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7/13/18

Local Knowledge and Global Trends: Fishing, Climate, and Industrialization on the Peruvian Coast

Ethnographic research and the discipline-specific methods such as pile sorting and free listing are not only the cornerstone of the field of anthropology, but they complement the research of numerous disciplines ranging from geography to economics and served as the cornerstone for the field of anthropology. Although there has been collaboration in the past, currently, the incorporation of and the collaboration with “ethno” disciplines are on the rise. These schools of thought effectively combine ethnographic methods and anthropological analytical lenses to their long-established discipline-specific methods, resulting in “ethnohistory” or “ethnoecology.” The benefits of these mergers are powerful.

Ethnographic methods and the resulting analyses offers intimate, lived-experience, grassroots glimpses into intricate, complex, and previously impenetrable cultural domains. Consequently, these interdisciplinary approaches not only bear the potential to revolutionize the ways in which research disciplines ask questions and approach problems, but they can enhance the robusticity of a research project, complement existing literature, and even dispel assumptions. My research question, in many ways, emerged from assumptions and the potential for ethnography to dispel problematic generalizations will emerge throughout this ethnography. I aim to

demonstrate the ways in which ethnographic accounts can enhance and provide a more detailed image into the complexities of climate change and global development at local levels.

Due to the myriad ways in which the lives of coastal fisherman are intimately enmeshed with the natural world, in this case, the coast, the lived-experience of these fishermen can yield powerful insights into how global climatic and macroeconomic trends are actually being experienced on a local scale. My question concerned itself with the increasingly complex and hard-to-measure ways that climate change at the global level is impacting local communities, specifically local subsistence practices such as coastal fishing. The assumption on my part, as the researcher, emerged as a consequence of hoping to find analogous lived-experience components between the impacts of climate change on Peruvian fisherman and the global trends exposed in literature. Many analogous components are present, but they are far from comprehensive for adequately encompassing the true locally-informed impacts of the changing climate.

Studying climate change is crucial not only for the production of new knowledge but also because it is a tremendously pressing issue for the twenty-first century. Climate change affects humanity, and consequently, the study of the changing climate should primarily focus upon the human element of climate change. The “human element” in this case not indicating the numerous and deeply embedded ways in which humanity contributes to climate change, rather the ways in which humans are already changing their lives, practices and economies as a result of climate change.

Methods and Setting

The material discussed in this ethnography emerged exclusively from semi-structured interviews (N=8) and observations in the Peruvian coastal town of Huanchaco over the course of approximately four weeks. The informants all resided in Huanchaco and were practicing fisherman between the ages of 30-68. Interviews were conducted with the assistance of a translator, most notably Martha Diaz-Adam, who will be further recognized in the acknowledgements. Additonally, Rafael Vasquez Guerrero assisted in acquiring informants and provided invaluable advising and direction to the study. Most interviews lasted between 15-25 minutes, while two lasted an hour. It is important to note that the interviews were conducted during the off season for the tourism industry in Huanchaco.

> “In considering the study of physical phenomena, not merely in its bearings on the material wants of life, but in its general influence on the intellectual advancement of mankind, we find its noblest and most important result to be a knowledge of the chain of connection, by which all natural forces are linked together, and made mutually dependent upon each other; and it is the perception of these relations that exalts our views and ennobles our enjoyments.”
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> -Alexander Von Humboldt, Cosmos, 1845

El Niño: A Complicated Relationship

Alexander Von Humboldt (1769-1859), a naturalist and geographer, inscribed these immortalized words into a five-volume treatise on the natural world, the human experience and human nature titled “Cosmos.” Wherein he describes histories and environments of numerous areas throughout the globe, including people and plants of the Andes. It is no coincidence that after spending 5 years in South America he would

describe natural forces as “linked together” through a “chain of connection” as the inhabitants of the Peruvian Andes, as well as the Peruvian coast, are inextricably connected to their environment. Humboldt, not unlike the locales of the Andes that filled his notebooks, was a vertical man, believing in the need for place-based research and first-hand experience in the natural world to gain the proper knowledge of the area. This philosophy led him to climb Chimborazo, which at the time he believed to be the highest mountain in the world. Altough he failed to reach the summit, his descriptions of the changing environment as one ascends were remarkably influential for the inchoate theories of mountain life and mountain geography.

There is scarcely a single population in the world more dependent on their glaciers than the people of the tropical Andes, for the populations occupying the arid and semiarid regions of the tropics and subtropics, these glaciers provide more than 80% of the freshwater for downstream communities.[1] The interconnectedness between the natural world and humanity does not end with the mountains. The inhabitants of the coast were equally dependent on the natural world as those dwelling thousands of meters higher. For thousands of years, the Peruvian coasts have been home to civilizations and ancient humans and the reason for this is clear. The Peruvian coast is one of the richest fisheries on Earth, allowing for multiple civilizations to flourish on the western edge of South America.[2] The Moche and the Chimu both thrived, in large part, on fishing as evidenced by the iconography and the clear cultural importance of coastal fishing. However, there is a tenuous relationship between the coastal inhabitants, past

[1] Vuille et al, "Climate change and tropical Andean glaciers: Past, present, and future," *Earth-science reviews* 89, no. 3 (2008): 79-96.
[2] Montecino and Lange, “The Humboldt Current System: Ecosystem components and processes, fisheries, and sediment studies,” *Progress in Oceanography,* 83, (2009), 65-79.

and present, due to an immensely powerful phenomena known as “El Niño.”

During a normal year, the Northern Humboldt Current System moves cold water up the coast of South America until it reaches Ecuador, at which point it flows out into the Pacific Ocean toward Asia. The equatorward winds of the Peruvian coast drive a persistent and crucial upwelling system. Upwelling occurs when winds travel parallel to the coast and drive the movement of cold, nutrient-rich waters to the surface. Upwelling systems provide a significant portion of the marine fish while occupying a very small amount of the global ocean surface area.[3]

The upwelling of nutrient-rich waters allows for rapid production of primary producers such as phytoplankton. Consequently, this upwelling allows for enormous populations of fish to flourish on the cascading chain that emerges from the phytoplankton as the accumulation of energy climbs the food chain. For Peru, this evidences itself in the form of massive populations of Peruvian *anchoveta*, or the anchovy. The anchovy is commercially fished by global fishing enterprises as well as locals on the coast of Peru. Primarily, the anchoveta is ground up into fish meal, which serves as a protein supplement, food for fish farms, or for fertilizer.[4] The health of the anchoveta population is deeply dependent on the temperature and nutrient density of the Humboldt Current and consequently, their population offers glimpses into the overall health of the entire Northern Humboldt Current System.

During an El Niño, the warm waters of the central or eastern Pacific are displaced eastward towards the coast of South America. The cold waters that normally

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[3] Jennings, S., Kaiser, M.J., Reynolds, J.D. (2001) "Marine Fisheries Ecology." Oxford: Blackwell Science Ltd.

[4] M. L. Windsor, “Torry Advisory Note No. 49, Torry Research Station, Food and Agriculture Organization of the United Nations, no date.

supply the coast of Peru with their world-renowned fisheries are abruptly buried under a pool of warm, surface water. As the warm water dominates the typically-cold Humboldt current, the anchoveta starves due to its dwindling source of phyto- and zooplankton. The stress placed on the anchoveta is felt in other fish species and propagates outward into almost all fish populations endemic to the South American western coast.

In the last fifty years, there have been four strong El Niño events during 1972/73, 1982/83, 1997/98 and in 2015/16. During the first three El Niño events, for which data is available, one can observe a stark decline in anchoveta populations during those years. Two Peruvian researchers included the figure below (Figure 1), from the FAO, in numerous case studies on the status of fisheries and aquaculture in Peru.

Figure 1: Historical catches of anchovies from 1960 to 2009 (FAO/Ministry of Production in Peru)

Each El Niño event matches perfectly with a dramatic drop in anchovy catches. Not only does the El Niño phenomenon have profound impacts on the ecology the Peruvian coast but the Peruvian Andes, as well. The glaciers of the Cordillera Blanca, some of the rarest and most sensitive glaciers in the world, feel the effects of the El Niño in the form of glacial retreat.[5]

Literature Review and Lived Experience Comparisons

Even though the international community and the literature agrees that colder waters yield better fishing, some informants regarded El Niño years as superior fishing years and gave credit to the warmer waters. This is entirely contrary to the literature and

[5] Rabatel et al, "Current state of glaciers in the tropical Andes: a multi-century perspective on glacier evolution and climate change," *The Cryosphere* 7, no. 1 (2013): 81.

accounts from other fishermen, but rather than discard these as inaccurate claims, I think there may be an important insight present. One possible explanation for these contrarian claims may be due to the harshness of cold water on old bodies. Multiple informants described the aching and pain that comes from prolonged fishing in the colder waters. The caballito, a reed boat used by the locals and their ancestors for thousands of yeas, subjects the fisherman to most of the full brunt of a frigid ocean. If a fisherman feels as though this is suffering and challenging for their bodies, they may be less likely to fish.

A second explanation emerges from an examination of commercial fishing. If commercial fishing enterprises acknowledge that during the El Niño fish populations are lower and consequently fishing is poor, they may shift their boats to other fisheries. Resultantly, the fishing, in an absolute sense, may be poorer than other years, but relative to a year in which commercial fishing dominates, the El Niño may appear to be better. For example, if the commercial fishing industry consumes 95% of all fish that would otherwise be available to the Huanchaco fisherman, and the El Niño removes 90% of all fish available off the coast, it is no stretch of the imagination to see that Huanchaco could experience better fishing during El Niño years because the influence by commercial fishing is so potent.

Navigating Assumptions

As a student researcher concerned primarily with the environment through the lenses of research, social science, and environmental history, it was easy and comfortable to focus my analytic lens and research question on the way in which the

fisherman of Huanchaco experienced climate change. Climate change is, after all, one of the most pressing global issues facing humanity today.

Consequently, I eagerly dove into my ethnographic interviews and research with the hope of finding a new, novel, and confirming answer to the questions regarding climate change in South America. Unfortunately, this clouded my research question and forced me to later re-examine my questions and the material I had acquired thus far.

The reason for the reassessment of the research question came after my first two interviews. Between them, the two men had more than a century of fishing experience, though neither of them cited climate change or the changing El Niño as the most pressing issue facing fishing in Huanchaco. In fact, the reported factors influencing the fishing practices in Huanchaco were varied enough to merit categorization. To help me better understand the factors affecting the fishing industry in Huanchaco, I organized them into human and non-human factors. Non-human factors include changes in water temperature or other climatic shifts. Even though these are certainly casued by human influence, I have placed them in a non-human category because they are aspects of the natural world, rather than than development or desires for education, which are in the category of human factors.

Non-Human Factors

Non-human factors ranged from water temperature to the South American sea lion. I suspected, as aforementioned, that the non-human factors would dominate the concerns of fisherman in the same way climate change dominates the environmental concerns of many young people in the United States. However, that was not the case.

Several informants mentioned climate change and the dynamic water temperature as factors contributing to the decline of fishing, though nobody considered it their top concern. Other noteworthy non-human factors include loss of the totora reed, a plant crucial to the construction of the centuries-old local fishing vessel, the *caballito de totora*, as well as lower yield of fishing expeditions. However, the catch from the fisherman is a concerted factor which I will highlight in the following passages.

Human Factors

The human factors affecting the fishing practices of Huanchaco are far deeper and more complex than the non-human factors. First, it is important to note that every informant did conclude that fishing is a dying practice in Huanchaco, but the causes for this loss were difficult to pin down. One fisherman expressed hope for his children, hoping that they could go farther and be more successful than him. He referred to fishing as a “suffering livelihood” as it is one of hard work and diminishing reward. He hopes that his children can get a university education and consequently move to the cities of Peru, rather than live in a small town like Huanchaco.

Another factor comes from the urban development in Huanchaco. One informant, also a fisherman, expressed concern over the human-induced destruction of the totora reed. In the neighboring town of Huanchaquito, city planners had zoned areas that were beds for the totora reed as an area for expansion, resulting in a loss of the already-locally-threatened reed. The reed is invaluable to the local fisherman. When asked if the fisherman fished by any other method other than the caballito de totora, the fisherman laughed. Fishing in Huanchaco and the caballito are entirely inseparable. The death of

the totora will likely catalyze the demise of fishing as a practice in Huanchaco.

The factor that received the greatest concern from informants came from commercial fishing. As mentioned earlier, commercial fishing is likely the most dramatic outside factor, human or non-human, affecting fishing in Huanchaco. Informants mentioned commercial fishing in almost every interview and consistently regarded it as a factor leading to the loss of fisherman to other industries. This ethnographically-based account concurs with the literature. The Peruvian *anchoveta* has been termed by the IUCN Red List, an international comprehensive list of threatened species, as "the most heavily exploited fish in world history," giving further credence to the concern shared by the Huanchaco fisherman.[6]

Conclusions

If one travels to Huanchaco, within the first few moments one will be bombarded by imagery of the *caballito de totora*. Flags bear the boat and every shop in town has either a painting of the *caballitos*, or small replicas mounted on the walls. They cannot be missed on the beach as they rest resolute against the walls of rock and stone that line the shore. Fishing is absolutely enmeshed in the culture and history of Huanchaco, and any threat to fishing and the livelihoods of those embedded in the craft of fishing is a threat to the subsistence practice that dates back generations.

Aside from the valuable cultural component of fishing in Huanchaco, fish also serves as a crucial source of protein for the locals. All of the oldest informants, who have been fishing for between thirty and fifty years, cited fish as a major source of

[6] Iwamoto, T., Eschmeyer, W. & Alvarado, J. 2010. *Engraulis ringens* The IUCN Red List of Threatened Species. Version 2014.

protein and regarded as necessary for their strength. It becomes further apparent that fish is a crucial staple when considering the popularity of the dish ceviche, prepared by curing raw fish in citrus juices. This dish is now consumed around the world and now many claim that it originated in Huanchaco.

The power of ethnography to inform and supplement climatological studies bears the potential to bridge expanding gaps between academic research bodies and the general public. Ethnography as a scientific method utilizes the human researcher as an instrument, allows for far more intimate glimpses into dizzyingly complex systems with equally convoluted cause-effect relationships. Consequently, anthropological research and the accompanying ethnographies with their immersive vignettes, offer a far more captivating and intuitive experience for the public, allowing them a more detailed and empathic perspective on the lived-experience of those living lives far different than theirs.

As the challenges facing Huanchaco are certainly analogous to factors elsewhere around the globe, social-science informed interdisciplinary studies are crucial for assembling and united a global force to address challenges that span far more than one sandy beach on the coast of Peru. Studies that integrate natural and social scientists demand a new cadre of interdisciplinary, applied researchers to capitalize on Humboldt's words, to understand the complex relationships in this globalized, interdependent world that "exalts our views and ennobles our enjoyments."

Acknowledgements

My time in Peru could not have been possible without the generosity and

empowerment of the Benjamin A. Gilman Scholarship Program of the United States Department of State. The mentorship and guidance provided by Dr. Michelle Grocke and Rafael Vasquez Guerrero served as invaluable fuel and direction for my research. Additionally, I am grateful for the translation assistance and language instruction provided by Martha Diaz-Adam. My peers provided consistent feedback and interview assistance, most notably Joseph Sulik, Alyson Spery, and Gavin Crane, who offered their ear and their thoughts throughout the project.