

I would first like to begin by sincerely thanking the American Alpine Club for helping to fund this expedition to Peru. Being given the opportunity to be able to travel half way around the world to some of the most incredible mountain I have ever experienced was something I will forever be eternally grateful for to everyone involved in helping me get there.

On June 11th I left for Peru for a 9 week expedition with the American Climber Science Program in the Cordillera Blanca's. The main focus of the expedition was to do scientific research with an environmental focus on the effects of climate change and the effects of human impacts in the Cordillera Blanca. My original plan was to go on this expedition with an intent of creating a lichen growth curve to be used in dating the local moraines. However, once in the field this proved to me much more difficult than previously anticipated, the lichen being much harder to accurately identify for the use of a growth curve and finding locations that could



be accurately date for use in the growth curve in microclimate zones similar enough to the location of the moraines proved another large. For that reason, it seemed my manpower was better put towards helping out with the several other projects that were being conducted on the same expedition.

Perhaps the project I ended up helping out with the most was with the insect survey in the valleys. Rebecca Cole, was the professor in charge of the project but since she could not be there for 6 of the 9 weeks I and another member of the group ended up taking charge of the data collection. The goal of the insect survey was to be able to collect insects in both the polylepis forests as well as the grasslands at different elevations in order to examine the effects of grazing on the insect populations. (Local grazing is a huge reason for the cause of deforestation in the valleys) The survey seeks to look at the effects of grazing through the lenses of insect population in and outside of the forests as well as to get an idea of the distribution of the different insects. 20 pitfall traps were placed inside of a polylepis forest and another 20 were placed just outside in the open grasslands with a spacing of 5 meters. Small holes were dug with the use of ice axes, and even the occasional cow bone in which a 10oz cup was placed flush with the surface of the soil and filled with an inch of diluted alcohol. Once collected the insects were placed into 100% alcohol to be preserved until they could be taken back to the states to be identified down to genus. We collected samples at three different elevations in 4 separate valleys.

One of the most visible effects of grazing was, naturally, the effects of grazing on the vegetation in the valleys. In order to see these effects, fences were built



Collecting insects from the pitfall traps to be preserved in 100% alcohol

around small plots of land called exclosures to keep livestock out to so that the effect of removing the stress of cattle and other livestock on the vegetation could be observed. This project was mainly located in the Ulta Valley. This was an ongoing project that had already been in place for several years but tasks involved a vegetation and taking soil samples which were analyzed for density, (the constant trampling of livestock compress the soil thus increasing the density) as well as looking dissolved ions.



Working on the vegetation surveys in the cow exclosure

Water sampling was also an ongoing project that



A creek that appears orange as a result of precipitation due to the high sulfuric acid content

was done in the valleys, where streams were sampled above and below various input feeders and tested for pH, temperature, dissolved nitrogen, dissolved oxygen and other various heavy metal and dissolved ions. Some of these measurements, such as pH, temperature, dissolved oxygen and dissolved nitrogen was taken in the field while other is going to be taken on samples taken and brought back in the states. One of the more interesting phenomenon's we observed taking place in one of the valleys relating to water quality took place in the Quilcayhuanca valley. Glacial retreat resulted in the exposure of pyrite rich bedrock, where, when weathered created sulfuric acid as a byproduct which eventually found its way into the streams causing a pH as low as 3 in some cases and appeared distinctly orange from the precipitation that collected on the stream bed as a result.

Another project I helped with was the black carbon snow sampling project. Black carbon is of particular interest on the glaciers as black carbon particles absorb solar radiation in the form of heat, which hypothesized to speed the melting of

glaciers. This involved climbing up onto the glaciers to collect snow samples to bring back to base camp to be filtered. Analysis of the filtered samples did not take place in the field but instead the samples were brought back to the states to be analyzed this winter. Analysis this winter includes both looking at the quantity of black carbon present in different snow sampling sites as well as making an attempt to determine the main sources using chemical signatures in the black carbon. We also took measurements on the reflectivity of the snow using a spectroradiometer to pair with the black carbon measurements. This was of particular interest when paired



Taking reflectivity measurements at a snow sampling location with the use of a spectroradiometer



A view of Huaraz from the roof of the Hostel we stayed at

with the black carbon research as the black carbon research hopes to link the quantity of black carbon to the melt rate of the glaciers, the reflectivity measurements help give insight as to how much solar radiation is being absorbed by the black carbon. This project was the one including the largest climbing element to it as we had to get up on the glacier to collect snow samples.

Before traveling to Peru I had never traveled outside of the US and Canada, so to spend 2 months in a completely different part of the world was an amazing and eye opening experience. Learning how to function in a place where my language skills were all but rudimentary was something that made even a simple trip down the block to the grocery store seem like a huge adventure and being exposed to a place where so many of the basic living conditions we take for granted in the states were all but non-existent in the everyday lives of so many people was something that really gives you a much deeper understanding of what most people go through on a day to day basis. While much of my motivation to traveling to Peru involved a passion for climbing and being outside, this trip has definitely deepened my interest in world cultures on a level I can honestly say, I did not expect in the planning stages of this trip. If anything, this trip was something that had greatly deepened a desire to be able to travel again if only to gain a better understanding of the world we live in and the people who inhabit it.



First moment of freedom from the tent after an unexpected snow storm

This trip also gave me a huge opportunity to expand



upon my own mountaineering skills. All of the mountaineering I had done up to this point had almost exclusively been done in the Cascades of Washington and Oregon and getting to learn a new mountain range was a super cool experience. One thing I remember from my first few weeks there was the coming to terms with how different the yearly seasons were in Peru and how this effected the snow conditions. Having spent most of my time in the Cascades, things like snow stability have an often somewhat predictable pattern depending on the time of year and the storm cycles coming though. While much of my Avalanche knowledge from home was very applicable in Peru, getting to know the character of the snow and seasonal snow cycles was something that was a super cool learning experience for me. Learning to deal with long term travel at higher altitudes was also a super new and an amazing learning

experience, made only more interesting by the fact that our group carried with us a pulse oximeter, allowing us to conduct our own informal experiments on how the body struggled to readjust to this new environment.

Thanks you so much for helping to make this expedition possible for me. I can say with complete honesty that this was truly a life changing adventure, and I cannot express enough gratitude for the opportunity you have helped give me. Thank you.