

# Reflective Report

## Summer 1 Research Project

Éamon Ó Catháin

### Introduction

During the summer of 2021 I carried out a research project investigating the carbon storage potential of a salt marsh in the Baldoyle Estuary, North Co. Dublin. The project started out with the intention of simply measuring the amount of carbon stored in the marsh. During the course of the project I became more interested in the varying sequestration potential of different vegetation types within the marsh. Particularly comparing native and non-native species. This reflective report will detail the skills and lessons I learned during the process of the application, the planning and preparation of the project, the field work, the laboratory work and the statistical analysis. I will also discuss areas where I had greater unfulfilled potential to develop and learn. To finish, I will summarise the overall effects that the project had on my development and learning.

### Application Process

During the application process I went through several different ideas and even tutors. I first came across the Laidlaw foundation scholarship sometime in my first year of studies. I knew I wanted to apply but I didn't have a project in mind yet. Eventually I came upon an article about a new bacterium found in Japan which was able to digest and breakdown PET plastic. I spent the majority of my first year trying to understand the process by which this bacterium did so and trying to come up with some sort of novel research which I could add to the field. In the end, I felt like the topic was out my reach and required expertise and equipment that I did not have. I sometimes regret not pursuing the idea further, as I never actually wrote to any supervisors about it. But it seemed that most of the studies which were improving the efficiency of the bacterium required genetic editing of enzymes and I just felt that it was beyond me. I also realised that the project was a step toward microbiology, genetics and more micro-scale biology that I didn't necessarily want to take. I wanted to be an environmental scientist and work on larger scale issues.

So I was slightly at a loss for what to do for quite some time after this realisation. I began looking through the webpages of different lecturers that I admired and thinking about what kind of research I might be able to do in their fields. I even spoke to Dr. Marcus Collier about carrying out research documenting the different community projects around Ireland which were using nature-based solutions. In the end, I realised that I wanted to do work in the field. Dr. Robin Edwards was one of my favourite lecturers and I knew that he did research reconstructing sea level change using salt marshes. I was also already interested in the Blue Carbon research that had been coming out in the previous decade. It was all new, exciting and societally important research. I ended up deciding that I would like to survey the carbon content of an Irish salt marsh. For me it was the perfect mixture of experience in the field, experience in the laboratory and statistical analysis that I felt would really benefit me in the future.

During the process of finding a supervisor and a project I learnt to be brave and reach out to people that seemed 'out my league' or intimidating. I found that when you do reach out to people they are always delighted to help you, no matter how busy and important they seem. This was a revelation for me and I went through a phase of emailing all the people I found interesting on the internet or people who had engaged with similar research to my project. I learnt a huge amount from these correspondences.

## **Planning and Preparation**

The planning process required me to first educate myself. I had training in the scientific method, biology, chemistry, geology etc. but I had never specifically been taught about blue carbon sinks or the mechanisms at play within a salt marsh. I spent weeks during both the application and the time prior to beginning the project reading papers which had been published on the topic, reading manuals on how to carry out blue carbon surveys and just googling all the things I didn't understand. This process showed me how effectively we are able to teach ourselves, especially in the internet age. I now feel that I know more about blue carbon and salt marshes than any other topic I've studied without ever having been taught on those topics. I hope to apply this confidence in my own self-learning to other fields in the future. However, I am aware that having a reason to use the knowledge is what made me seek it out so vigorously and the process of using the knowledge caused me to commit it all to memory.

I also learnt valuable hard skills. For example, I had to create a map and sampling regime on QGIS (a geospatial information systems software). This was a steep learning curve as I had never used a GIS software before and I didn't quite know what was possible. But the skills are absolutely essential in my field and will serve me well in any future project.

During the entire process of the project, I relearnt a lesson I had forgotten. Everything takes longer than you expect. In my original plan (before Dr. Edwards reeled me in) I thought that I would sample 45 different cores in a week. I also wanted to sample several sites. In reality, my time and resources were completely stretched with a total of 11 cores. I had completely underestimated the amount of time it would take to process all those cores in the lab.

## **Field Work**

One part of the fieldwork which I found particularly interesting was the risk assessment that I had to create prior to it. It's a standard process for all fieldwork which involves describing every possible event which might put you at risk of injury or other dangers and then rating each on a matrix of likelihood and significance. It made me realise how many different things could go wrong with such a simple task. It wasn't as if we were scaling a rock face to retrieve rare samples, we were walking on what is essentially a bog. But the tide could come in and trap us, someone could put their foot in a hole and break their ankle, we could get Lyme's disease. I had never considered these risks until I was forced to describe them.

Of course, I also learnt huge amounts of practical skills such as coring, sampling technique and good practice while sampling. I learnt to take the sun seriously. For the first day of sampling it was in the high 20 degrees and a day in it without shade gave me minor sunstroke. I also learnt to ask for help, I needed another person there to help me with the process and I ended up asking two friends of mine. They were both so happy to be there and it made the experience a lot more enjoyable.

## **Laboratory Work**

Work in a laboratory requires forward thinking, lots of it. I learnt this pretty quickly but I wish I had taken the lesson more to heart. In order for me to get the correct figure at the end of my calculations, each part of the laboratory analysis had to be done perfectly. Some parts were more important than others, some required compromise. But I regret that I didn't work through all my calculations sooner. I could have done them with sample numbers and therefore understood the importance of particular measurements before starting the laboratory work. In the end, I did all of my laboratory work before starting any calculations. This meant that if anything had gone wrong during the lab work without my noticing, there would have been no second chance. The samples would have begun decomposing and I would not have been able to get access to the lab and equipment to fix

the issue. If I had been running my calculations as I moved through the analysis process I would of had a much better idea of any issues that might have arose. Luckily, I don't think that any major issues did arise.

Again, I learnt practical skills such as using an oven, a furnace, a scales and an elemental analyser. But really it was dealing with people which taught me the most. Everything I did had to be run past the lab technician and supervised by a member of Dr. Edwards' team. This close working proximity required me to be reliable, responsible and pleasant to deal with at all times. I had my first taste of what it felt like to be part of a professional working environment.

### **Areas In Which I Could of Developed More**

Due to a broken piece of equipment, my project was delayed by several weeks. This meant that my last pieces of data came in on Friday the 10th of September, 3 days before teaching term started again. This left me with no time to write a mock-official academic paper on my findings. After speaking with another Laidlaw student who had been advised by his supervisor to write a mini-thesis on his findings, I realised the worth of having done so. Without having the experience of putting the findings into words, analysing the errors, shortfalls and areas which require further research and defining the extent of the knowledge contribution you have made, the project has not been seen to completion. Writing up your findings is as much a part of the process as is sampling in the field or analysing in the laboratory. I regret that I didn't start writing some sort of paper sooner, but it would of been impossible without my results.

### **Leadership Training**

The leadership training in general supported what I'd been learning during my project. In particular I enjoyed the session on networking where we were taught to reach out and write effective emails to people who might be able to help us in our projects/careers. The advice was to find a commonality between yourselves and emphasise that while reaching out. I had been learning this skills already during the course of my project but it was interesting to receive slightly more formal training in it. I also thoroughly enjoyed the public speaking workshop. I felt that I gained a lot of confidence from it. I went from avoiding public speaking to seeking it out as a chance to practice what I had learnt. The session on conflict resolution was also particularly interesting. We found that all parties in a conflict usually have the same basic human interests and needs such as safety, respect etc. but they are expressed with different goals. Conflict arises from conflicting goals but in reality both sides have the same motivations.

### **Overall**

The experience of carrying out a research project from start to finish, from conceptualisation to presenting my results in a poster, has given me an insight into the world of science and a practical understanding of how scientific knowledge is generated which I would not usually have the opportunity to see. As an undergraduate, we spend three and a half years learning theoretically about the findings of science and how science is carried out, but only in the final 6 months do we actually get the chance to try our own hand at it. I feel that with my new understanding of the scientific process I will have a greater appreciation for and interest in the theoretical knowledge I learn during term. I feel that I understand better the painstaking endless hours of work which go into each fact or figure I read and the hundreds of researchers which each contribute years of their lives to come to some conclusion about how nature works. I appreciate their time more and feel proud to be reaping the benefits and standing on the shoulders of so much work that has come before me.

The experience has also given me greater confidence in my own abilities as a researcher. I've been able to understand complex processes and machines and hold my own when discussing their use with experts. I've shown myself that there is no reason I shouldn't be able to succeed in a scientific career as long as I apply myself.

I really value the connections that I've made with my supervisor and his team. I learnt so much more about normal life during a career in science through casual discussion with them than I did in all my lectures. We discussed mundane things like career paths, salaries and lifestyle which are so valuable to my understanding of a possible future in science and academia.

Through working on a Blue Carbon project, I feel some degree of ownership, or as if I have a stake in, the body of knowledge and the field. I'm excited to work on other Blue Carbon projects and to see where in the world that might lead me. It feels as if I have taken a first step along what might be a much longer road.