



Determining the techno-economic optimal design parameters of solar drip-irrigation systems for small-scale Dominican farms.

Before departure

I applied for the KTH Field Studies travel grant because I was very interested in applying my academic knowledge to a project in the global South to address a real-world challenge and contribute to positive change in an area that is often forgotten. The Dominican Republic particularly drew my attention as it offered the possibility to connect with my Dominican heritage and family. Additionally, I wanted to improve my Spanish skills and I saw no better way to do so than immerse myself in a Spanish speaking country for a prolonged period of time. With regards to the project, I was especially interested in the topic proposed by my supervising professor at the Dominican university, INTEC, as it allowed me to explore the potential of the mostly unexploited solar potential of the Dominican Republic for a often neglected part of the population, small-scale farmers.

I did not take any special language course beforehand since I had colloquial knowledge of Spanish, but did make an effort to read and watch more Spanish language content to immerse myself in the language before leaving. I was fortunate that I did not need to prove my Spanish knowledge for my stay at INTEC since I have Dominican citizenship. However, if you are not a Dominican, you will need to have a Spanish language certificate to participate in a research stay at INTEC. The Dominican Republic had no vaccination requirements and also does not require a Visa for EU citizens.

Upon arrival

Before heading to the Dominican Republic, I conducted the background literature review in Sweden for approximately two months; from January through February. I arrived in the Dominican Republic on the 23rd of February and stayed until the 27th of May.

There was no formal reception for me when I came. However, on the first day I started at INTEC, the international mobility coordinator gave me a tour of the campus and helped me organize access to the internet, the library and other services. Additionally, my contact person/local supervisor met with me the first day to talk about the project progress and next steps while I was there.

Financials

Although the Dominican Republic may be perceived as cheap, it is not! Although Uber and the sparse local transportation is quite cheap, Food prices except for street food is quite expensive. I would say that it is on par with Swedish prices with regards to the supermarket.

Since Uber can be unreliable and local transportation is very hard to access for non-locals (no set schedules nor stops) and was recommended to be avoided due to safety issues, I drove everywhere using my family's car. On average, I spent about 30 Euros every two weeks on gasoline.

Flying to the Dominican Republic can be expensive as well. This is where the majority of the field study grant money was used. The best way that I found to travel there was through Madrid.

Accommodation

For my time in the Dominican Republic, I stayed with my aunt so I did not have to pay rent, utilities nor have to worry about finding an accommodation. However, I have heard that finding an accommodation can be tricky, especially in the capital, Santo Domingo.

Project

My project focused on finding the techno-economically optimal design of solar-powered drip irrigation systems for small-scale farms in the Dominican Republic. Originally, the idea was to conduct experiments to assess the performance of different possible configurations, however the governmental funding at INTEC fell through so I instead focused on creating Python models. Nevertheless, I tried to keep the project local by visiting the modeled case study location to gather data and also do a market analysis of available equipment.

My typical day during my field study was going to INTEC to work on my models in an office I was given access to. I would periodically meet with my local supervisor to discuss the project and also would meet with a local PhD student working on a similar project about solar-powered water pumping systems.

After this project, I plan to continue with the topic by writing a journal article with the local PhD student to publish our results over the summer.

Country

I really enjoyed my time in the Dominican Republic. Although I grew up going there often for vacation and to visit my family, getting to live there for an extended period of time allowed me to experience the country in a whole new way. It was no longer just a place of childhood memories and tourist attractions, but a vibrant community with its own challenges and triumphs. I now better understand the struggles people face with living there such as the high cost of living that is not comparable to the average wage, the grand problems regarding transportation, and the constant need to be watch your soundings. However, I also got to better experience the wonderful culture; music, food and friendly people.

Leisure and social activities

Since walking on the street in most areas of Santo Domingo is not really advisable from a safety perspective and there is little nature in the city, I became a member of the botanical garden for 1000 Dominican Pesos per year (around 200 SEK) so I could walk in nature. This was something I really enjoyed since I got to see a wide variety of local plants, breath fresh air and take advantage of the multitude of trails they have.

I tried to work on my project mainly during the week, so on the weekend I met with my cousins, aunts and uncles, went to the beach, swam in the neighbourhood pool, and tried various local foods.

Sustainability

Overall, I would consider the Dominican Republic a very difficult place to live sustainably! There is very little public transport and it is often not considered safe so driving or ride-share services are really the only way to get around. Most things are packaged in plastic and opting for more 'green' alternatives are significantly more expensive. There is really no recycling or sorting of garbage either. Additionally, the local diet includes a lot of meat and therefore when eating out I ate a lot meat than I would normally. Most restaurants do not have a vegetarian option and although there are a few vegetarian/vegan restaurants they are significantly more expensive.

My project was directly related to multiple sustainable development goals. Firstly, Goal 7; affordable and clean energy for all, as the project aimed to find an affordable configuration for renewably powered irrigation systems in the Dominican Republic. Also, this project was connected to Goals 2.4 and 6.4 as it aimed to design an irrigation system using drip-irrigation to increase overall water use efficiency.

Other recommendations and observations

Firstly, if you are interested in doing a project aboard, then you definitely should and the KTH field study grant is one perfect way to help facilitate this! I would also highly recommend doing a project in the Dominican Republic, I really enjoyed my time there. If you do go, I suggest the following:

- Learn Spanish, at least at a conversational level. Although some people speak English, the majority do not and you do not want to miss out interacting with and getting to know locals.
- Eat local food, but be careful what you eat. Avoid raw food as there is a high risk of food-borne illnesses and do not drink from the tap.
- Travel around. The Dominican Republic has a wide variety of landscapes. The beaches are some of the best in the world, but the mountain regions should not be forgotten! There are beautiful waterfalls, coffee and chocolate plantations and great places to escape the warm weather.