbing) Maintenance

The ORCA house is constantly maintained by the coordinator. The wear and tear on the house is extensive due to the constant flow of volunteers. Accordingly any breakage or problem has to be reported to the coordinator immediately so that it can be repaired. The coordinator fixes smaller issues, such as burnt-out light bulbs, clogged drains, and small breakages. The student is also required to replace plugs, repaint any areas needed and replace damaged or old padlocks. If any item of significance is damaged, such as door locks, the fridge, a geyser or damage to any plumbing or electrical occurs, the student must notify the owner of the house, who will then take the necessary action required. On the 22nd of August, 2010, the student arrived home to a burst geyser. Water had leaked throughout the upstairs living area. After inspection, the student realised that the geyser was outdated. The owner of the house was informed of this and had the geyser removed and replaced that same day. The student himself dealt with many other smaller problems, such as the fixing of clogged drains, the changing of plugs and the replacing of windows.

3.5.4. Aquarium Maintenance

The student was deeply involved in three major projects concerning the management of both the house aquarium and the OBA aquarium. These projects included: 1) the Logger Head turtle rehabilitation and husbandry in the OBA aquarium, 2) the Knysna Seahorse husbandry in the home aquarium, and 3)

Photo 8: Equipment used for cleaning the seahorse Aquariums (Luigi Lottino,

the Knysna Seahorse husbandry in the 34° South Restaurant aquarium in Knysna. Either Tracy Meintjes or the student supervised these aquariums. All of them were intensively cared for: water tests were done on a weekly basis, and water changes were carried out upon any change of pH or chemical spikes. A standard aquarium clean-up included: the rinsing of the under-gravel, using a siphon, and scrubbing of the tank to remove algae. The data was also recorded and filed according to date.

3.6. Resource Management

Natural resource management is a broad term, including water management, soil/ earth management and invasive species control and management (including plants and animals). Natural resource management runs hand in hand with a scientific principle known as sustainable development and forms the basis of the conservation and preservation of natural resources for generations to come (Wikipedia, 2010). During the practical year, the student had to complete ten weeks, or 400 hours, of natural resource management (Erasmus, 2010). This includes, but is not limited to: planning and implication of management methods and monitoring the results thereof, erosion prevention and control, invasive species control and management, fire protection and the use of fire, aquarium management, water management, and patrols concerning poaching within an area (Erasmus, 2010). The topic that follows describes the resource management that the student has been subjected to up until the 31st of October, 2010. The student has not been involved in management concerning the use of fire, or the management of erosion, as this will be completed during the month of December, 2010, with Cape Nature.

3.6.1. Invasive Species Management

The student was involved in invasive species prevention and management; this primarily involved the removal of Black Wattle *(Acacia mearnsii),* and Rooikrans *(Acacia cyclops)* (Global Invasive Species Program (GISP), 2008). Both these plants are considered extremely invasive and have encroached large areas of land (Global Invasive Species Program (GISP), 2008).

The ORCA foundation has built a strong relationship with a farmer, Lello Incendiario, situated just outside Plettenberg bay along the Bithou River; this is the primary spot where the ORCA Foundation participates in invasive plant species removal. The farm is heavily encroached with Black Wattles *(Acacia mearnsii)* all along the river passing through the farmer's property (Lello Incendiario, Personal communication, 2010). During the planning for the coming week, Tracy and the student called for a meeting to discuss the projects requiring completion, as well as to coordinating plans with Lello. On many occasions, the student and the volunteers have been assigned to the removal and control of the invasive trees. During this time, the volunteers are transported to the farm to meet with Lello who then guides everyone to the designated work site. The trees are cut down using both chain saws and handsaws by either Lello's staff or the student, who has experience using a chain saw. The volunteers were not permitted to use these machines, as they were not trained and could harm themselves (Tracy Meintjes, personal communication, 2010). After the trees had been cut down, they were then fed into a wood chipper that ground them down into mulch. Finally, the mulch was transported to heaps and returned into the soil.

3.6.2. Law Enforcement

Poaching has become a serious problem in South Africa, as well as in many other parts of the world. In Plettenberg Bay the problem of snares has been addressed by the ORCA foundation. The student took the

initiative in arranging a meeting with the owner of Tenikwa Rehabilitation Centre to discuss the matter. The owner explained that, in many situations, rehabilitated animals are found caught in snares. It was also later found that the areas set aside for releases were being targeted by the local communities, in the hope that the poachers could snare the animals easier, as they were more habituated to humans. The ORCA foundation along with the owner, decided to start monthly patrols in these areas, in the hope of finding any snares, or poachers. The new project quickly became supported by many farmers who claimed to have the same problem. The student then arranged for meetings concerning the topic and quickly formed strong relationships. These areas include, Kurland lumber mill where it is believed that employees from the mill, set traps in the surrounding bush and pine forest, bordering neighbours of Tenikwa, and on the premises of Ingwe. This area has many valleys of indigenous forest which are also readily checked.

3.6.3. SASS Evaluations on River Health

Photo 9: Tracy Meintjes and volunteers, performing a Mini SASS evaluation on the Piesang River. (Luigi Lottino, 2010)

The ORCA foundation started a program that monitors the water quality of local river systems. The system used for these tests is known as the "Mini SASS Evaluation System". This is a condensed version of the more sophisticated SASS (South African Scoring System) system that is used as part of the National River Health Program (Dickens, 2000). ORCA Foundation chose to use this simplified system to ease water testing, as both the staff and the volunteers lack the training required to identify all insects in the full SASS evaluation (Tracy Meintjes,

personal communication, 2010). Mini SASS examines the composition of invertebrates living within the rivers and draws its conclusions based on the sensitivity of those found to various water qualities (Dickens, 2000). The results have been compared with those of the more rigorous SASS methods; they were found to be very close in comparison (Tracy Meintjes, personal communication, 2010). The best evaluation sites are within fast moving, rocky rivers with thick vegetation growing alongside the riverbed, as the included invertebrates are most often found here (Tracy Meintjes, personal communication, 2010). Searching in calmer waters is also accepted, but is more time consuming (Dickens, 2000). After a suitable area has been found, the insects are most easily captured by holding a small net in the current, disturbing the stones, vegetation, and sand, and thus dislodging insects from them. The flowing water then pushes the insects into the net. It is recommended that this process be repeated for at least five minutes, and should be followed by rinsing mud from the net (Dickens, 2000). The remaining content is put into a plastic tray and the invertebrates are sorted into the groups listed in the Mini SASS guide. For every group found within the sample, a score is provided, which is encircled on the provided table. The scores are then added to give a total. This total is divided by the number of groups found in the sample, and is finally interpreted using the Mini SASS scoring system. A score of 0 – 2, means that the stream is highly impacted; 2 – 4 means that the river is moderately impacted; 4 – 6 means the river is slightly impacted; 6 or more is evidence that the river is in good quality. On rare occasions, however, very low variations of insect species (1-3) are collected, yet the score produced is very high. This will produce an incorrect result, as in some cases, an impacted or disturbed river is affected in a way that benefits or favours some of the sensitive organisms (for example, certain chemical spills).

The ORCA foundation focuses its testing on several rivers within the Plettenberg Bay area; these rivers include the Piesang, the Bithou, and the Keurbooms River. The results collected are filed and stored, and can be used as a comparison if it is suspected that a river has become impacted. If the results show that a river has recently become impacted, they are sent to Cape Nature, who then takes the action deemed necessary.

4. RESEARCH AND SPECIALIZED SERVICES

During the student's practical year, it was required that ten weeks (400 hours) of research and specialised services be completed (Erasmus, 2010). The student played an important part in data collection, project monitoring, and a variety of research initiatives with ORCA Foundation throughout 2010.

The wide range of ORCA Foundation projects necessitated a variety of research and monitoring methods, including: data collection, fish surveys or census, rare and endangered species monitoring, tag and release fishing, working with data banks, and facilitating post mortems and dissections. Many of the projects dealt with more than one aspect of research and specialised services at any given time. A fish survey could include a census, monitoring of endangered species, along with data collection and entry. The student also had the opportunity to start new projects, such as the Knysna seahorse husbandry, which required maintenance, management and project research, as well as the Hot Spots project, which involved plotting GPS coordinates of marine mammal sightings onto maps.

4.1. Monitoring of Rare and Endangered Species

4.1.1. Knysna Seahorse (Hippocampus capensis) Programme

Hippocampus capensis are endemic to the south coast of South Africa and have only been found in the estuaries of Knysna, Swartvlei, Keurbooms, and on rare occasions, Klein Brak River. They are protected by law in both the Knysna and Swartvlei estuaries, falling under protection of the National Parks Board (Whitfield, 1995). *H. capensis* is the first species of seahorse to be listed as endangered on the IUCN Red List of Threatened Species (Bell et al., 2003).

Photo 10: Volunteers cleaning the seahorse aquarium at 34° South (Luigi Lottino, 2010)

The ORCA Foundation has formed a relationship with 34° South, a restaurant situated at Knynsa's Waterfront, which is licensed to possess no more than 20 of the endangered Knysna Seahorse in a large display tank. In order to fulfil permit requirements, 34° South requested aquarium maintenance assistance from the ORCA Foundation. After several visits to the aquarium, the student realised that the seahorses within the tank were breeding, and had given birth too many young. Unfortunately, due to their ferocious feeding habits, the adult seahorses were consistently feeding on the juveniles shortly after birth. It was also observed that, after the death of an adult seahorse, 34° South staff would catch a replacement from the Knysna Estuary to fill their maximum allowed quota (20 seahorses). Once a seahorse has been domesticated, it cannot be released back into the wild. Due to the seahorses' endangered status, ORCA Foundation deemed the replacement capture of wild seahorses unacceptable. As an alternative, the student launched a new program within ORCA Foundation concerning the husbandry of the juveniles born in the aquarium. The owner would inform the student of any juveniles born and separate them from the adults; these juveniles would then be captured and introduced to aquariums within the ORCA House, where they were given intensive care. The primary objective of the husbandry program is to successfully rear *H. capensis* seahorses from juveniles to sexually mature adults; they will then be returned to the aquarium in 34° South. This will hopefully end the capture of wild seahorses, with which to fill their tanks

Seahorses are notoriously difficult to rear due to their need for varied live food and their vulnerability to disease. Juvenile animals of approximately 10mm length feed exclusively on zooplanktonic organisms <0.75 mm. Sexual maturity is reached within 1 year, when adult body length is approximately 65 mm. The diet of adult *H. capensis* consists mainly of small crustaceans, including copepods, amphipods and isopods (Whitfield, 1995). Adults will swallow prey <12 mm length, provided the width of the prey is not >2mm (Genade and Hirst, 1986). Consequently, juvenile sea horses are often eaten by adults and accordingly, when rearing seahorses in captivity, it is necessary to separate juveniles from adults in order to maintain population growth.

Photo 11: The large aquarium, housing two adult seahorses (Luigi Lottino, 2010)

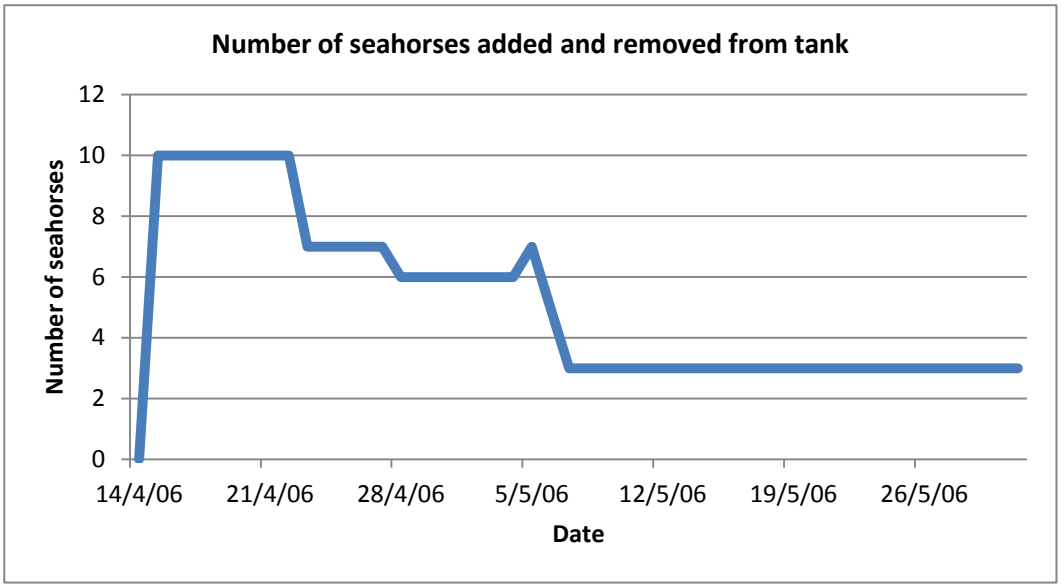
The study area for this project consists of two tanks; one containing juvenile seahorses and another to house the larger individuals. Seawater is collected from the local Keurbooms estuary and used to fill the tanks. The smaller tank measures 30x23x22 cm and houses the juvenile seahorses. This relatively small volume makes it easier for them to hunt and capture food. The larger tank measures 45x30x23 cm and houses the adult seahorses. Both tanks are maintained at a temperature of 24°C using aquarium heaters. This is in keeping with the aquarium requirements of 23 – 26°C recommended by Bull and Mitchell (2002), in their description of a very successful *H. capensis* rearing program at the London Zoo. The guidelines set out by the London Zoo program are used as a proxy for our tanks. 0 Nitrite (NO_2), 0 ammonia (NH_4) and < 20 ppm nitrate (NO_3) levels are suggested, with a pH range of 8.2 – 8.4. The cleaning schedule for

the tanks consists of a 10% water change every 3 – 4 days, 50% every 2 weeks, and a complete tank clean once a month. This is algal bloom dependant, and constant monitoring and observation is required to determine the need for cleaning. Both tanks contain a platform filter, which is refilled during each full tank clean. They are also oxygenated using aquarium air pumps. *H. capensis* are diurnally active in captivity (Bell et al., 2003), therefore a 12 hour photo period is created in the tanks using lights, which are switched off at night. The addition of this artificial light source during daylight hours helps the seahorses to locate and hunt their prey, since they are known to be very visual predators. A variety of artificial aquatic plants are used in both tanks to create a stimulating environment, similar to the *H. capensis* natural habitat. A substrate of gravel is used to line the tank, along with various rocks to act as holdfasts.

Photo 12: Luigi Lottino, Feeding the seahorses. (Luigi Lottino, 2010)

The adult seahorses are fed live food which is collected frequently (approximately once a week) from a near by estuary. A mixture of copepods, isopods, amphipods, larvae and other zooplankton are taken from the seabed in areas where sea grass is abundant. The samples are filtered through fine mesh nets to ensure that only suitably sized (<2 mm) food is collected. This method of food collection provides natural variation in the seahorses' diet, which is known to be essential for successful rearing. The juvenile seahorses are fed a mixture of brine shrimp (*Artemia Sp.)* and 'baby powder', which consists of fishmeal and other supplementary nutrients. An additional tank was set up to grow the brine shrimp in, since they are purchased in egg form. All the seahorses are fed twice daily; once in the morning and again in the evening.

Tank preparation began on the 15th of April, 2010, to ensure that a stable aquarium environment had been obtained by the following day. (Refer to Graph 1)

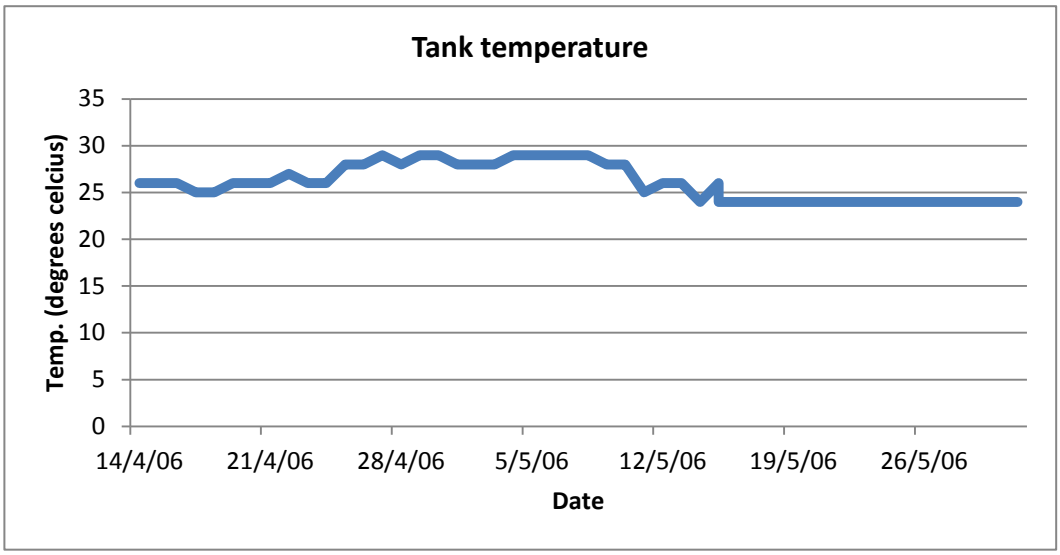


Graph 1: Showing the mortality rate of seahorses after initial introduction to the aquarium.

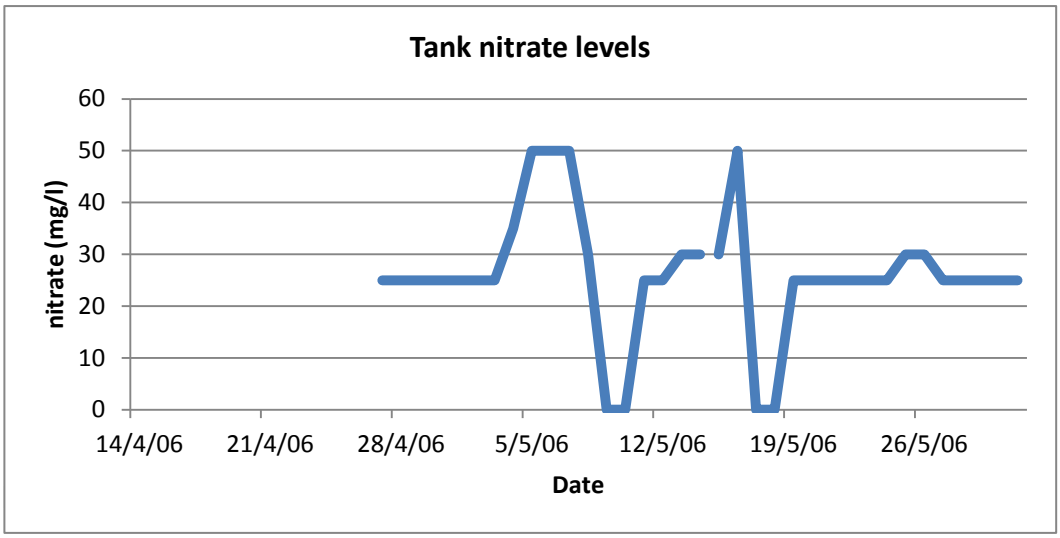
On the 16th of April, 2010, ten juvenile seahorses bred in the 34° South (Knysna Waterfront) restaurant aquarium were added to the ORCA house tanks. Within the first two weeks, four individuals died; two died on the 24th of April, 2010, followed by another two on the 29th of April, 2010. On the 06th of May, 2010, a new juvenile, found in the Knysna estuary (not bred in captivity) was added to the tank. Over the following two days, four more seahorses died, which coincided with a sudden peak in nitrate levels, reaching a maximum of 50 mg/l. There was also a lack of food three days prior to their deaths, since the brine shrimp were delayed in their hatching. Peak temperatures also occurred during the time of these four deaths, because of a broken heater. Continuous data was not recorded after the 1st of June, 2010, but close monitoring of the tank continued, with all relevant details noted. Another seahorse died on 30th of August, 2010, leaving just two healthy juveniles remaining. These individuals were identified as one male and one female when sufficient size was reached; the female was the juvenile collected from Knysna

estuary. On the 14th of October, 2010, the male seahorse gave birth to two babies, which were immediately transferred into the smaller tank. Following this, another two were born on the 17th of October, 2010 and were also transferred to the smaller aquarium.

The first six weeks of this project were very experimental, as the student and the volunteers were still learning how to best care for the seahorses. During this time there were many variables affecting the health of the animals, and tank conditions fluctuated significantly.



Graph 2: Temperature fluctuations within the aquarium.



Graph 3: Nitrate fluctuations within the aquarium.

uring the first month, the seahorses were fed exclusively on brine shrimp, which were added to the tank as eggs and allowed to hatch. This caused two problems in the juveniles' diet. Firstly, allowing the brine shrimp to hatch in the same tank as the seahorses meant that they ingested the shrimp before they had fully emerged from their egg cases. Being such visual predators, any movement from potential prey triggers the seahorses' predation instinct. It was observed that the animals were in fact choking on the egg cases, which may have lead to the death of some individuals. Following this observation, the brine shrimp were moved to a separate tank, where they were allowed to fully emerge from their egg cases before being introduced to the seahorse tank. Removing the brine shrimp also helped to stabilize the nitrate levels in the tank. Additional animals present in the seahorse tank produced excess ammonia and consequently increased nitrate levels (South Australian Seahorse Marine Services, 2007). The second problem caused by feeding the animals exclusively on brine shrimp, is that the brine shrimp do not have sufficient nutritional value for seahorses. Since seahorses have such short digestive tracts, they are unable to absorb the little nutrients available to them and essentially die from nutrient deprivation over a period of weeks. (Seahorse foods and feeding, 2001) In response to the knowledge that brine shrimp provide inadequate nutritional value, the student began feeding the seahorses live food collected from a local estuary. It replicated their diet in the wild, and provided a healthy, natural variation in food. Below are examples of the most abundant animals in the samples of food collected:

Figure 3: Three insects caught in the Piesang River and fed to the seahorses

The deaths of the four animals on the 7th of May, 2010 and 8th of May, 2010 were undoubtedly caused by the dramatically increased nitrate levels in the tank at this time. The reason for the death of another animal on 30th of August, 2010 is unknown, since by this time tank conditions were much more stable and the seahorses were receiving adequate nutritional input. Approximately a week before the animal's death, it was observed floating on the surface and coiling its tail around artificial plant life at the surface. It has been documented that this is a symptom of gaseous embolism, caused by many different factors, namely a gaseous imbalance or parasitic or bacterial infection, which leads to bloating of the male seahorse's pouch. If not treated, gaseous embolism will lead to death, since it prevents the animal from feeding (Seahorses, 1999).

The birth of four seahorses in October 2010 is of particular interest, since previous studies have shown that animals reach sexual maturity at around one year (Lourie et al, 1999; Whitfield, 1995). The male seahorse residing in the ORCA aquarium was only 6 months old, when he gave birth. It is possible that specific tank conditions caused the animals to reach sexual maturity at this early stage. Little is known of the sexual development of seahorses, making it very difficult to determine which factors could affect the age at which maturity is reached. Careful observation of the juvenile seahorses could lead to interesting discoveries, regarding the age at which seahorses, reared in captivity, reach sexual maturity. Particular attention should be paid to the future well being of the juveniles, who were produced by our seahorses, to see if their health is affected by their parents' early sexual activity.

The two remaining seahorses appear to be in good health and continue to grow steadily. It is worth noting that the female individual is the animal collected from the Knysna estuary – the only animal in the ORCA tanks

not to have been reared in captivity. It is possible that the female has survived due to being naturally hardier and more able to cope with the fluctuations in tank conditions, which may have mimicked her natural, highly variable intertidal environment.

4.1.2. Loggerhead Turtle (Caretta caretta) Programme

Beach stranding of sea turtles are becoming increasingly common due to pressures such as fishing and pollution which causes injury and stress to the turtles (Epperly *et al*, 1996). Loggerhead turtles are often found washed up on beaches after heavy storms (Meintjes, T.E. 2010). When found, turtles are exhausted, dehydrated, undernourished and unfit to be immediately released into the ocean immediately. The ORCA Foundation started a project which primarily involves the rehabilitation of these turtles in captivity, until they are healthy and strong enough for a successful release. In order for the success of this program the ORCA Foundation works with Cape Nature, Tenikwa Wildlife Rehabilitation Centre and the local community. There is a high mortality risk in sea turtles during their first year after birth (Heppell & Crowder, 1996), as many juveniles do not reach maturity or become stranded. Sea turtles usually travel large distances during migration; this increases their risk of drifting off course (Polovina et al, 2000). The turtles involved in this study will be loggerhead turtles (*Caretta caretta)* which are an endangered species according to the IUCN red list. The first few months of loggerhead turtle's lives are very uncertain due to their small size, limited power and drifting habit, which increase the risk of beach stranding (Davenport & Clough, 1986). Loggerhead turtles are generally all stranded along the coastline in the Eden National Park area and will be collected from the beaches stretching from Wilderness ($33^0$59'47.46S, $22^0$33'47.00E) in the west, to Natures Valley ($33^0$58'36.64S, $23^0$34'32.49E) in the east. Any stranded turtles along the coastline (approximately 80km of coast line) are reported and collected.

The main objective of this project is to rehabilitate loggerhead turtles to a suitable health in order to be released. During their stay they will be kept in the OBA aquarium where they can be viewed by the public and can be used to educate school children and the general public of the problems these animals will be facing.

Photo 13: Luigi Lottino showing method used for weighing the sea turtles (Luigi Lottino, 2010)

The OBA aquarium is a salt water wall size aquarium that is approx 2.3 m by 2 m (triangular) and 1 m deep. The water is kept at an ambient temperature to simulate natural fluctuations found in the ocean. The size and depth of the aquarium allows for the turtles to swim freely and practice free diving. In order to keep track of the wellbeing of the turtles, the ORCA Foundation measures their weight, the depth of their shell, and both the straight and curved shell length/width. The measurements are taken twice a week using calipers (calibrated to one millimeter). Shell length is measured along the middle of the shell which is the longest length. The width is measured across the widest point of the shell and the depth, from the highest point of the shell to the underside. To record curved shell length a cloth tape measurer (calibrated to one millimeter) is used, as it provides more accurate measurements than straight calipers. A weighing scale

Photo 14: Volunteer measuring the depth of a sea turtle (Luigi Lottino, 2010)

(in five gram intervals) is used to weigh the turtles prior to feeding sessions, to prevent food consumption confusing the data collected.

The turtles are fed on a daily basis, but in order to replicate their natural feeding habits, they also have fasting days where they are not fed. These days are selected randomly. The foods most commonly collected are as follows: the Common sand prawn (*Callianassa kraussi*), although not a natural food source, is collected from Piesang River estuary and are added to the tank alive, to allow the turtles to catch their own food, which stimulates their natural feeding behaviors. The Mediterranean mussel (*Mytilus galloprovincialis*) is also collected from rocks in the area. The mussels are then frozen to open the shells, followed by thawing, cleaning and removing the flesh from the shell. The Mediterranean mussel is an invasive species to South Africa, therefore, collecting these mussels are an additional benefit to the local biodiversity. Fresh fish off-cuts are collected at a local fish shop and fed to the turtles; this ensures freshness, minimizes waste and is a guaranteed sustainable food source. Prior to feeding, the fish bones are removed, as the small turtles are prone to asphyxiation by choking and have a difficult time digesting them. Twelve percent of the turtle's body weight of mixed mussels and fish is given in one feeding session.

Photo 15: The sea turtles in the feeding pen (Luigi Lottino, 2010)

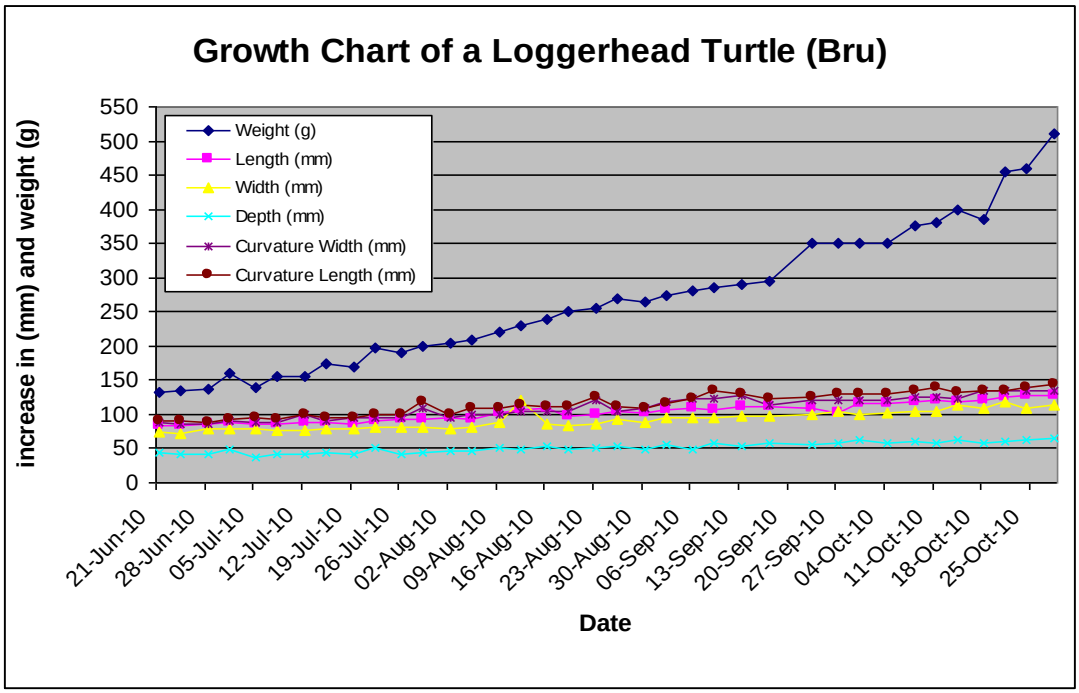
During feeding times, the turtles are separated from the other marine animals in the aquarium and are placed in an enclosed space for feeding; this ensures that the turtle have enough time to feed. The holding container is 50cm by 100cm and is made of PVC pipes and shade net. The depth of the enclosure is 50 cm, which allows the turtles to dive for their food, but is not

too deep for the turtles less than 50 g in weight, as they are too buoyant to dive deeply (Davenport & Clough, 1986).

If any of the turtles show any signs of illness they are taken to Tenikwa Wildlife Rehabilitation Centre to be treated. Tenikwa is approx 25 km from the aquarium where the turtles are held at present.

Firstly, it must be mentioned that there were irregularities in the turtle results gathered. These discrepancies may be attributed to mistaken identity, misreading of measurements or errors in entering the relevant information onto the database.
The most consistent figures from the results were that the turtles, on average increased in weight by 40 g each month for the first three months. During the fourth month, this average weight gain increased to 78 g for those turtles weighing less than 250 g. This indicates that once a turtle reaches approximately 300 g, the weight gain is even more pronounced. Diving improved as the turtles developed, and when a weight of 300 – 400g was reached, animals could dive to a depth of more than 2 m (Davenport and Clough, 1986).

Overall, the turtle's weight increased between 97% and 283% of their original weight over a 4 month period. The average increase was 190%, which is similar to previous studies (Njoman *et al,* 1982).
Their size, as measured by curvature width and length, increased between 29% and 56% over the same period. On average, the turtles grew in size by 5.5 mm for each 10 g increase in weight.



Graph 4: The growth rate of a Loggerhead Turtle from 21 June, 2010 – 25 October, 2010.

4.2. Data Collection and Surveys

4.2.1. Tag and Release Fishing

The Oceanographic Research Institute initiated the Tag and Release project in South Africa during 1984 (Meintjes, T.E. 2010). This program has been adopted by the volunteer program, giving the volunteers the opportunity to participate in the tagging and release of fish caught in the estuaries or along the coast of Plettenberg Bay (Meintjes, T.E. 2010). During the practical year, the student was involved in a variety of fishing projects. One took place on the Keurbooms River, where Garrick

Photo 16: Luigi Lottino catching fish on a Tag and Release fishing trip (Tracy Meintjes, 2010)

(Lichia amia) was caught, tagged and then released (Van der Elst, 1985). In another, a research boat was taken out to offshore reefs, where Red Roman *(Chrysoblephus laticeps)*, Black Tail *(Diplodus sargus)* and Galjoen *(Coracinus capensis)* were caught, tagged and released (Van der Elst, 1985).

The primary objective for this project is long-term monitoring of both marine and estuary fish, and to record the total catch over a given amount of time (Meintjes, T.E. 2010). The secondary objective of this project is the long-term monitoring of sea fish that use the estuary for breeding, focusing particularly on the juvenile period of their lives (Meintjes, T.E. 2010). The collected data includes the growth rates and migratory patterns of the fish involved.

The ORCA Foundation works according to a strict procedure, which insures accurate results and the well-being of the animal being researched. After the fish is caught, it is handled with a wet towel to prevent injury and is then placed on a flat surface. The species is identified, measured and then tagged by researchers. The date, time of capture, depth at which it was caught and the bait used is recorded, and then the fish is released. The student was involved in several tag and release trips, both in the Keurbooms estuary and offshore on marine reefs.

The ORCA Foundation has been working alongside ORI for four years and has managed to tag and release a total of 160 Garrick *(Lichia amia)* (Van der Elst, 1985). The foundation recorded 50 fish caught in the year 2007, 40 in 2008, 60 in 2009 and 10 fish in 2010. In the last four years, nine fish have been recaptured, which is a 6% recapture rate. In Tables 2 and 3, the capture and recapture of two Garrick are displayed: Table 2 shows the capture date of fish “D096952” and “D121495”, where each fish was caught, and the length and weight it was caught at. This initial capture can

then be compared to Table 3, which displays the date of which the same fish were recaptured, the location where each was again caught, and the length and the weight of each one on recapture.

Table 2: The data recorded for two Garrick first captured

Date	**Tag No.**	**Capture Site**	**Species**	**Length**	**Weight**
06/06/2007	D096952	Keurbooms	Garrick	320 mm	488 g
14/05/2009	D121495	Keurbooms	Garrick	310 mm	448 g

Table 3: The data recorded for two Garrick recaptured

Date	**Tag No.**	**Capture Site**	**Species**	**Length**	**Weight**
26/11/2009	D096952	St Francis	Garrick	670 mm	3600 g
17/03/2010	D121495	Keurbooms	Garrick	550 mm	2100 g

Fish D096952 was first caught on the 6th of June, 2007. The measurements show that the fish had a fork (measurement from the fork of the tail to the end of the head) length of 320 mm and a weight of 488g. On the fish's recapture on the 29th of November, 2009, the results showed evidence of migration from the Keurbooms estuary to St Francis Bay (approximately 200 km). Its measurements included a fork length of 670 mm and a weight of 3600 g. Fish D121495 was also caught in the Keurbooms estuary, but on the 14th of May 2009. This fish had an initial length of 310 mm and a weight of 448 g. This fish was recaptured in the Keurbooms estuary, on the 17th of March, 2010 and displayed measurements of 550 mm in fork length and had a weight of 2100 g. Both these fish showed growth in length and increase in weight.

4.2.2. "Hot Spots" Project

The Hot Spots project was initiated by the student in the beginning of 2010. This project uses the data collected during marine animal sightings on boat trips, and projects them onto maps. This became an on going project that required time and effort to complete. During a boat trip, the GPS coordinates of the marine animals sighted were recorded. These coordinates were then plotted onto a map of Plettenberg Bay. Each marine animal has its own map for plotting. The purpose of the project is to reveal trends in animal sightings. The areas frequently visited by each animal became clustered, when plotting the coordinates on its specific map.

This ongoing project has shown interesting results: The information plotted thus far only concerns the bottlenose dolphin, as the focus was placed on them. The following figures 4 and 5 show the formation of clusters over a period of one year. Each dot on the map represents a pod of dolphins sighted on a boat trip. The bottlenose dolphin showed a preference for shallower waters in five specific areas, namely: Grootbank, Arch Rock, Enrichos, Dune Park and A-Frame.

Figure 4: "Hot Spots" plotted on to a map of Plettenberg Bay (a)

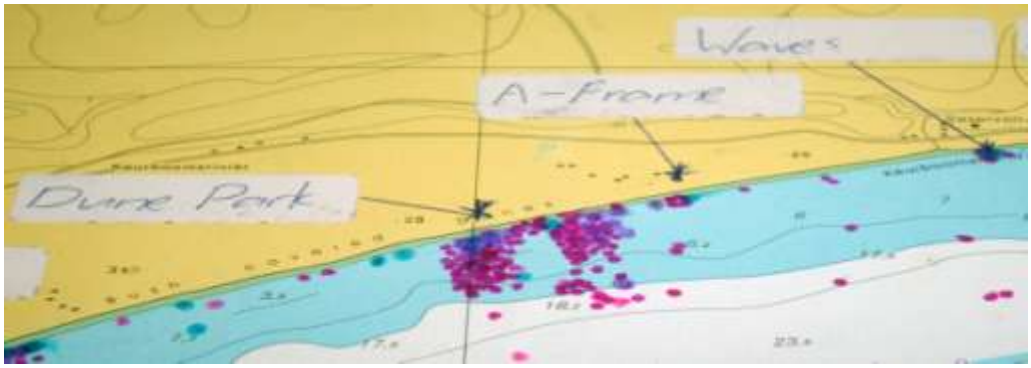


Figure 5: “Hot Spots” plotted on to a map of Plettenberg Bay (b)

Bottlenose dolphins prefer shallow water for a variety of reasons, including protection from predators and ease in herding and catching prey. They also tend to give birth to their young in shallow waters.

4.3. Dive Census on fish populations


Photo 17: Return from a successful Dive Census (Luigi Lottino, 2010)

The student had the opportunity to participate in four research dives that took place over the course of the year. The primary objective of this project was the long-term monitoring of territorial fish species, which is known to be heavily fished. These dives involved three fish census, where key fish species are counted, and one reef clean up which were all performed on the Red Bait Reef, near the Beacon Hotel, at Central Beach, Plettenberg Bay. It is known that this reef is heavily fished. The following procedures were followed to ensure accurate monitoring of these sites: A designated area of 50 m swum in a straight line was set. Using a slate, all fish within the field of vision were counted. Visibility had to be greater than

3 m, with only one count done per dive. The Field Data Sheet had to be signed by the diver who was counting, and then put in a spreadsheets folder.

Photo 18: Luigi Lottino and volunteer diving Red Bait Reef (Tracy Meintjes, 2010)

The monitoring has, to date, not produced any formal results. However, in the year of 2010, personal observations indicated that Red Bait Reef is a nursery for many juvenile fish species. The three most commonly counted fish are the Red Roman (*Chrysoblephus laticeps*), Black Tails (*Diplodus sargus*) and the Zebras *(Diplodus cervinus)* (Van der Elst, 1985). During the counting, divers observed the presence of both juvenile and adult black tails and Zebras. The Red Roman, however, only produced juvenile sightings. This initiated the question of whether or not the lack of adult presence was due to fishing, or if the Red Bair Reef only served as a migratory nursery for the Red Romans. If the reef is a nursery, then it can be assumed that the high number of black tails is a natural occurrence. However, if the lack of adults is due to overfishing of Red Romans than the high number of black tails is not natural (Tracy Meintjes, Personal Communication, 2010).

Photo 19: A Cape Fur Seal inspecting Luigi Lottino during a dive census (Luigi Lottino, 2010)

The student has approached the director of the ORCA Foundation, hoping to increase funds for a more detailed evaluation of the reef. The dive census will become a more precise and complete project in 2011.

4.4. Boat Sighting Records of Observations

Photo 20: Two volunteers scouting for whales and dolphins during a boat trip (Luigi Lottino, 2010)

The ORCA Foundation works in collaboration with OBA for research and data collecting purposes. The volunteers collect and record information and data on the marine life within the Bay. The objective of this project is to use plotting and map coordinates to identify the migration patterns of marine animals, and to take photographs of callosities and dorsal fins of dolphins and whales for photo identification and research.

The student organized boat trips for the volunteers at least 2 or 3 times a week. This has been an ongoing process for 10 years and has been a very effective research activity for the ORCA volunteers.

The volunteers participating in research on boat trips follow a detailed procedure. The volunteer first confirms the date, the time of sighting, name of skipper, crew and the boat, as well as the name of the person recording the information. The weather conditions are then noted under sub headings such as wind speed, wind direction, cloud cover, air temperature, surf height, swell height, swell period, swell direction and atmospheric pressure. Once the volunteers have recorded all the above information, the volunteer must identify which animal has been seen. The volunteer chooses from a numerical order list, whereby each marine animal found in the bay is numbered from 1 to 19. After the species has been confirmed and recorded, the volunteer uses the GPS system to

determine the whereabouts of the animal. The volunteers later plot these coordinates on a map, enabling them to analyze and compare the movement of each marine animal. After a GPS location has been taken, the volunteer collecting information must identify the number of animals sighted of that specific species. The numbers of these groups of animals may range from 1 to 1000. If whales have calves with them, the calves are marked down as a half. The last step in recording the data is to take note of the animal's activities. The system used to do this, is the same as the animal identification, using numeracy to label each animal. However, this time, the numbers each identify a certain activity the animal is taking part in. For example: 1. feeding, 2. hunting, 3. flying, 4. sleeping, 5. sun bathing, 6. swimming, etc. This whole procedure takes place each time a volunteer voyages on a whale watching boat. The data sheet is then taken back to the office, where the data is analyzed and manually recorded into a database on the computer.

Another method of data collection used on the boat is photo identification. The volunteers use their own personal cameras to take pictures of marine life. Their photos are then taken back to the office, uploaded onto the ORCA House computer and are organized into folders labeled by year. When the transfer of photos is needed for identification purposes, the pictures are usually burned onto labeled discs.

The boat trips proved to be an essential part of the volunteer program, as it allows for information to be both collected and analyzed. The research that follows increases the understanding of each species and the results can be used for conservation purposes. The callosities and dorsal fin identifications taken during these boat trips are used by Vic Cockcroft at (CDS) in his research on marine mammals.

4.5. Post Mortems and Dissections

During the practical year, the student was involved in two post mortems and dissections. This was very educational, as the student was able to work with marine biologists and scientists who supplied the student and the volunteers with in-depth insight concerning the death of the animal.

Photo 21: Luigi Lottino and Volunteer during a dolphin rescue on Robberg 5. (Tracy Meinties, 2010)

The first incident occurred on the 12th of April 2010, when a bottlenose dolphin was found washed up along the Robberg Beach (Robberg 5). Cape Nature was informed, who then contacted the ORCA Foundation. Tracy, the student and a volunteer (a marine biologist with ten years experience in dolphin handling), took over the animal rescue and all related operations. A veterinarian was called in, who then made the decision to euthanize the dolphin. This was reported to the head of Cape Nature, who gave the approval to do so. At a meeting held between ORCA Foundation, CDS (Centre for Dolphin Studies) and Port Elizabeth Bay World Aquarium, it was decided that the dolphin be moved to the aquarium and used for research. It was arranged that a post mortem would be performed on the dolphin to find the cause of death, which was scheduled for 14:00 on Tuesday, April 13th, 2010 at the Bay World Aquarium. The student, along with two volunteers, was sent to represent ORCA Foundation. The post mortem took approximately four hours to complete. During the dissection, many tissue samples were taken and stored; these samples were sent to a lab for testing at a later time. Many photos were taken for future reference, and notes were made on

interesting findings. After the post mortem, the carcass was disposed of. The collected tissue was kept, as was the stomach, so that its contents could be examined. This was done separately and at a later stage.

The student was also involved in a post mortem of a juvenile bottle nose dolphin that washed up on the beach. The post mortem was held on the 26th of July 2010 at CDS; the dissection was led by Vic Cockcroft (PhD in Marine Biology). The dolphin's size and weight were recorded and, during the discussion, notes were taken on the interesting facts and possible cause of death.

The results of the Bottle Nose dolphin post mortem were as follows: the external inspection showed rake marks along the whole body, including the dorsal fins, pectoral fins, and the tail. Rake marks are wounds inflicted by other dolphins, either during the process of mating or during fighting. The dolphin also displayed indentations behind the head, which is a sign of severe dehydration. Upon inspection of the mouth and throat, it was noted that the animal had many ulcers lining these areas. The animal also showed signs of injury at the base of the tail, which could mean the animal had sprained the tail.

After the dissection a discussion was held, where it was deduced that the dolphin had stopped feeding due to the ulcers lining the mouth and oesophagus. The lack of food could also explain the dehydration, as dolphins receive water via their food intake (Vic Cockcroft, personal communication, 2010). On inspection of the internal organs, dark spots were found on the lungs, the first and second stomach, and the liver. This may be attributed to infection, which could have caused internal bleeding. Upon dissection, the first stomach was found to be full of undigested fish bones. In some cases, dolphins will expel the undigested bones, as they cannot be processed. It is believed that such expulsion was impossible for

this dolphin due to the ulcers lining its oesophagus and mouth. This resulted in a bloated stomach, which prevented food from entering the second stomach, where food is further broken down and absorbed. This ultimately led to dehydration and starvation of the dolphin.

On dissection of the tail, it was noted that the bone had been broken, possibly during birth, but had healed. This was not considered a deciding factor in the death of the dolphin.

The second dissection produced results showing the juvenile bottle nose dolphin had in fact been aborted. There are several reasons for dolphins aborting their young. Each reason was explained and discussed by Vic Cockcroft. In many situations, the reason for abortion is due to infection of the foetus or placenta of the female. This can be a result of secondary and tertiary poisoning. A similar example and an increasing problem concerning this is the status of the Humpback Dolphin *(Sousa plumbea)* (Branch *et al,* 2005). This animal is found close to estuarine waters, where it is believed that poisons accumulate within the fatty tissues of the hump of the animal. This in turn contaminates the milk, which feeds the young, resulting in a high mortality in juveniles.

4.6. Build a Bin Project

The student initiated a project concerning the disposal of garbage within the township, Qolweni. It was noticed that garbage bags were placed along the roads for pickup, but the municipality had stopped the weekly collections as the bags were always broken. This was due to dogs and pigs breaking the bags, which led to unhygienic conditions. Furthermore the animals became a pest and a threat to the children walking to and from school. The student,

Photo 22: The bin built for Qolweni by the ORCA Foundation (Luigi Lottino, 2010)

along with OCRA Foundation, approached Penny Pinchers for donations and quotes for materials to build elevated bins, to be placed within the community.

With the donations and materials, a bin was erected at the entrance of Qolweni. The prototype has proved to be a success, and is maintained by the community in that specific area. This project is expected to come into full effect from January, 2011.

4.7. Beach Clean-up

Photo 23: Luigi Lottino and volunteers performing a beach clean-up (Cassie Cardiff.

The student was involved in regular beach clean-ups during the practical. These clean-ups were part of the volunteers weekly schedule, where different sites were targeted, namely: Poortjies, Central and Robberg beach, Natures Valley and the beaches surrounding the Robberg Peninsula. The aim of this project is to do long term monitoring of littering in the Plettenberg Bay area. By using the results of the data collected, a cleaning program would be initiated yearly, with the most common component of the litter used as a focus point in the awareness campaign.

On arrival at the clean-up site, the student would ensure that the required information be filled out on the data form. This included: the time, date, location, weather conditions, and the name of the volunteers recording the data. The rubbish was then systematically collected, using gloves and plastic bags. After the clean-up, the rubbish was separated into several different piles, for example: glass, plastic, paper, tin, clothes and other. The number of objects within each pile was counted

Photo 24: Recording of trash collected (Cassie Cardiff, 2010)

and then recorded onto a “field data sheet”, which was then entered into a data bank. Finally, the garbage was taken to a dump site to be recycled. This often had an indirect impact on the community, as people would notice the work being done, and would offer to help.

4.8. Rescue and Rehabilitation

The ORCA Foundation plays an important role as a middle man in any rescue of an animal in distress. The Foundation is contacted by Cape Nature, The National Sea Rescue Institute (NSRI), Natures Valley Trust or any local from Plettenberg Bay on the sighting of an animal in distress. This includes the stranding of dolphins, seals, penguins and sea turtles. The Foundation is also involved in terrestrial and avian rescues.

Photo 25: Volunteer holding an injured Cape Gull (Luigi Lottino, 2010)

On the 4th of October, 2010, the student was informed by OBA that there was a young seal stranded on Central Beach. Along with the volunteers, the student arrived on site to investigate. The seal was then identified as a Sub-Antarctic Fur Seal *(Arctocephalus tropicalis)*, suffering from dehydration and exhaustion (Stuart and Stuart, 2001). The student contacted Cape Nature and received permission to transport the seal to Tenikwa Rehabilitation Centre. Over the following three weeks ORCA Foundation was kept up to date on the seal’s condition and progress. The student arranged for weekly assistance by the volunteers in the care of the seal. On 17th of October, 2010 the student was notified that the seal was ready for release. Cape Nature was informed

Photo 26: Volunteers helping Tenikwa with the feeding of the seal (Luigi Lottino, 2010)

and Vic Cockcroft and his volunteers were asked to attend the release. It was arranged for a boat trip on the 18th of October, 2010, whereby the seal was successfully released 3 nautical miles offshore.

Photo 27: A successful release of the Sub-Antarctic seal (Tracy Meintjes, 2010)

4.9. Data Banks

It was the responsibility of the student to ensure that data collected was correctly entered onto the relevant data bases. The two programmes used for data compilation are Microsoft Excel and Microsoft Access. The student was required to have a good working knowledge of these programmes, so as to teach the volunteers the correct procedure for input.

4.10. Tour Guiding and Excursions

During the practical year, the student was involved in activities that required specialised services. Such services included transportation of volunteers and staff (requiring a PDP), taking volunteers on leisure dives (requiring an Open Water 1 divers licence), and guiding volunteers on various outings, such as marine tours of the bay, nature hikes, and excursions to towns outside of Plettenberg Bay.

The student was, to a large extent, responsible for the activities of the volunteers during their time with the foundation. He was accountable for

the planning and organising of evening events for volunteers throughout the week. The activities planned included, but were not limited to, DVD rentals, braais, parties, and joining the activities of other local volunteer organisations. The student, if required, facilitated volunteer transportation to and from such events.

The student received a Field Site Guide (level 2) certificate in 2008, which was used to its full extent. The student was responsible for guiding volunteers on hiking trails such as the Robberg Peninsula, Nature's Valley's Salt River, and the Perdekop hike in Harkerville. The student would lead the hike and share interesting information regarding the fauna and flora in the area. The student also acted as a marine guide at OBA during dolphin and whale watching excursions.

During the week, the volunteers were taken on snorkelling trips to reefs located near the Plettenberg Bay area, to do activities such as biodiversity counts or species collection. During biodiversity counts, volunteers were asked to count the numbers of various species in the area. This was typically done in rock pools near Nature's Valley. When doing species collection, volunteers caught juvenile fish species, which would then be put in to the OBA aquarium for educational purposes.

The volunteers are encouraged to complete an Open Water 1 diving course during their time on the program. Upon completion, volunteers were able to participate in leisure dives organised by the student. A dive master, who is assisted by the student to ensure the safety of the volunteers, usually led these dives.

Photo 28: Luigi Lottino and a curious Cape Fur Seal (Tracy Meintjes, 2010)

Photo 29: Volunteers at the Elephant Sanctuary (Luigi Lottino, 2010)

On weekends, it was the responsibility of the student to ensure that the volunteers were kept busy. During the weekends, the student would organise activities such as bungee jumping, zip lining, or visits to the Elephant Sanctuary, Monkeyland and Birds of Eden. The student was responsible for pre-organising all of these trips. He did this by contacting each tourism resort and making bookings. In addition to ensuring organised accommodation for the volunteers, the student was responsible for transporting volunteers to and from these events in a safe and timely manner. Weekend trips to neighbouring towns along the Garden Route were also planned. The student occasionally took volunteers on weekend excursions to Mossel Bay, where they were shown significant landmarks, such as the Mossel Bay Museum or the Cave. The student would additionally organise shark cage diving, skydiving, or game drives for the volunteers during their stay. Other places toured by the student with volunteers include Jeffery's Bay, Port Elizabeth, George, Oudtshoorn, and Cape Town.

Photo 30: Bloukrans Bridge, where volunteers were taken to do the world highest bungee jump. (Luigi Lottino, 2010)

5. ENVIRONMENTAL EDUCATION

Education is the basis for any future development and progress in the continuation of successful conservation. The single most important aspect to ensure collaboration between all parties involved with conservation is the creation of awareness in this field through the far-reaching medium of education. All people, regardless of age, race and class, can be reached and educated through an educational programme.

ORCA Foundation has made it one of its objectives to reach out to the communities, thereby increasing conservation awareness.

5.1. Educational Programmes

5.1.1. Outdoor Classroom

The outdoor classroom project is an educational program offered by the ORCA Foundation and is targeted at children of schools in the area of Plettenberg Bay. The objective of the outdoor classroom is to open the children's eyes to the world of conservation and to teach them how to protect the environment. This is done by following a schedule that takes the children through a variety of talks/discussions about conservation. Comparisons between what is clean and what is polluted are used. The children are also taken out on practical field trips, where they can apply what they have learned throughout the day. Such field trips include aiding in a SASS evaluation on the Piesang River, visiting the rock pools and seeing the animals first hand, performing a beach clean up, joining on a boat trip to the seal colony at Robberg Peninsula, being involved in a carbon neutral program, and investigating

Photo 31: a Sea Hair found in the Keurbooms estuary (Luigi Lottino, 2010)

the dry aquarium. These educationals are typically arranged to be held on Wednesdays, and are run by Tracy and the student. When the groups are large, they are divided into two groups; Tracy is in charge of one group, and the student looks after the other. The 2nd of June, 2010, was one of such occasions where the student was assigned to plan a day for a group of children. The student gave a talk on conservation in the morning, using comparisons between what happens in nature, and what man has created by pollution. He used a two contrasting photos as an example: one of a jellyfish, the other of a plastic bag underwater. Using these photos, the children are presented with a visual comparison that can be associated to their lives at home. This simple concept allows the children to see the environment as their sibling, teaching them that earth must be protected in the same way. The student then took the children to the beach, where the children were asked to collect 2 shells and a feather. The student then told the children to make sand castles in the shape of dolphins, using the shells as eyes and the feather as a blow. After the children identified the various parts of the dolphin, it was time for the boat trip to the seal colony. The student was responsible for getting the children and staff to the boat safely, to give a full safety briefing and to ensure that both the children and school staff received an educational experience on the Robberg Peninsula.

5.1.2. Siyakula Pre-school

The Siyakula Pre-school is another place where the ORCA Foundation is able to teach children about environmental conservation. The pre-school is visited by the ORCA Foundation every Thursday, and is coordinated

Photo 32: Luigi Lottino playing a game with the children (Tracy Meintjes, 2010)

by Tracy Meintjes. The student worked closely with Tracy during these educationals and aided in the preparation of the volunteers for the day. The educational included many games and activities with regard to environmental education. Coordination games were especially important, as the children need a good balance of theory and practice to keep their attention sharp. Preparations for a typical day at the preschool involved writing a story involving the ocean, printing pictures of marine life to show the children, and thinking of several games to play. The story on the marine is usually invented by a volunteer, who uses a character named “Rainbow Fish” to teach the children about pollution, animal predation, shark awareness, common species in the Bay, and conservation of the environment. Another tool used in the program is the use of pictures of the animals in the Bay. Two pictures are used: one of the animal in question and the other of the predator that will catch it. The children are tested on the pictures shown during the previous week, and are shown new images every month. This continuation system is vital for the children’s education. Other games that are played include running, stretching, jumping, dancing, and role-playing.

5.1.3. Field Trips

On many occasions, the ORCA Foundation organised field trips for the children and educators to broaden the children’s education. Many of the children from Siyakula have never even been to the beach, so these field trips were a great experience. The trips included beach walks, boat trips, visits to Monkeyland or Birds of Eden, and trips to the Elephant Sanctuary. The ORCA team is in charge of the safety of the children and the staff during such trips, and also organises and sponsors the children’s transport, meals and entrance fees.

5.1.4. Conservation Exhibitions

A temporary exhibition was held in Natures Valley during Marine Week on the 25th – 31st of October, 2010. This gave the student an opportunity to work alongside SANParks and Natures Valley Trust in the planning and organising of educationals for different school groups. Scholars were divided into 4 groups upon arrival and were presented with a 30 minute talk on 4 different subjects: estuaries, sand dunes, the ocean, and marine conservation and MPAs (Marine Protected Areas).

5.1.5. Community Education on Tree Planting

The student together with volunteers from the ORCA Foundation and Willing Workers (a volunteers program involved in community work within the Crags) planted 100 trees on the 4th of June, 2010, in collaboration with Natures Valley Trust. The indigenous trees were planted in a township within the Crags area. The responsibility for the care of the trees planted was entrusted to the community. A demonstration was then given on the care and preservation of these trees, to the community by the student and the volunteers. This project forms part of the Planet Green Ocean Blue programme which promotes the use of local labour in restoring indigenous forest, which plays an important role in neutralising carbon emission. This campaign creates awareness within the community of their impact on our planet.

Photo 33: Luigi Lottino explaining procedures for tree planting and care (Cassie Cardiff. 2010)

5.2. Presentations

Apart from the weekly presentations to both children and volunteers, the student was asked to present a talk on the Knysna Seahorse to the U3A

(University of the Third Age). The duration of the presentation, done using Microsoft Power Point, was 90 minutes. The habitat, anatomy, reproduction, cultural significance, endangered status and the difference that can be made with improved management and conservation methods were presented. The presentation was well received and appreciated by U3A. The student was invited to give a presentation the following year.

Photo 34: Keurbooms estuary sun rise taken from the ORCA house. (Luigi Lottino, 2010)

6. SHORT COURSES

The student is required to complete a minimum of two weeks of short courses in order to broaden his education (Erasmus, 2010). Courses successfully completed during the practical year include:

A marine guiding course, focusing mainly on guiding principles, personal attributes of a guide, general guiding skills and knowledge, and interpretive skills. This course entailed a theoretical examination and a practical evaluation.

A “Competent Crew” course, which acted as the introductory course for the student’s Skippers Licence. This included a theoretical and practical examination.

The student also competed a Skippers Licence examination, with nine hours outstanding on the practical experience.

An informal short course was done on procedures concerning research dives, as the student had already attained his Open Water One diving certificate.

The student participated in several workshops regarding marine biology and conservation in Plettenberg Bay.

7. CONCLUSION AND RECOMMENDATIONS

The student was given the opportunity to work alongside role models and mentors in the chosen field: conservation and its many diverse branches. Tracy Meintjes (Foundation Manager) Tony Lubner (ORCA Director), Chris Dallaglio (Marine Biologist), Vic Cockcroft (Marine Biologist), and others played, and continue to play, a massive role in improving environmental conditions. The student was fortunate enough to be directly involved with them on a daily basis; they assisted him in fulfilling his objective of garnering and evaluating knowledge that could be applied in a work situation.

As house coordinator and assistant volunteer coordinator, the student gained the necessary experience and skills for successful project management within the conservation industry. Through the research programmes implemented by the student as well as existing projects, the student received the opportunity to gather and evaluate facts, and hereby apply his gained knowledge in situations as called upon.

The student finds that the ORCA Foundation is a solid entity, incorporating tourism, research and community involvement. Through their constant involvement and dedication to different projects in conservation, ORCA is making a significant difference.

However, due to the many different tasks undertaken and a wide diversity of interests, many projects remained uncompleted by the end of the year. The student recommended to the organization that the working hours of the coordinators/managers be adjusted, allowing increased productivity throughout the day. In addition, the student suggested that less projects be started, so that more time would be available to complete the immediate projects at hand. It is also recommended that each project be summarised with up to date information pertaining to the project. This

information is separate from the data included in the ORCA manual for volunteers. Due to the constant turnover of volunteers, this would immediately bring the volunteers up to date with the duties expected.

The student also recommended further research on the Knysna seahorse husbandry project, the dive census project and the hot spots project. Resources such as improved diving equipment, larger aquariums and more consistent time allocated to these projects would produce more accurate and informative results.

In conclusion, the student applauds the ORCA Foundation for opening the world of conservation to so many individuals from a variety of countries. South Africa has an amazing biodiversity, and any individual can benefit from partaking in the different projects offered by ORCA Foundation.

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