INTERNSHIP REPORT

STUDENT: JOY RUGURU NDWIGA

PROGRAM: OCEANS AND LAKES

INSTITUTION: FLANDERS MARINE INSTITUTE (VLIZ)

SUPERVISORS: Dr. Ir. Gert Everaert (gert.everaert@vliz.be)

Dr. Ana Catarino (ana.catarino@vliz.be)

TUTOR: MSc. Jan Bouwens (jan.bouwens@vliz.be)

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EXECUTIVE SUMMARY

My internship took place at the Flanders Marine Institute (VLIZ) over a period of two months, from 1st of July to 30th August. The objective of the internship was to get acquainted with real life situations outside the classroom and is also a part of the mandatory requirement for the Oceans and Lakes masters program.

This report will include information on the research institute, my daily tasks and data collection, a summary of the results obtained, discussion and the skills I obtained from this internship experience.

TABLE OF CONTENTS

1. INTRODUCTION TO THE ORGANIZATION

The Flanders Marine Institute (VLIZ) is a non-profit organization that promotes marine knowledge through interdisciplinary research, collaborations with other research groups, scientists and international organizations. The institute was founded on 01/10/1999, with the intention of creating a point of contact in Flanders in order to increase the visibility of marine research, both locally and internationally.

Over the years, the core role of VLIZ has grown, to not only support the local marine scientific research, but also in management of marine scientific data and information, translation of scientific results for the government and the general public, facilitation of scientific publications and organization of workshops and symposia. VLIZ is the platform for coordination and generation of marine and coastal research in Flanders (VLIZ, 2021).

VLIZ has various research facilities and platforms like the RV Simon Stevin, Marine Station Ostend (MSO), the Marine Data Center and the Marine Robotics Center, among others. These platforms provide state-of-the-art marine research. In 2017, the institute developed a research division, in collaboration with the Flemish government, tasked with detecting challenges and opportunities for marine research in Flanders, in collaboration with the Blue Economy. The research division has six research themes, where I was under the Ocean and Human Health division. This division aims at understanding the effects of marine environment on human health and wellbeing. The division is led by Dr. Gert Everaert, who was my internship supervisor.

1.1 THE MARINE STATION OSTEND (MSO)

The MSO was a key location for my data analysis during my internship period. The station is a scientific hub next to the sea, with four sheds with varying usage and four multifunctional laboratories (Biology lab, DNA lab, Chemical lab and the Microscopy lab). MSO offers laboratory and experimental facilities, analytical capacities and technical workshops for mechanical and electronical maintenance. MSO hosts a variety of researchers, students and interns, encouraging collaborations and free data exchange (Vandegehuchte, 2018) Most of my work and analysis was done at the microscopy lab.

1.2 SAMPLING SITES

Fig 1: The map of the different sampling locations. https://www.portofoostende.be/en/port-areas

The internship study was carried out on slipways at the port of Ostend, Belgium. A total of four slipways were sampled, between the months of July and August 2021.

The MSO slipway is one of the two slipways outside MSO (VLIZ Marine Station Ostend) building. The slipway has an American origin, constructed as part of the development of a new fishing port in 1931. Due to loss making, the slipway was closed and is now designated as a protected monument since 2002 (Twee slipways, 2021). The slipway is not active but has a high accumulation of plastic debris. There is also deliberate disposal of waste inside the ship monument.

The Ferry slipway is located at the inner harbor, and most of the litter can be assumed to be from the inner harbor. The slipway is open and accessible via a boat or by pedestrians. This exposes it to plastic litter that is blown by wind or discard of litter, especially cigarette butts, by pedestrians or local tourists.

The fisheries slipway is found at the back of a fishing dock. The slipway is inactive but has a high accumulation rate of litter. The Eastern Stretch dam (Beach Slipway) is currently active and is a shipping dock slipway.

2. INTERNSHIP ACTIVITIES

The main objective of my internship was to quantify and characterize marine litter at the four slipways in the Port of Ostend.

Marine litter consists of any persistent items that are manufactured or processed and discarded, disposed of, or abandoned in the marine environment (Galgani, 2015). The main sources of this litter are either from land (littering by tourists or locals at the beach, recreational activities, or flash floods) or from the sea (Discarded fishing gear, illegal sea dumping and other fishing activities). Marine litter has been an increasing environmental problem globally and in order to curb this menace, the quantity, type and sources of this litter need to be known.

2.1 METHODOLOGY

The study was carried out between the month of July and August 2021 in four slipways: MSO, Beach, Ferry and Fisheries Slipways.

The OSPAR Commission Guideline for monitoring marine litter on the beaches in the OSPAR maritime area was the protocol used for this study. The GPS coordinates were obtained for each slipway, using iPhone and IWatch GPS coordinate system. This mapped the start and end points of each sampling unit, although the length of the beach slipway and ferry slipway varied based on the daily tides.

The tidal chart, weather conditions and availability of manpower were key reference point when selecting the sampling day. Sampling was usually done a few hours after the last high tide. There was no sampling when there was a storm, rain, or heavy winds. A minimum of 2 surveyor were needed for sampling, playing another huge role when selecting the survey days.

Sampling in each beach was done over an interval of on average, 2 weeks, and repeated 3 times, per slipway. The site description (length of transect surveyed, number of visitors per day, frequency of clean-ups and the organizations responsible, distance to the nearest harbor, food and drinks outlet and river mouth) and the site conditions (weather conditions, presence of any stranded or dead animals, circumstances or events that may influence the survey or evidence of dumping) were recorded for each slipway.

All litter items were removed and collected from each site. Items that couldn’t be removed from the beach, either because they were stuck or were too heavy to be carried away, were counted, identified (digital photos) to avoid re-sampling. Once all the litter was collected, they were transported to the MSO building, where they were let to sundry over a few days. Items with sand were dry cleaned to remove the excess sand, that would otherwise compromise the weight of the items.

The litter was then sorted based on the OSPAR litter categories protocol which groups the litter into plastics [soft and hard plastics (with different size categories), fishing items (nets, ropes, tangled nets etc) caps/lids, food containers, cigarette lighters, toys, bags, bottles, lollipop sticks and many other categories], rubber, paper, metal, glass, sanitary waste (condoms, sanitary pads, tampons etc) and medical waste (syringes, medical tubes, bandages etc). Other items not included in the protocol were added, such as water filters, different foam fragment categories, covid face

masks and covid vaccine stickers. The different items were then counted, weighed and the data recorded in the OSPAR marine litter monitoring survey forms.

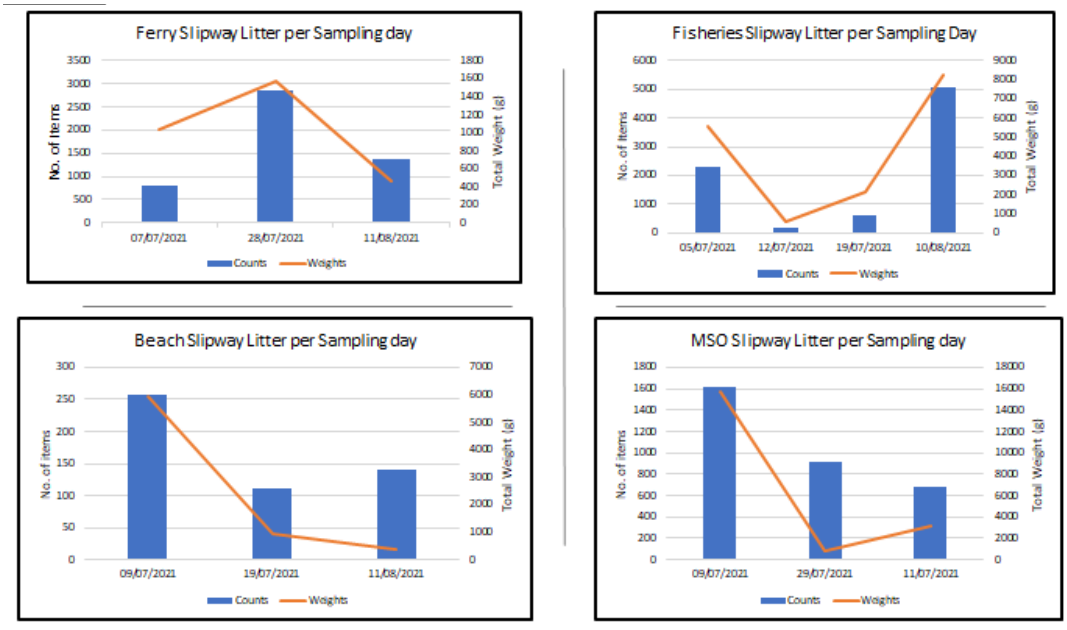
A brand audit was then carried out in addition to the characterization and quantification of all the marine litter. All branded products (food wrapper, water bottles and cosmetics bottles) were separated, counted and the brand name, manufacturer, country and region of origin identified. This data was recorded, and any missing information was obtained from a google search on the products manufacturer's website. The brand audit was used to determine the topmost polluting companies at the Belgian slipways.

To determine the polymer content of the plastics obtained, a sample of the top five plastics commonly found in each slipway was analyzed under the macro FTIR machine. These top-five plastics were cords and strings, hard plastics (<2.5cm & 2.5-50 cm), Soft Plastics (<2.5 cm & 2.5-50 cm) and foam fragments (<2.5 cm & 2.5-50 cm). A small, thin piece was cut from each plastic analyzed under the macro FTIR machine. The polymers commonly found were Polyethylene and Polypropylene.

The sorting, sampling and sorting of the litter was done following strict adherence to the OSPAR Marine litter monitoring protocol. All the data was recorded in Microsoft excel and analyzed.

2.2 RESULTS AND DISCUSSION

The data that I collected will be used in the writing of a scientific paper, and therefore only limited results will be provided. Most of the litter that I collected originated mostly from the deposition by currents and waves during the high tide and input from the wind and tourists. Previous studies show that the type and amount of litter entering the Belgian beaches, and in this case, the slipways, is highly seasonal. Overall, the Fisheries Slipway had the largest number of litter collected and a higher accumulation rate while the MSO slipway had the highest weight.



The top 5 litter categories collected from all the sampling location was foam fragment, hard and soft plastics (of different size categories), food wrappers and strings and cords (usually used in fishing activities). Polyethylene was the most common polymer found in the sampled litter, followed by Polypropylene and Polystyrene. For the brand audit, 76% of the total litter was from Belgium and its surroundings. The other 24% was from international origin.

There were numerous plastic pellets at the fisheries slipway, possibly from the fishing boxes that transport fish and are usually filled with these pellets. Tides, wind, heavy storms heavily influenced the litter accumulation, with more litter being sampled after. Deliberate discarding of cigarette butts and other toxic litter by tourists and pedestrians, at the Ferry slipway.

Image 2: Images showing the negative impacts of marine litter on marine species. Source: Joy Ruguru.

2.3 TIMESHEET

Below is a summary of my day-to-day internship activities, although the sampling days were every two weeks, and varied with the environmental conditions.

DAY TIME	MORNING (9-12:30 pm)	LUNCH (12:30-2pm)	AFTERNOON (2-5 pm
Monday	Sampling, Fisheries Slipway + Drying litter	Lunch Break	Sampling, Beach Slipway + Drying litter
Tuesday	Sampling, Ferry Slipway + Drying litter	Lunch Break	Sampling, MSO Slipway + Drying litter
Wednesday	Litter sorting, Weighing, Branding & Data entry	Lunch Break	Litter sorting, Weighing, Branding & Data entry
Thursday	Polymer Analysis using Macro FTIR Machine	Lunch Break	Polymer Analysis using Macro FTIR Machine
Friday	Total Data recording & entry in Microsoft Excel + analysis	Lunch Break	Total Data recording & entry in Microsoft Excel + analysis

3. OVERVIEW OF INTERNSHIP EXPERIENCE

During my internship experience with VLIZ, I was able to develop various skills:

1. **Research Skills:** Data collection, recording and analysis are some of the key skills I gained during my internship. I was also able to work with top research scientists whose advice and guidance improved my research skills greatly.
2. **Problem Solving Skills**: Working in the field presented various problems which through critical thinking, I was able to solve. I was also able to brainstorm ideas with my supervisor and come up with solutions to the everyday hiccups.
3. **Teamwork Skills**: I was fortunate to work with top research scientists, other early career scientists, laboratory technicians among others, and this progressed my teamwork skills.
4. **Accountability Skills**: The independence I gained while working under minimum supervision upheld my accountability skills and proper time management.
5. **Communication Skills**: From communicating with my supervisors and colleagues to report writing and currently working on a scientific publication from the data I collected, I have improved my writing and communication skills greatly.

6. **Work Ethics**: My internship at VLIZ, a top research institute in the country, provided an opportunity for me to develop my work ethics; from following the institution and laboratory rules, working harmoniously as a team and being accountable to myself and to my supervisors.

The skills gained from this internship, have not only helped develop my professional skills as an early career scientist, but as an individual as well. I was able to put the theoretical knowledge gained from my Masters program studies and previous work, to real life situation.

I was able to use new scientific equipments that I had not used before, like the Macro FTIR machine, providing me with additional skills. I have also broadened my professional network, with possible future collaborations. Although the daily commuting from Brussels to Ostend and back proved to be challenging, the experience gained was worth the slight inconvenience.

While I had many useful experiences at VLIZ, I feel that I need to develop my writing and data analysis skills. This is in order to better write the scientific paper from the data collected from my internship. I am also working on my language skills, by learning French and Dutch, which is the dominant language used, and this can help me communicate effectively and read the available scientific literature.

In conclusion, the internship was a wonderful experience and an amazing opportunity that I will always treasure throughout my scientific career. I would highly encourage other students who are interested in doing their internship and VLIZ, to not be in doubt. The experience gained and the working environment is favorable and most importantly, life changing.

Image 3: My last internship day. I collected a total of 16,865 plastics, weighing 46.7 kgs.

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