

**Country for the project**

Grenada

Degree programme

Civilingenjör inom Energi och Miljö- Kandidatarbete (Bachelor Thesis Project in Energy and Environment)

A study on the possibility of making biogas out of Sargassum seaweed in Grenada, Caribbean

Before departure

I applied for a minor field study because I really wanted a change of scenery. After studying for 4 years in KTH (including the preparatory base year), I was very tired of the mundane routine of the classrooms and lectures. When thinking about writing a bachelor thesis, I knew that I had to do something different and exciting to keep the motivation alive. I had seen that friends from the year above had gone to Mozambique and Grenada the previous year and was, because of them, very inspired to do a Minor Field study as a bachelor thesis project, instead of just doing a literature review back home. I didn't plan for Grenada specifically, but when the opportunity presented itself to do the MFS in the Caribbean, I just had to say yes. The thought of spending my days on the beaches with sunshine, crystal clear ocean, and a new culture was too enticing. I had never been this far from home and especially not in a developing country, so I was both excited and scared. Grenada is a tourism-based country, so we didn't really need any visa, and since the official language was English, we didn't need any other language course either. I took only the vaccines that were required according to the vaccination centre one month prior to departure.

Upon arrival

We stayed a total of 10 weeks in Grenada because the digestion of seaweed is a slow process and we wanted to take as many measurements as we possibly could. There were many obstacles in the way that we hadn't thought about beforehand, so everything took longer time than planned. One of the main hurdles was figuring out a proper storage method for the seaweed. We started building a small cage with chicken wire, but it wasn't long after that we discovered that it didn't work properly. Additionally, one of the main ingredients required for the experiment took way too long to arrive, so the project wasn't started as soon as we had arrived, like we had planned. But all these things are part of the learning process, and it turned out quite well in the end. It is fair to say that when working in a developing country, expect that everything takes a little longer time.

Financials

Grenada was much more expensive than I expected. Since it is a tourist destination, there were two separate economies on the island- a local and a tourism economy. The food prices were extremely high in grocery stores but anything local had a reasonable price. The main reason for the expensive food prices is the need to import all the goods to the island, so anything like a pack of Pringles was triple the price of what you'd find in Sweden. There was a local fruit and vegetable market on Saturday mornings from 7 to 10, but we never had a chance to get there. We rented a car for a very reasonable price and since we were 2 groups traveling together, we were able to split the price by four. It was hard to commute on the island without a car, but there were local busses that were cheap if we needed to split up. The problem is that they charged much more to get to the hotel we were working at because it was in a fancier area off road.

Accommodation

Without the sponsorship of our contact person, it would have been very expensive for us to stay in Grenada. Our contact person who has invested in the project and his wife own a hotel business, and because of their subsidizing the price of the accommodation, we were able to live close to everything for a reasonable price on a student budget. In total, the accommodation costed around 20 000 SEK, so it was a very big share of the money received for the trip from the school. We also looked at Airbnb options, but they were even more expensive. We had to move around a lot also depending on guest availability so being flexible is key. But it was totally worth it since we had ocean view and could go down to the beach in 3 minutes and enjoy Caribbean sunsets almost every night for 10 weeks. I loved every day of living there.

Project

The project that we conducted felt important and relevant. Researching the valorisation of Sargassum seaweed felt like the perfect mix of marine biology, energy generation, market analysis, and climate mitigation all at once. I was very lucky to have this be my thesis project to be honest. We conducted a comprehensive study on the energy potential of biogas production using Sargassum seaweed and food waste as feedstock. Our investigation focused on understanding the impact of mechanical pretreatment of the seaweed on methane yield. Furthermore, we conducted a market analysis to assess the prerequisites of electricity generation from biogas if it were to be produced on larger scale.

Our daily routine during the project involved several key activities. Once a week, we fetched seaweed from the other side of the island (since that's where most of the seaweed washed up). Storage was crucial as the seaweed degraded rapidly on land, and immersing it in saltwater kept it fresh, leading to higher methane yields during biogas production. Each day, we fed the biogas digester with a 50% mixture of seaweed from the fishnet and food waste collected from the hotel kitchen. Wearing gloves, we manually handled the food waste and algae (that part was not pleasant). Subsequently, we measured the methane content in the biogas chamber by boiling water using a stove attached to the biogas system. After completing our fieldwork, we returned home to work on our report. Additionally, once a week, we conducted interviews with people on the island as part of our market analysis. Our contact person played a crucial role in facilitating meetings with important stakeholders on the island, and without his help, we wouldn't have had the opportunity to interview them.

Country

I absolutely loved the destination and the culture of Grenada. The people there were incredibly kind and welcoming. From the moment we arrived, I felt a sense of belonging, as if I had become part of a close-knit community in just a month's time. Personally, I felt more at home in Grenada than I do here in Sweden. The locals were so inviting, often welcoming us into their homes and inviting us to dinners after knowing us for only a few days. I believe this strong sense of community is influenced by the island's population size, with around 100,000 inhabitants. In such a close-knit society, people naturally depend on each other more, forging deeper connections and creating a warm and inclusive atmosphere.

Leisure and social activities

Leisure time in Grenada was truly the best. The island was always buzzing with exciting events, from beach parties and football events to delightful barbecue gatherings. Grenadians knew how to embrace life to the fullest, and there wasn't a single boring day on the island. We explored the national park and swam in several waterfalls. We volunteered in the chocolate festival hosted by the hotel we were working at which was a great deal of fun. We snorkelled in the underwater park. The only downside was our reliance on a car to get around, which led to missing a few late evening events when the local buses stopped running. Despite this, we managed to make the most of it by walking everywhere during the second month after affording a car rental for only one month.

Luckily, we formed deep connections with some friendly Grenadians we met on the beach, and from then on, we would often hang out with them during our spare time. All in all, my time in Grenada was unforgettable, and I truly had the time of my life there.

Sustainability

The project had a clear connection to the sustainable development goals (SDG) by tackling the negative impacts caused by Sargassum overgrowth. Once washed up on the shore, the seaweed causes problems that range from limiting biodiversity on the coast to income losses from the bad sight and smell as mentioned. By investigating the potential uses and requirements for biogas production on the island, the project aims to contribute to SDG 11, "Sustainable cities and communities," by enhancing the habitat and promoting cleanliness. Additionally, it aligns with SDG 14, "Life under water," by mitigating the negative effects of algae washing up on beaches, which can harm coastal and marine wildlife, tourism, fishing industries, and recreational activities in Grenada.

Other recommendations and observations

Book the direct flight from London to Grenada because it is much better. The flight will be six hours shorter than an overlay at the neighbouring islands, and Inter-Caribbean airways have a reputation of losing luggage (which happened to us as well in the beginning of our trip).