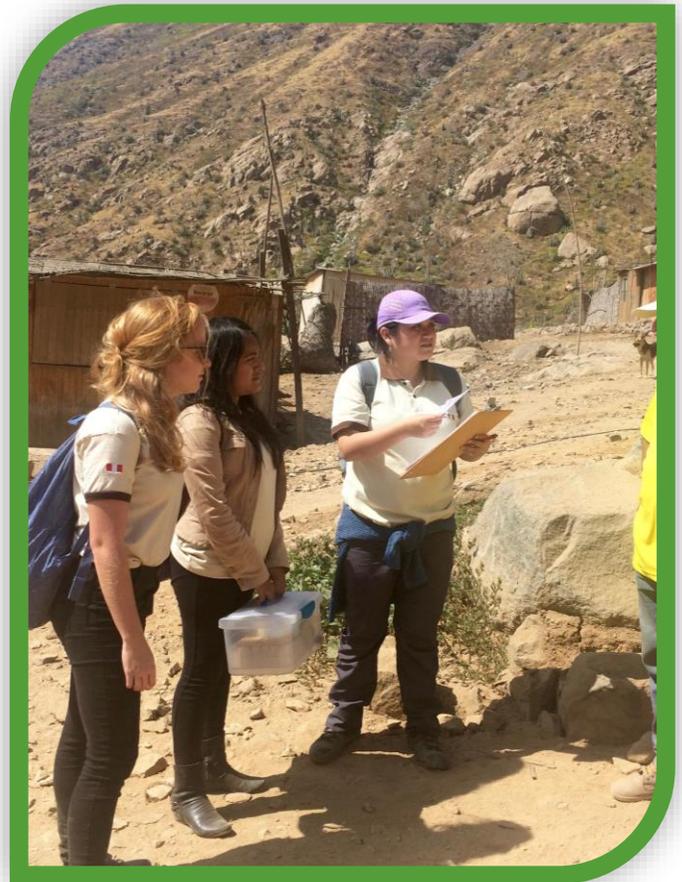


An Investigation of Environmental Health in Peru



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McGill Institute for Health and Social Policy

Project Overview

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 Department: Environment
 Organization: Centro de Investigación de Salud Ambiental (CREEH) Perú
 Location: Lima, Perú
 Mentor: Thomas Meredith
 Fellowship Duration: May 29th to July 31st



About the McBurney Fellowship Program

Through McGill’s Institute for Health and Social Policy, the McBurney Fellowship Program supports students in international service programs related to health and social policy in Latin America. McBurney Fellows serve abroad in organizations working to meet the basic needs of local populations. One key aspect of this fellowship is its mandate to make a significant contribution to improving the health and social conditions of poor and marginalized populations through the delivery of concrete and measurable interventions. Students and their mentors identify issues, make connections with local organizations, and develop a strategy for the fellowship. The views expressed in this document are the opinions of the fellow, and do not necessarily reflect the opinions of the IHSP.

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An Investigation of Environmental Health in Peru

Fellowship Rationale and Objectives

We participated in projects by conducting soil samples for contaminated sites research and also doing a service-based project by the implementation of eco-gardens in an artisanal gold mining settlement. These projects were a part of the vision of the Center for Research in Environmental Health (CREEH) to assist the vulnerable, marginalized populations in Peru to mitigate some of the human caused impacts to health and the environment. The research and projects are designed to educate and raise awareness to the public, industries and government about environmental contamination whilst providing contamination prevention methods and solutions to help people live a healthier, more sustainable lifestyle.

Overall, we sought to address issues connected with environmental contamination, specifically with heavy metals such as lead and mercury in the Lima metropolitan area. This included a lack of knowledge and access to resources to prevent environmental contamination, especially in artisanal small-scale gold mining communities that use mercury. We aimed to educate people who do not realize the critically dangerous situation they live in with heavy metals impacting their health as well as encourage, in the case of gold mining, the miners to switch to a mercury free alternative. We also created an eco-garden project with the purpose to help and promote the development of successful eco-gardens in the community by the transfer of knowledge and tangible hands-on work with the collaboration of the participants.

Background/Context

Pucará is a small informal settlement placed on the upslope of a mountain and a three hour bus ride from the center of Lima. Gold miners started settling in the area around 2004, and has since grown to approximately fifty families. This “pueblo joven” is not recognized formally by the government, and has no public services such as schools, healthcare facilities, roads or running water. The people of Pucará face many daily challenges with transportation, water accessibility, lack of education and immediate health care assistance. Yangas, which neighbours Pucará, is a thirty minute walk downhill where the children attend school and where the people go collect water. There are over six gold processing sites (molinos) in Pucará, which provide the main source of income for the community. However the practice of gold mining in this area is unstable; while we were there, for example, the production was largely halted due to the flash floods (“Huayco”) Peru experienced at the beginning of the year. This instability caused the men and women to be at a standstill with no income. The internal politics and disputes between mill owners and the workers coupled with the lack of community engagement are also an issue in Pucara.

The artisanal, small-scale gold mining processes use liquid mercury, and have resulted in significant detrimental effects on the environment and human health. The community, especially children and pregnant women, are particularly susceptible to these toxic substances. CREEH has begun working with the molino owners and workers to eliminate the use of mercury in the gold melting process by providing them with a mercury free alternative, borax, with the goal of helping create a healthier and more sustainable livelihood.

Lima has a population of almost 10 million people and is an extremely polluted city with a high



amount of toxic substances in the air from industries, public transport, cars, open dumps, mines, tire burning as well as pollution from improper waste disposal. Additionally, there are no green areas and the cloudy climate and mountains cause the air pollution to persist in the city. This has a serious impact on the respiratory and cardiovascular system of the population, often causing irritation to the eyes and skin and rises of allergies. The dust and pollutants are blatantly making the population ill and the

poorer neighborhoods - the informal settlements - are most affected. The people of Peru generally recognize the worsening situation and understand, for example, that the metallurgy industry in their neighborhood is causing harm to their children. Complaints are then filed to the municipality or by word of mouth and through these sources, CREEH focuses in on locations and takes soil and water samples. This is a severe issue, where the worst effects are felt by the most marginalized populations of Lima, according to CREEH.

Activities

Our role with CREEH was to assist in the advancement of the organization's projects in the field as well as assist staff when required with any work or tasks. Considered as staff equals, we were encouraged to contribute new ideas, comments or concerns on any of the topics. Throughout this internship we got to partake in many activities organized by CREEH and ourselves in the field, at conferences, in the office and public events for each of their projects; Mercury Zero Project, Contaminated Sites Project and create an eco-garden project.

For the Mercury Zero Project, we had the chance to assist in the World Environment Day Conference at the Ministry of Environment in Lima, explaining the effects of mercury in Peru caused by mining. The week of June 12th, as an introduction to the topic, we conducted an investigation and presentation on mercury and its contaminant effects on the environment and in health. We also

prepared a summary for a research paper submitted to the International Scientific Meeting 2017 in Peru, entitled: An Analysis of Strategies for the Implementation of National Action Plans to Reduce the Use of Mercury in Artisanal and Small-scale Gold Mining in Peru. This application was accepted to present during the conference program at the end of July, where our colleagues had the chance to present the research topic. On July 11th, we attended a second conference at the Ministry of Environment titled: Remediation Alternatives for Contaminated Mercury Sites and learned methods to reduce and eliminate exposure to mercury pollution in the environment specifically for mercury

used at the industrial level. During the months of June and July we visited the small gold mining community of Pucará, Lima, Canta in Santa Rosa de Quives. We visited Pucará many times during our fellowship as it was where we worked the most: for the Mercury Zero Project we went to see the process of washing/separating the gold, to introduce



ourselves to the locals of the community, engineers of the municipality, health center doctors, and toxicology experts to best understand the situation, as well as the owners of the individual mills to make us aware of the reality of the work, their doubts and obstacles that are presented.

For the Contaminated Sites Project, we worked on the field research part in a handful of highly polluted neighbourhoods in Lima. On June 8th we travelled to the Lima district of Carabayllo, where we interviewed doctors at two different health centers, teachers, miners and locals for any information on what were the main sources of contaminants and causes of health issues in the area. We discovered that the main sources of environmental contamination were a nearby battery recycling facility and a rock crushing plant, and took ten soil samples in Carabayllo near these locations.

On June 9th and 19th, ourselves and a co-worker were accompanied by a government official of the municipality of Ate to drive us to locations for more soil samples. We got the chance to speak with industry managers such as brick factories, city hall engineers, health center workers, locals and school teachers. Similar to previous soil sampling excursions, we took over thirty soil samples near schools, industrial facilities, health centers, parks and communal spaces. At the end of July

we then used a fluorescence x-ray analyzer to measure the elemental content in the soil and create a risk map. Finally, our third site was in the mining community of Pucará, where we took soil and water samples, which we later tested for arsenic, near and within the gold mills and along the main roads.

During the second half of the fellowship in Lima, CREEH organizers asked us to initiate an eco-garden project in Pucará. On June 27th we initiated the project with a brief presentation to our colleagues in the office, outlining our goals and methods used to start the eco-gardens. This was an important conversation to get everyone's ideas, comments and perspectives. We then presented a written action plan for the Eco-Garden Project with the dates, times and objectives of the visits to Pucará.

At the beginning of July, we returned to Pucará with a co-worker to interview the locals who wished to participate in the eco-garden project. The goal was to interview the potential participants with a semi-structured list of qualitative questions aimed to improve our understanding of the problems the community face and what each participant wanted to learn in terms of small-scale agriculture. It was also to obtain a general idea of participants' knowledge about water conservation, agriculture, composting and soil rejuvenation. We also got to view their "yards" where they planned on putting the eco-gardens.

On July 6th, we visited Pucará and gave a small info session on the expectations and commencement of their garden projects. We provided printed picture guides on how to create a small plot for their gardens, which included recommended sizes for each of the participants' garden, as well as suggestions such as the construction of barriers around the designated area to prevent entry of the chickens and dogs that frequent the village. We taught a brief lesson on soil fertilization, water conservation techniques and possible methods to enhance soil quality and explained the difference between compact vs. loose soil. We emphasized the benefits of composting and demonstrated how to start a compost bin.

On July 14th, ourselves and another volunteer returned to Pucará for a follow up visit. We saw advances in their plots as well as presented a more developed guide for composting and soil preparation.

July 24th, our penultimate visit to the community, we discovered that the participants were not successful in keeping the soil damp in the desert climate, therefore the goal of this trip was to further emphasize the importance of having a moist soil. We did a third info session on irrigation and water conservation techniques and physically showed them drip irrigation methods using recycled bottles. It was important to use visual aid and walk in the yards with the participants to demonstrate the techniques for the eco-gardens. We passed out invitations for further info sessions on pest control. July 26th was our final day in Pucará. We gave one last farewell talk to encourage their continuation of activities and techniques, give them new knowledge and reassure them of their good work.

This is a long-term project and CREEH will maintain contact and evaluate the progress over the next couple years. This eco-garden project in Pucará is expected to continue with the other volunteers once we have left. There will be an implementation phase, long-term supervision, and more info sessions. CREEH is dedicated to supporting the eco-garden project until the gardens are deemed successful and the participants in Pucará believe that the organization is no longer needed.

Challenges and Successes

With the Mercury Zero Project for artisanal small-scale gold mining, we got a better understanding behind the reasoning and the difficulties of changing to using a non-mercury alternative in the gold processing method. We expected the miners and workers to prefer to switch from using mercury as it was cost effective for them, but as we talked with miners in the community, we realized that this practice was ingrained and they did not comprehend the environmental or health risks of using mercury nor the benefits of switching to a mercury-free alternative. We then understood the severity of the situation and strived to inform our colleagues and volunteers and come up with solutions to this issue.

For the Contaminated Sites Project, we succeeded in aiding CREEH's efforts as we were assigned specific tasks throughout the two month period. We were successful in taking over forty soil samples in three districts of Lima that we later analyzed and created a risk map from. We analyzed the soil samples and determined that the levels of contamination were very high in some areas. The lead, arsenic and zinc levels outcomes proved to be higher than expected and reached levels 5-8 times higher than the recommended amount in a residential areas for contamination in soil and water.

We accomplished planning and organizing the Eco-Garden Project. We initiated the creation of the participants' gardens and helped them with soil preparation, water conservation techniques, taught composting practices and provided positive and continuous encouragement for the success of their eco-gardens.

Unfortunately we did not have all the time necessary to complete the entirety of the eco-gardens project. CREEH gave us the responsibility of starting the project and implement it in a single month. After planning and



starting to implement the project, we began to realize one month was not enough time for completion as working with people in the community proved to be more challenging than expected. It was a challenge to get the participants to commit the necessary time and we found it difficult to organize community meetings at a time when everyone could attend. We reevaluated and reorganized our action plan to match the time constraints and managed to accomplish everything we set out to do for the month of July and tried to be as present as much as possible in the community of Pucara.

Questions Raised

The fellowship gave us plenty of work and topics to learn from and allowed us the chance to work hands-on in the field with the community and to explore areas of Lima facing health and pollution issues. Accomplishing all that we did left us with the feeling we had done something meaningful however, on the downside, we were often pressed for time. Another difficulty was the communication and the cultural differences in terms of the manner in which Peruvians addressed a situation or explanation in a professional setting. We had to adapt to their method of work and learn what we could while still working hard. The work of the organization was inspiring and the structure and planning of our work days was always perfectly done. Our fellowship raised many questions about the insecurity of small scale artisanal gold mining, the health concerns surrounding these informal communities, the neglect on the part of the government of these areas as well as the complex politics and lack of awareness and education on sanitary issues. We became aware of the availability of potential alternatives to aid the communities to lead a healthier, more financially stable life through, for example, something as small as the creation of vegetable gardens.

Training and Mentoring

The first couple of days in Lima we received training by the organization through introducing us to the team, explaining in depth their area of work, giving us context and background, exploring the surroundings of the office and assigning us with topics to research. With the eco-garden project, we were thrown in the deep-end when they gave us independence to create the project. This was a challenge although our knowledge acquired at McGill, our common sense, and both of our experiences working on various projects in Latin America beforehand were great training for this opportunity. We used McGill's online library service for research and online literature with additional help from qualified Peruvian engineers as resources to succeed in our work. We also knew our faculty mentor would be of help if needed. Overall, we believe that we had sufficient training and mentoring to complete our work.

Training/mentoring from McGill supervisor

During the Panama Field Study Semester our mentor taught us Environmental Management, so we had the chance to explore practical management tools of impact assessment and situational analysis all while conducting interviews and interacting with the locals. Understanding the importance of public participation helped us immensely while working with the Peruvian commu-

nity, as communication was a key factor to getting a clearer picture of the people's circumstances as well as simply being able to work with our coworkers. This also gave us a more wholesome view and better grip on the environmental management and community response in Latin America. We had sufficient mentoring to complete our work and just enough training from our organization. We were given the resources needed to be successful, which included support from the McBurney Fellowship program, our mentor, as well as our CREEH supervisors throughout the fellowship.

What did you learn?

Apart from learning in depth about Peru's environmental health and pollution situation, small scale agriculture in the Peruvian coastal desert, informal settlements and the mining affairs we also learned how to be patient and manage our time wisely. When working with the organization there were timelines and deadlines, and so we learned how to work efficiently under pressure and how to distribute our time accordingly. We learned that it's important to be patient when interacting with people in an unfamiliar community, especially in a foreign country in a different language. It took patience to gain the trust of the people we worked with and time to understand their needs and capabilities, because we came from different backgrounds where our everyday problems were much different from theirs. We had to learn how to be able to communicate and relate to them to form a connection. We learned quickly, for example, that their level of education is very different from ours, so we needed to teach them concepts in novel ways. We had to reevaluate how we were going to distribute the information, for example with short information sessions, guides with only pictures on them, and by using simple vocabulary and visual demonstrations that they would more easily understand.

Would you do anything differently next time?

We would clarify a set schedule with our supervisors as well as be aware of the conditions of the exact places we were visiting. For example, if we knew about creating the eco-gardens at the beginning of the two month fellowship instead of in the last month we would have had more time to prepare and be able to accomplish more for that project. We also got invited to visit their eco-mining projects in other Peruvian departments in Madre de Dios and Puno; if we had more time we would have jumped at the opportunity to participate.

Community Implications and Further Work

What was your contribution to the delivery of health and/or social services for poor or marginalized groups?

For the contaminated sites project we took soil samples in residential areas to identify regions with high heavy metal contamination in the soil. This entire project was to emphasize and to highlight the detrimental effects of contaminants for the less-fortunate people in these communities who do not have the knowledge or resources to be able to understand or address these issues. Working in the most marginalized areas, a doctor once thanked us for remembering they existed.

We worked to identify the problem, educate the community to expand their knowledge on risk and prevention methods. Ultimately, in the long-term, this scientific evidence we helped collect will be used to create national action plans and policies to implement solutions to these growing issues. With the data evidence of detrimental effects to public health, this urges governments and national and international organizations to invest and create solutions to these issues — hopefully including education programs, temporary and long-term health assistance as well as regulations and restrictions to control the contamination from the polluting industries.

In the long-term, the eco-garden project we created was to provide an alternative source of revenue, increase food security, build stronger social networks, educate people about healthy living, create green spaces and to empower the women of Pucará. Our contribution to the eco-garden project also aimed at providing women the opportunity to have a sense of control and contribution to their household's economic productivity, especially if they choose to use their products for revenue.

How might your fellowship make a difference for the people you worked with?

The community members were grateful toward us for volunteering our time to help them create gardens and teach them about the harmful effects of mercury, as they care about the health of their children and their environment.

The miners and workers were appreciative of our efforts to help them understand the benefits of switching to mercury-free alternatives in the gold cleaning process. We demonstrated the true advantages and opportunities they had not only to make more money, but also to be cleaner and healthier to the environment and their families. For CREEH and our co-workers, we brought in new international perspectives on the issues and



projects they were working on and overall we think we made a difference in the two months we were there.

What would the next steps be to translate your findings into policy action?

The next step would be using the scientific soil sample research data we collected to help provide proof to justify the critical need for change in policy and regulations to improve the environment

of the polluted neighbourhoods we visited. Implementation of better policies is necessary because Lima has the most air contaminated pollution in all of Latin America and the effects of this pollution is affecting the people living there today and will affect the future generations. We would start off by bringing attention to the seriousness of the situation by raising awareness and giving recommendations to the public. Hopefully then, once the people have been educated and are aware, that's when non-profit organizations and government agencies bring in short-term solutions to help the immediate issues while policies and laws are being implemented for long-term. There needs to be a shift for change at all levels: individual, household, community, regional, industrial and at the national government level to address the pressing issues of contamination.

Moreover, with the implementation of the United Nations Minamata Convention in Peru, there will be a large regulation of the informal sector of artisanal and small-scale gold mining phasing out mercury use. With the help of CREEH these artisanal small-scale mines can convert to mercury free alternatives (ecological mining) as to not operate illegally and continue operations. CREEH hopes this eco-mining is put into action nationwide.

Program Evaluation

How did this fellowship further your academic or career goals?

We both firmly believe that this fellowship allowed us to fully put into practice our academic learning and advance our career goals. We did online research, field research, worked in a professional setting, interacted with community members, held interviews with professionals, attended international conferences, worked and taught in a different language and lived in a foreign country, which we think are all valuable experiences this fellowship has offered us. Working with environmental and health issues, toxicology and food security in a country such as Peru gave us ample experience in our domains and prepared us towards our future careers.

What did you value most about the fellowship?

The experience of working with such a passionate, hard-working non-profit organization whose employees dedicate their lives to helping people in need of assistance was something we valued and has inspired us to keep working on the same track. We valued this life-changing opportunity we were given to partake in such great work to improve the lives of people who lack resources, support and help people who do not have the same opportunities we have. We valued the relationships we made during our time in Lima with our colleagues and the communities we worked with.

Any advice for future fellows?

Our advice for future fellows would be to keep an open mind, be flexible and prepared to work out your comfort zone, don't be shy when interacting with the locals, people are very curious whether it is warranted or not. Do quite a bit of literary research to succeed and do not be afraid

to ask questions — Peruvians are very kind people that love to teach and show foreigners everything about their country and what they know. Finally, the pollution and poverty can be quite shocking so prepare yourself, wear sunscreen, a substantial amount of bug spray, be careful of what you eat but make sure to try all the Peruvian delicacies!

How useful was it to interact with other fellows?

Unfortunately we did not get the chance to interact with other fellows as we were both previously in the Panama Field Study Semester and could not attend the pre-departure orientation and therefore didn't meet any other fellows. However we are very interested in hearing the experiences of the other fellows and interacting with them in the future McBurney Fellowship events this coming year.

Any suggestions for how to improve the program?

The program is excellent, giving us the great opportunity to work with CREEH. One thing the fellowship did in the past was for all fellows to email once a week their work, progress and how they were feeling so we all kept in touch with each other and saw what others were doing. These emails were very appreciated and would be amazing for the future. Also have a reunion for the fellows when they come back to Montreal, as we are all interested in each other's work.

Was your project part of a larger/ongoing program? If so, what are the next steps? If not, would you recommend this placement/organization to someone else?

This was the first time the McBurney fellowship worked with this organization and we would highly recommend it for students interested in working in environmental health, sustainable development and small-scale agricultural projects. For the student to prepare for a similar fellowship they would need to do research on the relevant topics, be culturally aware, refine their Spanish skills (as there is no English spoken whatsoever), and be prepared for extreme poverty and to live in the large hectic city of Lima.