



MFS REPORT

Names

Year and term for exchange

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2023

Country for the project

Tanzania

Degree programme

Degree Programme in Biotechnology

Investigation of the microbial contamination of groundwater in Dar es Salaam, Tanzania

Before departure

We are a group of five girls who conducted our bachelor thesis in Dar es Salaam, Tanzania. One month before the application to MFS, no one in our group was aware of the possibility of doing the bachelor thesis abroad with the support of MFS. However, one person in our group received an email regarding an information meeting and signed up for it. She told the rest of the group about the opportunity and we all got very excited and started the application right away. Our project group decided to apply for MFS because we wanted to expand our experiences and gain a broader understanding of other cultures and how biotechnology skills can be used in different parts of the world and for different purposes.

However, in our program we were required to write our bachelor thesis in a group of 4-6 people, while MFS recommended a group of maximum 2-3 people. This made us uncertain about the ability to go, but after many emails and conversations with the course responsible and MFS coordinators we received positive feedback and thus started our application process.

We wanted to do a project related to water purification and therefore contacted our former professor Gunaratna Kuttuva Rajarao, Department of Industrial Biotechnology, who is an expert in that particular field. This led to her becoming our supervisor and connecting us with Dr. Shadrack Mwita Matiko Sabai at Ardhi University in Dar es salaam, Tanzania. Dr. Sabai and Gunaratna assisted us in designing and planning the project.

Before departure general preparations also had to be done. Some required vaccines were taken and we ate malaria pills throughout the entire stay. We went to the nearest vaccine clinic and asked which vaccines were required for our destination. It's important to start the vaccinations on time as some must be taken over a month before departure.

As for the visa, our local supervisor advised us on which visa we should apply for and we applied online for a student visa which was granted within less than 10 days. In addition, we were recommended by the embassy to also apply for a research permit (COSTECH) to be able to conduct our field study in Tanzania. However, in the end we did not apply since our project was a field study and not a research project. Our local supervisor in Tanzania helped us to receive all the permissions we needed to conduct our study.

To enable the conduction of the project we had to bring a lot of disposable material, such as lab equipment and chemicals, from Sweden. To get through the customs, our supervisor in Sweden wrote us a letter regarding the use of the materials which we made sure to print out and bring with us along with the invitation letter to Ardhi University. We had to show these papers to the customs upon arrival and we had no issue with bringing these materials in.

Since none of us had been to Tanzania before, we had a hard time imagining what life would be like there. However, all of us have traveled a lot before and have experienced different cultures and lifestyles. Thus, we expected the culture and life to be different from Sweden but nothing we were worried we couldn't accommodate to.

Upon arrival

We traveled to Dar es Salaam in the middle of January 2023 and had six days of getting the project started. Before arrival we booked a taxi through our accommodation to pick us up at the airport and showed the apartment. The day after arrival we had set a time to meet with our local supervisor at the university. During these first days we met a lot of the staff at the university, applied for the permits we needed, prepared the laboratory, settled into the apartment and got to know our surroundings. The project in Tanzania was conducted for eight weeks in total.

Financials

Generally, it was less expensive in Dar es Salaam compared to Sweden but much more expensive than we thought before arrival. Most restaurants and supermarkets were quite expensive compared to local food where it was much more affordable. To save money during the field studie we recommend buying local food at markets and cooking a lot of food at home.



To get around the city we often went with bajaji (tuk-tuk). You can go up to three people and it's a very cheap and quick way of transportation, since there's a lot of traffic. To feel safe in the beginning we only used a bajaji contact we got from another MFS student. His name is Frank and his number is +255 655 210 732. We rode with him from time to time during our stay but we quickly found out that Bolt operated in Dar es Salaam and was very cheap and

easy when you needed a ride quickly. Therefore we also used Bolt a lot as well to get around. A recommendation is to change the setting to pay for the Bolt in cash to avoid extra charges.



Accommodation

We lived in an apartment for six people in the area of Kawe, right outside the city center. Our contact person gave us advice about which areas we should stay in and recommended us to find accommodation through Airbnb, which we also did. We had a hard time finding cheap accommodation at a good location and therefore chose to spend a little more than originally planned. However, the apartment was very nice with three bedrooms, three bathrooms, two balconies and a large, well equipped kitchen where we cooked most of our meals. The apartment was located in a gated community and we had access to a shared pool. The price for the apartment was around 4 600 SEK per person/month. We usually traveled to school with bajaji which took about 10 min from the apartment and cost around 25 SEK which made the locations very good.



Project

The aim of the project was to determine the presence of three waterborne bacteria *E. coli*, *V. cholerae* and fecal streptococcus by investigating the groundwater in the two municipalities Ilala and Ubungu, Dar es Salaam. The presence of these common bacteria indicates contaminated water. Through this, awareness of the groundwater quality could be raised and information on water treatments could be provided. The project was conducted in collaboration with Ardhi University and the groundwater was investigated through water sampling during a 5 week period from selected boreholes, cultivation on selective media, DNA extraction, DNA amplification through PCR with specific primers and gel electrophoresis.

During the project, a lot of time was spent in the laboratory and a typical day was spent first by collecting groundwater samples at the designated sample sites followed by taking the samples back to the laboratory and starting the investigation of them. We had access to a large and well-equipped laboratory but most of the disposable equipment was brought from KTH, Sweden. Despite the laboratory being well-equipped we encountered some difficulties with the electricity and water coming and going, gas not always working and limitation in access to all equipment. However, our contact person at Ardhi University was of great support throughout the project, from start to finish. We also received great support from other employees and students at the university.

The results from the study were communicated in person to each borehole owner. This was done by handing out a documentation of the results which also consisted of tips on how to treat the water before use.



Country

Tanzania is a beautiful country with loads of different kinds of nature and cities. There is everything from mountains to forest to beaches, which means that people live in different surroundings and conditions all around the country. We lived in Dar es Salaam, Tanzania's largest city. Between areas of the city, infrastructure and living conditions differed greatly. People lived in everything from high-rise buildings to sheds.

Many people talk about African time, that is that everything takes so long and that no one will arrive on time. To some extent this was true, but mostly not. In the vast majority of cases, people arrived on time for meetings and such. From our experiences, the taxi always arrived on time and all ferries and international flights departed according to schedule. However, the rhythm in day-to-day life was very different from that in Sweden. Everything went at a more leisurely pace, which in the beginning was a form of culture clash.

The people we met have been incredibly welcoming, nice and helpful. We made so many new friends during our stay thanks to the openness from the locals. Whatsapp came in handy for communication since it is the main platform for both young and old in Tanzania.

Leisure and social activities

In our spare time we visited some nice restaurants. One that we particularly liked was the Cape town fish market which had very good food and was right by the water so you could see beautiful sunsets. There we also met a new friend who invited us to play floorball with other Nordics on Tuesdays at the Nordic school of Tanzania. We also made sure to explore the nightlife in Dar es Salaam, karaoke on wednesdays at Samaki Samaki and dancing at Warehouse on the weekends.



On the weekends we often went to the islands of Mbudya and Bongoyo which are located just outside Dar es Salaam. The islands are naturalized by the government and have incredible coves and waters to swim in. To get to Mbudya we took a bajaji to Serene Beach resort where they provide a round-trip boat to the island for a fee. To get to Bongoyo you take a well organized ferry from Slipway harbor. In both cases you pay both a government fee and the boat-fee and in total it costs around 200 SEK/person. On both islands, there are nice restaurants serving lobster and fish with fries which we highly recommend to order whilst visiting the islands.



We also made some longer trips, taking the ferry to Zanzibar and a three day safari-trip to Nyerere national park. Both of these were amazing experiences where we were able to explore.



Sustainability

The project conducted in Dar es Salaam can be directly linked to several of the global goals stated by the UN. First and foremost, the project is connected to the sixth global goal which is clean water and sanitation. By identifying contamination, efficient and easier purification of the groundwater could be possible and would therefore contribute to this goal. A clear outcome of clean water is good health for those who drink it, which is directly connected to the third global goal; good health and well being.

When clean water is not available many people have to buy bottled water or fetch water away from home, which is both negative from an environmental perspective and time and money consuming. If the water from the supplied water source is clean there is no need to buy bottled water which is economically profitable. Another direct consequence of those who become sick from contaminants is that they are not able to work which affects the overall economic growth negatively. Clean water could therefore hinder diseases and contribute to decent work and economic growth, which is the eighth global goal.

Although the project contributes to the global goals stated by the UN the sustainability of the executions of the project could be questioned and especially the sustainability in a climate perspective. The project required multiple unsustainable actions from us and this included travel by airplane from Stockholm to Dar es Salaam, daily commute with a gasoline-powered vehicle from the apartment in Dar es Salaam to the university and a great use of single-use plastics in the lab with insufficient recycling and garbage disposal. Through this, the demands on us to live more sustainably in everyday life increased. To live more sustainably in our everyday life we took some easy measures and one example of this was choosing local markets to buy fruits, vegetables and fish and cooking at home. By choosing local foods and crops that were in season the sustainability of the food we ate could be maximized. Because of the unsafe traffic situation, the absence of sidewalks and the risk of robbery it was required to take a car or bajaji when traveling, even for short trips. By avoiding unnecessary travels and planning purchases in advance the travels could be minimized. Also by working efficiently and economizing the resources in the lab the sustainability could be increased for everyday life.

Even though the project could be seen as unsustainable from an environmental point of view the social and economical sustainability is prominent. By sharing knowledge, understanding another culture and making new friends, important insight and knowledge was given. The project was conducted by balancing the environmental aspect and the importance of discovering a new country and culture so both social and environmental sustainability could be maximized.

Other recommendations and observations

What is highly valued in Tanzania is learning a few phrases in their language, Swahili. We recommend doing this on, for example, the app Duolingo or on google translate. Another thing we did that was appreciated was to bring small gifts from Sweden that we gave to our contact person and other people who helped during the project. Also, in Tanzania the culture is more conservative when it comes to clothes and especially on the university campus. One thing to have in mind is that students need to cover knees and shoulders to enter the campus area.

To be able to communicate easily, a recommendation is to arrange a Tanzanian SIM card and a local telephone number as soon as possible after arrival. The easiest way of doing this is to go by bajaji to a Vodacom center (for example in Mlimani City). There, the staff can help you get the right subscription to be able to make both domestic calls and surf. Don't forget to bring your passport as it is needed to register for a SIM card. For us, the subscription cost around 250 SEK/month. At the same center it is also possible to start an Mpesa account where you can transfer money. This account can then be used in the Mpesa app to buy more surf or pay for the next month of SIM-subscription.

In Tanzania, cash is still king. There are ATMs scattered throughout the city and withdrawing Tanzanian shillings was never a problem. In ATMs, a small fee is charged for each withdrawal and there is a maximum limit of approximately 2000-3000 SEK for each individual withdrawal. Because of this fee a tip would be to withdraw more cash at the same time to minimize the cost of each withdrawal.

Individual reflection

Louise:

For me personally, doing this project has really helped me grow a lot as a person. Creating and writing our own project plan was something I had never done before, and I learned how much planning one has to do to create a project plan and how much work really goes into it. Also understanding that not everything will go as planned and learning how to adjust to changes has been very rewarding. Working in a big group was very rewarding and the group dynamic was always positive. We helped each other a lot and it was good to have so many different perspectives when facing a problem. I felt that it was an overall good experience to have such a large group travel and execute the project together.

Living and working in a different country with an entirely different culture was a very rewarding experience where adjusting to the culture taught me a lot. The opportunity to do this kind of exchange where you live in a different country for so long really helps with understanding the culture more and learn more about it in a different way compared to when you only visit a country for a short period of time. Overall, the experience has been incredibly rewarding and I feel that I have grown a lot as a person and learned a lot about myself and also gained a new perspective on a new country and culture.

Rebecca:

Doing my bachelor's thesis through MFS in Tanzania is among the best decisions I have made. The opportunity to travel to an unknown country with a different culture has provided lessons that could not be obtained if the thesis were to be carried out in Sweden. The trip and the work at the university have given me memories and friends for life, and I see this trip as one of the highlights of my time at KTH. If you are thinking of doing an MFS, I really think you should do it! I promise you won't regret it.

Julia:

I am so happy that I got the opportunity to do this project and travel to Tanzania. Since I started studying I knew that I wanted to go abroad in some kind of way. When I read about MFS I more as a joke told my friends about it. It turned out to be a very good decision to tell

them since they are so driven and together we got this whole project done! It has been such a wonderful, stressful and fun journey, but I would recommend it to anyone and everyone. It was very giving to work in another culture and learn how to use our knowledge in different settings and situations. It was good to learn to not take things for granted when working in the laboratory, and to get a push to show and use my own knowledge. Also it was very giving to meet and talk to people who work in this field but have a different cultural approach to things. For me a very giving part of the trip and project was to talk to so many people who came from such a different culture and background compared to me. The people we had contact with in Tanzania were so nice and welcoming, warm and helpful. Because we had to go around every week to take water samples we also met people in different areas of the city, which gave us a good understanding and view of how life is there. I'm very happy that I got the experience of getting to know local people and understand their way of life to some extent.

To learn how to plan a big project like this and do everything from start to finish was a new experience and gave insight to the working field that I am getting into when I'm done studying. It has been a lot of work and taken a lot of time but it has been such a great experience.

Once again I would recommend traveling through MFS or similar to everyone! It is such a giving experience in so many ways.

Michaela:

This experience has been inspiring, fun and educational in every way. I have had time to experience both Tanzanian culture and the field of biotechnology in a new and interesting way. At the same time I have had a lot of fun in my free time, creating memories I will bring with me for life. Particularly, I think it has been a fantastic opportunity to be able to carry out a self-created project through MFS since we both got to create and follow the entire chain that a project entails.

Johanna:

Traveling has always been a great interest of mine. I enjoy discovering new places, experiencing new cultures and meeting new people. Therefore, I didn't hesitate when I had the opportunity to carry out my bachelor thesis in Tanzania.

Previously, groups of five people haven't had the opportunity to travel with MFS, but in my opinion, traveling with a larger group was only beneficial. I always felt safe and the possibility to split into smaller groups allowed everyone to do things according to their own personal interests.

For me, this journey was incredibly rewarding, both on a personal and academic level. Sharing knowledge with people from Ardhi University and learning how they perform biotechnological methods was very interesting and educational. In addition, I have become more independent and confident in the laboratory, which will benefit my further studies and my future career. I also think that an experience like this is an opportunity for personal

growth, by encountering new cultures and meeting new people. For example, I constantly learned new things, got new perspectives and experiences.

Tanzania is a beautiful country with kind people and we made a lot of friends. Although the main focus is on the project, I think you should try to travel and see as much of your surroundings as possible. In this way, you would get a more in-depth experience and understanding of the country, the environment and local culture.

From this trip I have made memories for life. I'm thankful for this opportunity and grateful that MFS made it possible and, also to my amazing friends I got to share the journey with.

If you have any questions regarding our project or if you're interested in doing something similar, you're more than welcome to contact us via email:

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