Online Proceedings

2L

WATER, WASTE, AND MONKEYS

Session Moderator: Stevan Harrell, Anthropology
MGH 284
3:30 PM to 5:15 PM

* Note: Titles in order of presentation.

When Monkeys Push your Buttons: Mapping Human-Macaque Conflict in Singapore
Dana Joy Needelman, Senior, Anthropology: Human Evolutionary Biology, Anthropology: Medical Anth & Global Hlth
UW Honors Program
Mentor: Lisa Jones-Engel, Anthropology
Mentor: Amy Klegarth, Anthropology, Center for Studies in Demography and Ecology

Global urbanization and deforestation are erasing spatial buffers between the two most widespread primates, humans and macaques. This dynamic interspecies interface can cause competition over space and resources and may precipitate general conflict, which may include property damage, physical harm, or disease transmission. In the highly urban island city-state of Singapore, multiple organizations are tasked with responding to nuisance reports and may cull, translocate, sterilize, or export macaques to manage these conflicts. This research employs a multi-disciplinary approach to assess which variables drive this interspecies conflict. From 2010-2015, 1,109 complaints were registered with National Parks, Singapore. These complaints spanned 41 subzones of Singapore where nearly 2,000 macaques in 64 troops were distributed. The complaint data were spatially plotted using ArcGIS in order to analyze where complaints occurred. These complaint data were then compared to macaque demographic data such as habituation score and group size, as well as land usage, in order to analyze factors that contribute to a high frequency of complaints in some areas. These findings have the potential to inform stakeholders, including community, government and non-governmental organizations, of more effective and sustainable management options.

Waste Management in the Remote Developing Communities of Las Piedras: A Case Study in Lucerna, Peru
Danielle E. Bogardus, Junior, Environmental Studies
UW Honors Program
Mentor: Tim Billo, Program on the Environment
Mentor: Samantha Zwicker, School of Environmental and Forest Sciences

The migrant community of Lucerna is located in the last pristine frontier forest of the Madre de Dios region of Peru, and has a fluctuating population of approximately 65 residents. To date, their waste management practices include burning, burial, and dumping waste in the river, which is causing both environmental and human health risks. The aim of this study was to understand the amount of waste and its composition, the levels of water contamination, and the mentalities towards waste management within this remote river town. Data collected during both the dry and wet field seasons and seven waste audits suggest that each family produces 3.5 kilos of waste per week on average. The composition of this waste includes plastics (bottles and bags), cans, glass, and miscellaneous waste. Organic waste is primarily reused as food for livestock and was therefore excluded from this study. The amount of waste acquired per family remained constant between seasons. Thorough water sampling was completed that will later supplement waste audits to correlate water contamination and the current burning, burial, and dumping of waste near water sources. Mentalities towards waste management were measured through informal interviews and observation. The option to transport waste to the closest city of Puerto Maldonado was impractical due to the cost and needed organization within the community. Instead, garbage pits were constructed in January of 2017 to ensure proper waste management and the mitigation of contamination until the necessary infrastructure is in place at the municipal level. This case study will serve as a replicable waste management framework for other remote developing communities within the Las Piedras region, and Amazonia as a whole.

Detecting and Measuring the Concentration of Zinc in Water Using *Saccharomyces cerevisiae*

Lauren Nicole Goetsch, Junior, Extended Pre-Engineering
Hieu Ngoc Do, Junior, Pre Engineering
NASA Space Grant Scholar
Pezhman Khorasani, Junior, Electrical Engineering
Caleb Ellington, Junior, Bioengineering
Mentor: Eric Klavins, Electrical Engineering

Zinc pollution is a large problem in underdeveloped countries with mining industries. Leaching of brass and galvanized iron can add substantial amounts of zinc into water resources. Furthermore, high zinc concentration is usually indicative of lead and cadmium, which, when once accumulated in the human body, can negatively affect the immune system. Currently, there are no rapid, inexpensive methods to determine the concentration of zinc in water. The sample is usually sent to a lab and analyzed using sophisticated and prohibitively expensive instruments. Our goal is to create an affordable and easy-to-use diagnostic tool using Saccharomyces cerevisiae—a yeast commonly used in industry. By designing a gene circuit that connects a zinc-sensitive promoter for Green Fluorescent Protein (GFP), we hope to engineer a strain of yeast that will give a green fluorescent output of different intensities when grown in different concentrations of zinc. After building and testing different strains of yeasts– each using a different zinc sensitive promoter, we found that there was no significant variation in GFP output between different concentrations of zinc and between different yeast strains. In addition, after comparing the results with a wild-type control, we also found that our recombinant strains are not much better at detecting zinc than the wild type strain. For the next steps of this project, we will continue to build gene circuits involving other zinc sensitive genes. Once a few genes are identified as being suitable for our purposes, we will focus on amplifying and fine-tuning GFP expression as well as replacing the GFP with that a color output that can be detected by the naked eye.

The Biogeochemistry of Thornton Creek: An Urban Watershed Investigation

Rachel Sumiko (Rachel) Yonemura, Senior, Environmental Science & Resource Management, Biology (General)
Mentor: David Butman, School of Environmental and Forest Sciences
Mentor: Catherine Kuhn, SEFS

Urban development is occurring at an unprecedented rate in the city of Seattle, WA. What were once healthy salmon spawning streams are now highly altered ecosystems that reflect the impacts of human land-use change. However, little work has been done on the impact that these changes are having on the carbon biogeochemistry of urban streams. We investigated the biogeochemical properties over time of Thornton Creek, a recently daylighted and restored stream network in Seattle. We conducted longitudinal sampling at three locations along Thornton Creek in a unique and newly restored area. Our longitudinal study consisted of weekly headspace and chemistry sampling in addition to data collected continuously from carbon, dissolved oxygen, and temperature sensors installed in the stream. We used the headspace method to analyze dissolved gas concentrations contained in the stream water by equilibrating the stream water with atmospheric air and injecting the samples into evacuated exetainers. The samples were then run through a GC-MS machine and corrected using atmospheric samples to reveal the dissolved stream carbon dioxide and methane concentrations. The results of this research have implications for how humans have had an impact on the concentrations of dissolved gases in the surrounding water bodies with ramifications for urban streams as localized sources of carbon dioxide and methane to the atmosphere. Additional data on water chemistry highlights the consistency of these gas concentrations over time.