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Editors' Note:

The Anthropology Graduate Student Society thanks the many people who made this journal possible. First, thank you to all the students who facilitated the production of this journal. From fundraising to serving on the journal committee, your spirit of volunteerism allowed this publication to materialize. To the community of exceptional anthropology students, your warmth and enthusiasm eased each step of the publication process with mutual support. Just as last year's journal saw continued collaboration between graduate and undergraduate students, this year's teamwork was no exception. The ongoing success of *Furthering Perspectives* is largely due to these hardworking and talented students. We thank all students who submitted papers to the journal, and we hope you have benefited from the review process and become more confident in your research and writing.

This year we were very fortunate to have an editorial board comprised of reviewers with a diverse range of experience. We would like to express our sincere appreciation to these editors, whose time and insights have raised the caliber of the papers in this journal. Thank you to: Dr. Cliff Boyd, Dr. Donna Boyd, Dr. Colin Grier, Dr. Barbara Hawthorne, Mr. Benjamin Jewell, Dr. John Jones, Ms. Bethany Mizushima, Dr. Donna Nash, Ms. Carla Pezzia, and Dr. Tim Wallace.

We extend thanks to the anthropology faculty and staff who have provided us with advice and fundraising. Also, we extend a personal thanks to our faculty advisor Dr. Mary VanBuren, and the wonderful staff in the CSU anthropology office, including Rosalie Samaniego and Lynn Stutheit. As well as a very special thank you to former students, Melanie Graham, and AGSS founders Benjamin Jewell and Bethany Mizushima. We aspire with each volume of this journal to continue the tradition of service and academic excellence that our AGSS founders exemplified.

Finally, we thank you for purchasing a copy of this journal. With your support, we come closer to a fifth volume of *Furthering Perspectives*, continuing what we hope will be a long series of publications.

The AGSS Journal Committee welcomes and encourages feedback from those who come across this journal. Please feel free to contact us.

Editors-in-Chief
Anthrograd.group@gmail.com

I. Archaeology

Two Paths Diverged in Beringia

Andy Kruse

Abstract—*It is most commonly agreed that during migration around the planet, humans first reached North America between 20,000 to 14,000 years ago, with increasing populations arriving towards the end of this time period. Through archaeological, skeletal, genetic, and dental evidence along with language tradition movements; a migration route using the Bering Land Bridge from northeast Asia is apparent. The exact path along this route is not yet agreed upon, although a land route with a southern path through an "ice-free corridor" remains the most popular. However, a reconstruction of this proposed corridor through paleoecological, paleogeological, paleofaunal, and archaeological evidence suggests that this area was too narrow and inhospitable for human as well as most floral and faunal existence during the late Pleistocene Wisconsin Glaciation of 25,000-10,000 years ago. Thus, a coastal route along the land bridge rather than an inland route seems a more logical means of migration from Siberia and East Asia to the New World.*

Introduction

At the turn of the 20th century it was thought that humans had only been in North America for a few thousand years. Then in the 1920s, discoveries at Folsom and Clovis, New Mexico, of fluted spear points lodged in the skeletal remains of extinct bison dating to about 12,000 years ago pushed the human arrival date back to at least then. Through archaeological, skeletal, genetic, and dental evidence along with language

tradition movements; a migration route through a then exposed Bering Land Bridge from northeast Asia has been established. Subsequently, this date of human presence in North America, means that people had to be migrating through the land bridge in the late Pleistocene during the time of the Wisconsin Glaciation, a period from about 25,000 years ago to 10,000 years ago when much of the northern part of the continent was covered with extended ice sheets (Jackson and Wilson 2004). At this time there were two major ice sheets in this area of the continent; the Laurentide ice sheet, which covered much of northern Canada extending far to the east; and the Cordilleran ice sheet, which came from the northwest coast of Canada to east of the northern Rocky Mountains.

In the 1930s, studies from the Geological Survey of Canada revealed that there had existed a passageway (see Figure 1) between these two ice sheets that would have made it possible for human migration into southern North America (Jackson and Wilson 2004). This passage would have extended 2,500 kilometers from northern Yukon south to northern Montana on the east side of the Rocky Mountains, which extend all the way up to Alaska as the Mackenzie Range (Jackson and Wilson 2004). It was coined the "ice-free corridor" and serves as the popular explanation of how humans made this migration to the New World through a region covered by ice. But this begs the question, was the corridor actually hospitable enough to provide for human life in order to make such a migration possible? This paper questions the "ice-free corridor" hypothesis for human entry into the New World.

Figure 1: Ice-Free Cooridor (Jackson and Wilson 2004)

Methods

Several methods are employed in order to paint a picture of this past ice-free corridor. Paleogeological reconstruction of this area can serve to determine the movements of these ice sheets during the Wisconsin Glaciation in order to identify the extent of the corridor. Here a look at glacial moraines and glacial erratics is used to find glacier location and movement. Glacial moraines are the build-up of rock that a glacier causes as it advances across the land and then leaves in place as it melts and retreats (Walker 2005). From these, the exact extent of the last glacier present in an area can be told. Glacial erratics are rocks and boulders that are left behind by a moving glacier. These can be bigger than cars and houses and show the path in which it followed (Jackson and Wilson 2004).

These events can be dated using a technique called cosmogenic chlorine exposure dating. Minerals in rocks have a reaction with cosmic rays when exposed on the earth's surface, which causes a buildup of chlorine-36. This can be measured in

order to determine the amount of time the rock has been exposed, therefore indicating a relative time of the glacial event that caused the exposure of the rock (Phillips et al. 1986).

Paleoecological reconstruction determines the past floral presence in the area and is done largely through pollen analysis. Pollen has an outer layer that is extremely resistant to decay lasting tens of thousands of years. This outer layer also has a structure that is specific for its plant taxonomic group, making it possible to identify precisely from what plant the pollen comes through taxonomic keys (Krutz 1955). And unlike fossil remains, pollen is continuous and uniform, allowing for very reliable results. This, coupled with radiocarbon dating, which can date organic material almost to 50,000 years ago, produces an accurate picture of the past flora that existed in this supposed path of human migration.

Paleofaunal and human presence from the area is then determined through proper paleontological and archaeological survey and excavation. Various absolute and relative dating techniques are used here to determine the chronology of the remains found.

Paleogeological Evidence

The paleogeological evidence was taken from a combination of glacial erratics along the western limit of the Laurentide ice sheets, from glacial moraines near the Mackenzie Mountains, and from what is called the Foothills Erratics Train. This is a 600-kilometer path of quartzite boulders ranging from car-size to house-size that extends from northern Montana halfway to Alberta and into British Columbia. The cosmogenic chlorine exposure dating of the Erratic Train shows twelve dates between 18,000 and 11,000 years ago (Jackson and Wilson 2004). These dates coalesce with dates of the other erratics and moraines from the area. The path of erratics was at times as

narrow as a kilometer and is found in areas of mixed Cordilleran and Laurentide ice sheet till (Jackson and Wilson 2004). This suggests that the Cordilleran and Laurentide ice sheets were mostly merged during the Wisconsin glaciation, and if open at all, the corridor remained very narrow. In addition to these factors, the Richardson Mountain Range which lies at the northern end of the corridor would have all but blocked the passage. During the glaciations, one path through McDougall Pass was flooded by glacially impounded waters, and the other, Peel River Canyon, was buried under glacial ice (Catto 1996). These factors make the ice-free corridor a very unlikely path for human migration.

Paleoecological Evidence

In the areas that may have been exposed, paleoecological data was gathered to find whether or not the area could have supported human life. Stratigraphic pollen analysis combined with a regional vegetation record that extended back 18,000 years was evaluated in relation to human caloric need. The results showed that the food base of the corridor between 18,000 and 13,000 years ago was below that of the minimum nutritional needs required to maintain a viable human population of at least 500 individuals. But this food base was abundant however, after 12,000 years ago (Mandryk et al. 2000).

The faunal record of the area shows an abundant mega-herbivore presence before and after the time of the Wisconsin Glaciation. In central Alberta, several thousand bone and tooth specimens have been recovered, 20 mammalian grazer remains have been found, and almost 40 radiocarbon dates have been attained since 1989 to support this (Burns 1996). The data here suggests that the land before and after the times of the ice-free corridor would have been an abundant grassland steppe region

that supported horse, bison, and mammoth and would have provided plenty for human subsistence (Burns 1996). But conversely the data implies that during the Wisconsin Glaciation, the "ice-free corridor" would have not been inhabited.

Archaeological Evidence

Archaeology tells us that Neanderthals had migrated up into southern Siberia during the Middle Paleolithic period between 70,000-40,000 years ago leaving behind Mousterian lithic tools. Then during the Middle Upper Paleolithic from 26,000-19,000 years ago, people moved up into the sub-arctic Siberian mammoth steppe leaving classic upper Paleolithic technology of blades, bifaces, and bone and antler awls and needles. It was not until the late glacial maximum receded that people moved up into the northern arctic regions of Siberia starting around 17,000 years ago (Goebel 1999). Subsequently there is a 5,000 year gap in the fossil record between the latest sites in Siberia and the earliest in western Beringia that date to 14-12,000 years ago. The reason may be due to the mountain range making up the border between the two regions that could have been a significant barrier to human migration during the last glacial period. The earliest components in eastern Beringia of Alaska show to be from the Dry Creek site which dates to 11,700-11,000 years ago (Goebel 1999). Unfortunately the available evidence from these regions only tells a partial story. Due to harsh conditions, glacial tilling of the earth, and the much higher sea levels, much of the remains are lost or have yet to be found.

In regards to the "ice-free corridor," we are faced with what seems to be a complete lack of evidence for human life from this time period. The oldest dated human occupations in Alberta begin at about 10,400 years ago (Burns 1996). The

fluted-point record shows the oldest in North America are from the southern plains and the distribution follows a northward movement of points instead of a southern route through a corridor (Jackson and Wilson 2004). This suggests that humans were already in the mainland of North America by this point and actually migrated north as the ice sheets receded.

Results

All of the above evidence seems to argue against "ice-free corridor" migrations for early Americans. Displaying normal glacier behavior, the ice sheets would have been fluctuating back and forth, especially in a time period such as the Wisconsin Glaciation with so many different periods of varying climate. So at times they could have converged while at others they could have been open. So even if there were periods of an open corridor, it most likely would have been a harsh wind tunnel between two huge ice walls, and flowing with erosion and water from glacial melt. These would have been extreme conditions that most likely would not have been favorable to sustain human life, let alone the tough plants and animals of a tundra environment that may actually support humans.

Alternative Route

If an inland route was not taken across the Bering Land Bridge, the only other alternative is a coastal route (see Figure 2). However, due to the lack of archaeological evidence that has been buried by rising sea levels, the arguments here are highly inferential. It does though, make sense that with recent peoples in arctic regions displaying the ability to exploit the coastlines by traditional means in order to meet their full subsistence needs, this option cannot be denied. The coast would have

provided extensive food resources and warmer temperatures as compared to the inland. Past human dispersals were probably largely affected by available sunlight, in that they would have stayed farther south for more optimal sun throughout the year (Hall et al. 2008). Hours of light available geographically at different times of the year can be determined through a model that takes into account the eccentricity of the earth's orbit, the precession of the equinoxes, and the amount of tilt in the earth. At 65 degrees latitude, at about mid-Beringia, there would have been 2.32 hours of light on the shortest day of the year 14,000 years ago. And at 60 degrees latitude, at about the southern coast of Beringia, there would have been 5.28 hours of sunlight on this same day 14,000 years ago (Hall et al. 2008). In this way of thinking, humans would have stayed south along the coast and never even been in a position to come down the "ice-free corridor."

Linguistic data also points to a coastal migration route during this time period. The data suggests that the more than 1000 Native American languages can be grouped into three large families: Amerind, Na-Dene, and Eskimo-Aleut. Supported by dental and genetic evidence, the patterns show the major migration of the Amerind family around 14,000 years ago, followed by Na-Dene speakers between 14,000-12,000 years ago, and the Eskimo-Aleut between 11,000-10,000 years ago (Greenberg et al. 1986). Based on the frequency distribution of grammatical markers, a series of migrations by coastal peoples between 15,000-12,000 years ago produced a Pacific Rim linguistic population along the Pacific coast of the Americas (Nichols 1999). Also, connections between the Na-Dene family with the Yeniseian family group from central Siberia show 36 core words that originated from a common ancestor and reflect a maritime adaptation. Many of these words such as lake, river, ocean, and boat could point to an arrival by watercraft along the Pacific

coastline (Lysek 2000).

Figure 2: Coastal Route (Virtual Museum of Canada 2005)

Skeletal evidence shows that Paleo-Indians had morphology much different than more recent Native Americans. Although expressing a mosaic of characteristics overall, many appear to be clustered more with Polynesian and South Asian groups. This also points to possible Pacific Rim migrations of a maritime people.

A coastal migration route could also be used to explain the relatively quick arrival of people down to the southern end of Chile at Monte Verde, a site dating to 12,500 years ago. Small groups of coastal adapted foragers exploiting sea and land animals and plants, could have made their way down the non-glaciated Pacific coast during this glacial period at a relatively rapid pace (Boyd 2003).

Discussion

If the evidence points against the ice-free corridor, why did it become such a pervasive theory? Possibly the "ice-free

corridor" theory is nothing more than a powerful myth that couples the big game hunter idea for early humans and keeps us from considering other options for foraging and migration (Mandryk et al. 2000). Even if there are remains of large mammals in the far north and through the area of the corridor this does not signal human existence. These large mammals that would have inhabited Beringia are much different in their physiology, morphology, and respiratory mechanisms than humans. This would have allowed them to exist in these harsh environments where humans would have had great trouble despite their cultural advances (Hall et al. 2008).

The wide acceptance of the "ice-free corridor" theory could also be due to a lack of evidence for alternatives. With much higher sea levels today, the Pleistocene coastline is far underwater, making it very difficult to search for evidence of a coastal route. And with our knowledge of the Cordilleran and Laurentide ice sheets, we know that at times they could have allowed for such passage. So possibly the idea was jumped at pre-maturely.

The lack of evidence in the actual area of the "ice-free corridor" does not necessarily disprove the theory either. The constant grinding and movement of the earth by the advancing and receding glaciers would have no doubt led to the destruction of much of the remains left in such a corridor. So does our lack of evidence attest to the extreme geological movements that would have shredded any remains? Or does our lack of evidence attest to an actual absence of life?

The most logical alternative, when considering the lack of empirical evidence to support an "ice-free corridor" theory, is to assume a coastal route for early migrating humans during the Wisconsin Glaciation period of 25,000-10,000 years ago. However, until the next ice age freezes some of the earth's ocean waters and re-exposes ancient coasts, we will be unable to conduct the proper archaeology that may find coastal sites to

support this. Until then, the coastal route will remain just that, a logical alternative.

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American Indian Watch Fobs: Evidence of Cultural Entrepreneurial Continuity and Change

Andrea Akers

Abstract—*Historically, American Indian tribes have had diverse entrepreneurial strategies involving relationships among tribes and with Europeans. The "watch fob" is an exemplary case of American Indian entrepreneurial innovation by creating and selling European fashion items in a native style. The exploration of watch fob origins and history through examining local watch fob collections and reviewing literature reveals extensive American Indian trade networks and skillful negotiations of entrepreneurial opportunities. The trace of the watch fob and its associated works in contemporary beadwork is briefly discussed as a connection to contemporary American Indian artists.*

Part I: Introduction and Historical Context

Introduction

American Indians have been involved in entrepreneurial enterprises of many types long before contact with Europeans. When the Europeans arrived, most American Indians adapted their traditional entrepreneurial techniques in order to cater to the new European market and to utilize new trade materials. One way in which tribes did this was to create European fashion items in a native style; the "watch fob" is a perfect example of that innovation. American Indian watch fobs were part of a larger system of trade and economic ventures both

with Europeans and between tribes. The manufacture of watch fobs is not limited to one area or culture group as they are seen across North America with many different designs. Watch fobs themselves are part of a larger group of artifacts centered on the pocket watch which included pouches, cases, and chains. The exploration of American Indian watch fob origins and history tells a larger tale of skillful negotiation of entrepreneurial opportunities by Native American groups. The continuation of these relationships is seen in contemporary American Indian groups and artists.

This paper is part of a research project for the Fort Collins Museum and Discovery Science Center (FCMDS) and as such will focus on the watch fobs in their collections. In this paper I describe seven American Indian made watch fobs in the FCMDS collection in order to position the watch fobs in a larger historical context.

Intertribal Trading and Bead History

Contrary to traditional European beliefs about American Indian tribes, their pasts are long, varied, and dynamic. Beadwork, although limited compared to recent times (post-1900), was part of life for every tribe. Beads have also been produced for a long time throughout the world, not excluding Native North America. A large trade network was established to distribute beads, among other materials, due to the fact that the materials for exquisite beads were found only in certain locations throughout North America. “Prehistoric Southwestern cultures traded turquoise throughout the western regions and into Mexico. Marine shells from the Florida coasts were traded north and made into beads in Illinois. They were distributed to the agricultural societies of the Mississippi, Ohio and Illinois River valleys about A.D. 1100” (McCallum 1997:20). According to Paula Giese (1996) there were many different

materials and methods for making beads; animal horn, turtle shells, and deer hooves were often used for dance rattlers. Wolf or bear-claws often were "proof of a hunter's powers." Seeds were softened and strung, wooden beads were carved and hair-pipe bones were made out of small animal bones, which were used for regalia breastplates and necklaces. Shell was polished and drilled and was a marker of status for many. Flattened porcupine quills were used to decorate items before trade beads were available and are still used today, although marginally (Giese 1996). Beaded works were of great importance to American Indian tribes. Giese (1996) argues that Europeans did not understand the importance of the process of making beaded items, but for many tribes the process of creating a beaded work was a "sacred task." The focus of the American Indians was on the sacred process of creation rather than the "thing," which is different than Western values concerned with the finished product (Giese 1996).

Fur Trade and European Trade Contact History

The fur trade and contact with Europeans was important in the history of American Indian life and beadwork. Even though contact with Europeans drastically changed lifestyles for many American Indians tribes it is important to remember that "in studying the history of American Indian[s]…intertribal affairs bulked large and solidly permanent, whereas the new and shifting relations with the white intruder seemed recent, shadowy, and evanescent by comparison" (Volo and Volo 2000:232). According to Prindle (1999), American Indians were not interested in beads for their monetary value but were concerned with their symbolic value such as well-being, success, and immortality. They were chosen for their colors, form, and material rather than monetary value (Prindle 1999). In the 17th and 18th century of contact between American

Indians and Europeans there was a reciprocal relationship between the tribes and Europeans as many European groups adapted to tribal systems of trading, gift giving, and reciprocity (Volo and Volo 2000). Europeans utilized American Indian trail systems and trade routes in order to distribute goods, among which were Venetian and Bohemian glass "pony" and "seed" beads (Lyford 1979; Giese 1996). The new glass and metal beads were popular among American Indian groups presumably because "native beads had been prepared at such great expenditure of time and labor that they were eagerly replaced by the bright, manufactured beads of glass and metal in varied forms and sizes which were brought into the country from Europe" (Lyford 1979:56). According to Giese (1996), these small glass seed beads were interpreted by the Ojibwe, Odawah, and Pottawotomi, as "little gifts of beauty from the spirits, handed over by the white man as an intermediary of some sort." American Indians did not passively accept beads and other items of European influence; rather they incorporated the items into their worldview and beliefs.

Trade with Europeans had negative effects on American Indian groups, such as competition between tribes for European trade goods, diseases brought by Europeans, and a dependence on Europeans for new trade goods, especially dependence on alcohol (Volo and Volo 2000). Along with these aspects traditional American Indian arts such as quillwork and beadwork declined as a result of the introduction of the manufactured glass bead (Giese 1996). Many non-Indians argue that American Indians should assimilate into American culture due to the loss of traditional practices such as quillwork. In reality American Indian groups are dynamic and have adapted to the introduction of new opportunities. This is best presented by McCollum (1997:60) who commented that, "the elements that make up a cultural society include continual growth and expansion borrowing a bit here and a bit there. To

state that beads and Euro-American influences took away the national identity from the First Nations is to deny their intelligent capacity to grow." As trade and European contact increased, beads became more widely circulated and reached the Plains tribes. This increased circulation is reflected in a surge of beadwork coming from the plains. "All-over" bead patterns rather than just strips of beads and/or quillwork on clothing and other items was a characteristic of the availability of beads (Lyford 1979:58). In the mid to late 1800s groups also started to make traditionally European goods with American Indian patterns of beads in order to trade and sell to Europeans and other tribes (Lyford 1979). According to Lyford (1979:60), American Indians "realize[d] the variety of shapes and colors now at their disposal [and had] an interesting opportunity to develop the traditional style in new directions and for new purposes." The creation of beaded watch fobs was part of this innovation among other items such as "earrings, barrettes, bolo ties, purses, and dolls" (Wright 2000:216).

Part II: Analysis of FCMDS Watch Fobs

In this section I will consider three collections of American Indian watch fobs from the Fort Collins Museum and Discovery Science Center's (FCMDS) collections, the Denver Museum of Nature and Science's (DMNS) collections, and the National Museum of the American Indian's (NMAI) collections.

What are Watch Fobs?

Watch fobs originated as an important part of European men's jewelry and apparel in the late 1890s to early 1900s, more specifically as a man's pocket watch attire. The pocket watch would be in the man's pocket, with a chain attaching it either to

his belt/belt loop or to his vest button. The watch fob would be attached to the end of the chain where it attached to the man's clothing and would dangle off the chain as a piece of decorative jewelry. According to Jim Yowell, a member of the International Watch Fob Association, many European fobs were a form of advertising for large companies but were also used to present family names and clans (personal communication, October 21, 2009). Most of the watch fobs made by Europeans were usually of metal but some were out of other materials such as horse-hide. Mr.Yowell commented that many people made mementos out of their prized horses by making watch fobs out of their hair and hides (personal communication, October 21, 2009).

Advertising Watch Fobs (IWFA)

Bullet Fob (Chrisholm's Trail Old West Leather Makers)

American Indians and the Watch Fob

According to Lyford (1979:58), American Indians not only incorporated new glass seed beads into their own art, they also "saw new objects belonging to the whites and used them, at least insofar as these coincided with their own taste." Watch fobs, as traditional European jewelry, fit into the category of an entrepreneurial and personally tasteful opportunity for American Indians. American Indians made them not only to

trade with the Europeans but to wear for themselves as well. American Indians also wore more traditionally European metal watch fobs. American Indians did manufacture metal fobs as well but these were considerably less in number when compared to beaded watch fobs (based on the collections of the DMNS's collections where only two metal watch fobs are present and the NMAI's collections where there are no metal watch fobs). American Indian's adaptation of European products and vice-versa does not come as a surprise according to Mark St. Pierre because "the making beautiful of a functional item is at the core of Plains Indians art ethos" (personal communication, November, 13 2009). Although watch fobs have yet to be explored in most literature concerning American Indian art there were a few sources that mentioned American Indian watch fobs among other items that were made by American Indians and normally sold by trading posts (Anderson and Hussey-Arntson 1982:157; Schneider 1983).

Fort Collins Museum and Discovery Science Center Collection

The Fort Collins Museum and Discovery Science Center has a large collection of American Indian material culture that includes seven American Indian made watch fobs; six were given to the museum by Mrs. Marjorie Bird, (1983.041 series) and the other was donated by Mr. G. O. Simmons (1943.083.0006). Very little information is known about the items donated by Mrs. Bird and I took the task of finding information on these particular watch fobs.

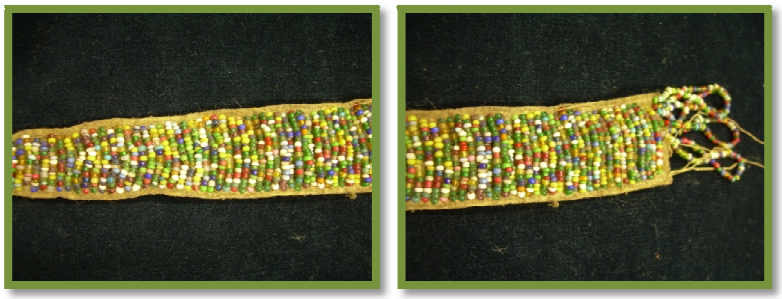
The first step in finding information was to locate people who had knowledge of beads and could perhaps provide insight on the dates and tribal origins. Two people with this sort of knowledge responded to my request for information.

One man, Mr. Andrew Higgins, the Assistant Curator of the Ethnological Collections at Arizona State Museum, was able to give suggestions on the approximate dates of the watch fobs in FCMDS' collections by analyzing the bead type and color and by thread and hide materials. Another contact who was helpful concerning tribal origin and time period was Mr. Mark St. Pierre, a former American Indian art dealer living on the Pine Ridge Reservation in South Dakota. Other information was gathered from texts describing beadwork designs, colors, and techniques that were unique to specific tribes and time periods (Douglas 1930; Wildschut 1959; Lyford 1979; Ferg 1987; Bates 2000; Wright 2000).

There are two dominant characteristics for the FCMDS collection. First is that all but one of the watch fobs are made with fibrous thread rather than sinew (animal tendon traditionally made into a thin thread by American Indians) and this indicates a more recent time period. Also, most of these watch fobs (except for 1983.041.0021) are made on tanned hide which according to Mr. St. Pierre, tends to indicate an older time period (personal communication, November 13, 2009).

Watch Fob Number 1983.041.0016

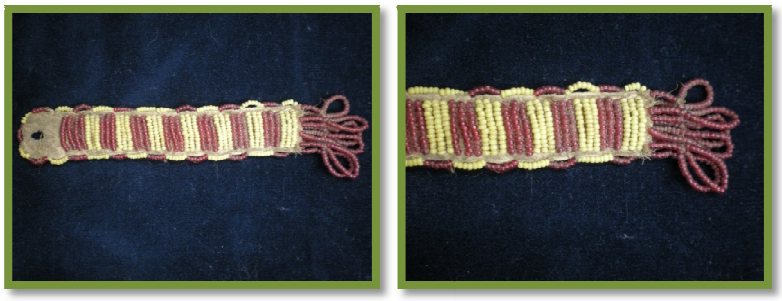
Mr. Higgins estimates that this watch fob, among others, was most likely manufactured during the 1920s to 1930s (Higgins, personal communication, November 13, 2009). In comparing watch fob number 1983.041.0016 to the DMNS and NMAI collections there were no similar patterns or colors. The shape of the watch fob was also less common as most are sharply tapered at the ends rather than having a gradual taper throughout. Like this watch fob, many of the others are sewn on hide with fibrous thread rather than sinew. This indicates a more recent time period for the manufacture of the watch fob.



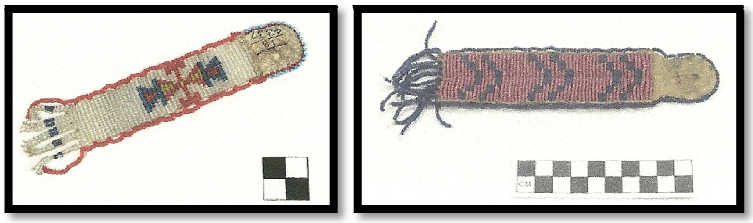
Watch Fob Number 1983.041.0016 (FCMDS)

Watch Fob Number 1983.041.0017

This watch fob also falls into the 1920s–1930s time period (Higgins, personal communication, November 13, 2009) and may be Ute because of the lazy-stitch border around the outside (Bates 2000). According to Mark St. Pierre, the use of only two colors can also be attributed to the Ute (personal communication, November 13, 2009). When comparing this watch fob to the collections at DMNS there is not much similarity but when compared to the NMAI collections there are two watch fobs that are similar, item number 184337.000 and 190735.000. The two collections are similar in shape especially with the beaded tail, but not in color. The two similar watch fobs are from the Northern Cheyenne and the Santee Sioux both dated to be made before 1936. This may reflect a system of interaction between the tribes, similar value systems, and/or similar demands from markets.



Watch Fob Number 1983.041.0017 (FCMDS)



Northern Cheyenne 184337.000 Santee Sioux 190735.000
(National Museum of the American Indian Collections)

Watch Fob Number 1983.041.0018

The time period for this watch fob is also 1920s to 1930s (Higgins, personal communication, November 13, 2009). This watch fob could be associated with the Ute because of the use of light green, light blue, yellow, and white beads (Douglas 1930). The lazy-stitch edging also points to the Ute (Bates 2000). On the other hand the box and border design can be attributed to the Crow (Wildschut and Ewers 1959). DMNS and NMAI collections did not have any similar watch fobs.

Watch Fob Number 1983.041.0018 (FCMDS)

Watch Fob Number 1983.041.0019

According to Mr. Higgins, watch fob number 1983.041.0019 may be from the 1890s (personal communication, November 13, 2009). It could be attributed to the Crow because of the bordered-box design (Wildschut and Ewers 1959). There were not any similar watch fobs at DMNS but there were two from the NMAI, one from the Blackfeet and one from the Seminole. The fobs in these two collections are similar most in shape with the two tailed end. The NMAI fob number 222351.000 tapers at the top like the FMDS fob as well.

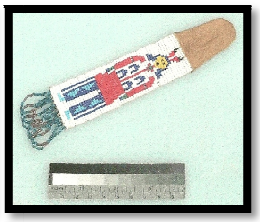
Watch Fob Number 1983.041.0019 (FCMDS)


Blackfeet 222351.000 Seminole 229063.000
(National Museum of the American Indian Collections)

Watch Fob Number 1983.041.0020

According to Mr. Higgins, this watch fob falls into the same time period as the others, 1920s–1930s, but Mr. St. Pierre believes that it could be older, possibly from the late 1890s due to the wear on the piece (personal communication, November 13, 2009). According to Mr. St. Pierre this watch fob may be Ute because there are two only two main colors (personal communication, November 13, 2009). The coloring could indicate either Ute or Sioux due to the green, blue, and white (Bates 2000). There are two watch fobs in the NMAI that are similar to this watch fob, one is Northern Cheyenne and the other is Oglala Sioux, both of which are dated pre-1932. They are most similar in their large rectangular shape and beaded tails. The DMNS collection does not have anything similar.

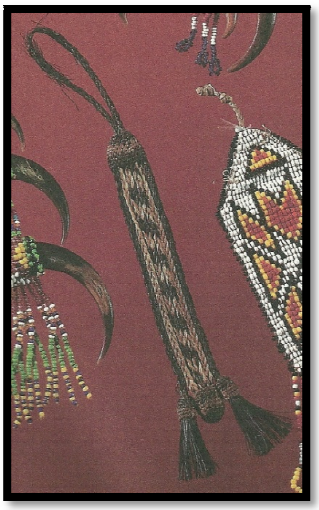

Watch Fob Number 1983.041.0020 (FCMDS)

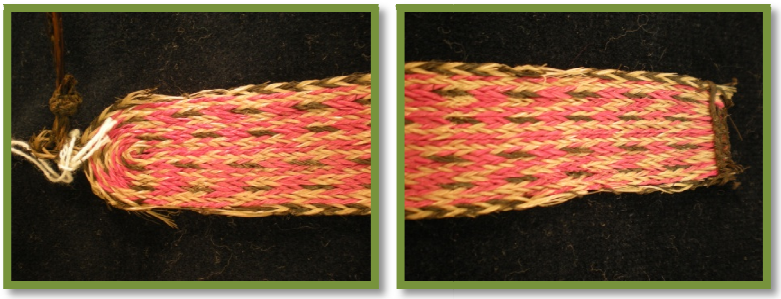
Northern Cheyenne 184340.000 Oglala Sioux 184353.000
(National Museum of the American Indian Collections)

Watch Fob Number 1983.041.0021

This watch fob is unique in that it is made of braided horse hair, which is less common than the beaded watch fobs. Due to the material this watch fob may have been made in a prison. Many American Indians in prisons around the country employed their skills in traditional arts to make items to sell for extra income. Horsehair objects were fairly specific to work done in prisons, work done by ex-convicts, or those who were taught the skill from ex-convicts (Ferg 1987). Ferg (1987) documented an Apache horsehair fob made by an ex-convicts' son (see image below). Mark St. Pierre also commented that the horsehair watch fob in the FCMDS collection was possibly from a prison inmate (personal communication, November 13, 2009).



Apache Horsehair Watch Fob, made by a man who learned the skill from his ex-convict father (Ferg 1987)



Watch Fob Number 1983.041.0021 (FCMDS)

Watch Fob Number 1943.083.0006

This watch fob had the most information from its previous owner. A Mr. G. O. Simmons donated this watch fob; he obtained it from the reservation that used to exist along the northern border of Nebraska where the town of Niobrara is located (the reservation is now called the Santee Sioux Indian Reservation and has been diminished in size from the reservation in the early 1900s). This watch fob is dated to pre-1908. Because Mr. Simmons obtained the watch fob from the "Niobrara" Reservation, it was most likely made by the Santee

Sioux who lived on that reservation, although there were many tribes in that area such as the Dakota/Yankton Sioux, Pawnee, Ponca, Arapaho, Omaha, Otoe, Cheyenne, and Lakota; all of whom could have been the manufacturers of the watch fob. There is one watch fob that is similar to this one in the NMAI collections which is Northern Cheyenne dated pre-1932, but none in the DMNS. NMAI watch fob number 184339.000 is similar in shape with a tapered top and a hide slit at the top. There are also two watch fobs in the NMAI collections that are from the Santee Sioux but they are not similar in design or color to this watch fob, although they are all made on hide.

Watch Fob Number 1943.083.0006 (FCMDS)

Northern Cheyenne
184339.000

Santee Sioux
183507.000

(National Museum of the American Indian Collections)

Exhibit Proposal

In order to educate the public on the topics of beadwork, watch fobs, continuity, change, entrepreneurial enterprises, and

relationships it is important to present some ideas for making these artifacts into a museum exhibit. After doing some research and thinking I propose that these items would convey the most information as part of a larger exhibit on beadwork and entrepreneurial enterprises. In addition, beadwork analysis should focus on how relationships with Europeans and between multiple tribes influenced American Indian beadwork. A part of this exhibit could include case studies of contemporary artists, and the experiences and stories behind their beadwork. Another goal (with sufficient funds), would be to make the exhibit an online exhibit much like what the National Museum of the American Indian does with a lot of their exhibits. An online exhibit is interactive, would reach a much larger audience, and would be a more spatially practical way to present a large amount of beadwork and information.

Denver Museum of Nature and Science Collection

The Denver Museum of Nature and Science (DMNS) has a total of twenty-eight American Indian watch fobs. Seven from the Seminole, five from the Ute (1920s and 1950s), one from the Osage (1910), one from the Navajo (1920s), one from the Jicarilla Apache, one from the Iroquois (1900), one from the Yuma (pre-WWI), one from the Nez Perce, two from unknown tribes in the southwest, one from the Sioux, three from Northern California (1920s), one from the Quilente in Washington, and three from the Arapaho (1932-1936). Of the thirteen watch fobs that have estimated creation dates, the average date is 1920 with a range from 1900 to 1950. Although the collections at DMNS are extensive, it did not provide an abundance of information about the FCMDS collections through comparison. This was due to a lack of similarity in shape, beadwork style (loom vs. lazy-stitch vs. overlay stitch), designs, and colors.

National Museum of the American Indian Collection

The National Museum of the American Indian (NMAI) has seventy-nine watch fobs or related objects. They only have creation dates for three of their watch fobs, (range from 1889–1940) but many were collected around the 1930s so it would be assumed that they were made pre-1930. They have a diverse collection in tribal affiliation which is depicted in the graph below. Overall, this collection was more useful in possibly determining the tribal affiliation for the watch fobs at the Fort Collins Museum and Discovery Science Center as there were more similarities in color and shape. It is interesting to see the whole range of "products" centered around the pocket watch such as pouches, cases, chains, and of course fobs (for images of these other items please see the image portfolio at the end of this paper). The pouches and cases were beaded on hide and also on trade cloth. The chains were braided with horsehair and were carved out of bone. Interestingly, the pouches are more affiliated with the tribes of the Northeast, the chains to the "Eskimos" of Northern Canada and Alaska, and the fobs and cases are more centralized in the plains tribes. It seems that there may have been a specialization of sorts by these different geographical areas and the products would be circulated by trade (see Chart 1).

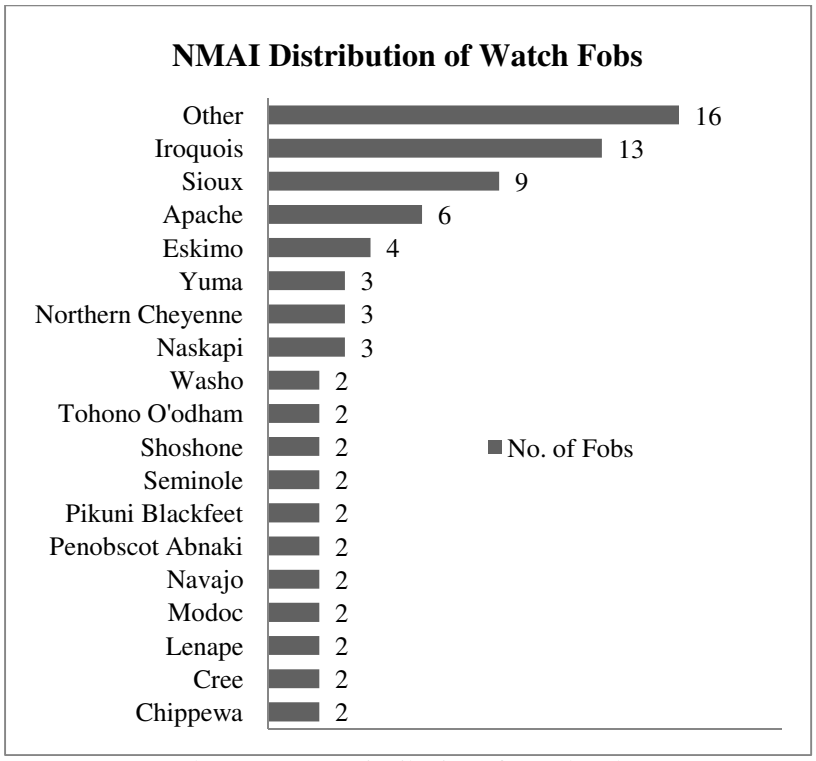


Chart 1: NMAI Distribution of Watch Fobs

Part III: Contemporary Context and Conclusions

Contemporary Items of Beadwork

It is of utmost importance that contemporary American Indian bead-workers and artists are incorporated into a discussion of American Indian beadwork. Many times only American Indian history is discussed and this presents a very static view of Indians and more importantly does not recognize contemporary lives, communities, and relationships of American Indian people. Wright (2000:217-218) captures this sentiment:

> Why do people expect Indians to be doing the same things they were doing 100 years ago? Innovation and change occur in American Indian cultures just as they do in popular American culture…While family and tradition are important to today's artists, they are not completely separated from the experiences of daily life that touch any American, including the media and current sports heroes, among others. As part of an evolving contemporary culture, they make choices based on personal aesthetic preferences and use a combination of natural and traditional materials with contemporary trade materials and embellishments which are incorporated into traditional forms.

Contemporary American Indian bead-workers are similar to their ancestors in that they navigate their economies in order to make items that are desirable for their markets and out of this relationships develop. According to Lyford (1979), contemporary Sioux beadwork is a "product of two influences: Indian and white." He even argues that, "[n]o white, given beads and flannel, would be likely to work out the art style which came naturally to the Sioux woman who passed white man's material through an Indian imagination. The result was an art deriving from both cultures and forming an interesting example of the interplay which has been going on between them through the centuries" (86). It is important to note that most contemporary beadwork is done by families for families, rather than for sale (Giese 1996). Much of this beadwork, in many tribes, is made for powwow regalia and gift-giveaways that are associated with important life transitions. Although beadwork may be part of some people's income it does not seem to be a dominate way of earning a wage (Giese 1996).

Beadwork and artwork also involves spiritual and community processes. This is apparent in the writing of Wright (2000:221) who presents the narrative of an American Indian man, Norman Lansing, who describes the importance that art has played in his life and healing from boarding school trauma:

> Who am I? Now to this day I'm still doing it, I'm still trying to reconnect myself. Learn more of who I am and my people's ancestors. So that's why I rely a lot on my art because I figure a lot of it is spiritual from my ancestors' side that comes and tells me, or puts these designs and these things. That's why I couldn't understand it after I finished it and later on, in a month or so, it comes back and makes sense. It's just me and that's the way that it is. So I have a lot of faith in my art because it brought me everything, brought this house, brought me a lot of things. So I'm not really afraid of going out there because my art is with me. I know I can survive out there with it.

Artwork can be a way to express and transmit cultural values to others while building community cohesiveness and may be a channel for economic development programs.

The economic aspect of bead-working is also important to many families. Beadwork is sold in many parts of the country and on the internet. In understanding the transition away from beaded watch fobs it is interesting to postulate what American Indian people made instead. Some ideas are wrist watches, cell phone cases, belts, and purses. In the early 1900s, beaded purses, belts, and vests were popular and as the need for belts and purses has not faded, and they are still beaded today. However, as a sign of continual change and adaptation American Indians have started beading wrist watches and cell phone cases, among other items. This sentiment is also held by Mark St. Pierre in that he agrees that watch fobs were a good niche market but now they would not do well, but cell phone covers do (personal communication, November 13, 2009).

Watch

Cell Phone Case

Contemporary beadwork for sale (Two Dog Southwest Gallery 2006)

Interestingly, a search of American Indian beadwork on Amazon.com brought up a couple of pattern books that have what looks like a watch fob on the front. It is possible that watch fobs could have been adapted to be a sort of ornament. Contemporary American Indian art is varied just as it was in the past and understanding this variation as a trend exposes many more connections to other parts of American Indian life. It also allows for a reflection of non-Indian interpretations of Indian culture, continuity, and change.

Conclusions

After compiling a body of knowledge on this topic I have discovered a few anecdotal statements about material culture and museum work as voiced by Mark St. Pierre:

> Items are representative of the contemporary tribal cultures and specific communities they came from and in a way are a measure of retention, resistance and conservatism. Each item tells a huge story and a factual story of where that tribe of origin is at in a continuum of material culture and historic memory brought current with the making of each item (personal communication, November 13, 2009).

Material culture is supremely important and can reveal many things about a contemporary group of people and tells the dynamic story of continuity and change that needs to be more visible when concerning American Indians.

Acknowledgements
I would like to acknowledge the people who contributed to this work. Mr. Jim Yowell of the International Watch Fob Association, Mr. Andrew Higgins, the Assistant Curator at the Arizona State Museum, Mr. Mark St. Pierre, Ms. Isabel Tovar, Anthropology Collections Manager and NAGPRA Coordinator at the Denver Museum of Nature and Science, Mr. Pat Nietfeld, Supervisory Collections Manager at the National Museum of the American Indian, Ms. Linda Moore, and finally Dr. Kathleen Pickering Sherman for being an amazing mentor and friend.

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How to Make a Bigger Hole: An Experimental Analysis of Projectile Point Morphology in Wound Creation

David Anderson

Abstract—*Projectile points have been made in a variety of shapes and sizes, out of many different materials. This experiment is an in-depth analysis of the effects of different projectile point morphologies on the size and shape of the wounds that they inflict. The experiment used eleven plastic replicas of a wide variety of projectile points, delivered with a standardized device into ballistics gelatin. The goal is to see if a particular attribute or morphology is more effective, and if those results point toward a larger trend in weapon evolution, or if there are other factors in projectile point change.*

Introduction

No stone tool has as much variability in design for the same, seemingly simple purpose as projectile points (see Figure 1). They are found on every continent that archaeological research is done, and their dimensions, materials, and method of production vary as widely as their locations. Some questions naturally arise: why have so many different and complex forms arisen for the same, relatively simple purpose? Is one design more efficient or effective than others? Did these tools all gradually change toward a more efficient design, or was the evolution driven by other forces? This paper will relate the design, construction process, testing and results of an experiment in projectile point wound creation. This is an experiment designed to determine, through testing, if a specific

attribute, morphology, or dimension of a projectile point corresponds to a significant increase in wound size. It will hopefully give a starting place for further investigation of many of the questions around projectile points, their use, and the evolutionary forces that acted on them.

Figure 1: Plastic Cast Projectile Points

Design

The experiment was set up to examine the different wounds that projectile points inflict on impact, utilizing a flesh substitute (ballistics gelatin), and a device that would allow for consistent delivery. It involved eleven points from Dr. Jason LaBelle's replica collection (see Figure 1) and a fire-hardened hardwood shaft, with as wide and variable a morphology as possible. These replicas are plastic casts from Lithic Casting Labs, who produce extremely detailed replicas. Using plastic casts instead of stone replicas may have had several effects on the results. Since the plastic casts are of a uniform sharpness, differences in the sharpness of the original material are lost. Differences in production technique that influence that sharpness are also lost. Because the sharpness of the original tool is lost, wound morphology will be substantially different than if these were stone implements. However, since the experiment is designed as a comparative analysis, these factors

are irrelevant. These points come from a variety of places around the world, from a huge span of time, and were also designed for slightly different purposes. All are hunting implements, but some were created to attach to spears, some to arrows, and others to darts. This experiment is not designed to deal with the differing delivery mechanisms that are associated with the points, only the effects of the projectile point morphology on the wound. While this is an unrealistically narrow view, it is applicable to the experiment's limited environment. Ideally, this variable could be addressed in future testing.

Background

Cheshier and Kelly (2006) took a similar experimental approach, examining the effects of different point forms on the durability of a point. The basic premise, that the projectile point's dimensions affect the durability, inspired the basic premise of this experiment. Letourneux and Pétillon (2008) deals with bone points and the damage they inflict on flesh and bone and answers questions about hunting, but its focus is on explaining archaeological evidence, not the mechanisms that influence and could drive change in those points. Frison (1989) shows some aspects of Clovis wound morphology on live animals, and Shea and Sisk (2009) evaluate the penetration of Levalloisian points fired from a bow into leather. Waguespack et al. (2009) details an experiment carried out on the television show *Mythbusters* that tested the penetration of a stone point and a wooden arrow, but its scope is limited. Nowhere in the literature is there a deeply controlled and standardized experiment dealing with projectile points and the wounds they create.

Preparation

Delivery Device

The experiment used a gravity-based delivery system (see Figure 2) in order to eliminate variables. With gravity acting as the propelling mechanism, there is very little variability in delivery force. The mechanism consisted of a central post, with a greased iron pole attached. The pole allowed a stabilized, standardized angle of delivery. A shelf near the base held the ballistics medium, and the points, hafted to a shaft, dropped along the pole, into the gelatin. A guide-wire was attached parallel to the central pole to further stabilize the shaft as it fell.

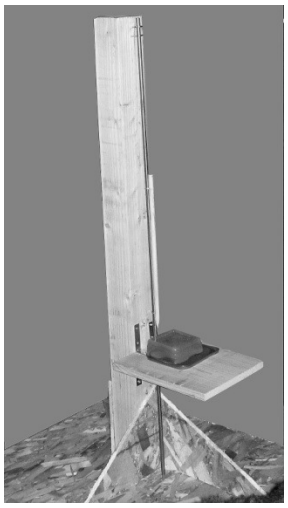


Figure 2: Delivery Device

Arrows and Hafting

The arrows were made of ½ inch diameter hardwood dowels cut into 43 cm lengths. This width would allow for reshaping of the proximal end to allow for hafting, and be sturdy enough to support added weight without warping or bending during delivery. All points were side-hafted, with a small amount of wood removed from one side of the dowel to fit the point. The amount did vary, based on the size of the point, but the difference was between 0.2 grams and 1.45 grams. The points were side-hafted to the shafts using artificial sinew. Three I-hooks, screwed into the ventral portion of the shaft, provided contact with the greased metal rod and the guide-wire. Weight was added in the form of 32 flat-cut, ½ inch zinc washers (1.23 pounds), which fit very well over the shaft, and provided a

centralized, concentrated weight that would prevent the arrow from wobbling during deli very. After final construction, the arrow weight varied from 595.93 grams (lower) to 606.19 grams (upper), amounting to around two percent variability.

Ballistics Testing Medium

The experiment used a 17 percent solution ballistics gelatin, following the guidelines laid out by Fackler and Malinowski's 1988 article on gelatin for ballistics studies. The modern standard is a ten percent solution, and an older standard, created by NATO, was 20 percent. The less air incorporated into the mixture, the better the gelatin will set, so care was taken to minimize aeration. The gelatin was *bloomed* (allowed to set and absorb more water) for two hours, then heated with steam to no more than 104 degrees Fahrenheit. Heating the mixture over 104 degrees has detrimental effects. (Fackler and Malinowski 1988). The molds used were plastic food storage containers, measuring 10.5 centimeters wide by 10.5 centimeters long by 9 centimeters deep.

Experiment

Initially, testing was conducted in the Pattern Analysis Laboratory in the Department of Mathematics at Colorado State University. The facilities were happily made available by Dr. Michael Kirby and postgraduate student Josh Thompson assisted with setup and recording. High-speed video of four trials for each point were recorded at the Pattern Analysis Lab. The high-speed footage allowed for an analysis of the process of penetration for each point. Further testing was done at an outdoor location. The device allowed for easy repetition. The point being tested was loaded into the device, and the guide wire was secured through the lateral I-hook. A gelatin block was then placed on the shelf directly below the loaded arrow.

This insured that every arrow would drop 39 centimeters before impacting the ballistics gelatin. The weights of the arrows did vary slightly, but the median weight was 600.06 grams. This means that each arrow would be traveling at 3.09 meters per second just before impact, with 2.76 Joules of energy. The impact force would be about 23 Joules. This is roughly half of the kinetic energy of a basic bow and arrow, as stated by Hrdlicka (2004). After a single trial was run, the point was carefully removed from the ballistics medium, the test block was rotated, and the trial repeated. The block was labeled and placed in a refrigerated area for later measurement. This was repeated until forty trials were completed.

Measurements

All of the wounds had to be measured within 24 hours of the experiment. Any more time, and the gelatin would start to "heal" and reseal the wound. All measurements were conducted using a pair of calipers accurate to 0.01 millimeters. The wound morphology was measured in width, thickness (corresponding to the dimension opposite to width), and depth (penetration length, which corresponds to the dimension perpendicular to width and thickness. In other words, width is (x), thickness is (y) and depth is (z). Width was difficult to measure, because the medium would split along the same axis as the width

Figure 3: Striations with Siberian Point

measurement. As the point entered the medium, some of its force was translated out, perpendicular to the angle of penetration. This would cause an artificial "widening" of the wound. In order to remedy this, measurements were taken from the side (see Figure 3). The area where the point penetrated the medium was marked with vertical striations, while the split areas were marked with horizontal, wavy striations. These striations were relatively easy to detect in good lighting. Measuring the depth proved even more difficult. In order to see the full extent of the wound, it was necessary to "reopen" it. In order to do this without falsely increasing the depth, it was necessary to carefully blow air into the wound through a straw, at very low pressure, until the wound reopened. The striations observed while measuring the width continued down throughout the entirety of the wound, which showed the exact extent that the point penetrated to. Using the point as comparison and the striations to mark the ending of the wound, it was possible to accurately measure the depth of the wound. A red spectrum light assisted in locating the maximum depth; holding up the medium with the light behind it. The red spectrum light highlighted the striations as well as the outline of the wound much better than a normal spectrum bulb did (see Figure 4). After measurement, the gelatin blocks were re-melted and remolded for the next set of trials.

Figure 4: Vertical Striations

Results

The following sections are each dedicated to a single point in order to present the qualitative and quantities results in an easy to understand manner. The final comparisons and conclusions will be related after the individual, point-by-point presentation. Information about the location and period of each point comes from the producing company, the Lithic Casting Lab, and descriptions written by Pete Bostrom. Quantitative morphological information and statistics can be found after the point-by-point section (see Chart 1). The point measurements correspond to the "exposed" portion of the point, only the area of the point that extends beyond the shaft of the arrow.

Cumberland Point

Hailing from North America during the Paleoindian period, the Cumberland point is a long, vaguely ovoid point that is frequently bifacially fluted. It is quite substantial, and was easy to haft, thanks to the fluting and ears at the distal end. The point is a wide V-shape, and it increases in thickness quickly proximal-distally. It is thickest at the most proximal point of the fluted area and widest at the midpoint, proximal-distally. When hafted, the exposed portion of the point was just under ten millimeters thick (at maximum), 22 millimeters wide (at maximum) and 58 millimeters long.

Before testing, I did not expect this point to be particularly effective. It was long and had a fairly sharp tip, but I thought that the steep and rapid change in thickness would reduce the point's penetration power. However, the Cumberland point had the deepest penetration overall. It also had one of the widest wound widths.

Tanged Point

This point comes from the American Southwest, from the Pueblo I Period (750 CE to 900 CE). This point's shape is probably closest to what most people would envision when picturing projectile points. The tang made it easy to haft, and it has a very acutely angled tip. It was fairly thin and its maximum width was also small, which would seem to give it a large penetration capability.

Upon testing, the point managed to create a much larger wound than would be indicated by its morphology. After analysis, I began to suspect that the angle of the point had a much larger effect than previously thought, and that the thickness of the point had far less to do with the damage inflicted.

Fan-Eared Point

This point is from Sub-Saharan Africa during the Neolithic Period. Its intricate design would have required a skilled producer. It is very thin, at 3.4 millimeters, and its point is needle-like and sharp. It flares out in width quickly, and retains its edge to the end of its namesake fanned ears. Its tanged distal end and fanned ears made it quite easy to haft.

This point's metrics are similar to the tanged point from the previous trial, so I suspected its performance would be similar as well. I didn't think that the needle tip would function better than the acutely angled tip sported by the tanged point. However, the results show quite clearly that this point's shape is a large advantage. Upon reviewing the high-speed footage, it was clear that the needle tip sliced into the ballistics medium with little resistance, evident from the lack of 'indentation' as the proximal end penetrated the surface. Overall, this point caused the smallest “ripple” in the medium, showing the power of its initial penetration. After the needle tip sliced into the

medium, the flared sides cut into the medium with a much greater ease than the other points.

Tri-Notched Point

While this point was included in a Cahokian burial as grave goods, it is fairly representative of more common Mississippian hunting implements that saw use. Its triple notched base made it the most securely hafted point. It was one of the thinnest (thickness), and was the slimmest (width) point tested, making it the smallest point in the sample.

I expected moderate results, due to the point's small size. In terms of wound width and thickness, its results were near the bottom, but its penetration depth was in the first quartile. The combination of a highly acute tip and a very small width maximized the depth that the point reached.

Hollow Base Point

This Hollow Base Point comes from Predynastic Egypt (5300-3300 BCE). The tip of the point is angled close to 45 degrees and canted slightly off-center. It increases rapidly in thickness proximal-distally, and flares out to a width of about 20.5 millimeters, only one millimeter shorter than the point's entire exposed length. Hafting this point proved to be extremely difficult. The hollow base made side hafting impossible, and so the hollow portion of the point was used for the shaft. During delivery, the arrow shaft completely released the point, so rehafting was necessary between trials.

I expected a poor performance from this point for several reasons. First of all, I thought that the canted tip would decrease the point's penetration power, since the tip would not be cutting straight and directly into the medium. Secondly, I believed that the rapid increase in thickness would also be detrimental to the penetration power. Finally, the point's substantial width would open up a larger wound, but decrease

its penetration. This point did not perform very well in any of the three wound dimensions.

Siberian Point

This point is from the Kamchatka Peninsula in Siberia, and dates from 12,000-11,000 BCE. Its tip is sharp and acutely angled, and it slowly increases both in width and thickness proximal-distally. The thickest point is also the widest point, which is just before the sides were removed to create a tang. The small, thin tang did not hold firmly, and shifted after repeated impacts, necessitating rehafting during testing.

From this point's morphology, I guessed that it would do quite well, since it was similar to the Cumberland point. It had the second-highest penetration, behind the Cumberland point, and made a much wider wound than I first expected. Like the fan-eared point, the high-speed footage showed a very small amount of 'bend' in the medium, indicating a greater initial piercing power.

Clovis Point

From Paleoindian North America, the Clovis point is an extremely large tool that has a relatively short fluted area. This point is unifacially fluted, which was utilized for hafting. The tip is almost parabolic in shape, curving out to fairly straight, parallel sides. The point is very wide and thick at 32 millimeters and 7.5 millimeters respectively, and is the longest point in the sample at 76.4 millimeters.

I thought that the Clovis point would open up an extremely large wound, given its size, but once again, my speculation was far from the results. Despite its size, half of the points in the experiment penetrated deeper. It did open the widest wound and a fairly thick one as well. Its massive size seems to have been a hindrance instead of a boon. Its parabolic tip seems to have negatively affected the damage dealt.

Midland Point

The Midland point is from the Paleoindian period in North America, and this specimen was probably broken and re-sharpened several times, which gave it a wide, squat appearance. Hafting this point proved difficult, and it had to be rehafted twice during testing. Its tip is wide and parabolic, and flares out quickly to a width of 22 millimeters. Its thickness is moderate, around 4.5 millimeters, and it reaches this value at the approximate midpoint proximal-distally.

The Midland point did better than expected in terms of penetration. I expected it to barely manage a 1:1 wound depth to point length ratio, but it did substantially better. However, on average, it created a wound width that was less than its maximum width. Its poor performance was most likely due to its thick, wide form and parabolic tip.

Plainview Point

Plainview points are from the Late Paleoindian Period in North America. It is a long, straight-sided point with a wide V-shaped tip. It is of average thickness for the sample set, which it maintains for the latter two-thirds of its length.

The Plainview point created a thin wound, in terms of both width and thickness. The wound had very straight sides, which only occurred with this point. It reached a depth of 38.6 millimeters, which was very close to the depth that the fan-eared point achieved.

Folsom Points A and B

The Folsom complex of Paleoindian peoples in North America created some of the most difficult to produce lithic tools. The large bifacial flutes make these points extremely thin, and there is much debate as to the reason why they were produced this way (Hunzicker 2009). Two Folsom points were used due to

slight differences in morphology that could prove to be significant. Folsom A is short and wide, with an acutely angled tip that flares out into a parabolic curve, while Folsom B is slightly thinner (thickness) and slimmer (width), but substantially longer, and has a much wider parabolic tip, without the angular pointed tip of Folsom A.

Despite point B's length advantage, when comparing the penetration values, point A exhibited a length: depth ratio of over 1:1.25, while Folsom B showed a 1:1 ratio. This is most likely due to the difference in tip structure.

Fire-Hardened Shaft

The fire hardened shaft is meant to represent a simple sharpened arrow. Since wood does not preserve in the archaeological record in the way that stone does, we do not know how widely simple wooden arrows were used in hunting activities. The shaft served as a comparative baseline in this experiment. The shaft is cylindrical, and therefore far thicker than any of the points examined. The sharpened area was about 28mm long, and tapered to a pointed tip.

Before I began testing the fire hardened shaft, I was unsure as to the effect that a rapid increase in both width and thickness would have on the penetration and overall wound size. The shaft's penetration depth was nearly the median of the sample. Its thickness and width did not seem to affect the shaft's depth.

Waguespack et al. (2009) state that lithic points are only slightly more effective (10 percent) than wooden arrows. The results from the experiment described in this paper seem to show that projectile points are substantially more effective than Waguespack et al concluded. When comparing the most effective point (Cumberland) to the shaft, the point is, on average, 23.9 percent more effective. And, perhaps more importantly, this experiment is comparing plastic lithic replicas

with an actual fire-hardened shaft. It is doubtless that an actual stone replica will be sharper, heavier, and penetrate deeper into the medium.

	Data Type	Cumberland	Tanged	Fan-Eared	Tri-Notch	Hollow Base	Siberian	Clovis	Midland	Plainview	Folsom A	Folsom B	Shaft
Wound Width	Average (mm)	23.450	22.880	18.130	13.780	19.880	20.830	26.910	17.080	15.160	19.010	20.670	7.540
	Standard Deviation (mm)	1.958	1.892	2.074	0.989	1.914	2.089	0.707	1.971	0.641	0.991	4.447	1.983
Wound Thickne	Average (mm)	2.760	2.200	2.900	2.060	2.420	2.790	3.460	4.300	1.610	1.280	2.210	5.320
	Standard Deviation (mm)	0.402	0.492	0.374	0.122	0.311	0.159	0.332	0.659	0.248	0.146	0.126	0.321
Wound Depth	Average (mm)	46.020	32.530	38.680	36.890	31.000	43.170	34.550	34.300	38.600	25.420	30.120	35.720
	Standard Deviation (mm)	5.643	3.172	3.809	3.800	1.826	1.370	1.132	1.957	1.328	0.942	3.321	1.682
Correlation	Width: Thickness	0.008	0.451	0.490	0.134	0.059	0.036	0.586	0.121	0.370	0.250	0.302	0.041
Coefficient	Width: Depth	0.260	0.016	0.399	0.319	0.493	0.465	0.163	0.237	0.445	0.024	0.291	0.344
	Thickness: Depth	0.457	0.370	0.312	0.387	0.009	0.080	0.346	0.262	0.301	0.392	0.021	0.046
Point Metrics	Point Width (mm)	22.340	17.380	16.130	11.300	20.410	17.080	32.140	22.220	17.480	19.730	18.000	12.130
	Point Thickness (mm)	8.910	3.910	3.410	2.690	4.780	4.780	7.500	4.540	4.510	2.270	2.780	12.640
(Maximum)	Point Length (mm)	58.540	23.800	24.470	22.260	21.550	46.220	76.440	22.130	40.530	20.230	30.350	28.670

Chart 1: Data Summary

Figure 6: Correlation of Width and Thickness

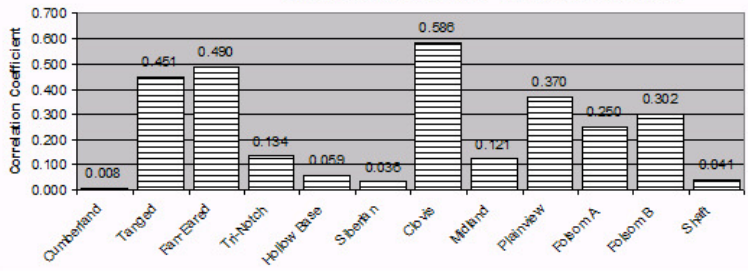


Figure 7: Correlation of Width and Depth

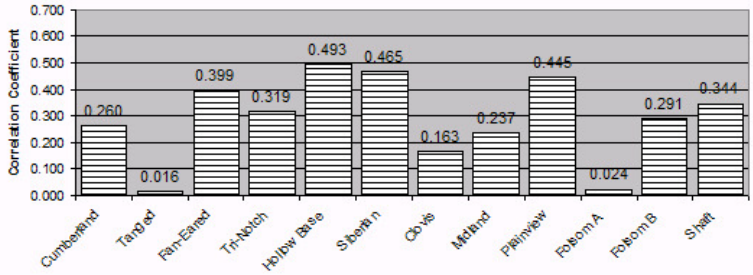
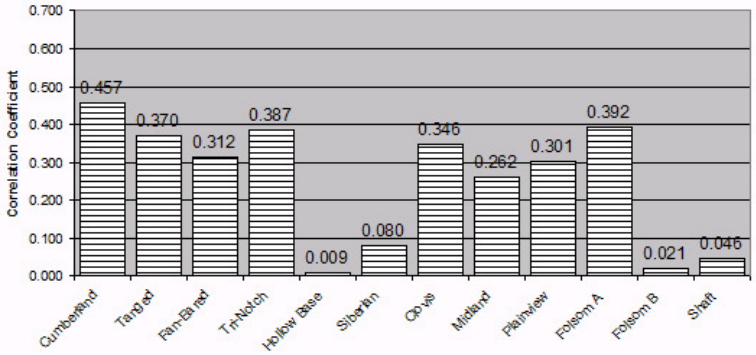


Figure 8: Correlation of Thickness and Depth



Results

Penetration

In terms of penetration power, one morphological feature was most effective. In the case of the three highest depth values, Cumberland, Siberian and fan-eared points, all have an extremely acutely angled tip. The value of this sharp tip is reinforced when the fan-eared and Folsom A, both sharply tipped points, are compared to points with similar metrics but that have different tip shapes. The fan-eared point, when compared to the tanged point, nearly matches its metrics, but the fan-eared point penetrated 16 percent (over 6 millimeters) deeper. When evaluated for effectiveness of penetration, the fan-eared point yields a ratio value of seven, while the tanged point gives 3.92. This means that the fan-eared point's design is nearly twice as efficient as the tanged point. Folsom points A and B both have disparate exposed lengths, but when evaluated for efficiency of penetration, Folsom A has a value of 7.03, while Folsom B has a value of 4.37. Since both of these sets of comparisons yielded similar efficiencies, I believe that we can say, with confidence, that the acuteness of the angle of a point's tip will dramatically affect its penetration value.

Simple Arrows vs. Projectile Points

Waguespack et al. (2009) assert that a stone projectile point will only add a ten percent increase in penetration value over a simple wooden point. When comparing the results of this experiment's highest penetrating point, the Cumberland, with the fire-hardened shaft, the stone point penetrated 23 percent deeper. The fire-hardened shaft had a penetration value that was slightly above the median value of the entire sample set, which creates a question: Why would people use points that are less effective, sometimes substantially less (29 percent when compared to the smallest penetration value), when producing

these points take substantially more time, material, skill, and labor to create? One factor could be the overall morphology of the wound produced. All of the points used in the sample created a wound that was from 183 percent to 311 percent wider than that produced by the fire hardened shaft. While creating a wider wound may not be important in all instances, it is important to consider when evaluating total damage dealt, blood flow, and general trauma to prey animals. I would assert, based on the wound morphologies that this experiment yielded, that stone projectile points were used more frequently when hunting larger game, and while hunting smaller game, points were used as a matter of habit or cultural procedures. The size of the animal in question would correspond to a positively correlated wound size. Bigger animals would need a bigger wound to dispatch, so a large point would be needed, while a smaller animal, small deer or rabbit, could be dispatched with a wound from a simple wooden arrow. Since points do open up a larger wound than the fire-hardened shaft, it is a logical conclusion that when a large animal is being hunted, it would take a larger wound to bring it down. (Letourneux and Pétillon 2008). It is also entirely possible that large projectile or spear points became widely used by people while megafauna was being hunted. As population pressure increased and smaller game was hunted, points became more and more unnecessary, and perhaps became a social signaling item. Groups may have used projectile points to create and identify different cultural groups. They may have become a luxury item, or object of artistic expression. They are often used as grave goods for elites, and may have become a status object. Whatever stone points came to symbolize, they were still used as projectile points, perhaps even unnecessarily and at a waste of materials and labor. It is clear that other factors, aside from effectiveness in terms of hunting and wound creation, influenced the continued use and evolutionary change of projectile points.

Uncertainty and Problems

In spite of the striations mentioned in the measurements section, it was difficult to differentiate between actual damage and the splitting effect. While exactness was attempted, complete accuracy, in this case, was not possible.

Since the ballistics gelatin was not calibrated, there is no way of knowing if it was exactly the same consistency every time. The same methods, materials, and processes were used, but it is possible that the consistency varied between batches of ballistics gelatin.

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Some of these trials can be viewed at
http://www.youtube.com/user/zirrillian

Hanging by a Thread: Testing the Efficacy of Ochre in Mastic

Jason Chambers

Abstract—*Ochre, or iron oxide (rust), is a mineral component of the archaeological record that has vague implications, ranging from ritual use to hide preservative. In this paper I investigate the techno-functional utility of ochre (goethite and hematite) as used in mastic/adhesive. Several mastic recipes will be prepared with ochre in varying amounts, to test its ability to maintain a bond in a hafted stone tool. Wadley (2005) performed similar experiments testing different ochre recipes in mastic, testing the durability of adhesion by "chopping the bark off branches" (Wadley 2005:597). This paper presents results of a quantified strength test designed to break the adhesive bond of ochre-laden mastic joining handle and stone tool, using the addition of increasing mass.*

Introduction

There is much debate in the scholarly literature as to the role played by ochre in prehistoric life. This is one element present in the archaeological record with a significance that is not fully understood by archaeologists, and presents ambiguous clues as to its contextual role in prehistoric behavior. Not all artifacts are as functionally obvious as, say, projectile points, with their morphology highly suggestive of their function. In the case of ochre, or iron oxide (rust), a multitude of contexts at a variety of site types are identified in the archeological record (Stafford et al. 2003:72). These vagaries introduce divergent interpretations of that record, and thereby, the behaviors

associated with them. The result is in myriad publications exploring prehistoric ochre use as everything from hide preservative (Watts 2002), to medicine (Velo 1984), to pigment in paint (Pomies et al. 1999b). Implications for these interpretations range from functional (Lombard 2007), to complex cognition (Wreshner et al. 1980), to symbolic and ritual meaning (Marshack 1981; Watts 2002).

This study aims to determine if ochre, or iron oxide, as an additive to mastic improves its effectiveness as an adhesive in hafting stone tools to handles. In this experimental study, an inductive understanding of the techno-functional properties of ochre is sought, with informative inferences drawn from experiential and scientific means. Through the process of working with the material, as well as by systematically manipulating the variables being tested, this study will lend itself to (or hint at) a more discrete understanding of the role of ochre in prehistoric life, its representation in the archaeological record, and subsequent behavioral interpretation of that record. This study draws on works from Paleolithic South Africa, though it is mainly focused on the archaeologically-recognized utilization of ochre by Paleoindian peoples in North America within the Central Plains region.

The variety of treatments on prehistoric ochre use in the scholarly literature reflects differing kinds, and ways of doing archaeology. Theoretical trends borrowed from cultural anthropology, as well as data patterning, and experiential inferences on the part of each individual archaeologist contribute to our collective understanding of the archaeological record and the behaviors reflected in it. Only recently, since Binford's (1978) work with the Nunamiut, have experimental and ethnoarchaeology become accepted tools in the interpretive toolkit available to practicing prehistoric archaeologists. Experimental archaeology, useful as but one of many

contributing schools, allows appropriate analogy to be drawn to the archaeological record.

> The lesson is clear; archaeologists working in the real world can little afford not to use every tool at their disposal. Anyone using an eclectic approach to the study of prehistory may risk being branded as atheoretical by those who cleave rigidly to any one theoretical model. The archaeological record is a nonrenewable resource, and we cannot afford to shortchange it by limiting our interpretations to those permitted by one particular model at the expense of all others (Gilmore et al. 1999:50).

To this end, an inductive approach derived from experimental replication is used to develop experiential inferences concerning ochre use in mastic that would otherwise be unavailable in a study confined solely to citing the primary scholarly literature.

While a variety of primary literature suggests multiple prehistoric uses for ochre, this study is primarily interested in addressing questions relevant to its presence on hafted tools. To that effect this study seeks to address application of ochre powder (both goethite and hematite) in varying proportions, to pine-resin mastic in order to determine if the intentional addition of ochre to a mastic recipe facilitates a more effective bond holding a stone knife blade in an antler handle. This study seeks to address a few, specific points concerning ochre use in mastic. Do varying proportions of ochre in mastic affect how well a stone tool is adhered to a handle? Do different ratios affect, or are affected by, different hafting methods?

Background and Purpose

Ochre, as a noun, is defined by Webster's Dictionary as "any of a class of natural earths, mixtures of hydrated oxide of iron with various earthy materials, ranging in color from pale

yellow to orange and red, and used as pigments." Here we seek to address this narrow Websterian definition and outline a context for the discussion of ochre relevant to this experimental study.

Ochre is a general term for common iron oxides (rust), under which fall two main kinds, goethite and hematite. Goethite is a mineral form of iron hydroxide ($HFeO_2$) typified by a yellow or brown color; hematite is a mineral form of iron oxide (Fe_2O_3) typically reddish in color; both forms occur from the oxidation of iron, and are chemically distinct from each other, "with little difference in iron content…61 percent and 70 percent respectively and both minerals being common weathering products" (Watts 2002:4). Goethite and hematite are found as nodules in ferrous deposits as well as loosely eroded, iron-rich powder or sediment. Regionally, goethite sources are available near Silverton, Colorado, as well as in southwest New Mexico; hematite is and was mined historically and prehistorically at the Powars II (Stafford et al. 2003) site near Sunrise, Wyoming as early as 11,000 years ago (Stafford et al. 2003). The Powars II site is of particular significance as it is "presently, the only confirmed red ochre quarry with clear evidence of Paleoindian activity" (Stafford et al 2003:71).

The utility of ochre has been recognized on every continent, both historically and prehistorically. Ochre, in varied contexts, has been utilized by contemporary peoples as well as being used prehistorically. Such ethnographic data (see Figure 1) is informative as it provides analogy, the basis for experimental archaeology (Ascher 1961). Ethnographic data in the form of cultural trait comparisons within the Human Relations Area Files (HRAF) demonstrates this variety of uses historically across the globe, while the presence of ochre in a variety of Paleoindian assemblages among different site types confirms prehistoric utilization. Pomies et al. (1999a) discuss this specific chemical transformation of heat-treating goethite

into hematite as being attainable by groups in the prehistoric past (Pomies et al. 1999a:1605), and indicates this process as recognizable archaeologically through the use of X-ray diffraction (XRD) and transmission electron microscopy (TEM).

Ochre and the Ethnographic Record

Group	Location	Ochre Use	Reference
Hottentot	Nambia	Make-up; ochre and clay	(Schultze 1907)
Baganda	Uganda	Canoe paint; cordage dye	(Roscoe 1911)
Mali	West Africa	Coloring for ritual masks	(Palau Marti 1957)
Katab	Nigeria	Stain for women's headboards	(Gunn 1956)
Yapese	Micronesia	General dye use	(Senfft 1903)
Woleaians	Micronesia	Canoe paint	(Damn 1938)
Kurtatchi	Solomon Is.	General dye; body adornment	(Blackwood 1935)
Muragia	Australia	Ritualistic cave painting	(Mountford 1956)
Murngin	Australia	Ceremonial purposes	(Thomson1949)
Kapauku	New Guinea	Face paint for pig feasts	(Pospisil 1959)
Tiwi	Australia	Tomb-post paint	(RAIGB 1913)

Figure 1: Some ethnographic uses of red ochre in the Human Relations Area Files (HRAF) (reproduced from Stafford et al. 2003)

As previously mentioned, ochre was used (or interpreted as being used) throughout prehistory in multiple contexts (see Figure 2). In considering ochre use in mastic, Lombard (2007) discusses ochre use as appearing "at the same time as the first evidence for hafted tools" (Lombard 2007:414) in African Middle Stone Age sites, lending to their functional argument that powdered ochre was mixed into hafting adhesives (2007:413), and archaeologically discernible via distribution patterns on a completed, hafted tool (2007:414). A more in-depth discussion of the ubiquitous characteristics of powdered ochre in relation to distribution patterns will be presented later.

Ochre and the Paleoindian Archaeological Record

Site	Affiliation	Context
Agate Basin	Folsom	Habitation
Anzick	Clovis	Burial/Cache
Bottleneck Cave	Plano	Habitation
Cattle Guard	Folsom	Habitation
Gordon Creek	Plano	Burial
Hanson	Folsom	Habitation
Hell Gap	All Components	Habitation
Jurgens	Plano	Habitation
Lindenmeier	Folsom	Habitation
Red Smoke	Plano	Habitation
Sheaman	Clovis	Habitation
Simon	Clovis	Cache
Fenn	Clovis	Cache

Figure 2: Ochre in Paleoindian Contexts (reproduced from Stafford et al. 2003:72)

Among other prehistoric interpretations of ochre are Velo's (1984) comments that the salts present in ochre facilitate healing of wounds, sores and burns, citing ethnographic Australian accounts of the Gugadja. Intriguingly, Velo extends this consideration, suggesting the possibility that ochre found

in burial contexts may "represent a continuation of efforts to save the person's life" (Velo 1984:674).

Watts (2002) discusses ochre in terms of hide preservative, indicating this as a "possible alternative interpretation of Middle Stone Age ochre use" (Watts 2002:3). However, Watts cites failed experiments (Mandl 1961) and taxidermic doubt as to the efficacy of preservation of hide, particularly the bacterial inhibition properties of ochre. He suggests that as a hide preservative, "the involvement of ochre in hide-working is almost invariably at the finishing stage as a decorative inclusion," citing Khoisan ethnographic data (Watts 2002:3). Endscrapers exhibiting ochre polish are mentioned as "having been used with an ochre abrasive to raise the nap of already tanned buckskin" (Watts 2002:4), and not in preparation of the raw hide.

A discussion of ochre would be incomplete if mention is not made of its striking color. However, as a techno-functional investigation is sought in this study, symbolic/ritual and pigmentation aspects of ochre will only be briefly mentioned, as these topics are treated in more eloquent detail elsewhere. "Goethite (a-FeO_2H) and hematite (ar-Fe_20_3) were the first pigments of art history, probably because of their intense color, respectively yellow and red, and because of their natural abundance. Together with manganese oxides and charcoal, chosen for their black color, they constituted the early prehistoric painter's palette" (Pomies et al. 1999b:275). DeBoer (2005) describes colors as being representative of cardinal directions to Native American tribes, He includes a chart demonstrating some of these associations amongst different cultural groups, with differing compass-direction associations (DeBoer 2005:71-72). Ritual uses of ochre tend to be more interpretive, lend less to quantitative analysis, and are more appropriately dealt with in the realm of anthropological theory. However, Lombard (2007) makes mention of "the possible

symbolic role that ochre may have had in the hafting technology of (South African) Middle Stone Age tools as 'added value' over real and above its functional application" (Lombard 2007:414). Generally then, it may be safely assumed that ochre, and the color exhibited, has played an important, though varied role in the behavioral considerations of groups both extant and archaeologically-recognized.

Methods

This study began with a primary literature review, in which "ochre" was used as the search term in a database search of scholarly journals available via Colorado State University's Morgan Library. These articles formed the background knowledge informing the larger discussion of prehistoric ochre uses, the relevant aspect of that discussion which this study seeks to inform, and as a place from which to begin experimentation.

The Experiment

Two samples of goethite were used in this experimental study, with both samples graciously donated by Dr. John Ridley of the CSU Geology Department. The first was an 86.3 gram nodule of goethite obtained from the Gossan mine in southwest New Mexico, with the second sample 224 grams of loose, unconsolidated material from a surface pile collected from the San Juan mountains near Silverton, Colorado. The nodule was abraded using a sandstone slab to obtain powder for additive to the mastic mixture, as well as providing some insight into the amount of work necessary for an individual to obtain powder from a nodule (see Appendix, notes on abrasion). As this powder was freshly generated, no introduction of macrobotanical elements was therefore possible before its use in mastic recipes. This could skew results by incorporating

unintentional additives to the mastic. In the second round of experiments, the surface sample of goethite from near Silverton, Colorado was screened through 1/16 inch, followed by 1/32 inch screens to remove the aforementioned botanical elements. This goethite sample was then dehydrated into hematite via heat-treatment as previously outlined in this paper.

Heat-treating Geothite

It is possible to dehydrate goethite, by submitting it to a minimum temperature of 250^0 C (Pomies 1999a:1605), chemically transforming it into hematite. This results in an accompanying color change from yellow to red. Figure 3 shows the before-and-after result of dehydration of goethite into hematite via the application of heat.

Figure 3: Samples of Goethite (left) and Hematite (right)

As part of this project, 6.0 grams of goethite, from the Silverton surface mine sample, was heated in a 500^o F (260^o C) oven for minutes hours (120 minutes), on an aluminum-foil-covered (shiny side down) cookie sheet. After heating, the dehydrated sample weighed 5.0 grams, or 83.3 percent of its original weight. This indicates 1.0 grams, or 16.6 percent of the original weight, dehydrated out of the goethite sample. A

dramatic color change accompanying this dehydration was noted, from a yellowish-brown to a strong dark brown/deep red, indicating a successful chemical transformation took place.

Methods

The methods used in this experimental study may be summarized simply as: Prepare and heat mastic, mix in additive, apply to haft, insert stone blade, and attempt to break the bond. First, a mastic recipe was prepared by heating locally collected pine-resin using a hot plate. A soup can within a tuna can was used as a double-boiler, to separate out macrobotanicals (bark, pine needles, bugs, etc.) from the resin. A candy thermometer was used to record the temperature of the liquefied mastic prior to application. After the pine resin had melted, increasing concentrations of ochre powder were mixed into the mastic as an additive and binder. While the mastic mixture was still in a semi-liquid and gooey state, it was applied to an antler handle; with a stone blade then quickly set into the rapidly drying mastic. After allowed a few minutes to cool and harden, this newly hafted stone tool was then submitted to a strength test. This experiment is relatively easy to replicate, using mostly available household materials.

The strength test consisted of suspending the compound tool and adding increasing weight (in the form of stones) until the bond between stone and handle breaks. This method was reproduced from that used by Baker in his 2009 experiment, and seemed satisfactorily applicable to testing results in this experiment.

In testing the strength of the bond between stone tool and antler handle, weight was suspended from near the tip of the stone blade, with the tool upside down and at an angle with the blade upwards. This arrangement was inspired from a previous experimental study (Chambers 2009, unpublished) of butchery processes using stone tools, as part of Dr. Jason

LaBelle's Fall 2009 Anthropology 580: Experimental Archaeology course offered at Colorado State University. It was inferentially believed that the above arrangement would simulate the differential, leveraging forces exerted upon a hafted knife during the flesh removal process, noted as occurring during the out-to-in drawing and slicing motion associated with this specific, butchery process.

Hafting

Prior to discussion of the multiple mastic recipes, a consideration of hafting methods is necessary. Three types of hafting arrangements are archaeologically recognized in Newton's (2006) examination of intact hafted stone tools, citing Stiger (2001). All specimens used in this study coincide with Stiger's three-class categorization of hafted stone knives, represented by: (1) end-haft with blade wider than handle, (2) end-haft with blade narrower than handle, and (3) side-hafted blade (Stiger 2001:245). With the experimental specimens validated by the literature, thereby providing appropriate analogy to the archaeological record, it should be noted that in Newton (2006), none of the archaeologically-recovered intact specimens mentioned as having only mastic (without the use of binding) utilized handles made of antler. Indeed none of the recovered, intact specimens were mentioned as utilizing antler handles, with either wood or bone used. Additionally, none of the intact hafted tools utilized obsidian tool stone, this may be due to the "smoothness" of the fracture plane of the stone, lacking the irregular, frictive surface of other lithic materials, such as chert or quartzite.

Figure 4: Hafting arrangements: Jam (upper), Slot (middle), Side (lower)

The Assemblage

Three handles (see Figure 4) were constructed out of a single elk antler shed. As all handles were cut from the same shed, differential composition of the antler is minimized as a contributing variable in this study. Three different hafting methods were used in this study. All hafting arrangements, jam, slot and side-haft, concur with archaeologically recognized specimens (see Newton 2006). Three stone blades were pressure-flaked from hard-hammer, percussively-reduced flakes of obsidian. These blades all incorporated a stemmed-base design to facilitate hafting. Breakage during trials rendered it necessary to expediently create an additional two blades. These replacement blades were manufactured in an attempt to conform to the freshly-broken specimens as nearly as possible to minimize variability during strength testing. In each attempt, morphology, dimensions, and mass were reproduced as near to the originals as skill and time would allow.

Mastic-only, Intact knife examples from Central and Northwestern Plains

Site/#	Age	# of Elements	Handle Material	Blade Material
Horned Owl Cave	Late Archaic or Late Prehistoric	3	Pine	Quartzite
Hagen (24DW2)	Late Prehistoric or Proto-historic	3	Bison vertebra	Unspecified
25FR22	Late Precontact AD 1000-1400	3	Bison rib	Unspecified
Plum Canyon (5LA2158)	Late Prehistoric AD 900-1250	3	Bison scapula	Quartzite

Figure 5: Occurrence of recovered mastic-only hafted knives (adapted from Newton 2006:38-39)

Mastic/Adhesive

Four different recipe variations of pine-resin-based mastic were utilized to determine the efficacy of adhesion from the inclusion of ochre. A single control recipe using only pine-resin mastic was initially used to determine base-line adhesion/strength properties in each of the hafting configurations. Following the pine-resin-only control recipe, six subsequent iterations utilized ochre (goethite, followed by hematite) to pine-resin mastic in three increasing concentrations of 15:1, 7.5:1 and 5:1.

Comparison of Patterns in Case Studies

Wadley (2005) performed similar tests to determine the efficacy of ochre in mastic/adhesives, using split and L-shaped hafts. "Wooden hafts were prepared by cutting a split in the haft or by cutting an L-shaped platform of about 12 mm in width and 18 mm in height. Replicated flakes were made from a variety of local rock types, and 38 flakes were hafted with replicated adhesives" (Wadley 2005:591). As previously mentioned, my experimental study incorporated three different hafting configurations (jam, slot, side), none of which were represented in Wadley's sample. Additionally, Wadley used heat treatment to assist in drying the newly applied mastic. This differed in my experiment, as my mastic recipes were found to air dry rapidly without the need of heating. Though my experimental study incorporates fewer elements (i.e., a single stone type obsidian) and variations in mastic recipes than Wadley's study, the numerous iterations (n=18) of ochre-based mastic recipes in differing proportions provided consistent testing of fewer variables.

Another major difference between Wadley's experiment and my own lay in the testing strategies of the mastic bond. Wadley tests the effectiveness of the mastic bond by "chopping the bark off branches" (Wadley 2005:597), with durability of the mastic determined as to whether or not the tool survived six minutes of this chopping activity intact, or broke. More empirically quantifiable results were desired for my experiment, thereby making direct comparison difficult. I therefore utilized the testing strategy demonstrated by Baker (2009) in testing jam-hafting in antler handles. My results were, again, not directly comparable to Baker's however, as soaking of the antler handle was not attempted in this experimental study. As such, I had nowhere near as high a value for separation force (breakage weight); Baker recorded in

his trials separation forces of 13 and 17 pounds respectively (5896.7 grams and 7711.1 grams) using stone weights added to a bucket, massed via a digital postage scale, suspended from the projectile point. The greatest mass sustained in my two most successful trials was only 2904.6 grams. It seems that in comparison to other experimental studies, my apples don't quite compare to Wadley or Baker's oranges.

Strength Test Increments

Interval #	Max. Breakage Mass (g)	Interval #	Max. Breakage Mass (g)
1	191.1	**9**	1770.6
2	956.5	**10**	2090.5
3	1114.9	**11**	2248.9
4	1113.1	**12**	2423.5
5	1185.2	**13**	2652.2
6	1208.9	**15**	2675.9
7	1367.3	**15**	2904.6
8	1541.9		

Figure 6: Strength Test Intervals

When considering the breakage mass value utilized in this experiment, this should be regarded as the maximum value for the range within which the adhesive bond is broken, rather than the exact mass necessary to break that bond. The true breakage value for each iteration is therefore less than this maximum and greater than the last incremental value. Figure 6 highlights the irregular, non-standardized intervals (defined as the summed mass of added stones) utilized in this experiment, and hopefully provides clarification as to the range of values within which the mastic bond broke per strength test trial.

In discussing the efficacy of ochre in mastic, it is useful to consider the mastic: additive ratio per haft type. Jam haft –

Isolating the trials while holding the haft type and materials constant, it becomes apparent that increasing the ratio of goethite or hematite to mastic results in a stronger bond. While the 15:1 and 7.5:1 ratios perform similarly to the control, the 5:1 ratio of goethite is shown to be more effective, with the hematite outperforming the goethite at the 5:1 ratio.

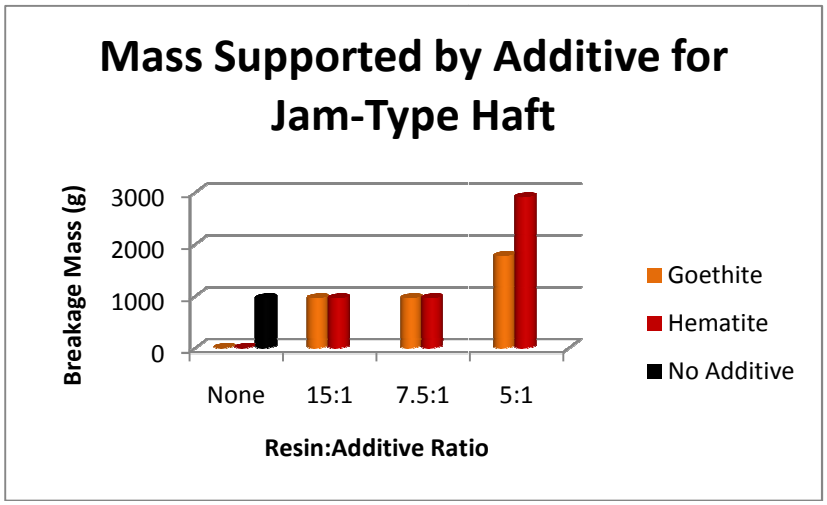

Figure 7: Strength Test Resuts: Jam Haft

Slot Haft

As compared to the control, both goethite and hematite perform identically across all ratios of ochre:mastic recipes. Only in the 15:1 ratio recipe does the goethite perform identically to the control, and less effectively than the same hematite recipe.

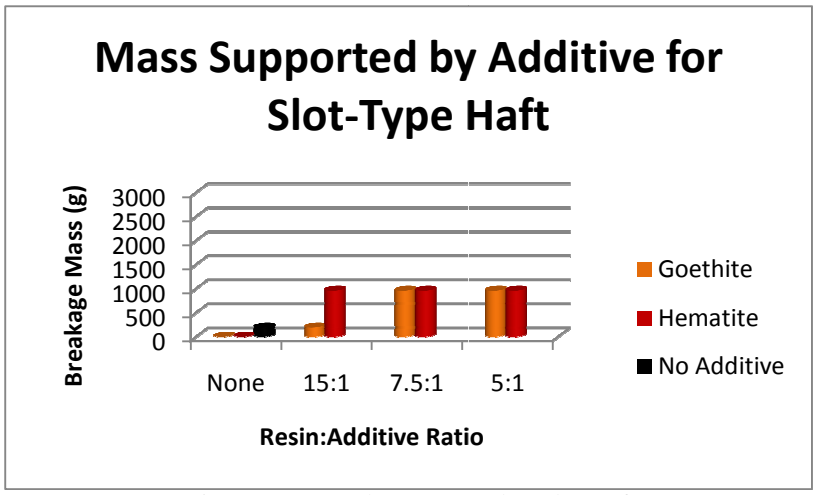

Figure 8: Strenght Test Results: Slot Haft

Side Haft

Contrary to the previously discussed results for the jam- and slot- hafts, the 15:1 ratio of goethite and hematite outperforms all other proportions, with the goethite more effective than hematite at the same ratio. However, there are slight performance discrepancies in this data, as the hematite slightly outperforms the goethite in the 5:1 ratio recipe. In comparison to the control, in all recipe iterations both the goethite and hematite increase effectiveness of the mastic bond as compared to the control recipe.

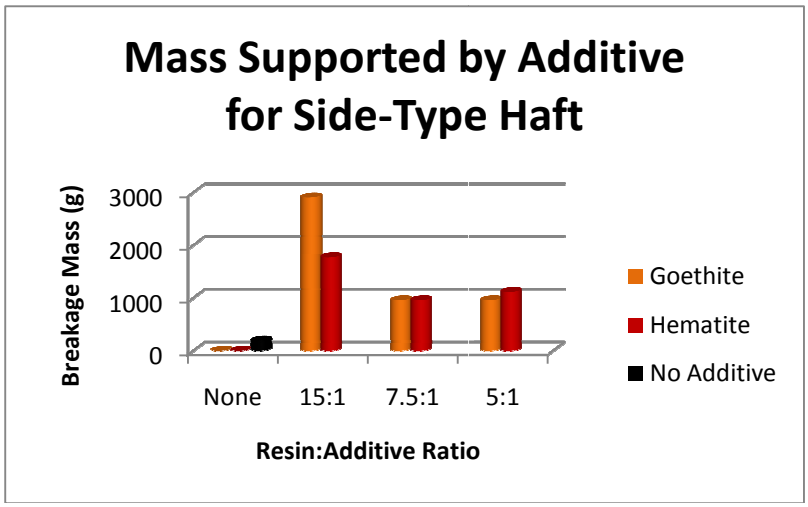

Figure 9: Strength Test Results: Side Haft

Overall, in 72.2 percent (13 of 18) of the recipe variations, the addition of any ratio of goethite or hematite did improve the adhesive strength of the mastic over the control recipe. In 27.8 percent (5 of 18) of the recipe variations was the addition of any ratio of ochre (goethite or hematite) noted as not making an appreciable difference in the mastic's effectiveness. Satisfactory to the goals of this study, in zero percent (0 of 18) variations did the addition of any ratio of goethite or hematite to mastic detract from the effectiveness of the control recipe, indicating that the addition of ochre, in either goethite or hematite form does in fact increase the effectiveness of pine-resin mastic.

Conclusions

Not all archaeologically-recovered artifacts are unambiguous as to their function in the contextual lives of the people that laid them down. Many different cultural groups, both contemporary and historic, as well as prehistoric, used ochre in

a variety of ways. This prevalence of ochre use is represented in HRAF cultural trait comparisons, ethnographic accounts, and archaeologically-recovered remains. The wealth of literature published on the wide-variety of ochre utilization in prehistoric life attests to this, with ochre variously treated as pigment, medicine, and hide preservative.

Specifically through the course of this experimental study of one specific use of ochre, it was observed that when added to pine-resin mastic in increasing proportions, the efficacy of the mastic (generally) improved. While some vagaries were noted in the pattern concerning hafting combinations, the general trend indicated by the data suggests improved performance of mastic with the addition of increasing proportions of ochre. It was also noted that while goethite and hematite additives performed similarly, hematite (heat-treated goethite in this case) slightly outperformed goethite as an effective mastic additive.

An interesting possibility is the consideration of mastic, not only or solely as a function of its adhesive properties, but as a void filler. Though while not addressed in this study, this consideration might indicate that mastic's first duty is not to adhere to the stone, thereby keeping the blade in the haft, but to fill in the space between the irregular surface contours of the stone blade and the handle. This could possibly account for the tendency of each and every stone blade used in this trial to "pop out" of the mastic/haft, leaving both obsidian stone blade and solidified mastic intact. In no cases did the applied force break the internal structure of the stone itself.

In interpreting prehistoric behavior in light of this single experimental study, it would seem that different combinations of materials would have been recognized as being necessary in constructing complex tools. Inferentially, in only two of the cases (15:1 ratio for side haft and 5:1 ratio for jam haft), would the mastic-only hafted knife have been

effective withstanding the leveraging forces present in butchering processes. In the majority of the remaining cases would the stone (specifically obsidian) blade would have "popped out" of the mastic/haft leaving a presumably hungry individual holding a temporarily useless tool.

The difficulty in attributing ochre distribution patterns on archaeologically-recovered tools seemingly lies in the diffusion-based qualities of ochre, in that in powdered form, it tends to coat everything in the vicinity in a fine layer of colored powder. This fact was observed during the course of my experimental study, one which required close, careful manipulation of the powder either outdoors, or in a semi-sealed plastic bag, to prevent it from finding its way onto/into expensive laboratory equipment. This infiltrative ubiquity of ochre is confirmed by Marshack (1981) in relating the distribution of ochre in deep antiquity as regards an Acheulian *Homo erectus* site:

> At the *Homo erectus* shelter of Bedov in Czechoslovakia ... J. Fridrich excavated a piece of red ochre that was striated on two faces with the marks of abrasion and one flat rubbing stone with a granular crystalline surface that had been abraded in the center clearly in the preparation of ochre powder. On the floor of the shelter, at the side where the piece of ochre was found, there was a wide area of ochre powder. Seating himself on a rock against the wall of the shelter to study the ochre, Fridrich (1976) found that his feet accidentally fitted the only two areas without ochre powder. *Homo erectus* had sat on this stone, away from other activities in the site, while he made his red powder (Marshack 1981:188).

While not considered to be an endorsement of ochre use in mastic specifically, the above quote is useful in demonstrating not only the deep antiquity of ochre use, but also the difficulty in archaeologically assessing distribution patterns on tools. Not only does ambient powder have the ability to be easily

dispersed, but direct contact also can affect the archaeological assessment of ochre distribution patterns on tools. It was noted that the use of latex gloves was necessary over the course of my experiments to avoid contamination of everything I touched. I even found it necessary, in order to prevent widespread tactile staining, to remove the latex gloves with latex gloves. A single careless moment proved the effective staining properties of ochre, at the time of writing this paper several days following the experiments, the fingertips of my right hand exhibit a yellow, jaundiced color where they came into contact with the goethite sample. Continuing the discussion of ochre distribution on stone tools, this leads one to question whether the presence of ochre on tool edges indicates ochre use in hafting, ambient staining from preparation in the vicinity, or contact with ochre-impregnated items (i.e., hide or hands and fingers).

Future Studies

Future studies could lead to a more appreciable (read strictly quantifiable) assessment of the exact mass required to break the mastic bond adhering the stone tool to the handle. With the use of more regular, incremental mass intervals used in the strength tests the ranges (represented by maximum values) that I have presented in this study could be more discretely reduced to actual, appropriate values.

Additionally, instead of using stone blades, future iterations of this experiment could include the hafting of modern razor blades. This consideration may provide insight as to the void filler/adhesive debate and the true role of mastic in compound tools, as well as indicating whether surface friction plays a part in the adherence of the blade to the mastic.

It would also be of interest to see, in subsequent iterations of this experiment, if different stone tool types

displayed similar results during the strength tests. As noted in Newton's (2006) discussion of hafting configurations, quartzite was identified as representing 50 percent of the sample (n=4) of tool stone from mastic-only hafted knifes recovered intact in Central Plains rockshelter contexts. Similarly, it would also be interesting to see if the lack of representation by antler handles in that study is a fluke of the archaeological record, or if further experimental studies could indicate as to whether wood and bone element handles prove more effective at maintaining the bond between stone and mastic, thereby perpetuating their appearance in the archaeological record.

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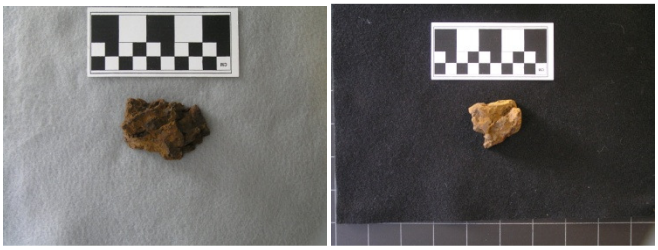
Appendix: Notes on Sandstone Abrasion of "Gossan Mine" (SW NM) Goethite Nodule

-Abrasion of the goethite nodule was accomplished by counting the number of strokes, and weighing the sample, and resultant powder, after each 100 stroke interval.
-Several fragments broke off from the main sample during abrasion; though these were too small to be further utilized for abrasion into powder, they were possibly useful as 'crayons'.
-Multiple faces of the sample were abraded, with the sample frequently turned over to abrade other faces, with no attempt made to associate each face with the powder resultant from it.
-Faces were initially irregularly shaped, though become more uniform with abrasion. This likely served to increase the surface area in contact with abrading surface over time, and resulted in each face marked with abrasion striations.

# of Strokes	Mass of Sample(g)	Total Mass of Powder(g)	Powder Mass per 100 strokes (g)	Powder Mass per Stroke (g)	Notes
100	84.7	1.2	1.2	0.012	4 fragments dislodged (6.9g)
200	77.4	1.5	0.3	0.008	
300	77.1	1.7	0.2	0.006	
400	75.5	3.2	1.5	0.008	
500	75	3.6	0.4	0.007	
600	73.9	4.5	0.9	0.008	2 fragments dislodged (8.7g)
700	65	4.8	0.3	0.007	
800	64.6	5.1	0.3	0.006	
900	64.2	5.5	0.4	0.006	
1000	63.6	6	0.5	0.006	

	Mass (g)	**Max. Length (mm)**	**Max. Width (mm)**	**Max. Thickness (mm)**
Initial Sample	86.3	64.3	43.1	27.7
Final Sample	63.6	45.55	40.13	26.43
Difference	-22.7	-18.75	-2.97	-1.27



Gossan nodule prior to abrasion (left)
Gossan nodule after abrasion (right)

Sandstone abrader after abrasion of Gossan nodule

Consequences of Connection: Patterns of Consumption in an Early 20th Century Western Saloon

Katrina Waetcher

Abstract—*The American Old West was a period that can be categorized by social and technological forces that profoundly altered human lifestyles. Consequences of these forces can be understood as indicators of the status of large-scale social systems. This paper explores the interactions of changing economic environments, infrastructure, and local culture as reflected in selected artifacts from a historic archaeological site in rural Colorado. The Corner Saloon, 5HN47, was a joint restaurant and saloon in operation at the turn of the twentieth century in Lake City, Colorado. The food service collection from the Corner Saloon, comprised of food containers and ceramic items on which food or beverages were served, is used as a stage to relate consumer choices at the Corner Saloon and the forces that shaped Lake City. Lake City shares a similar history with other early mining boomtowns, yet Lake City became economically viable beyond the boom years. The cumulative consequences of radical alteration of the local economy and its market status created a balance of primary and tertiary economic activities that provide a baseline of local economic stability.*

Introduction

In 1985, Susan Williams, expert in American Victorianism and Curator of Household Accessories and Tablewares at the Strong Museum, published a guide to formal and restaurant service in Victorian America. Williams' guide to meal

organization and food items described how eating as a concept and action changed during the Victorian era:

> Large-scale, efficient transportation networks brought out-of-season foods to consumers, and the rapid expansion of the publishing industry produced a multitude of cookbooks, household manuals and cookery catalogues… The choices people made about what to serve and eat, however, were not completely based on the appeal of new products or the desire for social acceptability.

Ideas about eating and food were transformed by the transition into the "modern world," redefining every aspect of life. Food became a stage upon which it was possible to demonstrate one's tastes, a display of conspicuous consumption. In a traditional sense, conspicuous consumption is used to describe excessive spending on goods and services acquired solely for the purpose of displaying wealth (Mayer 1999).

Directing attention to "prestige" or "status" goods is historically a behavior of upper classes or the leisure class (Veblen 1912), but it is certainly not limited to the rich. Similar practices have been documented in many social groups with diverse socioeconomic backgrounds. Mason (1981) describes conspicuous consumption in the late nineteenth century as a strategy to help protect one's position in society. This type of behavior thusly originates with society at large, which exerts pressure on individuals to express distinction. In this case, conspicuous consumption is directed at peers as opposed to social superiors or inferiors.

Conspicuous consumption in the Victorian tradition is conflicted. It is an expected form of protection of social status, but it is objected to by beliefs in modesty or select religious tenets. If the display of conspicuity in consumption were placed in a context of sheer excess, not a daily performed and necessary form as food, this conflict would be applicable to

this study. However, food and its consumption was an activity participated in by all and opportunities for excess are relative. It impacts little but dining and the resources allocated for that purpose.

Dining has always been an important social practice across cultures, but never in the American West before Victorian times did dining hold significant meaning as a social practice. Victorian cookery authority Elisabeth Beeton proclaimed, "Dining is the privilege of civilization. … [Dinner] is a matter of considerable importance; and a well-served table is a striking index of human ingenuity and resource," (Daly and Forman 2008). As the breadth of imagined and available food items widened, the dining table became the ideal stage on which to express tastes and standards.

This paper presents an inquiry into the manifestation of conspicuous consumption of food in a declining silver mining town in Victorian rural Colorado. While it would be appropriate in most regions to study items from a Victorian home, doing so in remote parts of the American West would reveal much more about the resourcefulness and tenacity of late nineteenth and early twentieth century townspeople. Thus, this study will examine items associated with food service at a historic saloon, the Corner Saloon, in Lake City, Colorado. Food service items include ceramic service wares and remains of food items, such as bottles.

The majority of historical narratives about Victorian food consumption focus on period dining room standards in the Eastern United States or England. However, similar standards in the American West attest to how Victorian ideology influenced the material goods people accumulated.

Background

The Corner Saloon, archaeological site 5HN47, was a restaurant and saloon operating at the turn of the twentieth century in Lake City, Colorado. The Corner Saloon was the latest of a series of service establishments to occupy the building at the corner of Third Street and Silver Street in Lake City. The building that housed the Corner Saloon was converted to a saloon in 1881. Before the building was a saloon, it was a mercantile, Lake City's main bank and also unoccupied for several years. However, the building passed through two previous owners before it became the Corner Saloon, operating under the proprietorship of Bert Perry and Joe White (Baker 1985:15). The Corner Saloon had a different fate than the previous businesses that occupied the same space. The Corner Saloon burned to the ground on December 27, 1912.

The Corner Saloon was destroyed by a fire that originated in the back of the restaurant on the northwest side of the building (*Silver World* 1913). The fire occurred on a Sunday afternoon shortly after Christmas. The blaze was discovered before it completely overtook the building and spread to any neighboring buildings. Lake City townspeople gathered to fight the fire, but only managed marginal success. The fire leveled the building and eventually burned out later in the evening.

Since the blaze, the land that was formerly the Corner Saloon was covered and developed into a recreational park. The site sat mostly undisturbed after 1912, excluding occasional bottle hunters and foot traffic. The Corner Saloon site was uncovered in 1977 during construction of a wading pool in the park. Upon discovery, the town of Lake City asked archaeologist Steve Baker of Centuries Research, Inc. to excavate the site so that construction activities could continue.

With the aid of a few of the city's workers and volunteers, Baker completed the excavation. In 2009, Baker loaned the Corner Saloon artifact collection to Colorado State University for analysis and to provide an opportunity for students to gain experience in historical archaeology.

Methods

This inquiry is an exercise in historical archaeology, which according to Hardesty (2003), takes the archaeological study of the modern world into its domain. Specifically, this inquiry is oriented at examining the consequences of social and technological forces that transformed human lifestyles as seen in conspicuous consumption at the Corner Saloon. At this period in American history, especially in Western mining regions, social and technological forces are the foremost actors of non-local influence of culture. Between Victorian traditions and the ceaseless improvements of mining equipment and related businesses, such as roads, railroads and organized commercial activity, small mining towns were subjected to induced demands. In this way, local economic environments are heavily influenced by large-scale social systems and relations to the world economy. In turn, local economies participate in regional and global markets through their role in production and consumption, the former being of interest in this paper.

Because of its particular location in this geographic feedback loop, Lake City's local economy operates from a unique standpoint in the San Juan Mountains. As described in later sections, Lake City functioned as the transportation hub of mining operations in Hinsdale County. Thus, the town held pivotal roles in both mining and agricultural production as well as the importation of goods that were unavailable locally. It is simple enough to verify the presence of non-local market

forces and entities in the Corner Saloon collection. However, archaeologists need to go beyond identifying the presence of mass-produced and exotic goods: archaeologists must explore how global knowledge and commodities are locally interpreted (Hardesty 2003).

Mute evidence, such as artifacts and historic texts, is often what remains archaeologists are able to work from. These sources of information, which have been separated across time and usually space from their author or user, must be interpreted without any additional comment (Hodder 1992). The food service artifacts from the Corner Saloon collection fit this description: they are without specific account and significant questions about them loom. The best tool to understand them is to build a context of Lake City's economy when the Corner Saloon was in operation and attempt to relate the findings of the collection to the known history of the area. By examining the historical context of the Corner Saloon, I hope to provide a frame from which to interpret food service at the Corner Saloon.

Arrival of the Mining Industry

Lake City was founded during a mining in the early 1870s and incorporated in 1884, ten years after the founding of Hinsdale County. After initial rounds of exploration, mines opened and prospecting took off in the immediate area. Most claims were filed during the 1870s; 122 lode and eight placer claims were filed within weeks after the organization of the first mining district (Conner et al. 1999:3). The proportion of lode to placer claims are very high and reflect early findings of rich surface mineral deposits. This time of ore discovery, primarily from 1870s to the late 1880s, witnessed tremendous change in Hinsdale County. The region shifted from a virtually uncharted

territory to a commercially developing area with mining ventures that rivaled others in the state in scope.

According to Smith (1982:18), three basic components are essential for creating a local mining industry: profitable mineralization, capital, and cost effective, reliable transportation. Valuable surface mineral deposits were discovered as early as 1873 adjacent to Lake City (Vinton and Co. 1895). Initial capital for investment had to be located to develop claims, which eventually coalesced into the construction of smelting plants and mills, maintenance of settlements and the underwriting of mining expenses. All of the preceding operations required a viable transportation network. Without cost effective, year-round transportation, the costs of living and mining activities remained high. Without reliable transportation, only small deposits of high-grade ore could be mined profitably. The limits of transportation around Lake City drove away potential investors. Instead, investors sought mining ventures that offered consistent deliveries of mineral products.

A pivotal political event defined the legal process, which only served to add to additional stress to the previously mentioned limits to silver mining operations (Conner et al. 1999:5). The Mining Act of 1872 formalized the rules of operations and claims. Its foremost aims were to promote mineral resource development and settlement in the West. The most important provision of the Mining Act to Lake City's economy was the order to patent claims to secure a land title. After a claim was made and filed, assessment work had to be performed every year or the claim was forfeited. Most claims in the San Juan Mountains went no further than filing. A claim owner could only apply for a patent if they thought the property was especially valuable after an outlay of at least $500. This process required a lawyer's help, land survey, patent notice publication in the nearest newspaper, and a sworn

statement of ownership. Finally, if no adverse claim was filed, the property was paid for by the government at five dollars an acre. Only then was the claim safe. While it was a bothersome procedure in the short run that precluded many would-be landowners, it was much cheaper to for laborers in the long run (Wyckoff 1999). Silver mining in and around Lake City was not a lucrative opportunity for individual miners and prospectors. The only feasible way to extract minerals near Lake City was through the incorporation of large-extent mines and mills.

Between the passage of the Mining Act of 1872 and the challenges of mining in the San Juans, the mining frontier around Lake City was a collaborative stake venture held by miners, laborers, capitalists, and their investors. Various social groups were incorporated in the local economy when the role of outside financial supporters was solidified. The local mining scene opened horizontally to miners and unskilled laborers. Employment opportunities support Lake City as a well connected remote rural town.

A Boom Town

Spurred by rich surface deposits, Lake City was one of two dominant commercial centers in the San Juan Mountains during initial expansion. Water power for the smelters and other industries was readily available as well as arable land for ranching and farming from nearby Henson Creek (Vinton and Co. 1895). Early in its history, Lake City was connected to a road network that extended into all nearby mining districts in the San Juan Mountains (Conner et al. 1999:6). Even though Lake City and its surrounding mines were connected, their transport network was unreliable. Roads were easily damaged beyond the point of being passable, whether from inclement weather or damage incurred by heavy traffic. Mines closer to

Lake City were significantly more successful than distant mines. Higher prices of ore from distant mines reflected this challenge of critical distance.

Lake City and settlements in the San Juans were not limited only in their production, but also in their ability to access non-local goods. Early mining camps and towns were generally isolated due to restricting terrain and climate (O'Rourke 1980:64). Foodstuffs and other commodities had to be imported by road from nearby railroad terminals. Additionally, high ore values were required in order to justify the costs shipping and refinement. The primary deterrent was the upfront cost of transporting ore on the unpredictable roads in the San Juans. Even though roads tended to be ineffective at lowering costs of operations, they were preferable to no infrastructure or trails.

In response to reliance on roads, most buildings in Lake City were concentrated along the main thoroughfare that led in and out of town. The business centers of Lake City and other similar mining towns developed in stages and agglomerated around roads and their major intersections (Smith 1982). Most of the early businesses that surrounded roadways were geared to the predominantly male population of the mining settlements. These businesses included saloons, general stores, as well as establishments that offered food and lodging.

Most people that made it to Lake City (i.e. miners) came to pursue their dreams of "the big strike" alone. Complementary businesses that catered to the material needs of the miners simultaneously emerged. As West and Whitman put it, "The rest came to 'mine the miners,' providing goods and services or seeking profit in the frenzy of speculation over claims and town lots," (1979:6). The businesses that followed the arrival of the miners diversified economic activity in Hinsdale County, even though this new sector was indirectly related to the mines. By opening the Lake City economy to

non-primary economic activities, these service oriented businesses represented an alternative should mining ever completely bust in and around Lake City.

Even though service oriented businesses in town were long-term economic entities that tended to outlast the boom-bust cycles of the mining industry (Hardesty 1990:31), the periodic economic trouble experienced by Lake City became a lasting crash in the late 1880s. Most mining companies floundered before 1890, which perpetuated greater instability than the typical boom-bust cycles. The crash of silver mining was the impetus for the creation of a new type of business class that is seen through the Intermountain West (Kinchloe 2001). The businessman class was new to the rural mining scene and contrasted with east coast capitalists. However, it was this new class comprised of local middle men and corporate organizers that rescued the productivity of the dying silver mines and feed the service industry.

Lake City moved towards technological modernization and development of other primary sector economic activities to combat the financial stand-still. The actions taken by the town of Lake City toward these ends also attempted to recapture a larger share of the mining industry. Electricity was procured in 1881, followed by the institution of a communications system (telegraph), railroad connection in 1889 (by the Denver and Rio Grande Railroad), and developing large-extent agricultural production (Conner et al. 1999). Railroad connection was a major improvement that provided incentive for the continuation of mining. Previous problems of transport costs were minimized by the ease of freighting by railroad. The railroad's arrival ushered in a period of growth, lasting until the silver mining industry collapsed nationally in 1893 following the Panic of 1893 and the repeal of the Sherman Silver Purchase Act (Baker 1985:9). Mining in Hinsdale County continued to be a strong industry due to mining of other

minerals, such as zinc, copper and galena. However, the San Juan region still declined, albeit gradually, at the turn of the twentieth century when all mining activities waned. Lake City entered a long period of recession deeper than those experienced in the 1890s. Unlike the recession in the 1890s, many miners and townspeople feared the collapse of mines and subsequent closings of many related enterprises, like saloons (O'Rourke 1980:98-99).

Overall, railroad access was by far the most important step towards modernization in the case of Lake City. Before the railroad, commodity prices were high because transport costs were high. Even with an established road network, non-local products cost many times more than local products.

Becoming a Money Culture

The shift in commodity values from barter to cash changed consumers' perceptions of commodities and businesses' marketing strategies. Consumer preference in general was placed on return value of the good (monetary) and net gain of a purchase (monetary and social value). Offerings such as free lunches became such an important component of saloon service that it was widely practiced in the Intermountain West. On the same note, it was also widely known among saloon proprietors that "free lunches" weren't really free: there was always a drink minimum. And even though the drink minimum was usually below the cost of the meal, it was a popular way to build patronage among would-be customers. Clearly, upfront cost was a defining factor of customer purchases.

Restaurant service was not only defined by appealing to customers' sense of value. Restaurants in Lake City also marketed towards social events and gatherings. For example, Delmonico's restaurant (Dallas 1988:9) portrayed itself in

newspaper advertisements as a wholesome alternative to saloons and a family-based community center (see Figure 1).

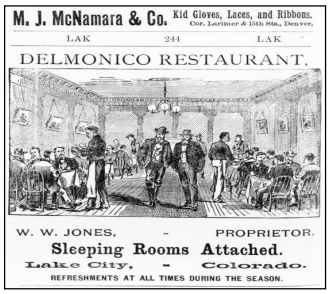


Figure 1: 1892 Delmonico's Restaurant advertisement (Dallas 1988)

Cultural context was as important in 1892 as it was in 1912. Later businesses like the Corner Saloon, in comparison with older businesses like Delmonico's, were subject to increased temperance sentiments. However, any number of changes in the economic climate surrounding western saloons may be responsible for the shift away from temperance. Based on the presence of glass bottles from mixed drinks ingredients in the Corner Saloon's collection, such as from Welch's Grape Juice, it is likely that negative perceptions of imbibing alcohol were shared by all residents of Lake City or patrons of the Corner Saloon.

Selections from the Corner Saloon Food Service Collection

Food Containers

Among the remains of food containers excavated at the Corner Saloon are several clear glass milk bottle pieces. The milk bottles recovered from the saloon were re-sealable bottles. Their maker and specific range of production is unknown, but the bottles have a broad range of production between 1890 and 1912, based on the semi-automatic manufacture of the bottles. The bottles are likely part of a larger set used to store milk and cream for either mixed drinks or as a stand-alone beverage.

Dairy operation in Hinsdale County was a small, rural industry. In the San Juan Mountains, dairy was not yet an important industry outside of immediate localities and was limited by moderate capital expenditures for containers and transport.

The presence of these semi-automatic milk bottles (see Figure 2) reflects the effects of a technological force that strongly influenced food storage in the late nineteenth and early twentieth century. Pasteurization and other sanitary measures, such as the use of cleaned reusable bottles, became common practice in most of the continental United States after 1864, when pasteurization was invented. Early dairies relied on natural conditions to prevent spoilage of their products and traveled to their customers in order to dispense their products. For example, McKnight Dairy outside of nearby Telluride, Colorado used creek water to cool milk containers and specially designed metal travelling containers to maintain cool internal temperatures (Church et al. 2007:350). Most distributors required customers to provide their own containers, which limited the quantity customers could receive due to an absence of effective and sanitary storage. Slowly, communities in rural Colorado started to use sealable sanitary bottles that became available as late as 1904 (Lockhart 2001).

Figure 2: Clear glass milk bottle tops from the Corner Saloon collection

Additionally, it is likely that the proprietors of the Corner Saloon used refrigeration to store their dairy products. After the fire, a report printed by *Silver World*, Lake City's primary printed news source, mentioned that the Corner Saloon had an

ice chest in which to keep products refrigerated. Refrigerated dairy would not only keep for longer, but it was more pleasant and ostensibly acceptable to consume cold.

Another diagnostic food container from the Corner Saloon collection is a clear glass, mouth-blown, cup-bottom fluted ketchup bottle (see Figure 3). The bottle is almost intact, only missing a portion of the neck and finish. Its most notable feature is that it has several remaining pieces of a glued paper label. In addition to the paper label, the bottle was side embossed to read "CURTICE BROTHERS and Co." The bottle is a product of Curtice Brothers brand's Blue Label Ketchup line.

Figure 3: Curtice Bros. Co. Blue Label Ketchup bottle from the Corner Saloon collection

Curtice Brothers Ketchup is a brand that originated in Rochester, New York in 1868. The Curtice Brothers ran a small grocery store and canned overripe produce to prevent spoilage. They opened plants in New Jersey and rural New York after initial success of their goods in local stores. As a brand name, the Curtice Brothers' "Blue Label Tomato Ketchup" and "Imperial Tomato Ketchup" lines were the most frequently advertised in the nineteenth century. Their advertisements in *American Grocer* and *Harper's Weekly* dwarfed all other ketchup manufacturers combined in total expenditures, which totaled $178,000 in 1908 (Smith 2001).

The Curtice Brothers had a unique strategy to target consumers. The Curtice Brothers Company affiliated itself with multiple railroads, mostly transcontinental railroads such as the Pullman Company, Wisconsin Central, Great Northern, Union Pacific, Northwestern, and Chicago. The preceding railroad lines would stock Curtice Brothers products exclusively in exchange for discounted prices on bulk purchases. Since Curtice Brothers ketchups were known to be resilient against rot, they were an ideal partner for any major transit or general service provider.

Keeping up with the demands of the railroads was tireless exercise. In 1909 alone, Curtice Brothers Co. manufactured 1,400,000 bottles and 25,000 separate gallon sanitary cans of ketchup to satisfy consumer demands and their railroad contracts (Smith 2001). The dominant market share that the Curtice Brothers Company held at this time did not last long. Soon, the Curtice Brothers Co. would be left behind when it came to innovation in ketchup production.

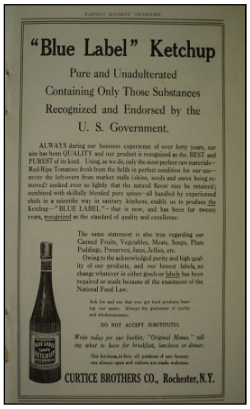
A Brief History of Ketchup

The Curtice Brothers Co. brand was one among several brands at the turn of the twentieth century that promoted the use of benzoates, notably sodium benzoate, in their sauces. The use of benzoates as a preservative was an extremely contentious political issue and received significant attention in national and international markets. After the Pure Food and Drug Act of 1906, composition standards of commercial ketchups were rigorously inspected by the Bureau of Chemistry. Not all manufacturers adopted the established standards, like the Curtice Brothers. However, controversies of ketchup ingredients did little to hamper the popularity of Curtice Brothers' Blue Label Ketchup. In a 1904 poll by Ralph Tilton, manager of the advertising for the Butterick Trio, Curtice

Brothers' Blue Label brand only trailed behind Heinz Ketchup (Smith 2001).

The use of benzoates was increasingly challenged throughout the early years of the twentieth century. Innovators like Heinz brand pursued alternative recipes that eliminated the need for the unpopular preservative agents. Heinz was the first major brand to succeed in the creation of an alternative ketchup (Smith 2001). Heinz's new recipe, which was neither bitter nor salty like the two basic categories of earlier ketchups, was unique to other non-benzoate recipes.

Pro-benzoate manufacturers contended that because alternative, modern ketchups boosted the quantity of vinegar and sugar, the tomato taste was destroyed. The Curtice Brothers Co. maintained that their Blue Label Ketchup contained "less vinegar, was lighter bodied, and cooked less to retain the real tomato flavor" (*Harper's Weekly* 1898). The Curtice Brothers Co. also maintained that their products were all "Recognized and Endorsed by the US Government," (see Figure 4).


"Blue Label" Ketchup

Pure and Unadulterated

Containing Only Those Substances

Recognized and Endorsed by the

U. S. Government.

ALWAYS during our business experience of over forty years, our aim has been QUALITY and our product is recognized as the BEST and PUREST of its kind. Using, as we do, only the most perfect raw materials—Red-Ripe Tomatoes fresh from the fields in perfect condition for our use—never the leftovers from market stalls (skins, seeds and stems being removed) cooked over so lightly that the natural flavor may be retained; combined with skilfully blended pure spices—all handled by experienced chefs in a scientific way in sanitary kitchens, enable us to produce the Ketchup—"BLUE LABEL"—that is now, and has been for twenty years, recognized as the standard of quality and excellence.

The same statement is also true regarding our Canned Fruits, Vegetables, Meats, Soups, Plum Puddings, Preserves, Jams, Jellies, etc.

Owing to the acknowledged purity and high quality of our products, and our honest labels, no change whatever in either grade or labels has been required or made because of the enactment of the National Food Law.

Ask for and see that you get food products bearing our name. Always the guarantee of purity and wholesomeness.

DO NOT ACCEPT SUBSTITUTES.

Write today for our booklet, "Original Menus," telling what to have for breakfast, luncheon or dinner.

Our kitchens, in fact, all portions of our factory are always open and visitors are made welcome.

CURTICE BROTHERS CO., Rochester, N.Y.

Figure 4: Curtice Brothers Co. "Blue Label" Ketchup Advertisement (Harper's Magazine 1909)

Whether the reluctance of the Curtice Brothers Co. to cooperate with common manufacturing practices influenced the

decision of the Corner Saloon proprietors to stock Curtice Brothers brand is unclear. It is difficult to identify a local interpretation of the Curtice Brothers brand because of the limited presence of Curtice Brothers products. However, it is likely that the presence of the Curtice Brothers Blue Label Ketchup bottle, which ranged in manufacture from the 1890s to the early 1920s (Rinker 1968), resulted from the sole reliance on railroad-supplied good of the Corner Saloon.

It is worth noting that since only one vessel recovered from the Corner Saloon was a Curtice Brothers Co. bottle, it is certainly possible that Curtice Brothers was not the preferred brand of choice. It could be the case that other brand bottles in use at the time of the fire were recovered from the blaze (see discussion in following section), and thus never made it into the collection. Similar uncertainties follow conclusions based on diagnostic artifacts from the Corner Saloon. However, it is possible to state that the presence of the Curtice Brothers brand at the Corner Saloon describes to some extent the level of access to nationally marketed products and purchasing power of the customers and proprietors of the Corner Saloon.

Ceramic Service Wares

For the purpose of this study, ceramic service wares are defined as all ceramic material items that are functional in the sense that they are not purely decorative. This approach treats all pieces in the food service collection of the Corner Saloon as open stock (i.e. found as an individual piece or part of a small group rather than in complete, predetermined sets). This assumption also increases uncertainties of what the entire Corner Saloon collection is like. Since there are very few pieces left from the fire and excavation in the collection, each piece is treated as representative of the collection when it is unknown if this is the case.

The representation of the Corner Saloon collection is undeniably skewed. The Corner Saloon archaeological site was quintessentially formed by the destruction of the saloon in the December 27, 1912 fire. The site was not formed by the normal quantities and types of items one would hope to have in a collection. While the townspeople of Lake City were fighting the blaze on December 27th that threatened to destroy the entire block between 3rd and 4th Streets on Silver, the saloon's proprietors were able to remove almost all of the items of value from the saloon. As the account from *Silver World* (1913) reads:

> The fire started from a defective stove pipe in the space between the ceiling and the roof over the restaurant, and had gained a great headway before it was discovered by Billy Griffith. The place had been bought a few days previous from Edna Manning by Mrs. Johnson who managed to save nearly everything. The proprietors of the saloon, Messrs. Bert Perry and Joe White, saved all the goods and all the fixtures except the big ice chest and the back bar.

The extent to which the proprietors removed all of the valuable items and furniture from the saloon is unknown. However, evidence from the saloon's food service collection supports the notion that most items were removed from the saloon. It seems that only the already discarded items were left.

Even though a moderate range of ceramic wares were recovered during excavation of the Corner Saloon, there are several related common themes among pieces in the collection. The food service ceramic items assembled are generally mass-produced, cheaply available utilitarian pieces. Out of a sample of 291 non-decorative pieces, forty percent were non-vitreous white bodied earthenware; nineteen percent vitreous white bodied earthenware; twenty-three percent stoneware; and less than fifteen percent delicate or exotic ceramic materials. To

reinforce the significance of the disproportionately high counts of coarser wares, measurements of the thickness of ceramic sherds were collected during cataloguing the collection. A two-tailed *t*-distribution test of mean piece thickness that compared fine materials, such as porcelain, semi-porcelain and vitrified ceramic, against coarse materials, such as stoneware, non-vitreous earthenware and hotel ware, was conducted and yielded a significance value of .038 (α=.05). While this calculation does not remotely suggest that the Corner Saloon exclusively stocked more functional and utilitarian pieces, it does reinforce the conclusion that the Corner Saloon stocked hardier wares that were more resilient than their easily breakable complements.

Additionally, most of the ceramic service ware pieces show signs of damage prior to the fire in 1912. As part of cataloguing items in the food service collection, I collected data on the level of heat damage per each piece (numeric scale signifying percentage of surface damaged, surfaces affected, effect of heat damage), presence and type of fractures on each item (primary, secondary) and a measure of completeness (compared to estimated diameter when applicable). As expected, the collection was in very poor condition. Most of the pieces were scorched and charred beyond recognition of anything but their most basic components, such as material. Over ninety-six percent of the pieces in the collection showed signs of crazing (a network of fine cracks on the surface of a glaze), had spalled (spalls are fragments of material that have been ejected from a body due to impact or stress), secondary fractures as a result of the fire, or exhibited some combination of the previous conditions. Ceramics can fracture in several ways depending upon how the vessel is struck. Primary fractures were very common (74 percent) in the collection, especially in conjunction with scorched ceramic body. They occurred more frequently in tougher, break resistant material

types. Based on the scarring and comparison of breaks, the food service ceramics collection from the Corner Saloon supports the notion that items left by the occupants of the site were left because they were discarded.

Since the Corner Saloon ceramics collection was formed from discarded odds and ends, artifacts from the collection ought to appear to have outlived their usefulness. Makers' marks are used to verify this supposition. Of the eleven vessels in the Corner Saloon collection that had discernable maker's marks, a majority were from various factories in the towns of Staffordshire, England. Staffordshire is an industrial area encompassing the towns of Tunstall, Burslem, Hanley, Stoke, Fenton, and Longton. Staffordshire was the premier center of ceramic production in the seventeenth century due to the local abundance of components needs to create historic ceramics (clay, salt, lead, coal).

A maker's mark seen several times in the Corner Saloon collection was Alfred Meakin's Royal Ironstone China. This piece, shown in Figure 5, was manufactured by Alfred Meakin Limited of Tunstall. Alfred Meakin Ltd. manufactured ironstone export wares from 1845 to 1913. The specific mark shown in Figure 5 predates 1897 in production (Chaffers 1954). Alfred Meakin Ltd. was reported to have set up well-connected distribution routes in the United States from the late nineteenth century to the first years of the twentieth century (Sekers 2008). Altogether, Alfred Meakin was one of the most prolific manufacturers within Staffordshire. Many of the Staffordshire companies exported Meakin's *Tea Leaf* and *Lustre Spray*

Figure 5: Alfred Meakin's Royal Ironstone China maker's mark from plate in Corner Saloon collection

patterns as well as their popular art nouveau floral designs (Chaffers 1954).

A second maker's mark belongs to the Johnson Brothers company. The transfer print maker's mark, shown in Figure 6, is from the Corner Saloon collection and is from Johnson Brothers' English Chippendale line. The Johnson Brothers, comprised of Alfred, Frederick, Henry, Robert and grandsons of the famous Meakin lineage, started production in Hanley in 1883. This piece is notable in that English Chippendale was not incorporated into the company line until 1913. The presence of the English Chippendale line at the Corner Saloon shows that management of the saloon stocked contemporary styles. This is significant because it implies that the proprietors had knowledge about ceramic product lines and releases but also had access to these products, even in the remoteness of the San Juans.

Figure 6: Johnson Brothers English Chippendale maker's mark from plate in the Corner Saloon collection

The Corner Saloon service ware assemblage is comparable to other late nineteenth and early twentieth century saloons in mining towns, like Virginia City, Nevada. Dr. Kelly Dixon (2005) describes the bulk of the ceramics with makers' marks from the Boston Saloon of Virginia City:

> The marks indicated that the plates came from various potters in Staffordshire, England, including Powell and Bishop and J. G. Meakin. Staffordshire potteries mass-produced ceramic vessels during the eighteenth and by the turn of the nineteenth century were shipping them around the world.

Similar trends are common in ceramic collections of the Victorian period in the Intermountain West. These regional trends show the distinct draw of distributors to supply a new consumer base, eager to show their worldly connections.

Conclusions

Social influences and technological forces were more prominent in the shaping of people's lives in Lake City from its founding to the destruction of the Corner Saloon than is expected in such a remote area. In a mining outpost almost 200 miles away from Denver, economic development and technological improvements were impressive at the turn of the twentieth century. There were radical changes in infrastructure and clear influences from large-scale social systems: roads to railroads, rush-induced mining to corporate mine enterprises, a single industry within the area to the promotion of economic diversification, a commodity-based exchange system to a cash economy. All of these advancements or shifts had consequences that are directly or indirectly reflected in the archaeological record. Their cumulative effect was to connect Lake City to larger economies and allow the town to become a market destination.

In the case of the Corner Saloon in Lake City, Colorado, economic behaviors like conspicuous consumption reflected the changes made within the town and immediate area. As rush mining waned at the turn of the century, local industry was redefined. Success or failure was no longer determined by the output of the mines; it was decided by the flow of capital in the local economy. Conspicuous consumption was an economic strategy, in this case, that allowed the town to persevere through the hard-knock times of Intermountain West. Showing conspicuity with material goods was already a component of Victorian culture in America, so

conspicuous consumption was a logical constant that fulfilled social and physical needs alike.

Boom towns, at least in the case of Lake City, were not necessarily limited by their origins and doomed to bust. Transforming a boom town was achieved by expanding beyond the functionality of an outpost. The Lake City population shifted. It was no longer a amalgamation of miners: it was a collection of families, shopkeepers, owners, corporate middlemen, and laborers. Social conventions and practices important to non-miners became dominant in the new "town" environment (Henry 1987). In a very short time, from the time of discovery of major ore deposits in the San Juan Mountains in the 1860s to the apex of the silver mining boom in Lake City in 1886 to the decline of silver mining in the San Juans at the turn of the twentieth century, the Old West became the Victorian West.

The most basic commodity group affected by changes in consumption patterns is food. Conspicuous consumption changed dining by opening food as a stage for middle and working class people to participate in the cultivation of social capital. This made conspicuous consumption of edible and related products an enjoyable and viable strategy for continued community investment.

Geographic connectivity allowed conspicuous consumption to be practiced by all in the removed atmosphere of Lake City. Non-local goods became readily available. Unprecedented access to consumer goods acted as a catalyst as much for economic recovery in Lake City as it did to the conformation of Victorian practices. Not only was it possible to have fresh ingredients that were previously unavailable due to spoilage, but it was expected of distinguished and proper people. Quality materials were no longer hallmarks of the rich: increased consumer access to global and national commodities opened a range of social gestures to all classes (Power 1996).

Taste was not limited by Lake City's location. The success of businesses in Lake City was no longer determined simply by presence. An establishment's services and products had to be appropriately marketed, offered and sold. It is my sincere wish to describe the fanciful pieces in the food service collection, like the hand painted nappies, faience teapot, and porcelain vessels, but it is not necessary to see conspicuous consumption in the Corner Saloon collection.

Conspicuous consumption was an economic strategy that sustained Lake City through the bust years. The thoughtful preferences for highly valued material items describes how goods were accumulated in this commercial environment. The mimetic behavior of commodities reflects how lives were transformed in this region at this point in history by larger social and technological forces.

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II. Cultural Anthropology

Braid of Conflict: The Contributions of Colonization, Diamonds and Globalized Forces to Sierra Leone's Civil War

Aziza Bayou

Abstract—*Between 1991 and 2002, the West African nation of Sierra Leone was embroiled in an intense civil war. This paper seeks to explain the historical structural forces that led to the outbreak of war in Sierra Leone, and to assess the role of diamonds in the conflict. Sierra Leone's civil war was the product of many factors, including the country's colonial historical situation that favored patronage and elite control. As a result, wealth and opportunity was concentrated in the hands of few, creating a large marginalized class of people. The main rebel army, Revolutionary United Front (RUF), was comprised mostly of young people who were landless and lacked education and economic access. Public understanding of the lengthy conflict has often attributed rebel greed for diamond wealth as a main impetus for such protracted violence. Using ethnographic evidence I assert that the real cause of war is to be found in the country's history of severe social stratification, established during colonial rule, and the concentration of resources and power in the hands of Chiefs and government officials. These factors were exacerbated by neoliberal IMF and World Bank policies towards indebted Sierra Leone. The stakes of conflict were raised by a culturally-transmitted demand for diamonds and a world diamond cartel that imbues diamonds with their excessive worth and allows only a few to reap the profits. I conclude with a discussion of the obstacles Sierra Leone still faces, including utilizing diamond wealth for*

the benefit of the masses and creating diverse and sustainable agricultural development to diminish diamond dependence. Diamonds may last forever, but hopefully oppression, social exclusion and poverty in Sierra Leone will not.

Introduction and Overview

Between 1991 and 2002, the West African nation of Sierra Leone was embroiled in an intense civil war. This paper seeks to explain the historical structural forces that led to the outbreak of war in Sierra Leone, and to assess the role of diamonds in the conflict. Sierra Leone's civil war was the proximal product of many factors, including the country's colonial historical situation that favored patronage and elite control. As a result, wealth and opportunity was concentrated in the hands of few, creating a large marginalized class of people. The main rebel army, Revolutionary United Front (RUF), was comprised mostly of young people who were landless and lacked education due to governmental corruption and a failure by the state to provide access to opportunity.

Public understanding of the lengthy conflict has often attributed rebel greed for diamond wealth as a main impetus for such protracted violence, and at least one World Bank-sponsored report has supported this hypothesis (Collier 2000). This is because control over natural resources such as diamonds is contested; they are extremely valuable commodities in an overwhelmingly poor country. Using ethnographic evidence (Keen 2003; Maconachie and Binns 2007; Richards 2005) I assert that the real cause of war is to be found in the country's history of severe social stratification, established during colonial rule, and the concentration of wealth and power in the hands of Chiefs and government officials was perpetuated after the discovery of diamonds. These factors were exacerbated by neoliberal IMF and World

Bank policies towards indebted Sierra Leone, as government elites used privatization policies to the advantage of few, and to the exclusion of the young and landless. The presence and accessibility of diamonds in Sierra Leone has created a situation of resource dependence, and shaped how the civil war unfolded. The influence of this element was made possible by a culturally-transmitted demand for diamonds, and the global diamond cartel's carefully cultivated control over supply that gives these gems their excessive worth. Thousands of miles away from the conflict, unknowing consumers were fueling the devastation, and the impact of the war is still felt in Sierra Leone today. Throughout the duration of the war at least 50,000 people died, and countless lives were ravaged. More than half of the country's roughly six million citizens were displaced (Richards 2003) and Sierra Leoneans continue to face hardship: the country is still ranked last on the United Nations Human Development Index (United Nations 2008).

While control of diamond wealth was the most conspicuous thread in the braid of conflict, I refute the popular hypothesis that greed was the principal cause of the war. To buttress my assertion, I will discuss how Sierra Leone's developmental history and social context, characterized by outsider and elite collusion and control, created the conditions that led to the outbreak and decade-long continuance of war. I will discuss the history of Sierra Leone's government and colonial rule, and I will subsequently link this history to the development of Sierra Leone's diamond industry. Next, I will discuss how globalized forces and economic interests influenced the course of the conflict, and I will then provide a detailed examination of ethnographic literature on the topic. Finally, I will discuss the role of diamond demand and marketing in imbuing diamonds with the worth they currently have. I will discuss some of the inherent inequalities in the diamond industry, and the challenges Sierra Leone faces in

regulating its diamond industry. I will conclude with a discussion of the immense obstacles Sierra Leone still faces, including utilizing diamond wealth for the benefit of the masses, creating sustainable agricultural development to diminish diamond dependence, and transforming the economy from being characterized by exclusion and extraction to inclusion and economic diversification.

Colonial History Establishes Roots of Social Stratification

The country of Sierra Leone was founded in 1792 by former North American slaves, for whom British philanthropists purchased the parcel of land that is now Sierra Leone (Campbell 2002). Fifteen thousand American slaves had fought for the British during the American Revolutionary War, and migrated to Britain afterwards. When they were not able to make a living in Britain due to the social environment and discrimination, British philanthropists purchased the 32 square mile "Province of Freedom" for the former slaves (Campbell 2008:28), most of whom were not originally from that area. Since most of the original 400 settlers died within three years (Campbell 2002), more were shipped in from North America and the Caribbean, and the colony began to flourish.

Following Great Britain's ban on slave trading in 1807 (but not the abolition of slavery), British military ships patrolled the west coast of Africa to catch any illegal traders, and released the captives at Port Kissy near Freetown, the country's capital. "By 1850, more than 100 ethnic groups were living in Freetown," and they had established a creolized language blend of English and indigenous languages, Krios, so they could communicate with one another (Campbell 2002:30). The country was initially a British Protectorate, then a Crown Colony, before gaining independence in 1961. From its inception as an artificially constructed nation-state, Sierra

Leone has been plagued with problems that stem from patrimonial colonial policies.

When colonial governance was established in Sierra Leone, the British employed the same policy that they had used elsewhere in their empire, indirect rule (Keen 2003; Richards 2005), whereby the British employed local Chiefs to maintain and enforce colonial policies. The Chief's role was to maintain law compliance and order within his sphere of influence, which was often made up of people who were not placed under his rule by choice (Keen 2003; Richards 2005). Chieftains who agreed to enforce the law of the empire, called Paramount Chiefs, were given access to the patrimonial power of the colonizers, and the colonial government suppressed Paramount Chiefs' rivals (Keen 2003), thus solidifying their rule. One power Chiefs were given was the ability to demand unpaid community labor (Richards 2005). This was similar to feudal corvée labor, which made those citizens less able to sustain their own livelihoods, thus making them more likely to be dependent upon the Chief's largesse. The Paramount Chief position was inheritable and lasted for the duration of one's lifetime, and Chiefs were known to personally benefit from this economically lucrative position (Keen 2003).

Thus, as Chiefs exerted their extensive powers, resentment over favoritism, ill-treatment by a powerful Chief, and general discontent grew. This system was of great benefit to British colonial rulers, since their lack of a direct authoritarian presence was less likely to prompt questioning or rebellion by the local populace. As Fanthorpe, Jay, and Kamara write (2002:15-16, cited in Keen 2003): "Once you are assured of the loyalty of the chiefs, responsibility towards the rural populace can be abrogated over time except for carefully targeted patrimonial distributions at election time." The roots of Sierra Leone's civil war were planted in a colonial system that gave immense power and wealth to a favored few Chiefs,

while most others, who did not choose their rulers, were forced become dependent upon and to support the Chiefs without great social returns. A situation of dependence without extensive development arose, fomenting uneasy social relations between those with access to British power and those who were simply subjects.

Discovery of Diamonds in Sierra Leone Further Concentrates Wealth and Power

Diamonds are the result of intense heat and immense pressure. About 120 miles below the earth's surface, carbon atoms are heated to about 3,600 degrees Fahrenheit, and the right amount of pressure yields diamonds (Campbell 2002). The diamonds found in Sierra Leone came from kimberlite pipes, a geologic feature that sent the diamonds shooting upward at speeds of up to 25 miles per hour through the earth's crust millions of years ago. As the pressure decreased when the pipe was reaching the earth's surface, gaseous explosions probably ripped the ground open, exposing the pipe and dispersing debris-riddled diamonds over the earth's surface nearby (Campbell 2002). Diamonds were first discovered in Sierra Leone on the banks of the Gbobora River by a British geologist named J.D. Pollett in 1930 (Campbell 2002). Since Sierra Leone's diamond deposits are to be found on the earth's surface, rather than buried deep beneath the earth and only accessible via mining, complete control of these gems was and is difficult to obtain.

Sierra Leone's alluvial (surface) diamond deposition requires artisanal mining (LeBillon 2001, Campbell 2002, Ojukutu-Macauley and Keili 2008), which consists of repeatedly shoveling gravel and muddy water into a sieve, and shaking and rotating the gravel while searching for diamonds. The diamonds are often found in riverbeds and other locations, especially after a rain (LeBillon 2001). This means that

artisanal mining is less capital intensive and can be performed by almost anyone, which is one of the central problems for the state in regulating and taxing Sierra Leone's diamond industry. In addition, this unregulated mining is damaging to the environment.

In the early 1930s when diamond extraction first began and the British-owned Sierra Leone Selection Trust (SLST) was formed, much of the diamond revenue was being reinvested in the areas from which the gems were extracted (Maconachie 2009). This led to unequal development as rural, non-diamondiferous areas were developmentally ignored. Schooling, employee benefits, university scholarships, housing and medical care were all provided to the miners until 1970, when the Sierra Leone government acquired a 51 percent share in SLST and formed the National Diamond Mining Company (NDMC) (Maconachie 2009). NDMC ushered in more mechanized methods of extraction, as well as a dramatic decrease in pro-social investment. Rather than reinvesting diamond profits in human capital development, the government of Sierra Leone, along with the diamond dealers who greatly benefitted from the system, took the profits for themselves. After enduring years of patrimonial policies, Sierra Leone's government was not experienced in using diamond wealth to provide social services and create a sustainable economy.

Sierra Leone's government accumulated diamond wealth by employing artisanal miners, and further concentrated their own wealth and political power while neglecting the country's development. While the chiefdom system officially ended at independence, Sierra Leone "was effectively a one-party state under the All People's Congress (APC) from 1973 to the military coup of April 1992" (Keen 2003:70), following the previous pattern of concentration of power. During this period, conditions ripened for civil war: there was virtually no industry to speak of in the country, and the agricultural sector

was weak due to a lack of capital investment and internal development by the government.

The diamond mining process in Sierra Leone is set up as a "hierarchy of participants" (Ojukutu-Macauley and Keili 2008) whereby the artisanal miners are at the bottom, dealers and 'supporters' are the middlemen, and exporters occupy the top rung of the hierarchy (Ojukutu-Macauley and Keili 2008). Mining licenses for private citizens cost $1000, which most ordinary citizens are not able to afford, and it is estimated that the real cost is actually two to three times as much after government officials are paid off (Ojukutu-Macauley and Keili 2008). This high cost lead to the current situation of "sponsorship," or a "tributor" relationship, as well as mining cooperatives (Ojukutu-Macauley and Keili 2008). While ordinary workers are always at the bottom of the hierarchy, corrupt government officials are at the top, working with the international diamond cartel, and reaping the most monetary benefits.

Diamonds are portable and lootable, and can easily avoid taxation (LeBillon 2008), which, in the case of unstable states like Sierra Leone, leads to "the insertion of politicians into informal diamond trading" (LeBillon 2008:355). The state serves to legitimize extraction of the country's resources, and corruption and instability are ignored, or in some cases fostered, by corporate interests seeking to extract resources. If no corporation were willing to purchase diamonds from corrupt politicians or rebels, then they would lose a critical source of funding, but in Sierra Leone, most of the diamonds are smuggled to nearby countries to be sold internationally. The paper trail of where the diamonds originated, and from whom they were purchased, is forgotten as deals are made through long-standing connections, using the currency of trust, and sealed with simple handshakes (Campbell 2002).

The diamond industry may have morally condemned corruption in Sierra Leone, but they continued to purchase the country's diamonds, whether knowingly or not, which provided funding to drive the continuance of the civil war. According to the World Diamond Council (2003):

> Regardless of the source, rough, uncut diamonds begin their transformation to jewelry when acquired by trading companies and sent to processing centers. The biggest of these are in Belgium, Israel, Thailand, the U.S., India, and South Africa…Diamonds from several sources are mixed and prepared for distribution to wholesalers and retailers around the world. Diamonds arriving in the U.S. typically come in shipments that have already been cut and mixed. Therefore, it is impossible to determine by any means—scientific or documentary—the place and time that a specific diamond was extracted.

If the World Diamond Council itself admits they cannot ensure a diamond's legitimacy, then how could any consumer ever be sure that theirs is not an "illegal" diamond, mined by a worker who will never reap significant profits?

In 2003 the Kimberly Process Certification Scheme, of which Sierra Leone is a part, was launched in an attempt to reveal the conflict origins of many internationally sold diamonds and thereby cease their legitimized circulation (Maconachie 2009). Sierra Leone also participates in a UN-sponsored program based on a similar idea of certification that was launched in 2000 (Maconachie 2009). It was estimated in 2002 that up to 90 percent of Sierra Leone's diamonds were exported illegally (Maconachie and Binns 2007), so any attempt to cease this occurrence is welcome. Yet this does not detract from the issue of how effective these certification programs are in their aims to promote the legal sale and nation-benefitting taxation of diamonds. The nature of Sierra Leone's alluvial deposits make artisanal diamond mining inherently

impossible to regulate, and the continued smuggling of diamonds evidences that Sierra Leoneans are still strongly motivated by existing conditions in their country to sell this precious resource via other means than those that are legally sanctioned.

Global Influences: Neoliberal Policy and Private Security Interests Perpetuate Conditions that Lead to Conflict

Neoliberal policies are an important crux of cause in Sierra Leone's civil war, working hand-in-hand with governmental corruption to drive the marginalization of some while boosting the wealth and advantages conferred upon a favored few "insiders." During the 1970s and 1980s the IMF and World Bank enforced privatization measures due to Sierra Leone's large international debt (Keen 2003). Much of this debt was a result of governmental misallocation and private use of public funds. "While neoliberalism is often presented as an alternative to state-based corruption, in Sierra Leone during the 1970s and especially 1980s the two tended to interact to the benefit of a small clique around the President and to the detriment of the broad mass of people" (Keen 2003:75).

Rather than strengthening the economy, the imposition of privatization policies caused smuggling to increase in the diamond and agricultural sectors (Keen 2003), depriving the government of revenue. This behavior reflects citizens' mistrust of their government's handling of public funds. Following the pattern of thick investment (Ferguson 2006) in diamondiferous areas while other areas (and people) were thinly invested in, or outright neglected, government officials used privatization to their own benefit, exerting monopolistic control over the issuing of import/export licenses. Government officials often favored a few Lebanese middlemen who purchased rough diamonds from artisanal miners at low prices

and resold them for much higher prices (Keen 2003, Ojukutu-Macauley and Keili 2008). In effect, the corrupted system of government allowed a favored few to increase their wealth, and "provided selective exemption from IMF-sponsored austerity programs" (Keen 2003:77). The same problems of concentration and misallocation of funds that plagued the country's administration were unintentionally reconstituted by IMF and World Bank privatization policies.

Neoliberal logic presents its brand of capitalism as morally neutral, while in fact the "moral sphere" (Browne 2008) of neoliberal capitalism excludes and denigrates economic systems of practice that are not encompassed within its norms. "Rather than expansion and incorporation" this neoliberal policy brings about "consolidation and exclusion" (LeBillon 2001:576), which emulates the corrupt system that the RUF was bloodily trying to bypass. Neoliberal policies leave excluded "others" to develop other economic moralities, ones that are usually categorically condemned by the globalized capitalist powers. These parallel "shadow state" (Reno 1995) economies often serve the needs of many, yet they are judged to be immoral by international agencies that are attempting to institute free-market capitalism. These agencies are hesitant to include the countries that operate with such economies, while the underlying causes remain unaddressed: a pernicious cycle.

The "criminalization" of the South (Bayart et al. 1999, cited in Le Billon 2001:576) is a moral judgment rendered by those in power without considering the local contexts and specific situations of the people involved in such activities. Lootable resources such as diamonds contribute to the economic marginalization of countries like Sierra Leone because they perpetuate the cycle of criminalization and exclusion while earning income for a select few. It is those marginalized, poverty-stricken groups who suffer the most

from the structural impositions of the IMF and World Bank, which, in the case of Sierra Leone, lead to the emergence of rebel forces who acted out, using one of the only forms of agency they are able to employ, violence.

Beyond Greed versus Grievance: Ethnographic Fieldwork Provides Nuanced Understanding of Conflict's Causes and Role of Diamonds

Many authors have fleshed out a "greed versus grievance" hypothesis in seeking to understand the cause of conflict (Collier 2000; Collier and Hoeffler 2002). Proponents of the "greed" hypothesis posit that in dysfunctional states, lootable resources drive greed, and embittered citizens feel entitled to take as much as possible because others are doing the same. This hypothesis holds that conflict is propelled by a thinly veiled scramble for these portable and in-demand resources. Keen comments that while it is "not unlikely" that greed underlies some of the conflict over resources, citizens are motivated by legitimate grievances over the injustices of British rule and resource extraction (2003:69). It is important to understand that the grievances of Sierra Leoneans were and are longstanding and well-founded, while the term "greed" implies that the RUF simply wanted to acquire diamond wealth. Rather than "greed versus grievance," an overly simplistic binary opposition, the conflict must be understood in terms of historical-structural exclusion, characterized by a small class of wealthy elites coexisting with a large class of uneducated, opportunity-restricted poor.

According to Keen, diamonds in Sierra Leone were not the initial cause of violence, but they did serve as "an *incentive* for violence…[and] helped to *fund* the violence" (2003:67). Keen argues that the RUF created an alternative economic system that bypassed the historically-rooted system of

corruption that began in colonial times with the Paramount Chiefdoms, and continued into contemporary times with a less formal, but still socially influential Chief system (2003). Chiefs and wealthy landowners whose power stemmed from past privilege kept laborers in their villages by providing them with basic amenities, while others left, landless (Richards 2005), in search of work with little to no education. It was these individuals who were thereby highly susceptible to RUF recruitment. With about 50 percent of the population under the age of 20 around the turn of the century (Keen 2003), this made for the exclusion of many, and many of those excluded soon joined the RUF forces.

Most Sierra Leonean youth were not educated past primary school, as a result of the government's withdrawal of funds from the public school system. By 1987 less than a third of children of secondary school age were still in school (Keen 2003). This caused a large segment of the young population to be under-educated and therefore less able to gain access to urban job opportunities (Richards 2005), while simultaneously unable to acquire land due to shortages and Chief-dominated inheritance systems (Keen 2003). This is a combination that resulted in extreme anger and vulnerability for a sizeable portion of the population. It has been suggested that the rebels wanted not only to loot and acquire resources to fund the uprising, but to inflict humiliation (Keen 2003), since they themselves had been victims of Chiefs' exclusionary tactics in the past. The outbreak of war in Sierra Leone was also precipitated by the state's retreat from the rural areas of the country, leaving many Sierra Leoneans with neither Chief nor state-provided governmental services (Richards 2005).

Economic reasons for war can also be interpreted as political. Richards writes that:

> the way Collier reaches his conclusion that "new wars" are fought over economic rather than political reasons is

> problematic. At root, concern focuses on the way his study partitions the data set and labels proxy variables. Collier finds low education a correlate of civil war, but excludes lack of access to education from the list of grievances…Why Collier thinks it would be "greedy" to want a basic education or a job is unclear (Richards 2003:21).

Richards' disagreement with Collier's materialist outlook is based on his own fieldwork experiences in Sierra Leone, which evidences the fact that one cannot simply crunch numbers in order to generate a portrait of a complex situation. Since he has spent time in conflict-era and post-conflict Sierra Leone and has asked those involved to tell him from their own standpoints why they rebelled, Richards is able to take into account more complex variables and narratives than the ones that can be distilled into statistics. Richards' qualitative data show that the implicitly simplistic (and morally condemning) accusation of "greed" is deftly undercut by ethnographic fieldwork. It is neither simple greed nor the presence of static, weighable grievances that spurred civil war, but a historically complex nexus of economic exclusion and governmental collusion, lack of education and opportunity, and international economic influence.

In his ethnographic work with rural youth in Sierra Leone, Richards found that inequality, poverty, injustice and oppression were, in his informants' own words, strong motivators for youths to join the RUF (2005). These informants were more concerned with how local conditions impacted their lives than with accruing diamond wealth. "Heavy fines…[are] imposed by [little] respected chiefs…with no love for the youths" (CDF Focus group, Wonde Chiefdom consultation, July 2000) (Richards 2005). "[We] joined the RUF willingly—seven girls and thirteen boys [in my village]…the main reason was lack of job…and lack of encouragement for youth" (RUF female ex-combatant, eastern Sierra Leone, 2001) (Richards

2005). Over and over the former RUF fighters cited local injustices and desire for the fulfillment of basic needs, such as access to education and the ability to acquire farmland and employment as their impetus for uprising, not the desire to get rich mining and selling diamonds.

In the words of one Sierra Leonean focus group participant, diamonds are "double edged sword" (Maconachie and Binns 2007:376), in that they have the potential to provide great wealth but that money could be misappropriated or squandered. Diamonds have the power to facilitate equally-distributed development or to tear the country apart, depending on the existence of effective governmental structures to ensure proper taxation, and that revenue is not used to line the pockets of those in power.

The RUF's goal was to overthrow the corrupt and exclusionary rule, yet they killed thousands of innocent people whom they suspected, or who actually were, against them and their violent tactics. The young men and women who made up the RUF forces were victims of the system, but so were many of the people they terrorized and murdered in the pursuit of autonomy. RUF forces recruited the young and powerless and employed them as diamonds miners so they could then sell the gems to outside middlemen just as the corrupt government had done. This source of funding significantly raised the stakes of the conflict, as the money enabled the rebels to purchase illegal arms from countries such as Saudi Arabia and Libya (Campbell 2002).

While the RUF may have had legitimate grievances, they disabled international sympathy for their claims by amassing illegal firearms purchased with diamond money, killing innocent civilians, and forcibly recruiting young fighters. Even though the government they sought to overthrow was guilty of the oppression and poverty-perpetuation of millions, the RUF's collective hands were stained with the

blood of many innocent victims. The tactics they employed were deplorable, and they did not reclaim and use diamond wealth for development, but instead fueled the bloody revolution, thus severely detracting from the legitimacy of their alternative claims. Sierra Leone's civil war cannot be causally attributed to simple greed, which is an out-of-place moral character assessment that does not produce a deeper, nuanced understanding, but it must be understood in its political and historical context, as well through an emic perspective.

Global Demand for Diamonds as Status-Symbol Commodities Raises Stakes of Conflict

Gem-quality diamonds earned over $50 billion on the international retail market in 2002, and Sierra Leone is the sixth largest African producer (World Diamond Council 2003). According to LeBillon, the conditions that create resource dependence are shaped by the local economy's relation to the global economy, not by simple geographic luck that a valuable resource is located in a certain country (2001). In the case of diamond dependence in Sierra Leone, the local diamond economy is fueled by the global diamond cartel's artificial construction of scarcity that keeps diamond prices high by controlling supply while cultivating demand. Profits are then multiplied for the cartel as they pay those who live on the land where the diamonds are found only a fraction of what they will eventually be "worth," a system that began soon after the discovery of diamonds in Sierra Leone. Exacerbating this system is the fact that Sierra Leone's alluvial deposits make it easier for diamonds to be smuggled, with some estimating that up to 90 percent of diamonds leaving Sierra Leone in 2002 were exported "illegally" (Maconachie and Binns 2002).

De Beers, the largest diamond dealing corporation in the world, headquartered in Johannesburg, South Africa,

established the Diamond Corporation of Sierra Leone in the 1950s to purchase the diamonds from those who were transporting and selling them in Monrovia, the capital of Liberia (Campbell 2002). Monrovia is a consistent location for the sale of diamonds smuggled out of Sierra Leone, and during the 1950s an estimated 30,000 Sierra Leoneans were mining "illegally" (Campbell 2002). These diamonds would then be sold to the Central Selling Organization, which was another DeBeers-owned enterprise, to be placed on the market (Campbell 2002). The practice of purchasing both "legitimately" extracted diamonds and "illegally" extracted diamonds continued to take place when the civil war began. DeBeers did this in order to ensure that their virtual monopoly of the world's diamond market remained intact. They are the only company in the world that controls diamonds from the source to the store, and DeBeers and their affiliates in the diamond cartel had and continue to have the power to set the world's diamond prices (Campbell 2002). Without DeBeers' willingness to buy smuggled diamonds, RUF combatants would have lost their primary source of weapons funding. If the system DeBeers set up had never come into existence, these diamonds would not have been worth as much as they are, and corrupt government officials and wealthy Chiefs would not have been able to consolidate profits as they did.

Even though DeBeers established the construction of "worth" that lacks a logical link to the diamond's inherent properties and practical-use capacities, post-modern consumption patterns play a large role in perpetuating the desirability of diamonds. According to Harvey (1989), the post-modern era is characterized by time-space compression, which is a result of global shifts in production, consumption and technology. Time-space compression has led to a marked increase in the influx (and onslaught) of information that people encounter on a daily basis, creating competition for

increasingly divided attention. This leads the status-conscious post-modern consumer to seek new ways to self-differentiate, and these consumers are able to achieve difference through highly individualized and often conspicuous consumption. Identity is then forged through consumption rather than creation. This allows the substance itself to become less important than its image or how it is projected: the shorthand symbolism. Diamonds may not be functional for most consumers, but they have an extant legacy as powerful cultural symbols.

Diamond jewelry, especially the engagement ring, has been marketed to western consumers as the ultimate symbolic expression of love that is both unique, since no two diamonds are the same, and status-affirming. Diamonds are conspicuously worn, and their exorbitant price tags are common knowledge. The diamond engagement ring is a 15th century royal invention (Donahoe 2008) and 20th century customary convention that has become inextricably embedded in western marriage practices as a standard male-bestowed dowry. First marketed by DeBeers in 1939 as an expression of romantic love,

> in 1947 the slogan "A Diamond Is Forever" was born. Jewelers were instructed to pressure men—who buy 90 percent of all diamonds—to spend at least two months' salary on a ring. In 2003, De Beers began a new campaign to market diamonds to single women with the slogan, "Your left hand says 'we,' your right hand says 'me.'" (Donahoe 2008:170).

This 21st century marketing attempt to include single women in the consumption of diamonds by posing the diamond as a way to treat oneself well is an example of capitalist market expansion. Building on the Enlightenment cultural legacy of individualism, DeBeers hopes that diamonds will continue to

be coveted and to have a place in the consumer life-cycle of all, no matter what changes occur in the demographics of marriage.

Modern technology and time-space compression (Harvey 1989) have increased exposure to globalized media circulations for most groups around the world, thereby expanding people's "imaginations" (Appadurai 1991) of the world beyond their direct experience, knowledge and attendant subjectivities. The Sierra Leoneans who mine diamonds for sale in more developed countries are aware of the status and prestige of these gems, and they are aware that others with more wealth and prestige will adorn themselves with gems that they themselves could not afford to purchase once cut and polished. Miners are paid a fraction of what the diamonds will later be "worth." This reinforces the disparity between the global "haves" and "have-nots." The prevalence of wealthier countries' diamond demand did not force Sierra Leone into civil war, but the expanding market for this weighted commodity raised the intensity and increased the destruction of the protracted conflict.

Creating Economic and Agricultural Sustainability: Present and Future Concerns

Maconachie and Binns propose that in order for Sierra Leone to reemerge from the decade-long conflict and create a better future, citizens, especially rural farmers, must be able to sustain their livelihoods by diversifying their incomes and resource bases (2007). According to Chambers and Conway (in Scoones 1998:5), "A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, [and] maintain or enhance its capabilities and assets." The different forms of capital required for one to possess a sustainable

livelihood do not necessarily need to be possessed all at once, but one must have most of these assets to ensure a greater chance of self-sustenance. These capital forms include natural capital (natural resources required for survival), economic or financial capital, human capital (personal development in the form of knowledge or skills), physical capital (infrastructure or physical means by which one can produce a livelihood), and social capital (having social networks and relationships of exchange) (Scoones 1998). From this framework, Scoones identifies three livelihood-producing strategies: agricultural intensification and extension, livelihood diversification, and migration (1998).

By the early 1970s farmers in Sierra Leone had begun producing food for miners and benefitting from food-sale incomes produced by the consumptive needs of miners (Maconachie and Binns 2007). Rather than taking food to a central market, many Sierra Leonean farmers established arrangements whereby they sold food directly to the miners and were able to generate a cash income in addition to subsistence farming. Fieldwork performed by Binns in the 1970s demonstrated these links between rural farmers and miners, and fieldwork performed in 2002 and 2005 in the same towns reinforced his findings of the 1970s. Despite the long interval of war, farmers and miners have maintained inclusive social networks (Maconachie and Binns 2007). In a globalizing world, with more opportunities available for diversification of one's livelihood, Sierra Leoneans have adopted "complex and dynamic livelihood strategies that involve the intertwining of the farming and mining communities" (Maconachie and Binns 2007:369).

The demography of Binns' study changed in that his informants were now mostly post-conflict returnees, yet the similarities are startling. Rural farming women especially have benefitted from these linkages in that they are often the ones

who embark on voyages to sell food to miners, although some are restricted by lack of access to roads. Trader women have developed "a vast and highly organized network for the marketing of food crops" (Maconachie and Binns 2007:374). It was once thought that diamond mining detracted from livelihood development since male farmers would often join mining cooperatives or enter into a mining patronage relationship with a middleman, but Maconachie and Binns posit that most Sierra Leoneans who do this are actually increasing their chances of thriving economically. The male heads-of-household tend to leave the farm to mine when farming work is at a stage traditionally handled by female heads-of-household, so mining incomes supplement that of farming (2007). It is ironic that this "shadow state" form of economics, which has come into existence because of corruption and inadequate social services, is the mode of exchange that helps Sierra Leoneans get by on a daily basis.

Sierra Leone may still be ranked lowest on the UN's Scale of Human Development (2008) but the "sustainable development of the country's valuable mineral resources is a government priority and has been a central tenet of the *National Recovery Strategy* (NRS), launched in October 2002, and the *Poverty Reduction Strategy* (PRSP) of March 2005" (Maconachie 2009:72). Maconachie states that if diamond revenue were to be reinvested in the local economy, especially in rural areas, this could fuel sustainable development (2009). This reinvestment of profits is an essentially capitalist idea, but Sierra Leone has already been drawn into a capitalist world system, so economic diversification and reinvestment are compatible with the current framework. The UN advocates tightening international and regulatory frameworks, and the USAID Office of Transition Initiatives advocates opening the country to free trade (Richards 2003). These neoliberal solutions could replicate the conditions of that led to conflict in

the first place, and lead to further concentration of wealth. On the other hand, the country is already subject to international intervention, which has the potential to create a more transparent government due to international attention in collaboration with citizen demand.

Conclusion

According to Richards (2003:38), one of the weaknesses of the political economy approach is that it risks an overemphasis on the tools of war, rather than the meaning behind the war. "War is also ritual action...[and] dealing with greed requires attention to the ritual spaces in which to articulate grievance." Many Sierra Leoneans do not feel that their government has ever served their needs, and while certification schemes and structural adjustments seek to ameliorate the country's dire predicaments, trust in the efficacy of government and social inclusion through education and access to opportunity are the keys to change. All Sierra Leoneans deserve to benefit from the sale of diamonds mined in their country, but they must first develop a system whereby citizens can trust that their government is operating in their best interests. The conflict was put into motion because of societal restriction and suppression, and diamonds provided one venue for the expression of explosively unequal social relations. In this way, diamonds were grease applied to already rolling wheels, but diamonds themselves did not ignite the engine of civil war.

The "shadow state" and shadow markets (Reno 1995) of Sierra Leone continue to hold sway for citizens that have been left to fend for themselves, thus hindering the development of a "legitimate" market and industries. Sierra Leone's colonial history initiated the conditions that enabled deep lines of social stratification to solidify, and the subsequent discovery and extraction of diamonds worsened the situation.

In addition, neoliberal policies meant to improve Sierra Leone's economic situation through privatization of industry only increased extant divisions. Were it not for the developed world's (and particularly the United States') demand for these artificially scarce gems, Sierra Leone would still face major problems, but it is the world market that has facilitated the perpetuation of elite control and significantly raised the stakes of conflict. Without diamond money government officials and chiefs would never have amassed the wealth and power that they did, and the RUF would not have been able to purchase weapons. Diamonds were not the impetus for war, but an element that brought an already simmering conflict to its boiling point, greatly increasing its intensity and scope of damage. Diamonds may last forever, but hopefully oppression, social exclusion and poverty in Sierra Leone will not.

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A Critical Analysis of Participatory Approaches to Sustainable Development: Four Case Studies from Central and South America

Meaghan Bludau

Abstract—*Within sustainable development, participatory approaches to research and development that involve local stakeholders in the process of development, are becoming increasingly prevalent. This paper first examines the theoretical foundations of participatory approaches within sustainable development. Through the comparison of four case studies, this paper considers the variation within the approach to arrive at a better understanding of the strengths and weaknesses of the participatory model. Though participatory research and development is lauded as an equalizing approach, the approach has the potential to reify relationships of power amongst stakeholders and foster dependency of local stakeholders on development agencies. I argue that for the participatory approach to cultivate equitable, sustainable development, it must entail a process of reconfiguring relationships of power and promote the capacity of local stakeholders to self-mobilize.*

Introduction

In 1987 the World Commission on Environment and Development, more commonly known as the Brundtland Commission, outlined the need for sustainable development as the "ability of humanity to ensure that it meets the needs of the present without compromising the ability of future generations

to meet their own needs" (NRC 2002:23). Sustainable development foregrounds the importance of human-environment relationships and questions assumptions that have been central to previous models of development. It seeks to address not simply environmental or economic aspects of development but social and cultural factors as well.

The shift toward sustainable development, especially within academic disciplines, has coincided with a transition toward research and development that reflects this comprehensive approach. Participatory approaches to research and development that involve local people in the formulation, implementation, and maintenance of sustainable development initiatives are becoming standard practice in applied disciplines and for some development organizations. This paper explores the theoretical foundations of participatory approaches to research and development. Four case studies are presented that highlight variation amongst participatory approaches. I will use Ericson's (2006) framework for understanding difference within participatory approaches and draw upon post-development critiques that emphasize relationships of power to consider the strengths and weaknesses of the approach. Because development models have broad, enduring impacts, critical interrogations of such models are imperative to make explicit both their strong points and deficiencies.

I will argue that variation within the participatory approach highlights the tendency for it to be only partially implemented by development organizations with the effect of reproducing social and economic inequality. At the same time, the case studies show that the approach can be effective when communities are involved at every step in the process as the primary decision makers and stakeholders. I argue that reconfigurations of relationships of power amongst stakeholders and sustained community involvement are particularly important for the implementation and continuation

of sustainable development initiatives, as they acknowledge and strengthen the capacity of local stakeholders to self-mobilize and manage place-based social, economic, and environmental systems.

Theoretical Foundations of Participatory Approaches to Development

Previous models of development, such as modernization theory and structural adjustment programs (SAPs), have privileged economic growth as the primary means to attain political and social development. Historically, social and environmental spheres received little attention, and much research has examined the deleterious effects of such programs, especially for marginalized populations (Ferguson 2006; Pacheco 2006; Sawyer 2004). SAPs have lead to neoliberal economic restructuring marked by the transition to open markets, export-oriented production, and the reduction of state power in provisioning for social welfare needs within developing countries. Such programs target economic development at a national scale and often have the effect of reifying economic and social stratification within countries as vulnerable populations are drawn into the capitalist economy. Emphasis is on strengthening the economy, commonly by shifting to large-scale production of commodities through the unrestrained use of natural resources (Sawyer 2004).

Though economic shifts often occur at national and international scales engendering patterned impacts across countries, particular ecosystems and social practices vary from place to place. In line with this understanding, theories of sustainable development highlight the linkages between human systems and ecological systems and operate from the understanding that these systems are place-based (Berkes and Folke 1992). In contrast to SAPs that are focused at the

national level, sustainable development initiatives are often focused a regional or local level to address the distinct challenges that arise with the interaction between environmental, social and economic processes.

Theories of sustainable development acknowledge the importance of economic development, but hold that economic development must occur within the limits of the environment and with the priority of meeting human needs. When the Brundtland Commission outlined the need for sustainable development, the commission enlarged the focus to include an emphasis on equity (NRC 2002). Sustainable development does not simply uphold the importance of strengthening ecosystems but rests on obligations to ensure that doing so occurs ethically. Including local people in the process of developing and implementing sustainable development initiatives is necessary for addressing the triumvirate of environmental, social and economic dimensions, which forms the grounding framework for sustainable development (Bloom 2007).

Participatory approaches to research and development are becoming standard practice within sustainable development. Participatory approaches gained some traction in the late 1980s and early 1990s before the diffusion and adoption of theories of sustainable development (Burkey 1993; Chopra et al. 1990). Grounded in critiques of top-down models of development, participatory approaches sought to provide marginalized people with opportunities to direct the terms of their own development, albeit to varying degrees. However, participatory approaches have been the target of criticism. Post-development theorists have interrogated participatory approaches, arguing that they are thinly veiled reincarnations of hegemonic development schemes aimed at disciplining and controlling knowledge and dissent of marginalized populations (Cooke and Kothari 2001; Fernando 2003). These criticisms

offer important insights from which to evaluate the effectiveness of participatory approaches, as they are becoming commonplace in sustainable development initiatives and have the potential to reify relationships of power and access.

Despite criticism, participatory approaches to research and development, continual engagement models, and action-oriented research are considered to be preferable approaches for a number of salient reasons (Ericson 2006). First, involving local stakeholders promotes the inclusion of local and indigenous knowledge, which provides rich information sources that compliment other epistemologies in managing ecosystem services (Van Kerhoff and Lebel 2006; Berkes and Berkes 2009; Reid et al. 2009). The cultural capital of local people, in the form of knowledge and practices, is seen as essential for arriving at sustainable strategies to utilize the environment to meet human needs (Berkes and Folke 1992; Holling et al. 1998).

Second, participatory approaches are thought to facilitate a process of sensitization toward sustainable development within communities by raising awareness of the linkages between human and ecological systems and promoting the importance of community management of vital ecosystem services. Third, participatory research aims to acknowledge, support and build the capacity of local people to self-organize, identify placed-based problems, and resolve such problems through community investment, collaboration and negotiation (Ericson 2006; Reid et al. 2009). Finally, and perhaps most importantly, participatory research models can provide spaces for marginalized groups to engage in problem identification and decision-making, giving them greater control in directing the terms of their own development.

Offering opportunities for multiple stakeholders to engage in the process is thought to strengthen the efficacy of sustainable development initiatives in particular places as

stakeholders invest in the project through participation. In theory, participatory research represents the full manifestation of theories of sustainable development as it addresses social dynamics in a place, not simply as a focus of study but as a central component in the research and development processes.

The Tense Relationship between Development and Participatory Approaches

Though participatory approaches are becoming increasingly prevalent, the approach can be at odds with development goals and practices. Development initiatives are often project-driven and techniques-based (Cleaver 1999). Such initiatives focus on solving a particular problem that poses a risk to the environment through technological solutions. Projects have circumscribed budgets, timelines, and measurements, as well as a focus on efficiency (Holling et al. 1998; Cleaver 1999). Robust participatory approaches, as the case studies show, require the creation of long-term relationships across sectors, attention to relationships of power amongst stakeholders, capacity building, negotiation, and compromise.

The interests and goals of stakeholders are often distinct and can pose challenges for participatory research and development. Local people may not hold the same priorities as development organizations or government. Communities that struggle to meet basic needs may not develop initiatives that meet sustainable development objectives, as their priorities differ. Communities may also make demands based on cultural needs and historical experience, which often fall outside of the objectives of development organizations, as in the case study of the Zoque in Mexico shows (Walker et al. 2008).

Critical analyses of the participatory approach have posited that the participatory approach privileges formal institutions, which may not take into account the informal or

locally distinct forms of social organization in place (Cleaver 1999). The preference for formal institutions can reify social boundaries within the community, as people who are typically marginalized from institutions continue to exist outside the formal sector. In addition, critics argue that sustainable development initiatives that claim to employ a participatory approach often pay little attention to the relationships of power and patterns of inclusion and exclusion in the communities they attempt to involve (Cleaver 1999). However, the case study in Honduras (Classen et al. 2008) illustrates that participatory approaches can be successful when an understanding of social organization in communities informs strategies to involve local people.

Variation within the Participatory Approach

In spite of these critiques, development organizations have lauded the participatory approach as an equalizing, empowering approach. However, much variation exists within broad concept of the participatory approach. Ericson (2006) developed six categories that outline differences within the participatory approach. Ericson bases the different forms of the participatory approach on two characteristics that describe the relationship between the community and the development entity: whether or not the community initiates the project and the degree to which the community is in control of the process.

Participatory approaches range from "passive participation" where an outside entity initiates the project and the community is informed of something that will happen or something that has already occurred. In the second category, "contractual participation," the community provides the labor to achieve a goal that is initiated and controlled by an outside entity. In "consultative participation," an outside entity initiates the project and develops the goals based on the needs, opinions

and desires of the community. In "collaborative participation," community participation is initiated by an outside entity, but the community in conjunction with other stakeholders work together to identify the problem, understand the information collected through research and arrive at a solution. Ericson notes that collaborative participation requires long-term relationships in which each group invests in the other. It is common for the groups to be in close proximity to foster such relationships. In "participation amongst colleagues," the focus is on capacity building to enable the community to control the process. Participation is initiated by an outside entity but "the emphasis is on activities that can increase the ability of informal and local systems to be self-mobilizing," (Ericson 2006:246). Finally, "community self-mobilization" occurs when the community initiates the project or initiative and directs the process from formulation to implementation and maintenance. The community may enlist the help of outside consultants but remains in control of the process at all stages (Ericson 2006:245-246).

Ericson's framework is useful for considering variation within the participatory approach. Importantly, it highlights relationships of power throughout the participatory process. I will employ this framework to compare the four case studies of participatory approaches from Central and South America, which capture the diversity of configurations within the participatory approach. Drawing on post-development critiques, particular attention will be paid to relationships of power and the degree to which the process strengthened the capacity of local stakeholders.

Case Studies

NGO-Mediated Land Use in Ecuador

In the mid-1990s, PLAN-international was active in the Canar region of the Ecuadorian Highlands. The majority of the population with whom PLAN worked operated *minifundios*, or "small, marginalized, highly fragmented [land] holdings…of less than 10 hectares" (Keese 1999:456). The national transition toward domestic and foreign market-oriented agricultural production during the 1960s and 1970s dramatically changed land use and labor patterns in the region. Increased commercialization of agriculture has meant that the highlands populations, who have few resources to enter into potentially risky markets, have not been able to maximize resources through the expanding markets, and increasingly, people travel to the coastal region to work in seasonal employment on large haciendas (Keese 1998).

PLAN sought to help local farmers enter the market economy through the production and sale of commodity crops, intensification of agriculture to use less land, and maximization of efficiency in livestock production. This strategy had three goals: to prevent people from practicing agriculture in fragile, peripheral ecosystems, to decrease labor expenditures in agriculture and livestock production allowing more time for seasonal work, and to increase families' income though the sale of market crops.

According to Keese (2008:8), "before PLAN began assistance, a local PLAN staff member completed a community diagnostic, which consisted of a description of the community (two pages), accompanied by a plan of action (one page)." From this diagnostic, PLAN identified 23 families out of 75 in the community to be recipients. PLAN's approach was to use high capital inputs and give-a-ways to ensure greater production. PLAN contributed 80 percent of the cost of ten

hectares of land, financed an irrigation plot, provided veterinary assistance, and financed the renovation of pastures. According to Keese (1998), PLAN expected the technology to diffuse through the community. However, since non-participants lacked the capital to invest in costly inputs, the technology was not adopted by the larger community. PLAN's strategy also "fueled jealousy and created conflict with some non-participant families" (Keese 1998:10).

The approach employed by PLAN represents a form of contractual participation or consultative participation. PLAN identified the problem as the low incomes of highland farmers and the erosive effects of agriculture on peripheral ecosystems. The organization also decided upon a solution in which a portion of farmers were provided with the means to enter the market economy. Keese (2001) notes that PLAN's model fostered the sense that development was only achievable through the use of high cost technology and that local people were incapable of developing solutions. The focus on short-term, techniques-based solutions rather than capacity building fostered dependence and PLAN's lack of attention to patterns of inclusion and exclusion created conflict within the community.

Calakmul Biosphere Conservation in Campeche, Mexico

In Campeche, Mexico, Ericson (2006) used a participatory approach to research attitudes toward conservation in the Calakmul Biosphere Reserve. Ericson was invited by the director of the biosphere with the goal of establishing a dialogue between stakeholders about the effects of population growth on biodiversity. Using Participatory Rural Appraisal (PAR) techniques, both the research team and the communities studied were chosen to represent the diverse backgrounds of indigenous groups in Calakmul. The researchers spent two to three weeks in each community conducting semi-structured

interviews and creating maps, diagrams, and calendars with informants to understand their values, practices, and goals concerning conservation. Community members were invited to attend a meeting at the end of the process to evaluate the information that had been gathered before making conservation policy recommendations.

Though the study was not initiated by the community, it sought to represent the diversity of values, knowledge and practices within the community, unlike PLAN. Local community members formed part of the research team and were involved in decision-making and data analysis. According to Ericson, the research team members benefited most from participatory approach as they strengthened their communication skills and made contacts that constituted a form of social and cultural capital. The dynamic within the research team reflected participation among colleagues in which the goal is to promote the capacity and strengthen the power and autonomy of local stakeholders (Ericson 2006). However, the conservation NGOs that were involved and were the project's link to funding showed collaborative and collegial participation until recommendations were made, at which time the participation of organizations dropped (Ericson 2006).

The research team had presented a proposal that addressed three areas identified in the research study: conservation, population and development. The proposal called for the creation of a land use planning team comprised of community members, regional officials and land-use experts, a reproductive health program, and a population monitoring pilot program to be carried out by residents. However, the proposal did not receive funding, and one of the primary funders, the World Wildlife Foundation, reorganized funds to focus on protection of priority regions, of which Calakmul Biosphere was not included (Ericson 2006).

Though the collaboration between the community and the researchers were able to arrive at a set of recommendations that were holistic and in line with sustainable development objectives, development agencies were unable, or perhaps unwilling, to fulfill their responsibilities to the participatory process. This study highlights the challenges involved in creating long-term, accountable relationships that accompany sustainable and equitable development–relationships that often exist in opposition to conventional, top-down models of development. Implementation of initiatives that arise from the demands of local stakeholders often depends on funding from outside entities that may not share the community's values. Importantly, this study underscores how relationships of power that rest on differential access to resources present serious obstacles to employing participatory approaches.

Adaptive Management of Land Use in Honduras

In the case of land use amongst Honduran farmers, a participatory approach fostered capacity building and adaptive management of land, allowing local farmers to meet their subsistence needs while operating within the limitations of their environment. The Foundation for Participatory Research with Honduran Farmers (FIPAH) funded a study of farmer research teams or CIALs, with the goal of increasing participation of the most marginal people in experimental agricultural research in three rural regions of Honduras. Wealthier members of the community had previously dominated the CIALs, seeking to maximize their crop productivity by using the results of the experimental agriculture projects.

To facilitate participation, Honduran agronomists lived in the community and invited local people to join the CIALS, especially those in the community that were typically excluded. Participants worked together, using plots of their land to

"develop and adapt technologies" as well as to develop local varieties of seed in "participatory plant breeding (PPB)," (Classen et al. 2008:2413). This process provided opportunities for local farmers to develop skills enabling them to respond adaptively to their environment. The process took roughly five years and required a significant investment in time and energy as well as patience and humility. One farmer facilitator explained,

> When I go to make [erosion] barriers with a CIAL group, I don't even tell the producers how they should be made, because they know how they like it…I know that theoretically the "law" says that the steeper the slope, the closer the barriers should be. However, there are times when the producers may like it done another way…This is when sharing, and taking into perspective the ideas of others comes into play. Some producers say, "no hombre, let's do a few closer and some others further to see which is going to give better results." Now this is participatory research (Classen et al. 2008:2414).

The study showed that participatory research was able to incorporate the most marginal segments of the community by actively countering patterns of inclusion and exclusion, fostering long-term accountable relationships, and employing research methods that strengthened local people's skills related to agricultural strategies and collective organizing (Classen et al. 2008). Great attention was paid to relationships of power within the community, and steps were taken to ensure that the most marginal members of the community were part of the process.

This model of participation, which meets Ericson's concept of participation among colleagues, differs significantly from conventional, top-down approaches to development. Though the project was initiated by an outside organization and the CLALs were facilitated by a outside agronomist, local

farmers who participated had autonomy to conduct agricultural experiments and develop knowledge for sustainable farming and collaborative problem solving. The focus was on long-term development of cultural and social capital to enable local groups to utilize their environment effectively and self-mobilize to adapt to meet social and subsistence needs sustainably in the absence of an outside initiator.

Forest Conservation in the Chimalapas, Mexico

The forests of the Chimalapas, Mexico were the focus of a World Wildlife Fund *Programa de Bosques Méxicanos* (WWF Mexican Forestry Program) project in the early 2000s aimed at "conservation and sustainable use of the Mexican forests" (Walter et al. 2007:428). The WWF has been active in Mexico since 1968, and like other civil society groups, the organization intensified projects in the Chimalapas during the late 1980s and early 1990s. The Chimalapas forests are home to the Zoque-speaking indigenous group, and the Zoque have increasingly been engaged with local, national and international forest conservation groups.

Walker et al. (2007) describe a meeting between the various forest conservation organizations in the region. The goal of the meeting was to foster coordination between disjointed conservation organizations and to consult with the Zoque about a plan for forest conservation. The WWF was responsible for organizing the meeting and saw the meeting as the first step in fostering "participatory conservation" (Walker et al. 2007:429). The Zoque were invited to voice their opinions on the second day of meetings. Walker et al. (2007) documented the hesitation of the leaders of forest conservation organizations the eve before the meeting.

> [Leaders] openly complained that the Zoque did not understand questions related to deforestation, development, and conservation, with several participants agreeing that this is

> why NGO and government experts have a special responsibility to organize programs in the Chimalapas (Walker et al. 2007:436).

The following day, the WWF delegate presented the conservation proposal to the Zoque, which centered on six components: "conservation areas, sustainable logging areas, operational rules for financing projects, sustainable development for non-wood resources, strategies for inspection and vigilance, and a guide to obtaining logging permits" (Walker et al. 2007:436). The Zoque then presented their own proposal, characterized by a more comprehensive approach that addressed the need for healthcare, education, transportation and communication infrastructure, and livestock and crop management along with environmental preservation.

The Zoque had gained experience since the early 1990s in negotiating with the NGOs in the Chimalapas. Using the discourse of development, the Zoque challenged the terms of the plan formulated by the organizations. The community self-mobilized to counter the consultative participation model employed by the organizations. Walker et al. (2007) argue that the history of grassroots organizing in Mexico, especially in neighboring Chiapas where Zapatistas challenged NAFTA in the mid 1990s, along with a shift in Mexican policy to acknowledge the rights of indigenous groups played a role in galvanizing the Zoque speakers to challenge the conservation organizations. In the case of the Zoque, local forms of organizing and resistance along with the cooptation of the discourse of development enabled the Zoque to question the organizations' version of "participation" and make demands by asserting their rights.

Discussion and Conclusions

As the case studies illustrate, there is great variation amongst participatory approaches. The studies also provide a number of instructive insights regarding relationships of power amongst stakeholders and the importance of the capacity of local communities to ensure sustainable development initiatives address environmental, social and economic aspects in a manner that promotes equity.

In cases where the main approach of development agencies is to invest in high-capital equipment that requires a great deal of maintenance, communities may become dependent on the assistance of development agencies. The case of PLAN in Ecuador (Keese 1998, 2001) exemplifies this pattern. Unless coupled with capacity building or long-term funding, this model has the potential to restructure local economies and social organization in place leaving communities more vulnerable when support agencies leave.

High cost and complex technical solutions will not diffuse throughout communities where people lack the resources to make the initial investment to acquire and maintain the technology. Place-based and collaboratively-generated technologies and projects appear to enjoy greater success. The CIAL program in Honduras (Classen et al. 2008) highlights how community experimentation and adaptive management is more cost-effective, rooted in local needs, and draws more investment from local people with the effect of building the capacity and respective forms of capital in social, economic, and environmental systems.

The case of the Zoque of Mexico (Walker et al. 2007) underscores how the increased capacity of local groups to self-organize, identify problems and solutions, as well as engage with other stakeholders can result in more comprehensive sustainable development initiatives. While development

organizations, private companies, and government may have a set of goals that relate to their respective interests, local people are more likely to demand that projects address a comprehensive set of goals that include social and economic provisions while addressing environmental concerns. The capacity of communities represents a check in the development process. Because of time and budget constraints as well as the tendency to disproportionately represent the views of formal, powerful stakeholders, development agencies, private companies and government are more likely to institute selective initiatives.

The case study of participatory research in the Calakmul Biosphere (Ericson 2006) points to the need for accountability amongst stakeholders, especially on the part of development and conservation organizations. In this case, conservation agencies curtailed funding, halting critical next steps in the participatory process. Funding is an important, yet often overlooked dimension when evaluating participatory approaches because it is in the arena of resources that relationships of power play out. Reevaluations of development practices, especially those related to the allocation of money, are required. These practices perpetuate unequal access to resources and promote the continued dependence of communities on development agencies.

The case study of the Zoque highlights the tendency for the participatory approach to be employed to pacify communities and maintain relationships of power–a criticism post-development theorists have made (Cooke and Kothari 2001; Fernando 2003). Conservation agencies offered the Zoque an opportunity to present their proposal though the agencies planned to proceed with their own set of initiatives. Including the Zoque was performative gesture meant to appease rather than to provide an arena for collaboration. The participatory approach runs the risk of being merely a

performative act by development agencies, and this tendency highlights the critical importance of communities to have the capacity self-mobilize to protect their interests, as the Zoque did.

The variation in participatory approaches points to the need to reconsider what participation means. Development agencies like PLAN employ what Ericson calls contractual participation in which local community members are not involved in decision-making but provide the labor to achieve a goal. On the other side of the continuum, the Zoque of Mexico self-mobilized to challenge conservation agencies whose interests did not reflect the needs of the community. Though Ericson (2006) classifies both of these distinct forms as "participatory," this is problematic in that it allows development agencies to adopt the moniker of the participatory approach though the degree to which participation occurs is questionable. While employing the participatory approach is attractive on a theoretical level, participation in which the community enjoys decision-making power is rare. More critical work is needed to evaluate whether participatory approaches uphold the comprehensive agenda of sustainable development, which imparts equal value to environmental, social and economic dimensions of development.

The four case studies from Central and South America demonstrate the complexity and challenges inherent in participatory approaches to sustainable development. These case studies illustrate that the success of participatory approaches requires reconfigurations of relationships of power where local communities enjoy greater control in problem identification and decision-making. In addition, the relationship between the local community and other stakeholders must be long-term and mutually reinforcing whereby all groups invest in one another, acknowledge different forms of knowledge, and have in place systems of accountability.

This requires a transition from project-based, uni-dimensional solutions that privilege economic or environmental spheres to comprehensive participatory approaches that take into account local social organization and practices including patterns of inclusion and exclusion. The foci of participatory approaches must be capacity building and adaptive management to avoid continued dependency and vulnerability of local populations.

Participatory approaches in which the community is involved and enjoys decision-making power in developing and implementing sustainable development initiatives are more attuned to the specific location, more likely to establish long-term, mutually reinforcing relationships, and are self-sustaining in the absence of development agencies. Thus, a transition toward sustainability is also a transition to community self-mobilization, in which local people direct the terms of their own development while meeting the objectives of sustainability.

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Biocultural Diversity, Food Sovereignty and Livelihoods in Ecuador: Structural Barriers and Possibilities

David M. Schutz

Abstract—*The promotion of biocultural diversity in food systems can potentially serve the dual purpose of enhancing food sovereignty and nutritional wellbeing for rural populations. In Ecuador, government decentralization and the rise of farmer's associations and similar organizations are factors that have the potential to aid in this promotion. These factors do not, however, guarantee the maintenance of traditional food systems and the promotion of sustainable livelihoods. The influence of multiple actors—including municipal governments and NGOs—have been shown to, in varying degrees, serve as well as inhibit this goal. This paper explores the need for: (1) food sovereignty and agroecology perspectives in studying agricultural livelihoods, (2) efforts by farmer's associations to maintain traditional diets alongside efforts toward modernization and market participation, and, (3) government and NGO participation that promotes the viability of these systems to maximize the benefits of bioculturally diverse diets.*

Introduction

It is becoming increasingly clear that conventional development efforts that aim to reduce poverty through economic growth may actually undermine the nutritional health of impoverished peoples through participation in the globalized food system (Johns and Eyzaguirre 2006:182). This reality is no more poignant than for smallholder farmers who, in many

cases, have long-standing dietary traditions and agricultural practices that are deeply attuned to the physical environment in which they live and work (Johns and Maundu 2006:34). Traditional food systems, defined as "all food within a particular culture available from local natural resources and culturally accepted" (Kuhnlein and Receveur 1996:418), are important strongholds of cultural knowledge and traditions, as well as important sources of dietary diversity (Johns and Maundu 2006:34). Perhaps one of the most well known examples of the interaction of elements in a food system is the maize/beans/squash triad that has roots in early Mesoamerican agriculture and is well-noted for its agricultural and dietary efficiency (Francis et al. 2003:101). Woodley et al. (2006:15) state, "There is a need for a culturally-sensitive development paradigm that values biological and cultural diversity, and a more holistic concept of well-being." Unfortunately, development is too often focused either on the marketability of agricultural production or pure calories, and not enough on nutritive and cultural role of the foods produced. The "food sovereignty" movement, forwarded most prominently by the peasant organization Via Campesina, aims to secure the integrity of traditional food systems toward the goals of cultural maintenance and nutritional health amid the ever-encroaching influence of globalization (Menezes 2001:29). In Ecuador—as in other Latin American countries—this confluence of the traditional and modern is a landscape that is inhabited by multiple actors including state and local governments, NGOs, private interests, and many others. In the last few decades, the effects of neoliberal economic policy have also marked this landscape. In this paper, I first highlight the issues of food sovereignty, biocultural diversity and smallholder livelihoods. Using the example of Ecuador, I examine intersection of these issues and relevant actors, focusing on NGOs, municipal governments, and farmer's

associations (FAs). The subsequent discussion identifies the need for effective cooperation of these actors, adequate resources, and an agroecological perspective toward promoting and empowering smallholder livelihoods.

Indigenous Technical Knowledge, Food Sovereignty and Agroecology

Alternative agricultural development models are gaining steam in the wake of the failure of Green Revolution technologies and neoliberal economic policies to enhance livelihoods and incomes of smallholder farmers (Gonzalez 2004; Cameron 2005). The importance of incorporating indigenous technical knowledge (ITK) into sustainable agricultural systems is becoming increasingly clear. ITK is the body of ecosystem-specific knowledge accumulated by farmers in a given area over a period of time. In practice, this knowledge translates to self-sufficient, productive agricultural systems that maintain regional biodiversity (Altieri 2004:35-36). Development discourse tends to characterize ITK and traditional agricultural systems as being mere vehicles toward sustainable livelihoods, while less attention is paid to the product of these systems, namely, food. Most of the food in the world is produced by smallholders, and this food is largely consumed locally (Pimbert 2006:1). Subsistence farming systems tend to coincide with traditional diets and, as such, are strongly linked to cultural norms and traditions. Just as ITK develops over a significant amount of time as a population negotiates its relationship with the surrounding ecology, so do the accompanying eating habits, tying these indelibly to cultural heritage (Menezes 2001:32).

Unfortunately, discussions of local participation in projects aimed at increasing food security tend to focus on farming practices, technologies, and inputs, neglecting

indigenous cultural history and knowledge about and nutritional and medicinal properties of foods. For instance, United Nations Food and Agriculture Organization (FAO) policy documents (see Ismail et al. 2003; Stamoulis and Zezza 2003) emphasize access to sufficient amounts of nutritious food, but in the context of food security, this can mean accomplishing these needs through purchased and/or introduced foods. It should be noted that the tide seems to be changing. More recently, the FAO Agricultural Biodiversity Fact Sheet (2008) touches on the importance of local knowledge of food properties, though not yet in a policy-specific context. In addition, the FAO has worked with the Centre for Indigenous Peoples' Nutrition and Environment, which is discussed in greater detail below. Nonetheless, the food security discourse generally focuses on simple access to food, neglecting potential issues with cultural appropriateness and safety of imported foods (Desmarais 2008:76).

As a response to shortcomings in food security discourse, several groups are refocusing development solutions around the concept of "food sovereignty." Most simply, the perceived flaw in the concept of "food security" is that it neglects an aspect of social control over food, especially in terms of its origins and cultural value. As Patel (2009:665) puts it, "As far as the terms of food security go, it is entirely possible for people to be food secure in prison or under a dictatorship." In other words, to be food secure is simply to have access to sufficient amounts of food, regardless of the food's origins or whether it is culturally appropriate. Via Campesina is arguably the most prominent group promoting food sovereignty, which they define as "the right of peoples to define their own food and agriculture" (Via Campesina 2009), focusing particularly on respect for cultural diversity (Desmarais 2008:76). More broadly, this includes an emphasis on local control in response to structural adjustment and trade

liberalization policies, which often encourage commoditization of food and subsequent specialization of food production (Menezes 2001:30). Ultimately, this specialization among rural producers and reliance on the market economy contributes to loss of ecological, cultural, and dietary diversity and susceptibility to food insecurity (Desmarais 2008:74; Gonzales 2004:447; Menezes 2001:32), as well as greater vulnerability to drought, crop disease, pests and herbivores (Altieri 2004:38-39).

Via Campesina is comprised of 148 member organizations from 69 countries (Via Campesina 2009). It is commonly classified as a peasant movement, and is primarily engaged in protest against neoliberal policy through strategies ranging from disengagement to direct action to negotiation. The strength of the growing movement has raised the profile of food sovereignty, but recognition of the concept is not yet prominent in the policy realm. The International Institute for Environment and Development (IIED) is a notable exception, putting food sovereignty at the center of several food policy documents (Cohn et al. 2006; Pimbert 2006; Pimbert 2007).

The concept of food sovereignty is important in that it bridges the gap between calls in the development literature for deeper local participation and evidence from research in food science regarding the health benefits of traditional dietary packages. In numerous case studies of populations in which Western diets have colluded with traditional ones, the latter tend to show greater health benefits (Dewey 1989; Kuhnlein 2004; Roche et al. 2007; Moursi et al. 2008). Further, ethnobotanical knowledge of wild and semi-cultivated foods contributes to dietary diversity and adequate household food consumption (Reyes-Garcia et al. 2008:577). While traditional dietary packages are understood to often confer health benefits, especially compared to Western diets, the complex biochemical interactions of foods and nutrients within these packages are,

for the most part, poorly understood. Bélanger and Johns (2008:245) state, "The dearth of empirical demonstrations of links between access and consumption of biological diversity and specific health outcomes of people subsisting within local ecosystems, or deriving benefits from biological diversity obtained through markets, in part stems from lack of research effort." One might say with cautious optimism that this trend is changing. The studies above are particularly focused on favorable micronutrient outcomes related to dietary diversity, but as implied by the above statement by Bélanger and Johns, the degree to which these look exclusively at traditional diets or include market-derived diversity varies.

As a step toward greater understanding the links between traditional dietary systems and positive health outcomes, McGill University's Centre for Indigenous Peoples' Nutrition and Environment (CINE) developed a useful framework for documenting these systems. Using a team of researchers, including a local leader, anthropologist, food analysis specialist and food and dietary database specialist, this method includes both collection of ethnographic information and nutritional analysis of foods (Kuhnlein et al. 2006). Toledo and Burlingame note the potential for biodiversity to contribute to food security and poverty alleviation, and state, "For this to happen, our knowledge about biodiversity in food and agriculture must improve, and food composition and consumption are important dimensions" (2006:478). Additionally, understanding traditional diets is not just useful in the identification of nutritional gaps in particular populations but also for the documentation for future study of dietary systems that may be increasingly at risk due to loss of biocultural diversity related to globalization (Esquinas 2005:947; Woodley et al. 2006:16). It must also be noted that malnutrition and dietary deficiency do not exist in a vacuum; rather, socioeconomics, sanitation, health care, and other

factors confound nutritional problems among the rural poor (Pellett 1987). While diet is important, development efforts focused on nutrition cannot neglect these other factors in designing projects.

In light of the above, a focus on traditional food systems has potential benefits beyond the importance of overall cultural maintenance. For instance, ITK can affect efficacy of plant breeding and retention of nutrients in growing, cooking and storage (Fassil et al. 2000:501). Crop diversity can promote food sovereignty by providing a stable household food supply in the presence of economic and environmental shocks (Reyes-Garcia et al. 2008:569-570). In the context of market production, evidence indicates that agroecological methods based on ITK and biodiversity can be as or more productive than more input intensive, modern methods. The term "agroecology" is increasingly used to encompass the complex web of technical, social and economic factors that make up food systems (Francis et al. 2003). Pimbert (2007:8) argues that agroecological approaches that draw from the functioning of natural ecosystems are often more productive and sustainable than modern systems. While modern systems often focus on monocropping (the growing of a single crop in a field or farm), traditional systems employ diverse cropping (sometimes referred to as intercropping or multicropping). There are several potential benefits to maintaining traditional systems, especially in a smallholder context. These include greater yield stability, the potential for less risk of destruction from pests, and a measure of insurance should one crop fail because of drought or pests (Power 1999:187). Further, diverse agricultural systems tend to thrive despite the absence of monetarily and ecologically costly inputs such as fertilizers and other agrochemicals and offer more returns for labor invested (Altieri 2002:3).

In a survey of 208 farming projects in developing countries, Pretty et al. (2002:220-221) identified two ways in which diversification contributed to increased productivity: addition of new productive elements that do not impinge on existing activities (e.g., adding fish or shrimp to rice paddies) and integration of regenerative elements into systems (i.e., legumes). It has been shown that shade grown coffee and cacao fields require fewer inputs and remain productive longer than full sun fields (Power 1999:189). Also, crop diversity can contribute to effective pest control and nutrient recycling in soils (Power 1999:190). In addition to crops, the integration of animals into farming systems confers the benefits of natural fertilizer production and contributes to further plant diversification for feed (Altieri 1999:203). Further, ITK as applied to farming systems does not exist wholly within the borders of that farm. For example, on farms in the Bolivian Amazon, Reyes-Garcia et al. (2008:578) found that ethnobotanical knowledge of forest products among male household heads led to greater crop diversity. This emphasizes the importance of the total ecosystem and the need for rural farmers to have access to surrounding areas. Often, agroecological approaches are well established among rural farmers: there are an estimated 75 million small-scale farmers in Latin America employing diverse agricultural systems (Altieri 2004:35). Many of these farmers face the pressure to modernize, based off the promise that monoculture and technological inputs will lead to higher yields and incomes, even though, as shown above, agroecological systems are more resilient and demonstrate greater yields than monoculture systems with the same level of management (Altieri 2004). In the face of such pressures, some external parties in these systems, such as NGOs and local governments, have the potential to enhance livelihoods of rural farmers, which is addressed in the following section.

Promoting Food Sovereignty and Agroecology in Ecuador: A Multiplicity of Actors

Smallholder farmers are not in a world by themselves. Their livelihoods can be affected by factors such as market forces, government policy, funding institutions, the environment, and others. In Ecuador, the power of municipal governments and NGOs are especially pertinent to rural farmers. In many ways, Ecuador is a prime study in the interaction between globalization and smallholder livelihoods. Agriculture has a deep history in the Ecuadorian highlands, but it was not until the 1960s and 1970s that the construction of roads led to the widespread colonization of Ecuador's Pacific and Amazon lowlands by farmers from the highlands (Wood 1972:602; Bilsborrow et al. 2004:636). At the same time, land reforms led to dissolution of the hacienda system that marked highland agricultural organization, giving way to modernization and increased production (Keese 1998:456). This shift has affected farming at all levels, but smallholder farmers have in many cases been left out of the system of state subsidies to promote production, leading to high rates of migration out of the area (Keese 1998:456). In the 1980s, a drop in the price of oil—one of Ecuador's key exports—led to the promotion of neoliberal structural adjustment policy (Keese and Argudo 2006:116). Resulting inflation, international debt, and currency devaluation constitute another set of factors that compelled many of Ecuador's rural farmers to modernize to achieve greater production, which has come at the detriment of ITK (Cruz 1999). Modernization tends to be accompanied by a loss in dietary diversity as farmers shift to monoculture, and, as a result, more imported foods, leading also to vulnerability in food prices and availability (Dewey 1989:418). While Ecuador has played into the broader trend toward government decentralization in Latin America, the extent to which this has

been enacted effectively at the local level is spotty (Cameron 2005). Simultaneously, efforts at implementing participatory development models often fall short, revealing a "yawning gap" between development discourse and actual practice (Korovkin 2005:62).

The promotion of biodiversity and maintenance of traditional dietary systems alone cannot ensure secure livelihoods. The ability to make a living is crucial to rural smallholders, as well as to those engaged in non-farm activities. Broader structural factors can serve or inhibit those livelihoods. These factors must be addressed, and as discussed above, development projects should incorporate self-determination on the part of smallholders in terms of ecological resources. Toward this end, farmers as individuals and within organizations must negotiate relationships with state and municipal governments, private interests and NGOs. All of these groups are characterized by particular strengths and deficiencies, and in practice, the interaction between these groups has led to widely varying results in Ecuador.

Farmer's Associations

One way farmers negotiate their place among other interests is through farmer's associations (also referred to as farmer's organizations, farmer's federations, producer's organizations). In highland Ecuador, in particular, there was a rise in FAs as farmers organized in response to land reforms in the 1950s and 1960s, which was associated with the decline of the hacienda system (Bebbington 1994:220; De Zaldívar 2008:583). As these state-level reforms were hashed out, FAs shifted focus to more local-level land tenure agricultural policy issues (Bebbington 1996:1165). Individual organizations were generally linked at the parish or county level, and, as such, agricultural development projects could occur through farmer-to-farmer extension (Bebbington 1994:221). In the 1970s, land

pressures led to colonization of the tropical lowlands by farmers—and accompanying FAs—from the highlands, which led also to the creation of FAs representing lowland indigenous peoples (Bebbington 1996:1165). While much of the focus of highland FAs at this point was on natural resource management and technical issues, only years later did these aspects reach the agenda of lowland indigenous FAs, which were originally formed around issues of basic land rights in reaction to oil exploration and highland colonization (Bebbington 1996:1165).

Several factors have challenged the viability of FAs in both highland and lowland areas, not the least of which is the problem of out-migration in response to falling farm incomes (Bates and Rudel 2004; Cameron 2005:376). In response, many FAs have embraced modernization of agriculture in the hopes of intensifying production and attaining higher incomes, though this may come at the expense of maintaining IDK (Bebbington 1993:287). As stated above, full-scale modernization attempts, especially to the extent that they encourage monoculture and large amounts of agrochemicals, have not necessarily delivered on the promise of increased production and incomes, and in the 1990s, the pendulum began to swing back in favor of a mixed strategy incorporating both modern and indigenous technologies (Bebbington 1996:1171). Although traditional knowledge and methods may be more conducive to the maintenance of traditional food systems, the bottom line for many is still income, and the resurgence of ITK may not coincide with the growing of traditional crops if the market impetus is not there (Cruz 1999:382).

Many argue that increased production, no matter the means, does not result in sufficient income increases for smallholders. In his case study of the highland Ecuadorian Colta, Cruz (1999) outlines the complexity of indigenous views on modernization. The regional push for the maintenance of

indigenous identities may lead one to assume that this includes retaining traditional agricultural methods; however, this is not always necessarily true. The perception that modernization is an economically viable strategy may lead to a sense of indigenous empowerment as much or more than do traditional methods, which may be viewed as a vestige of the exploitative hacienda system under which indigenous Colta worked before land reforms (Bebbington 1993:287; Cruz 1999:382). Amid currency devaluation in the 1980s and 1990s, however, the cost of modern agricultural inputs skyrocketed, and especially for smallholders, modernization failed to deliver on the promise of higher incomes (Bebbington 1994:221-222). Cruz concludes, "A viable indigenous development will require a restructuring of marketing and other social relationships to allow for the production of higher-value and processed products under the control of Colta that reach the market more directly, resulting in higher farm incomes" (1999:383). Given the fluid nature of FA self-definitions in the last few decades, it seems that these relationships will likely play a big role in successful economic development. Indeed, FAs in the highland province of Chimborazo have already begun to address vertical economic and technical linkages with the aim of higher-value production (Bebbington 1994:222). Essentially, this constitutes an adoption by smallholders of another part of the existing large-scale agribusiness framework, and the integration of this under the control of local producers is a main point of the Via Campesina platform (Via Campesina 2009). The key, then, is to do so in a way that employs ITK toward the maintenance of diverse, sustainable farming systems. Ultimately, FAs cannot do this alone, and the effective cooperation of state and local governments, NGOs, and private business interests are key.

Government and Decentralization

The trend toward decentralization of governments across Latin America is a one that, in theory, presents great opportunities to aid rural farmers in sustainable, self-determined development, especially in the context of food. However, for these opportunities to be realized, decentralization must be implemented effectively. Messer (1997:49) states, "National governments need to decentralize in order to gain access to local-level environmental information, improve resource management and information flow on local food availability and markets and accomplish greater equity, productivity and cost-effectiveness in the delivery of services to sustain food production and distribution." Essentially, decentralization entails the transference of resources and decision-making abilities from the central government to the local and provincial level. The implementation of decentralization ranges from the simple transference of some administrative responsibilities all the way up to nearly full autonomy of sub-levels of government (Messer 1997:37-38). In Ecuador through the 1980s and 1990s, decentralization took the form of the transfer of decision-making power to sub-national officials. However, financial control was not also transferred, thus constituting a form of veto power on the part of the central government. In other words, local decision makers could not attain funds to act on policy without disbursement—and as such, approval—from the central government (O'Neill 2003:1070). The government tried to remedy this with a 1997 law earmarking 15 percent of national budgets for sub-national control. This was followed by a 1998 constitutional article that allowed for the decentralization of all government functions not related to foreign policy, macroeconomic policy, and the like (Cameron 2005:372).

Despite these remedies, decentralization in Ecuador has not always been effective in practice. In some cases, the

transfer of power to local governments is still not accompanied by the necessary funding to capitalize on that power and municipalities may not have access to the technical expertise to carry out projects (Keese and Argudo 2006:115). In other cases, the shift of power does not necessarily result in democratization. According to Cameron (2005:372), reforms "lacked any clear requirements or incentives for municipal governments to operate more transparently or to foster citizen participation. Wilson (2008:140) found that, despite strong indigenous organization in the Amazonian municipality of Tena, "the government of Tena continues to follow a modernist logic antithetical to multicultural practices." Cameron's (2005:373-374) comparison of the highland municipalities of Guamote, Cotacachi, and Bolívar showed varying results of decentralization efforts. These results were contingent on several factors including socioeconomic and ethnic makeup, geographic location, economic activities, land distribution and others. In these cases, despite the existence of a framework for participation and democratization, the success of decentralization hinged on confronting socioeconomic disparities in the municipalities (Cameron 2005:387). Ultimately, municipal governments must negotiate cooperation between several stakeholders, including central government authorities, funding institutions, NGOs and local groups and individuals (Keese and Argudo 2006:115). The three-way relationship between NGOs, local groups (in this context, FAs) and municipal governments is particularly significant.

NGO Participation

As a part of decentralization policy in Ecuador, a municipality must formally request transfer of functions. To be approved, municipalities must demonstrate the capacity to handle these functions. NGOs can play a critical part in this demonstration (Keese and Argudo 2006:117). In addition to working with

governments in building administrative capacity, NGOs can also work with FAs in building technological capacity. The importance of the former in relation to the latter lies in the need for NGOs to be able to secure public funding and resources for agricultural projects, which contribute to sustainability of such projects more effectively than funding from outside agencies (Farrington and Bebbington 1994:208-209).

Cooperation between NGOs and local groups can be ineffective and even counterproductive in the absence of state cooperation. While North and Cameron's (2000:1761) case study of NGO/local development initiatives in highland Ecuador showed success despite the negative influence and/or absence of the state, the authors note that such cases are the exception and not the rule in Ecuador. They cite the experience of the NGO *Central Ecuatoriania de Servicios Agrícolas* (CESA) over the course of 25 years, who reported a bevy of factors restricting the success of NGO participation with local groups. These factors include limited access to land, markets, transportation, credit, and technical assistance, among other things (North and Cameron 2000:1762). NGOs often lack the resources to deal with these problems alone, and as such, a delicate balance of power and responsibilities among all actors is required to account for deficiencies and potential abuses of power. The accountability of NGOs is characterized by a two-way street of influence. For instance, NGOs can increase accountability of themselves and governments by encouraging substantive and transparent collaboration with farmers in resource allocation and strategy decisions (Farrington and Bebbington 1994:210). At the same time, NGOs are not directly accountable to the public the way governments are, so effective cooperation on the part of governments helps to remedy this gap in accountability (Zaidi 1999:269). Because the socioeconomic, ethnic, and geographic profiles of Ecuadorian municipalities are so diverse, effective

decentralization is necessary to tailor appropriate development solutions (Keese and Argudo 2006:123).

Until decentralization-based reforms are implemented evenly and effectively across the country, inequalities in development results will persist; however, the mere fact that decentralization is in process is important. Zaidi (1999) notes that the rise of development-based NGOs happened primarily as a response the shortcomings of centralized governments in forwarding development, and he makes a convincing argument that the shortcomings of NGOs have led to similar failures. As such, Zaidi has little faith in the potential of NGOs in the decentralized model of the "new state" (1999:269-270). I would argue, however, that the relative strength of NGOs (i.e., technical expertise and access to outside resources), combined with those of democratized municipal governments (i.e., public accountability, access to sustainable funding), present a unique opportunity to aid FAs in enacting self-determined and culturally appropriate development solutions.

While the interaction between FAs, municipal governments and NGOs is a key focal point here, there are other actors that, while they are not addressed in this paper for the sake of brevity, should not be ignored. These include business interests, religious groups, funding organizations, university researchers, international government aid organizations, and the like, all of whom play a part in the complex task of developing and securing rural livelihoods.

Discussion and Conclusion

How, then, does the confluence of relative strengths of NGOs and government apply to the promotion of ITK and agroecology toward the goal of food sovereignty and sustainable livelihoods in Ecuador? Several factors are key in this respect. First, attention to traditional dietary complexes

should primarily serve the nutritional needs of rural farmers and surrounding populations. This is the focus of much of the food science literature related to biocultural diversity (Dewey 1989; Johns and Eyzaguirre 2006; Bélanger and Johns 2008). Again, this is important for maintaining cultural traditions, ecological systems, and optimal health and wellbeing.

Second, development policy aimed at rural farmers must incorporate the goals of increased income and sustainable livelihoods through market participation, which can simultaneously work toward the goal of national food security. Concentrating only on the importance of traditional diets in the context of rural producers ignores the nutritional needs of Ecuador's substantial urban population. Johns and Maundu (2006:38) state, "This can be best achieved within a model linking local producers and consumers in which biodiversity contributes to poverty reduction and viable economies within a supportive sociocultural context." Efficiency of markets on the national level is required in order to accomplish these links (Messer 1997:40). Given Ecuador's broad cultural diversity, linking producers and consumers should not mean an imposition of one agricultural region's food traditions on an urban area that may not share the same traditions. Rather, local agricultural initiatives should aim to represent the dietary traditions of all within an area. Further, rural producers can use this diversity to their advantage, as shown in case studies of producers of high-value goods who were able to operate without an overabundance of competition (Bebbington 1994:223; North and Cameron 2000:1761). Identifying the potential for high-value niche markets should be a focus in establishing more effective vertical production linkages.

Third, in giving agricultural technical assistance, NGOs must work with FAs to strike a culturally and ecologically appropriate balance between Western and indigenous knowledge and techniques, and NGOs must not treat the latter

as homogenous and unchanging (Bebbington 1993; Cruz 1999). Many failures of modern agricultural applications can be traced to the reductionist and compartmentalizing tendencies of Western science, and different ways of understanding complex ecosystems must be taken into consideration (Pimbert 2007:5). Outside participants in development should keep in mind that development solutions should be locally determined and controlled (Bebbington 1993:288). Further, the use of ITK and traditional crops must be sensitive to the notion of cultural exploitation (Woodley et al. 2006:16). This technical aspect must be effectively supplemented by government support, which, at the municipal level, means effective levels of accountability, funding, and other resources. State government is charged with the responsibility of enabling those vertical technical and market linkages that are needed to promote income generation. In short, the effective cooperation between government, FAs, and NGOs is crucial for the promotion of smallholder livelihoods.

Finally—returning to one of the main themes of the food sovereignty concept—it is perhaps deceivingly simple, yet crucial, to remember that food is first an important part of human nutrition and cultural tradition, and should only secondarily be thought of as a commodity (if at all). Unfortunately, economic growth models of development tend to forget this, and too often, food becomes just another point of entry into the cash economy. It is my hope that locally determined development efforts will ultimately reverse this trend by focusing on biocultural diversity and food sovereignty, as well as market production strategies that work to enable these principles.

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Ethnicity and Agricultural Household Decision Making on the High Plains: Lakota Cultural Continuity and Environmental Ethics

Michael Brydge

Abstract—*Despite historical conflicts with antagonistic federal policy and non-Indian homesteaders some Lakota households practice farming and ranching on the reservation today. The Lakota in South Dakota have used agricultural operations to perpetuate cultural continuity; a culture that assimilationist policies intended to eradicate. Is ethnicity a salient variable in agricultural household decision making? Surveys were administered to 68 non-Indian and two Lakota agricultural households in 2007 to assess agricultural practices, motives, attitudes toward the environment, community values, and demographics. Similar surveys were administered to two non-Indian and 13 Lakota agricultural households in 2008. In addition, 20 Lakota agricultural households were identified from an eight year, 300 household longitudinal study conducted by Dr. Pickering Sherman and CSU Anthropology students. Follow-up surveys were administered by telephone in 2009 and 2010 to those 20 households as well as one additional Lakota agricultural household. An analysis of correlated and closely correlated survey answers from the Lakota (n=36) and non-Indian (n=70) subsets reveal stark differences in agricultural household decision making. Analyses reveal that Lakota identity has not been lost by agricultural practices. To the contrary, Lakota agricultural operators revitalize Lakota identity through spiritual connections and practices, ecosystem restoration,*

community engagement, and economic development. Environmental history illustrates Lakota connections between geographic space, spirituality, and cultural resilience on the reservation today. A comparison between Lakota and non-Indian agricultural operators of the High Plains conveys differences between agricultural practices, land use strategies, community conservation, and economic motives.

Introduction

As Manifest Destiny facilitated overland expansion across the Mississippi River in the early 1800s, popular thought provoked the taming of wilderness and the intervention of western civility among indigenous peoples. The land was thought of as untouched and in need of metal implements pushed by eager hands, to express productive dominion over God's provident resources (Locke 1773). To sooth urges for western societal land lust, colonists perceived the Lakota as part of the natural landscape and in need of alterations. To the colonists and later U.S. politicians, the West was vast, wild, and uncivilized. To Native Americans nature was life, subsistence, and origin. Sacred landscapes harbored indigenous historical roots.

The Lakota have continually preserved their culture, a culture enmeshed and reveled in the natural environment; preservation born of Indian dedication and resilience despite political, social, and ecological odds. Culture is always changing, thus preservation entails cultural continuity not cultural stagnancy. According to community developer, author, and long time resident of the Pine Ridge Indian Reservation Mark St. Pierre (personal communication November 2009), "Culture is a living thing…culture flows and changes over time. Culture changes but what stays the same are those things at the core of their value system as a people." However, Lakota culture has evolved in accordance with federally influenced,

abrupt physical and socio-political environmental changes. Since forced placement within reservation confinements the Lakota have utilized tools of colonial assimilation such as agriculture, to revitalize Lakota culture, reversing a trend of federally instituted deculturalization. Nature, once stripped from the Lakota, whispers clearly to those who listen. The cottonwoods speak; the Dakota knolls and prairie grasses teach the words of grandfathers and Lakota elders (Littlemoon and Ridgeway 2009:87-88).

In this paper I integrate resilience theory and environmental history to understand Lakota agricultural household decision making in relation to cultural continuity and environmental ethics. These two disciplines, used in tandem, allows the researcher, as well as the reader to understand the implications of the question, "Is ethnicity a salient variable in agricultural household decision making?" The bison and grasses adapted symbiotically on the High Plains long before the Lakota people. When the Lakota arrived on the High Plains, they too adapt symbiotically with the natural environment favoring hunting and gathering over agriculture. However, federal policy facilitating westward encroachment led to the demise of buffalo and the implementation of a reservation system, both influential in alienating Lakota people from their land and natural resources culminating toward Lakota dependency on the federal government. Yet in the past several decades some Lakota households have utilized agriculture, a method once used by federal agents to thwart assimilation, to perpetuate Lakota cultural continuity.

Theoretical Framework

Resilience Theory

Humans and their encompassing ecosystems must adapt to changes in order to maintain function in a dynamic global, political, economic, and environmental system. Local communities and landscapes are vulnerable to local, regional, and global disturbances, and therefore must adapt to accommodate or negotiate such disturbances. This is a description of resilience (Walker and Salt 2005). For example, Lakota society within the Pine Ridge Indian Reservation ecosystems were vulnerable to political (i.e., the Dawes Act), economic (i.e., near bison eradication), and ecological disturbances since the eighteenth century. Agriculture was an adaptive strategy of some Lakota families to overcome their vulnerability in the face of these drastic disturbances. For many Lakota households, this adaptation was made within their own set of cultural values and beliefs, demonstrating social and ecological revitalization as an act of resilience. Three concepts are imperative to resilience theory (Walker and Salt 2005:31-38):

1. Humans and ecosystems are inextricably linked within a social-ecological system.
2. Social-ecological systems are not stagnant and do not react to disturbances in a predictable, linear fashion (i.e. overgrazing as a result of land parcelization and fencing).
3. A *resilient* social-ecological system absorbs disturbances, yet the system's capacity to provide goods and services increases, without compromising the integrity of the system.

Resilience theory is critiqued for impressing assimilationist values on cultures that strive to remain culturally distinct despite pressures from the global market system; a system which often excludes cultural values such has spirituality, in favor of the abstractions of modernity, such as monetary capital (Hornborg 2005:196-198; Hornborg 2009). For example, a marginalized culture may be encouraged to adopt values of the majority (that are culturally inappropriate to them) so their culture will not "disappear." Marginalized communities have been hampered by global capitalism. Therefore the reservation communities are still vulnerable to the global market system despite some Lakota families' adoption of agriculture. In addition, if a socio-ecological system is in a vulnerable state and highly resilient to disturbances, the systems integrity over the medium to long term could be compromised. For example, the ecological conditions and social conditions on the reservation today are directly correlated with the socio-ecological vulnerabilities to historic and present federal and state regulations, despite the Lakota's ability to maintain ethnic traditions. The Lakota have demonstrated cultural resilience but this does not negate their victimization of historic and present discriminatory policies. These discriminatory policies must be addressed. A long pending lawsuit has just recently been resolved concerning faulty record keeping and mismanagement of Native American lands, the federal confiscation of the Black Hills, and monies held in trust (Cobell v. Salazar 2009). In addition the USDA has just recently certified the ceremonial killing of buffalo on the reservation. It is often policies that must adapt to ensure the resilience of a culture.

Environmental History

Environmental history helps to understand the Lakota in relation to their environment, both in the past and present. Environmental history is not the history of nature, the environment or environmentalism. It is a theory devised to extend agency to nature while avoiding determinacy; historical events such as colonialism in America are not proposed to be the effects of the environment, however extending natural agency provides greater insight into such historical events. Nature as agent conveys that nature and ecosystems are not passively present throughout history. The Lakota have always been engrained in their environment. Currently, they are practicing agriculture in a way that is more sustainable than the practices shared by non-Indians in the region. Environmental history recounts the importance of the past socio-ecological interactions between the Lakota and the environment and their present use of the environment as a viable resource and a mechanism to perpetuate cultural continuity.

McEvoy's Interactive Theory coupled with William Cronon's Four Habits of Thought, are foundational for implementing environmental history. According to McEvoy (1987), history is comprised of three parts: culture, production, and ecology. All three elements affect one another; they are interactive. Concurrently, all three elements evolve and remain elastic throughout history. William Cronon (1993) suggests four employable habits while writing environmental history:

1. Human history has a natural context.
2. Neither nature nor culture is static.
3. Environmental knowledge is culturally constructed and historically contingent.
4. Wisdom comes in the forms of parables (there is a story to be told).

Methodology

A 2000-2008 longitudinal study led by Dr. Kathleen Pickering Sherman represents 300 Pine Ridge Indian Reservation (Pine Ridge) households and provides information including welfare, education, demographics, natural resource use, traditional culture, and economics. This longitudinal study was utilized as a pilot study along with a 2005-2007 USDA funded survey to locate households involved with agriculture and to examine which questions should be administered to Lakota agricultural households (Bernard 2006:190). Twenty Lakota agricultural households were identified through the 2000-2008 longitudinal study. In 2008 the households involved with agriculture were called and a survey appointment time and meeting location was established. A mixed methods survey was administered. Quantitative questions provided strong statistical references while open ended qualitative questions validate the numbers produced by quantitative questions. Answers to quantitative questions were administered with a five point Likert scale including Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), and Strongly Agree (5). Numerical conversions were utilized to calculate statistical means of each response and assess the statistical significance using independent samples t-test. Questions covered demographics, land use, conservation practices, Lakota values, recreation, networking, and more. Concluding the survey were several questions aimed to obtain information on other possible informants. In this way, respondent-driven sampling was used to identify other likely informants from a difficult to reach survey population (Bernard 2006:192-193). Thirteen more Lakota agricultural households were identified through respondent-driven sampling. This methodology proved successful because there are very few Lakota households involved with agricultural operations today. Some of these questions were identical to questions from the

2000-2008 random household survey questions, while others mimicked questions from the 2005-2007 USDA funded surveys.

The 2005-2007 surveys were administered to agricultural operators from Colorado, South Dakota, and Montana. The informants were identified by snowball sampling, starting from A in the phone book and calling every fifth number until an agricultural operator was identified. Though snow ball sampling is easily criticized, Russell Bernard (2006:192-193) validates it for identifying hard to reach populations. This study provided surveys conducted in person for 68 non-Indian households and two Lakota households.

Follow up surveys were administered from 2009-2010 and one more Lakota agricultural household participated in a telephone survey. In total 70 non-Indian and 36 Lakota agricultural households contributed to this study. When consent was given, the survey administration was tape recorded and transcribed. Correlated and closely correlated survey questions from all three survey sets have been analyzed in Excel and SPSS for results.

The Environmental History of Agriculture and Pine Ridge

Nearly sixty million buffalo disappeared from the Great Plains since the colonists' arrival to the "New World" (Sutton 2004:259). Though Lakota people overhunted during seasons of abundance, their ecological footprint never reached the proportions of encroachers from the East Coast (Krech 1999). The buffalo became moving targets for sharpshooters, like clay pigeons today. Mountain men noticed the extreme reduction of buffalo herds by 1839 as a result of non-Indian westward encroachment. Prior to this time, ecosystems relied upon the bison just as the bison relied on ecosystems.

Plains grasses, buffalo and Lakota culture adapted symbiotically. Buffalo did not clear graze prairie grasses nor did they uproot plants as did cattle. On the contrary, prairie grasslands were able to replenish themselves after buffalo herd migrations, regenerating caloric value for the next passing herd. Buffalo manure, lacking human intervened chemicals, recycled the suns' nutrients into the soil, increasing soil fertility and feeding the grama and buffalo grasses without poisoning the ecosystem. Wallowing, a mechanism to cast scent or retaliate against parasitic flies and gnats helped disperse seeds along the prairie. In addition wallowing acts as natural tillage and cleared areas for natural propagation. Buffalo wallows became nurseries for wind scattered seed. The earthen vessels captured falling rains. Plants germinated in the wallows, free from the roots of other competitors surrounding the wallows.

Westward migration of homesteaders, cattle barons, and gold miners restricted herd migration. When extreme droughts of the 1860s and1880 struck the Plains, the buffalo had only room enough to lie down and die. The grasslands were no longer their domain; they could no longer retreat from dry weather, barren oases, or null food sources. Blood saturated soils no longer rumbled under a thundering herd. Stampedes no longer shook the seeds from the tips of green prairie blades (Malin 1956:126-230).

The suns energy traveled from grasses to buffalo and on to the soil, yet the Lakota entered this process to ensure their own survival. Lakota hunters harvested buffalo from the Rocky Mountains to the Mississippi River. Some scholars suggest the Lakota migrated from the Great Lakes region near the Mississippi's origin, to the High Plains, in part because of the abundance of buffalo (Schusky1994:258-263). Biologically molded, burly hides protected the buffalo from winter white outs and dry, summer Chinook winds. Likewise, hides protected the Lakota from natural elements. Teepees, cyclical

homes, made of lodge pole pines and tanned buffalo hides provided shelter for birthing women and sleeping families. While winter storms raged, families were telling stories under the protection of their teepees, chewing pemmican, thinly sliced buffalo flesh, dried under the sun. Fur laden hides embellished cold women, men, and children and became a trade mechanism between Indians, mountain men, and European traders. Food, clothing and shelter are necessary for survival; additionally spirituality is necessary for the Lakota. The buffalo is a spiritual brother to Lakota people. White Buffalo Calf Woman introduced the tribe to sacred ceremonies bringing forth the sacred pipe before recorded history (Black Elk 1982). However, contrary to popular belief, the Lakota documented historical events. Much like the pulpous paper or electronic Excel spread sheets used today, the Lakota recorded events on buffalo hides. For Lakota people food, clothing, shelter, and sanctity were all directly derived from the natural environment, without the alienating forces of industrialization and global capitalist markets.

Native plants adapted to droughts, frozen winters and prairie fires for centuries. Homesteaders extinguished prairie fires that once spread seeds and fertilized soils. Native species adapted to cyclical droughts; some plant roots tapped into water resources sixteen feet deep. Many of the roots naturally injected nitrogen into the soil (Malin 1956:122). Today, chemically induced nitrogen pollutes farm side rivers. Industrial agriculture operators deem native plants once used as traditional food sources, medicines, and responsible for the natural recycling nitrogen into the Earth as weeds, tilling them under or suffocating them with herbicides (Whitson et al. 2000).

Engrained within the natural environment; Lakota mobility patterns were dictated by the changing of the seasons and migratory game. The buffalo provided Lakota communities

with food, clothing, and shelter; the Creator's version of a 1930s Sears and Roebuck. One way to kill a people is to kill their food source as demonstrated by Kit Carson's 1864 ploy, felling five thousand Navajo peach trees (Brown 1970:27). Wanton buffalo massacres were not only for sport or trade, but a scheme to eradicate a primary food source, leaving Indians emaciated and dependent on the federal government and vulnerable to agricultural endeavors and sedentism (White 1983:206).

The Oglala Lakota of Pine Ridge knew about farming (Hurt 1987; Isenberg 2000). They traded extensively with Upper Missouri River Valley horticultural tribes who occupy present day North Dakota and with their distant relatives, the Minneconjou whose name translates as "plants by the water" (Marshall 2004:xxiv). However, an open and volatile wilderness such as the High Plains necessitated multiple modes of subsistence. The plains south of Bear Butte did not bloom with fertility like the lush river valleys irrigating the way for sedentary tribes. Keenly aware of their surroundings and nature's providence, the Lakota utilized hunting and gathering strategies. Plains tribes' mobility in accordance with wild food and game harvests were less taxing on the environment than the destructive agricultural ideologies brought by settlers and enforced by U.S. policy and treaties. Despite the Lakota view of nature as Provider, the settlers' view of nature as the "wild west" and the "uncharted plains" propagated their feelings of Lakota savagery and incivility. Settlers thought of the Lakota like the Earth; the browned skin peoples were in need of working and molding to increase the fruits of their livelihood. Equating mobility and common pool resources with savagery, the federal government halted Lakota seasonal migration patterns. The Ft. Laramie Treaty of 1851 utilized the watered veins of the High Plains to establish hunting and residency boundaries for the Lakota. From the Powder River east to the

Missouri, south to the Platte and as far north as the Cannonball River in present day North Dakota were the Lakota's new geographical barriers. The 1868 Ft. Laramie Treaty demarcated the political boundaries which confine the Lakota still today (Lazarus 1991:xviii-xxiv).

Colonial forms of agriculture altered local ecosystems in the 1800s. Decimated buffalo herds and altered migration patterns reduced threats to one of the most defining agricultural inventions, barbed wire. Tillage and cattle grazing disturbed the growth of naturally occurring legumes, forbs and tubers used by the Lakota. Non-Indian ways of agriculture included more than the planting of food sources, but the casting of anglicized seeds (the capitalist market system and private property) for the bountiful harvest of a dependent Native America (White 1983). In addition, federal enactment of the reservation system eroded the social and natural environments of the Lakota. Buffalo eradication and federally enforced sedentism halted Lakota independence and reinforced the settlers' ideas of property ownership complete with the metal demarcation of fencing (Ellis 1975:x). Political boundaries segregated Lakota people from their sacred geographic cathedrals. Bear Butte towered several days walk to the northwest of Pine Ridge, and *Paha Sapa* (the Black Hills) had been stripped from their hearts and hands and concurrently stripped for gold. The buffalo were gone. Food and clothing were gone. People were starving. South western South Dakota could not provide enough food resources to supply a sedentary population. Had the environment provided for such a population, the Lakota may never have roamed the extensive land base that they once used for hunting and gathering. By the late 1800's cattle barons and wheat farmers had stripped the Great Plains and Pine Ridge of the diverse flora and fauna used by natives to survive the bone chilling winters and drought ridden summers. Starving, facing broken promises, and

threatened with federal ration reductions, many Lakota heads of household began agricultural endeavors or worked as farm and ranch hands. This is when some Indians households became involved with agriculture, first as ranch hands and eventually adopting agricultural practices and owning their own operations (Iverson 1994; Robertson 2002).

The prairie landscape and the Lakota, once reciprocal entities, were being separated by an expanding canyon of deculturalization carved by a raging river of western ideologies. Settlers and politicians manipulated the environment and their thoughts of the environment to kill and oppress indigenous peoples. However, like the rising of the moons, migration of the sand cranes, and transitions of the seasons, Lakota revitalization is continuous; the culture is elastic and ever changing. Despite brutal hardships and environmental disconnects, the Lakota are an ecologically oriented, deeply historical and resilient people. Pine Ridge landscapes, like the social environment, are continually changing.

The Current Reservation Agricultural Environment

In the late twentieth and early twenty-first centuries the Lakota have utilized tools of colonialist assimilators to revitalize Lakota culture, reversing the trend of deculturalization. Despite an ill responsive federal government, the Lakota have become greater controllers of their own destinies and actors in their own communities. A tribal buffalo herd symbolizes a time long ago and a promising future for Lakota people. Currently the Lakota Buffalo Caretakers Cooperative (2009) is comprised of three Lakota families who have banded together, successfully reclaimed their land bases, and implemented buffalo ranching. Buffalo herds on the reservation instill community pride and expedite environmental restoration. Like a patchwork quilt

with a brown square sown adjacent to a green one, overgrazed cattle pastures adjoining buffalo pastures are noticed from the naked eye and through satellite imagery. The buffalo caretakers extend their harvest to the reservation trade economy to ensure that elderly and hungry receive healthy and adequate food rations. As the buffalo blanket the prairie, spiritual and natural connections once stripped from the Lakota are being restored.

Three buffalo caretaker families refrain from using the word rancher perhaps because of negative connotations. At one time, Indians became cowboys because they were left with no other alternative. Today, Lakota continuity is perpetuated through the practices of caretakers and other Lakota agricultural operators. Buffalo caretakers and Lakota farmers and ranchers incorporate traditional ecological knowledge and environmental ethics, community values and spiritual beliefs with some practices evolved from non-Indian influenced agriculture. Land, according to Lakota farmers, and money are not necessarily equivalent. Cultural and spiritual values of land supersede that of the dollar. Lakota agricultural operators do not seek to maximize arability. On the contrary they fallow lands and create reserves for animals such as white tail and mule deer, antelope, and fowl. Synchronicity and reciprocity with nature, a balance their Lakota predecessors never perfected but respected, motivates these operators. Extraction has left much of the Pine Ridge landscape scarred and sterile. Currently restoration and revitalization of culture is simultaneous with the restoration and revitalization of reservation ecosystems (Brydge and Pickering Sherman 2009).

Discussion

Three quantitative questions concerning agricultural households' attitudes toward the natural environment from the 2000-2008 longitudinal surveys and the 2005-2007, 2008, and

2009-2010 USDA surveys demonstrate the importance of non-agricultural activities and traditional subsistence practices on Lakota lands that are associated with Lakota environmental ethics. Qualitative responses from questions concerning conservation practices demonstrate the connection between Lakota cultural continuity and environmental ethics. The quantitative responses were analyzed by ethnicity (see Table 1).

Ethnicity by Question/ Responses	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Plants and Animals[1]*					
Lakota (n=30)	43.33 %	50%	3.33%	0	3.33%
Non-Indian (n=53)	11%	43%	21%	21%	4%
Relaxation[2]					
Lakota (n=25)	0	28%	4%	36%	32%
Non-Indian (n=49)	0	20.41 %	6.12%	67.35%	6.12%
Wild Animals[3]*					
Lakota (n=25)	32%	52%	12%	4%	0
Non-Indian (n=52)	2%	44%	19%	33%	2%

Table 1: Attitudinal Questions Concerning the Natural Environment

[1]Plants and animals have as much right to exist as humans.
[2]Natural areas are important places where I go to relax.
[3]It is important to have lots of wild animals in this county for people to hunt.
*These results are significant at 95 percent confidence levels using the independent samples t-test.

Natural Beings

Of Lakota respondents, 93 percent agreed that plants and animals have as much right to exist as humans compared to 56 percent of non-Indian agricultural households (see Table 1).

This finding was continually explained by Lakota agricultural operators' disregard for mono-cropping and overgrazing as a viable agricultural option. Discord was demonstrated in various ways. One elder Lakota sharecropper from Potato Creek stated, "We try not to do anything other than cut hay." The hay she referred to consists of native grasses growing unabated on her land. Rabbits, snakes, prairie dogs, and insects live in these grasslands. The hay field in front of her home replenishes itself every year without irrigation from the declining Ogallala Aquifer. This demonstrated the importance of her Lakota obligation to "allow the land to heal itself." For many Lakota agricultural households, the idea of turning their family land into an agribusiness or mono-cropping is synonymous with alienating animals from their natural habitat or degrading the natural environment. One retired Lakota coupled connoted agribusiness as being disruptive to their land and the elder Lakota rancher responded, "We decided a long time ago we would try to bring the buffalo back, the buffalo are more friendly to the land." Several Lakota agricultural households discredited the idea of using pesticides to promote agribusiness or mono-cropping while others blatantly detested the idea of mono-cropping. A Lakota buffalo rancher told me, "[There's] no crops [on our land] at all and we don't like [mono-cropping], we kicked our lessee off for mono-cropping wheat." Similarly, a Lakota hay sharecropper who had kicked a lease off her land for using chemicals as well. She explained: "No, [we don't like mono-cropping] not when it's going to affect the land that much, we like it naturally."

In addition one bison rancher who plants small amounts of alfalfa said he would not convert his family's land into a large scaled commodity agribusiness because the land "needs to be [there] for the wildlife." Another buffalo rancher and community political leader reiterated the environmental implications of growing agricultural plants. This buffalo

rancher spoke about the presence of utilizing herbicides, killing native species to encourage the growth of agricultural plants, in relation to holistic ecosystem services. Though he does not have a strong "western scientific" background he often uses extensive traditional ecological knowledge passed down from the earth and the Lakota language, thinking of nature as cyclical, a common Lakota practice: "I believe that those plants are natural you know. And if you disturb them you disturb the ecosystem. If you disturb the ecosystem you get the birds and insects you know… It's good just to keep your natural habitat, you know, the best you could." Conservation of the plants and animals is not necessarily derived from the desire to increase long term or short term capital gains, but from the desire to maintain cultural traditions and facilitate Lakota cultural continuity.

Consideration for all living things is an important concept to traditional Lakota culture. Chief Standing Bear, spiritual and political leader of the Lakota during the tumultuous years of non-Indian encroachment, acknowledged the importance of childhood development and a connection with birds, beasts, and the soil. All living things are connected by various interactions but one connection is through the air they breathe and the water they drink (Standing Bear 1975; Suzuki and Knudtson 1992:211-212). One Lakota cattle rancher detested the use of chemicals when he told me, "Here we have springs and live waters and stuff … rain and stuff washes it down in the creeks … It's not good for livestock or wildlife." As Lakota agricultural operators make decisions, their natural relatives and the connections with them are considered. A Lakota elder sharecropper from Potato Creek said "[I] quit leasing after [I] figured out what fertilizers do to the land and the air." The Lakota elder now fallows the land as opposed to earning income through leasing the land to farmers who use chemicals. This Lakota elder demonstrates the

importance of short term economic losses in favor of long term ecological gains, a concept that is demonstrated by the Lakota concept of considering the implications of decision-making up to the seventh generation.

Concerning future generations a buffalo rancher explained, "[We conserve] so we could have it all the time, for the next generation so the buffalo can grow up, so the bugs can grow up." He emphasized costly conservation practices despite his meager annual household income of less than $10,000. Even the "bugs" (grasshoppers can ruin an anthropologist's research tent in a week) have a place in the minds of the Lakota and on the reservation lands. His conservation strategies, including raising buffalo, not overgrazing, and selectively hunting game on his land are collectively leading to ecosystem and spiritual restoration. It should be noted that the non-Indian agricultural household annual income is $239,912, while Lakota agricultural household annual income is $65,396. Annual income for Lakota agricultural households is only 27 percent of annual household income for non-Indians. However, 92 percent of Lakota agricultural households implement conservation methods on their land that require short term and sometimes long term costs.

The buffalo is a symbol of freedom, sacredness, and being. As a Lakota buffalo rancher stated, "we are buffalo people." The reintroduction of buffalo both by the tribe and Lakota households is a symbol for Lakota cultural continuity. Historically the eradication of the buffalo was viewed as an avenue to eradicate Native America. Coincidentally, Lakota agricultural households have demonstrated resilience, adapting to federal land policies and regulations, and have adopted methods employed by closed range cattle ranchers to facilitate buffalo reintroduction on the reservation. As the buffalo are being reintroduced, ecosystem symbiosis is being restored; fields with buffalo are beginning to flower with sacred plants,

plants that cattle chew down to the root. The buffalo and native plants such as *tinpsila*, sweet grass, sage, and chokecherries are an integral part of Lakota culture, ceremonies, and spiritual praise and healing. The Lakota agricultural operators' emphasis on preservation of cultural traditions, practices, beliefs and language simultaneously facilitates the conservation of animals and plants on the reservation.

Relaxation and Rejuvenation

For the Lakota, natural areas are important places to relax. Of Lakota agricultural households 68 percent concurred while 73 percent of non-Indian agricultural households regarded natural areas as a place to relax (see Table 1). Both subsets of households demonstrate the importance of relaxation. To Lakota agricultural households natural areas are not a place to maximize arable landscapes to increase monetary gains. On the contrary natural areas are places of relaxation and spiritual fulfillment; a place to hear the grandfathers of days long past (Littlemoon and Ridgeway 2009:87-88). An atmosphere conducive to relaxation is a valuable natural resource that does not require ecological extraction, degradation, or depletion. For traditional Lakota and other indigenous groups, emotional and spiritual healing along with historical resonance is deeply connected to an intimacy with nature and natural beings such as the constellations, cottonwood, sage, and the eagle (Suzuki and Knudtson 1992; Basso 1996; Witkin-New Holy 2000:192; Marshall 2004:18; Nabokov 2007). This traditional ideology perpetuates Lakota agriculturalist households' participation in conservation practices, despite the discrepancies between Lakota and non-Indian participation in the Conservation Reserve Program (CRP). The Conservation Reserve Program is program aimed to increase conservation on farmable lands by leaving land in reserve as opposed to harvesting on the land.

Participants are economically compensated for reserved land. Only nine percent of Lakota agricultural households participate in the Conservation Reserve Program compared to 63 percent of non-Indian agricultural households. However, nearly all Lakota respondents fallow lands and hold portions of their land in reserve without economic capital compensation from government funded programs.

Though there is no statistical significance between Lakota and non-Indians in regards to natural areas being an important place to relax, the concept of place and natural areas play an important role in ethnic analysis. Lakota agricultural households' conserve their own agricultural land for the purpose of relaxation. Land that could otherwise be productive in the market system is left aside without monetary compensation, to enhance the relationship between the Lakota community and the non-consumptive values of reservation lands. A Lakota cattle rancher responded, "Land is peaceful and quiet and a nice place to go to sit and watch the wildlife." Lakota agricultural operators do not simply view their land as an industrial arm of the market economy machine, but a place of relaxation.

Relaxation is a natural resource, enjoyable apart from the market economy. A related CSU study found that 44 percent of Lakota respondents believe that natural areas are their favorite places to go on the reservation. One Lakota exclaimed, "Yellow Bear Canyon because there's tons of vegetation and buffalo pastures. [It's] a beautiful place to be!" The preservation of natural areas on agricultural lands facilitates community relaxation and adheres to the community values of non-consumptive natural resource use. In addition when Lakota respondents were asked what they miss the most when they are off the reservation, common responses pertained to natural areas or natural aesthetics such as rivers, rolling hills, the land and scenery. Natural areas were often defined as the

hills behind ones house, the river, or out in the country. The Lakota community values the presence of natural areas on the reservation.

Natural area preservation not only facilitates mental and physical relaxation but spiritual rejuvenation as well. Lakota people were banned from practicing sacred ceremonies for nearly a century, until the American Indian Religious Freedom Act of 1978. However ethnic solidarity permitted the continuation of certain ceremonies that permeate Lakota culture today. A buffalo rancher emphasized the importance of prairie preservation when he stated, "we would use [the] prairie in our cultural ceremonies." Lakota respondents from the 2000-2008 longitudinal study mentioned ceremonies and traditional events such as powwows, when considering the things they miss the most when away from the reservation. One Lakota woman described her favorite place to go in connection with her spirituality: "Annual Sun Dances, because of the spirituality. [We] experience that connection to spirituality [and] renewal."

Lakota communities emphasize the importance of natural areas as a place of relaxation and rejuvenation. Walter Littlemoon (Littlemoon and Ridgeway 2009:87-88), a Lakota elder, boarding school survivor and author from Wounded Knee, South Dakota emphasized the necessity of nature for spiritual and emotional healing:

> Through this process of remembering, I've become aware that the greatest help for healing has come to me through nature, starting with the cottonwood tree triggering positive memories...I found wisdom from the animals that have helped me to realize and to understand how to use my own sense of hearing, eyesight, touch, taste, and smell…with help from nature's grandfathers, the rocks, the trees, the wind, I am beginning to see and to understand situations and people just as they are.

Walter's reconnections with nature were the result of Lakota elders and nature's elders nurturing him as a young boy and teaching him "to respect the other forms of life here on earth" (Littlemoon and Ridgeway 2009:88, 93). It is in part a relationship with nature that has led to the healing of past wounds, scars left throughout history by westward encroachment and capitalist accumulation of the United States. Natural areas do not yield as much economic value in the market economy as arable land, yet land preservation heightens cultural capital and facilitates Lakota cultural continuity much more than increased agricultural yields.

Hunting

Of Lakota respondents 84 percent strongly agreed or agreed that it is important to have lots of wild animals in the county/reservation they reside for people to hunt compared to 46 percent of non-Indians (see Table 1). Hunting is a way in which Lakota people strive to retain cultural traditions and enjoy nature and nature's abundant resources. Simultaneously, hunting compensates for the limited access to food sources on the reservation, despite federal treaty obligations to provide adequate food sources and equitable access to those resources. A Lakota cattle rancher from Batesland explained, "Have you ever had commodities? ...We live in a Third World country here...for a lot of people [wild game is] the only protein they get…hunting is an extra meal for them." Another Lakota cattle rancher emphasized the importance of wild animals for hunting to compensate for inadequate food access: "[Hunting is] another way to feed your families. Our reservation is the poorest one in the U.S. and a lot of people can feed their families with deer, turkey, antelope, and pheasant. [It's] just another way to feed your families." In reserving land for wild animals, reservation residents as a whole benefit from natural

resources much more than they do from mass wheat production or cattle production taking place off the reservation for sale in the global market. Hunting allows for the local appropriation of food sources and contributes to the traditional Lakota modes of exchange.

Today, 74 percent of Lakota agricultural households engage in hunting. Qualitative responses reiterated Lakota agricultural operators' priorities to reserve land for habitats suitable for pheasant, mule deer, turkey, and bison hunting. One bison rancher emphasized conserving land "so the game is always plentiful." As in the past, hunting is an integral part of Lakota culture. Hunting supports the traditional obligation of dispersing resources to support symmetry within Lakota society. Though federal policies alienated Lakota people from natural resource use and thus weakened their access to sustainable livelihoods from hunting and gathering, Lakota families still utilize hunting as a means to reciprocate and redistribute resources throughout the community. Like in the past hunters provide lean meats for families, elderly, those in need, and ceremonies. One Lakota buffalo rancher from Porcupine explained, "[We] provide meat for ceremonial purposes, Sun Dances, [and we] give some to the powwow. We do what we can, you know."

For Lakota agriculturalists, hunting is an ecologically and economically viable alternative to growing mass quantities of one crop or livestock animal. A Lakota wheat farmer from Kyle told me, "[We need wildlife] just to survive, the price of groceries is so expensive…The need for wildlife hunting is so important, a lot of people make money as guides around here." One Lakota buffalo rancher who doubles as a hunting guide was hosting a man from Michigan for a buffalo hunt. Another Lakota buffalo rancher gleefully showed me a professional hunting video, which a showcases a professional hunt on the respondents' property. Though the hunting video was seen as

an advertisement opportunity, the video included Lakota prayers and beliefs, indicating that the buffalo was prepared to give itself up to the hunter.

Hunters provide meat to families that may otherwise go without. Some Lakota families such as one from Oglala dry antelope meat the traditional way (Sherman personal communication). In doing so, traditional methods of food preparation and natural resource use are being passed down to future generations. Communities come together for food processing and resource distribution, strengthening Lakota culture.

Conclusion

Analyses reveal that Lakota identity has not been lost by agricultural practices. On the contrary, Lakota agricultural operators perpetuate Lakota identity through spiritual connections and practices, ecosystem restoration, community engagement, and economic development. A comparison between Lakota and non-Indian agricultural households of the High Plains conveys differences between agricultural practices, land use strategies, community conservation, and economic motives. Ethnicity is a salient variable. Lakota agricultural practices and conservation methods reflect their environmental ethics and cultural values. Their practices of conservation and agricultural decision making are tools utilized to perpetuate their desires for a diverse natural environment and a thriving social environment.

This research demonstrates the importance of ethnicity and cultural traditions in relation to agricultural decision making, which has been demonstrated by other scholars as well (Hurt 1987; Lynn-Sherow 2004; Weisiger 2009). These acknowledgements should be reflected in policy making, USDA programs, and other agricultural programs. Currently the USDA favors practices dictated by cost-benefit analyses;

which have led to social, economic, and environmental devastation in rural and agricultural communities across the globe. There are other modes of decision making and practices which can and often do support communities, and could achieve even greater goals with equitable opportunities for political and economic support from multiple institutions.

Lakota people on the Pine Ridge Indian Reservation are still vulnerable to historical and present day policy which alienates them from their lands and natural resources. Yet they are coming full circle in regaining their place with nature. Buffalo eradication that haunted the Midwest landscape is now being replaced by buffalo reintroduction. Concurrently, despite present day inequities agricultural policies devised to end Lakota culture and sever their cultural and spiritual ties with nature are subsiding. The latter part of the twentieth century and the new millennium has brought forth a new era for Lakota people. Demonstrating cultural resilience, the Lakota are utilizing an alternative, hybridized agricultural approach to social and economic stability. Buffalo reintroduction and agricultural motivations alternative to the cost-benefit premise has created new and revitalizing relationships with nature and local ecosystems while simultaneously enhancing Lakota cultural continuity.

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Can Local Food Transform the Global Agrofood Economy?: An Analysis of the Ft. Collins Local Food Movement

Maureen McNamara

Abstract—*Globalization has affected all sectors of the economy including the agrofood economy. The current food regime is characterized by corporate control over standardized, homogenized, and global food production. The control of global food production by multinational corporations has led to unhealthy patterns of consumption and dependence on cheap, unsustainably grown food. In many areas of the world today, people are contesting the corporate food regime through grassroots movements that emphasize local food production, markets and economies that support local networks between producers and consumers. Critics often claim the local food movement is a short-term trend that cannot change the industrialized and global economy of food production. In this paper, I analyze the local food movement in Ft. Collins, Colorado as a transformational social movement, and as such, argue that this movement can challenge the agrofood economy. My argument draws on the qualitative research I conducted during the 2009 growing season as well as an online survey of local food producers and local food advocates (n=67). The nascent local food movement in Ft. Collins is built on a strong network of producers and passionate advocates. I will argue that the diversity and openness of the current local food movement in Ft. Collins can and does provide a counter to the hegemonic global food economy. However, there are significant barriers to production that include affordable access to land and water, a lack of a year-round marketplace and distribution system, and limited*

consumer education. Each of these barriers directly affects the sustainability of a local food economy and renders uncertain a viable income for food producers. Thus, to be transformational the local food movement will have to engage the global food regime and the political and economic aspects of food production.

Introduction

In the literature on global commodity systems, the theoretical tendency is often to emphasize either the producer or the consumer perspective. However, to understand the history, current trends, and future plans of food production and consumption, analysis needs to include all key players and the larger political, social and economic structures. A global food regime analysis takes a systems perspective and creates rooms for the social embeddedness inherent in personal actions and relations related to food production, distribution, and consumption. As McMichael (2009a:281) argues, the food regime concept is key to understanding "the structured moments and transitions in the history of capitalist food relations… [as] it is not about goods per se, but about the relations within which food is produced…refocusing from the food commodity as *object* to the commodity as *relation*, with definite geo-political, social, cultural, ecological, and nutritional relations at significant historical moments." McMichael (2009b) holds that the current (third) food regime is a "corporate food regime" typified by global corporate dominance in the food sector. Friedmann (2005), on the other hand, argues for a more positive analysis of current food politics that allows for change and transformation in her assessment of the third "corporate-environmental" regime.

Food production, during the past two food regimes, has been industrialized, modernized, regionalized, and globalized

to the extent that production and consumption are often disassociated from each other. The once locally-situated process of food production and consumption has expanded and shifted to constitute a complex and powerful global system. Despite, or perhaps because of, the trends of the past and current food regimes, as Lyson (2004) argues, space has been created for "civic agriculture." In the corporate, market-dominated food system manipulated and engineered by principles of neoclassical economics, civic agriculture promotes "rebuilding the linkage between farmers and consumers…[to] establish a foundation for a more socially and environmentally integrated food system" (Lyson 2004:7). Lyson (2004) argues that while civic agriculture currently does not economically challenge conventional agriculture and the food industry, it does promote innovative and sustainable production practices that counter the often destructive and resource extractive practices of industrial agriculture. These innovate and sustainable production practices are often referred to as "alternative agriculture." In many areas of the world today, people contest the corporate food regime through grassroots movements that emphasize local food production, markets and food economies that support local networks between producers and consumers, termed the "local food movement." The nature of local agriculture in the U.S. with its emphasis on local production and consumption differs from other global movements, like Fair Trade, that could be deemed "localization movements" because they market the inherent value of local production at a global level. Critics often claim the local food movement is a short-term trend that cannot hope to change the industrialized and global economy of food production.

The global scope and power of civic agriculture and food localization movements to contest the larger neoclassical, corporate, and market-based food economy is unclear. Evans

(2008) argues that in order for a movement to be a progressive counter-hegemonic force capable of changing the current neo-classical hegemony, the movement must meet four requirements: (1) transcend national boundaries and North-South divide, (2) move beyond organizational silos (3) combine the local and global and (4) promote a project that captures the collective imagination. Of particular interest to alternative agriculture is the transformational potential of moving beyond organizational silos, combining the local and the global, and capturing the collective imagination. Lyson's (2004) concept of civic agriculture and Evans' (2008) definition of a counter-hegemonic globalization movement can be applied to the local agriculture movement. In order for the local food movement to be counter-hegemonic, it has to exemplify diversity-receptive localization and not defensive localization, as outlined by Hinrichs (2002). Similarly, Friedmann and McNair (2008) differentiate between Builder and Warrior approaches within local food movements. I combine these ideas and argue that Builder movements are diversity-receptive and have transformational potential. On the other hand, Warrior movements are defensive and tend to be more destructive than transformational. Friedmann and McNair argue that even though Builder movements avoid direct confrontation with capital and work through the market (commercialized localized production), each movement is locally-rooted yet transformational as they add "to a common prefiguring of a new type of global economy based on culturally and ecologically embedded foods" (2008:431). For the local food movement to be counter-hegemonic and address change at the global level (transformative), local food movements need to be Builder and diversity-receptive movements.

The extent that the localization movement is capable of changing the global food economy may ultimately rest on the

interaction between the local and the global. The local food movement is strong throughout U.S. communities, cities, and states; however, the focus on the local community or state, despite its national appeal, limits the focus and the potential for global change. The nature of local agriculture in the U.S. with its emphasis on local production and consumption differs from other global movements, like Fair Trade. Without a larger network that encapsulates the various localization movements, it is unclear how transformational local agriculture can be on a global scale. Perhaps, globality of the local food movement, using the food regime concept, will counter the neoliberal food economy by focusing on the relations of food (production and consumption) rather than on food as an object.

The data used in this paper comes from my research of the Northern Colorado local food system during the 2009 growing season. I conducted participant-observation, semi-structured interviews, and a quantitative survey (n=67) of local food producers and advocates. In my research on the local food movement, I defined Northern Colorado as the Ft. Collins market that includes communities in Larimer and Weld counties and southern Wyoming. Throughout the 2009 growing season I volunteered on a local farm doing field labor. Through my connection with this farm, the farmers' market, and other local food activities, I met other local food producers. I interviewed key local food producers and advocates who support and/or produce fresh vegetables and meat for the Ft. Collins market. Local food producers vary in age and time farming, but all are highly educated formally (college) and informally (internships and apprenticeships), with many having multiple degrees and post-graduate education. I structured the online survey around my participant-observation and semi-structured interviews. Participation in the survey was voluntary and open to local producers and food advocates. A link to the online survey was distributed via the social networking tool,

Facebook, as a post and an email to online food groups "Local Foods Happy Hour" and "Slow Food Cache La Poudre." Over the three weeks the survey was available, sixty-seven people completed it. Despite the limitations of internet-based surveys, this survey provides a broader understanding of local food in Northern Colorado. In this paper, I analyze the local food movement in Ft. Collins, Colorado as a transformational movement, and as such, argue that this movement can change the agrofood economy. However, to be transformational the local food movement will have to engage the global food regime and the political and economic aspects of food production.

Global Agriculture and the Global-Local

Characteristics of the current food regime are contested (see Friedmann 2005 and McMichael 2009b); however, it is commonly held that a globally-integrated and corporate food system feeds most of the world. The underlying structural forces of industrial agriculture are rooted in four processes: farm mechanization, chemical farming, food manufacturing, and agricultural and food biotechnology. These processes helped transition agriculture from subsistence and locally consumed food production to a market-based and profit-oriented industry (Bowler 1992). Industrial agriculture is structured around intensification (increased farm inputs), concentration (fewer but larger units, economies of scale), and specialization (focus on a few commodities) (Stull and Broadway 2002). These structural forces have created an agriculture system that relies on corporations to supply the inputs and process and market the outputs. The business side of agriculture, agribusiness, has gained control over most stages of the food chain and thereby wields significant power in the agricultural sector (Ilbery and Bowler 2002) and in the creation

of agriculture policy. Agricultural powerhouses, like the U.S. and the E.U., have commandeered the global food economy and created domestic and global policies to promulgate the continuance of industrialized agriculture led by transnational corporations (TNCs). U.S. domestic farm and global trade policy are often stated in terms that appear to support family farms and small producers and aim to save rural communities. However, the business model of increased production and expanded markets aligns with and disproportionately helps agribusinesses who are better situated to profit in the global food economy.

TNCs are intricately linked to global political and economic structures and create the basis of the global food system. In addition to the political power of TNCs, their focus on efficiency and standardization to maximize profit has led to increased homogenization of agriculture production and consumption. This standardization and homogenization, in turn, has led to a reorganization of product differentiation and segmentation in alternative food markets around evaluations of "quality." In this sense, the food system has moved away from price competition to quality competition. Alternative and non-mainstream quality-based niche markets often focus on the social distinctiveness of production and consumption, as in Fair Trade, organic food, and local food, and highlight factors associated with social, environmental, and place-based characteristics of food as they relate to the production process (Raynolds and Wilkenson 2007). The emphasis on "quality" in alternative agriculture system allows for market differentiation and room for a higher producer profit margin yet also creates differentiated access to "quality" food based on income level. Local food is often discussed in terms of access to quality food, however, the high cost of local food does not make it available to all. Winter (2003) argues that the transformative nature of local food as a focus on quality over quantity needs to be

further analyzed. He argues that localization maybe an example of defensive localization rather than transformation.

U.S. Farm Policy and Farmers

U.S. farm policy is often stated in terms that appear to support small family farmers (and local production), however farm policy disproportionately and negatively affects small farmers. For example, the stated goal of agricultural subsidies is to support rural development, ensure domestic food security (sufficient production), and provide a "safety net" for farmers; however, many analysts argue the farm lobby is a main beneficiary as targeted industries (commodity producers) out-benefit other industries (small and non-commodity producers) in the agriculture sector (Riedl 2002). While the majority of farms in the U.S. are "family owned," corporate interests manipulate many farms. Corporations tend to have greater power over farms as farm size increases, regardless of whether the farm is family owned. A more apt analysis of the U.S. farm sector is to look at farm size and production output. The majority of U.S. farms, 54.4 percent in 2007, are small farms (less than 100 acres) yet these small farms only represent 4.8 percent of total farmland and 3.7 percent of harvested cropland. On the other hand, only 4.2 percent of all farms are large (over 2000 acres), but they account for 39.4 percent of farmland and 39.6 percent of harvested land (USDA Census 2007). The same trends can be seen in organic production. In 2007, 64.7 percent of farms growing organic produce were less than 100 acres, however, these farms only constituted 6.4 percent of total organic acreage. Large farms (over 2000 acres) represent 2.7 percent of organic farms yet 43.1 percent of total organic acreage (USDA Census 2007). Despite the prevalence of small farms, the majority of food grown in the U.S. is grown on

large-scale operations with ties to agribusiness corporations, who have much to lose if current policy changes.

Historically, small-scale farmers in the U.S. have struggled financially and have had a lower than average household income; however, since 1990 farm household incomes have equaled average U.S. household income and in 1996, surpassed the U.S. average (USDA in Mishra and Sandretto 2002). This overall increase in farm income and the resulting income stability, a main goal of U.S. farm policy, is not due to an increase in farm income (higher prices for production, etc), but rather from an increase in non-farm income (Mishra and Sandretto 2002). U.S. farmers' financial struggle has led to an increase in contract farming, expanded production scale, and employment in non-farm sectors of the economy. In other words, commodity production, the main emphasis of U.S. farm policy, has not provided most farmers with a stable income. Food producers in the U.S., whether producing for a global, national, or local market, struggle for financial stability. The farmer who grows and sells conventionally and the farmer who grows and sells for alternative markets are affected by the predominance of corporate agriculture, U.S. farm policy, and low priced foodstuffs.

Localization and Transformational Potential

The local food movement in the U.S. emphasizes locally produced, marketed, and consumed foodstuffs. On the other hand, international localization movements (i.e. Fair Trade and Slow Food) focus on the global market and consumption of such locally produced foods. Approaching localization from a global marketplace perspective, Friedmann and McNair (2008) argue that the success of sustainable local production depends on the global market and politically conscious consumers in

which *terroir* (land-based characteristics embodied in geographically-defined production) are valued on local, regional and global levels. On the other hand, Hinrichs (2002) examines the tension between "local" and "non-local" that positions the "global" as that which is not "local." When the local is not globally situated, an emphasis on the local can be seen as a defensive (local as patriotic, to preserve the past) more than a transformative process. Conservative and defensive localization embraces the local out of fear of change or of the outside which inherently limits transformation. Hinrichs illustrates the politics of local food and challenges the idea that local food (i.e. when defensive) is not inherently better than global food.

The local food movements in the U.S. emphasize local production and consumption rather than the global system or global market. The aims of the local food movement are diverse but tend to unify around five areas: (1) health and safety, (2) decreasing the carbon footprint, (3) taste and freshness, (4) preservation of the landscape, environment, and agrarian culture, and (5) social justice. Despite the partially-defined goals of the local food movement, the term 'local' is highly contentious and not clearly defined. Local can be a specific mile-radius, philosophy, environmental standard or morally-based opposition to globalization. Local has multiple definitions and uses because local is a movement, an identity, and a marketing and product differentiation tool.

The localization movement, internationally (Fair Trade) and domestically (local food), has grown in recent years. While local agriculture products, due to a limited economy of scale, tend to cost more than mass produced and widely distributed commodities, many consumers will pay more for local or place-based products. In the U.S., the two main outlets for local foodstuffs are farmers' markets where producers market directly to consumers and community supported agriculture

(CSA) programs where consumers buy a membership to a farm (pre-season) and receive weekly food shares throughout the growing season. Small local food producers (annual sales $250,000 or less) do most of their marketing through direct sales (CSAs and farmers' markets) which have drastically expanded. In the U.S., farmers' markets continue to increase with 4,694 in 2009 (80 in Colorado), a 6.8 percent increase since 2006 and a growth of nearly 3,000 markets since 1994 (AMS 2008). CSAs have also experienced unprecedented growth from 50 CSAs in 1990 to over 2,500 in 2009 (80 in Colorado) (Local Harvest 2009). In 2009, Ft. Collins supported four weekly summer farmers' markets (Wednesday, Saturday [2], and Sunday) and twice monthly winter farmers' markets from November to March. In 2009, the Ft. Collins area had ten CSAs with at least five new CSAs for the 2010 season (Local Harvest 2009).

For the local food movement, marketing of local foodstuffs benefits the movement, producers, consumers, and the community. For example, CSA direct marketing mitigates many potential insecurities of local food production (weather or market hardships) since "share holders" pay in advance for weekly summer produce. Numerous studies argue that farmers' markets have a community-wide economic benefit through increased local business revenue (see Lev, Brewer, and Stephenson 2003) and state-wide economic and job growth (see Henneberry et al. 2008 and Otto and Varner 2005). Local agriculture can also be marketed indirectly through value-based labeling (i.e. "cage-free" or "Colorado Proud"). In markets without direct producer-consumer contact, the value-based production practices are institutionalized and legitimized through labels. Barham (2002) argues that value-based labeling is an ethical and moral social movement that aims to counter and transform unsustainable practices, re-embed agriculture within the larger social economy and refocus attention on

social and natural relationships often lost in commodity market exchanges. As discussed earlier, the emphasis on quality, process, or local in the local food movement does not necessarily make the movement transformational. In the following section I will argue that the Ft. Collins local food movement is open to a wide range of producers and production-marketing models; making it a Builder or diversity-receptive movement. However, the transformational potential of the local food movement is unclear as there is not a unified global perspective in terms of addressing barriers to production and policy change.

Ft. Collins and the Local Food Movement

Local Food Movement: Definitions, Goals, and Values

In the past ten years, the local food movement in Ft. Collins has become more visible. A long-time local producer says she can sell a lot more locally now than in 1997, "now we are rockstars…it's the silliest thing, but it helps a lot" (Sarah, interview, September 10, 2009). The local food movement has been promoted through local non-government organizations like Be Local Northern Colorado which focuses on building "local living economies" (Be Local NC 2009). To attest to the presence of the local food movement in Ft. Collins, ninety-four percent of survey respondents (producers and local food advocates) agree there is a local food movement in Ft. Collins with 68 percent holding that the local food movement is "strong." Respondents, while agreeing on the presence of a local food movement in Ft. Collins, employ a diversity of definitions, which are likely tied to respondents' own political and moral leanings. When asked to define "local," respondents could select more than one geographically-delineated definition (67 respondents, 128 total selections). Most people defined local as food produced and consumed within 100 miles (25 of

128 total responses) or within the state (23 of 128) and fewer people defined local in limited geographic terms such as within 20 miles (14 of 128), city/town (13 of 128) or immediate community (11 of 128). A local producer exemplifies the moral underpinnings of local when he explains that "we wanted to move away from selling any food at all in Ft. Collins and really make it local" by selling only in Laporte (a town 6 miles NE of Ft. Collins) as opposed to transporting food to Ft. Collins to sell (Jake, interview, August, 31, 2009). As discussed earlier, some argue that "local" as a value-based label can have transformative potential, however, others express concern about the corporate co-opt of local, as seen with "green" and "organic." A Ft. Collins Slow Food member states "the term 'local' has become almost a joke; overused, misrepresented, and taken advantage of" (survey response 2009). The local food movement allows for a diversity of definitions, but the open definition may undermine the transformational potential of the movement as there is not central rallying point.

The goals of local food production, as with the definitions of local, are tied to people's value system therefore depend on individuals' priorities and are not unified across the movement. When asked to rank the goals of local food, respondents agreed on four main goals: decrease chemical usage (70 percent), produce high quality food (68 percent), improve environmental health (67 percent), and support local producers (54 percent). The range of goals denotes that the movement is not single-issue and might be diversity-receptive; both key to transformation. However, without a movement-wide goal, local foods may not be able to unify against the globally-structured agrofood system. The goals, tied to values and moralities, vary by individual experience and background. All respondents agreed that "participating in local agriculture is self-satisfying." Respondents find satisfaction in local food involvement and link local foods and personal values as almost

all (98 percent) state "I am involved in local foods because it corresponds to my value system." Most (84 percent) also agreed that "producing, supporting, and consuming local food is a moral decision." Involvement in the local food movement seems to be a conscious, valued-based and moral decision, but the movement is not exclusive as most people (85 percent) think that "everyone should be involved in local food." The diversity of local food goals and definitions implies that the movement is not constrained by organizational silos (separate and compartmentalized goals) and is able to appeal to the creative conscious.

In local food production, the emphasis on quality over quantity is cited as a production model and also a reason for consumption of local foodstuffs. Jake, a producer, believes some people in Ft. Collins "have a Wal-Mart mentality and they're looking for cheap. They don't know what quality is. They don't want food" (interview, August 31, 2009). In the survey, the importance of high quality food was confirmed as 79 percent agreed and only 3 percent disagreed that "local food production is about quality not quantity." Quality differentiation in alternative agriculture upholds local food as civic agriculture in which producers and consumers make value-based decisions to counter the agrofood economy. However, the emphasis on consumer power and morality in food decisions, while important is not enough to tackle the corporate food system.

Local Food Marketing and Education

Generally speaking, the local food movement in Ft. Collins is built around weekly summer farmers' markets, CSAs, and some retail and restaurant sales. Most local producers employ a diversity model approach that might include a mixture of the aforementioned production-marketing models. The local food movement in Ft. Collins relies more on individual and direct

contact between producers and consumers than widespread value-based labeling. The Colorado Department of Agriculture's "Colorado Proud" program was developed to help promote Colorado food products. The organization is free to join and has marketing material for Colorado-grown products, available at a cost. Most of the local producers do not participate in the value-based labeling program because they are small scale and locally-centered, as opposed to Colorado-centered. According to one Colorado Proud member and Ft. Collins producer:

> I think [Colorado Proud programs] are important [but] I don't know if they are key. If went around the market today, a lot of venders belong, but they don't display the symbol, they don't advertise it. Unless shipping outside of Colorado, [there is no need to display Colorado Proud]. We are in Colorado...nobody would expect different at a farmers market. I don't know how much it helps some of the other people, but the price is right, it doesn't hurt us (Katie, interview, September, 26, 2009).

The Ft. Collins local food movement focuses on the local community and direct sales with less of a push for value-based labeling. Value-based labeling is not seen as an immediate need because producers argue they can explain production practices through personal contact typical of direct marketing. The movement's focus is on building direct relationships and extending the local food network.

This direct contact is referred to as "consumer education" because in the process of selling products, producers talk to consumers about production practice, local seasonality, and how to cook and eat the food. Most survey respondents agree (94 percent) that "consumers do not understand the seasonality of agriculture" which directly impacts consumers in their support of local foods and producers in their education attempts. On a similar note, most

people agree (98 percent) that "consumer education is essential to the success of local agriculture." In the global food system, consumers have lost touch with local ecologies and the seasonality of agriculture as tomatoes and apples are available year-round. The divorce between production and consumption makes consumer education essential to the local food movement. But heralding consumer education as the saving grace of the movement ignores the political and economic structures that created the global food regime that local food is contesting.

Barriers to Economically Viable Local Production

Direct marketing and consumer education help transition food (as a commodity) from an object to more of a relation. However, the relations of production are limited in scope as they center on interactions between local producers and consumers without direct reference to global transformation of the agrofood system. One of the biggest barriers to localization is inherent in an alternative food movement, namely mainstream support. Survey respondents disagree (82 percent) that "mainstream society supports local agriculture production." Currently, mainstream society does not support local food and it is unclear whether the local food ecosystem could produce enough for mainstream consumption. The Northern Colorado Food Incubator and Be Local Northern Colorado have teamed up to conduct a regional food assessment as part of the Community Marketplace project (year-round community market in Ft. Collins). This collaborative community project holds great hope for producers as they will have a more consistent market. The Community Marketplace may be transformational in the local food movement; however, the possible tension between the ideal (mainstream support) and the real (food production

potential) is not widely discussed as the local food movement in Ft. Collins is still in its initial stages.

The local food movement is diversity-receptive and open to new voices. However, as with most movements, there is intra-movement tension. For example, when interviewed all producers said other producers were partners and collaborators rather than competitors. In my participant-observation and further discussion with producers, I observed competitive attitudes. Competition is not just about price, but also centers on questions of quality, scales of operation, age of producer, and models of production. The value-based and moral underpinnings of the local food movement unite the diverse producers under a common agenda to increase the local food market; however, the "best" way to expand the movement differs and becomes a competitive force. One clear tension is between producer generations. Alternative agriculture in Ft. Collins was active in the early 1980s and many producers from this older generation continue to be involved. A new generation of producers (farming 10 years or fewer) is increasingly involved in local food. The older generation provides support and advice for the younger generation but they seem to view the younger generation as "idealistic" and having "something to prove." The younger generation compensates for their lack of experience with passion and is spearheading many local food events like exclusive invitation-only and locally-sourced "Mad About Farming" dinners. The social network of young farmers is extensive and older farmers are occasionally, but not always included. The food producer community is looking for leadership, but leadership of all, not some.

The community is often cited as a reason (63 percent) for people to continue "to be involved in local food." At the same time though, community support for the movement seems either minimal or surface-level. One producer thinks there is "false support of the community" in the sense that it "seems

like a lot of talk, but not a lot of *talk*" (Ted, interview, August, 17, 2009). This comment leads to the question: what is real support? If farmers are to continue farming, they have to be able to cover production and living costs. One producer, John, defines economically viable as "something that a person can retire from eventually-- have saved up enough to retire" and argues that if farming is not economically viable "then it can be really disappointing and disillusioning." The social reward of farming can only get producers so far and "if they are dirt poor and working all the time" they might quit farming (John, interview, September 11, 2009). Using a present or future-oriented definition, at this point, local agriculture in Ft. Collins is not economically viable. Most producers in Ft. Collins rely on off-season jobs, second non-farm incomes, personal savings, etc. to make ends meet. Producers big and small struggled in 2009 with the economically-painful effects of multiple hail storms decimating crops, working on rented land and related land-use limitations, not being able to pay for field labor to plant, weed, and harvest, and insufficient markets for their harvest.

Despite attempts to develop a community to support local food, Ft. Collins is not an easy place for local agriculture because of land and water concerns. Land is expensive, so many producers work on rented land. Colorado farm land has to be irrigated and water is not readily available or cheap. Jake, a producer working on rented land, said "I'm tired of being a tenant, a sharecropper" and dreams of owning his own farm. He and his partner "feel pushed out by cost…there's no way we can afford a farm here" (interview, August, 31, 2009). He adds that "we're very picky, we don't want to sacrifice our dreams to stay in this town, it's not that great. It's nice [and] supportive but not enough because farmers can't afford land" (Jake, interview, August, 31, 2009). Jake, after farming in Ft. Collins for nine years, recently left for the less-expensive and

rain-watered land of the Midwest. Producers who own their land or have access to capital to buy land are rare. Land in Ft. Collins is expensive and much of it is commercially zoned for development. Purchasing land is financially unrealistic for most producers' who would not be able to cover mortgage and property taxes through farming income. Community members and the county are discussing options to farm county-owned open space land, however, many lands do not have water rights attached, making it unsuitable for small-scale specialty crop production. In addition, some producers feel that farming on open-space land with low rents and limited overhead costs will hurt the producers who own land and have to incorporate their land-related costs into their market prices. Land availability, private or public, limits the current and future producers' ability to farm and make a living farming in Northern Colorado.

Lack of water is also a barrier to farming in the high desert of Ft. Collins. Archaic water law in Colorado is based on prior appropriation--first in time, first in right. Often, when property with water rights is sold to developers, the water rights are separated from the land and sold to another user (such as Front Range municipalities). One community resident, who leases two acres to a local producer, recently bought 10 acres just north of Ft. Collins and the water rights cost more than the land itself! Jake, who farms these acres, could never afford the land or water. The rent-free land allows Jake to farm, but he cannot make long-term investment in the property or his farming operation.

In addition to land and water issues, another large barrier to economic viability is market and distribution. Some Colorado communities, like Boulder and Denver, have distribution systems that centralize ordering (mainly for local restaurants) and distribution of local foodstuffs. Ft. Collins, on the other hand, has no formalized distribution system and many

small businesses buy "local" produce from Denver and Boulder. Two producers created an informal distribution system. They merged their product availability and offered each other's products to their respective clients. In attempt to create a distribution system, producers, Be Local NC, and Colorado State University have collaborated on a grant to help develop a distribution system. As they wait for grant funding, producers are trying to put aside their differences and discuss how to centralize distribution. In order to collaborate, producers have to sidestep turf wars over retail accounts, valuations of quality, and competition based on size. Farms in Ft. Collins range from less than one acre plots to over 2000 acres. Obviously, larger farms can produce and distribute more produce over a wider range. While the larger farms may not intend to step on the toes of the smaller producers, the scale of the operation directly impacts a farm's ability to produce, market and distribute their products.

Government and Policy

The connection between the global food regime and the local food movement tends to come second behind concerns about the local community and relationships. People involved in local food understand the complexities of the food system. As one small-scale producer acknowledges, "I really understand why big agriculture is upset, but it's not the fault of the small producers…it's the big corporate producers" (Kara, interview, August, 18, 2009). However, the local food movement tends to rely on local over global solutions. For example, most respondents agree (78 percent) that "current federal farm policy has a negative impact on local production" but only some (45 percent) cited the large-scale agriculture industry as a barrier to local agriculture production. The local government, perhaps because of personal relationships and the local community, is a potential key player as most (89 percent) people think that

"local government should promote local food production" but only some (31 percent) cite city or county government as "very important" to the success and viability of local agriculture. In comparison, consumers and producers were cited as very important (81 percent for each). The role of local government may be to support local and small-scale producers rather than to make formal policy changes as one producer says:

> I'd like to see a local government program that covers agriculture more in this area…You drive to old farms and its all housing now and the county commissioners, while we have some that are strongly rooted in agriculture, it's not for the small grower (Sarah, interview, September, 10, 2009).

People involved in the local food movement in Ft. Collins seem to believe the success of the local food movement hinges more on local community and government support than policy. This support, as stated earlier, comes through direct relations and education as respondents (98 percent) think consumer education is essential to success of local foods. This widespread embrace of education comes from a very highly educated population as most (89 percent of survey respondents) of the local food advocates have or are working on a four-year degree or post-graduate education. Education and direct relationships may be central to the nascent stage of the local food movement in Ft. Collins; nevertheless, for local food to substantially challenge the global food system, the message will need to become more politically and economically focused. A key local food advocate acknowledged the importance of policy in moving the local food movement forward and said it would be great if someone took up the issue, but it was not his interest.

One glimmer of politically-oriented food policy change comes from the Transition Movement, an international

grassroots organization that aims to "build community resilience in response to the challenges of peak oil, climate change and the economic crisis" (Transition US). In May, 2008, the Transition Movement moved beyond Europe and made its presence in the U.S. in Boulder, Colorado. Transition Boulder and Transition Colorado have begun to challenge land-use policy in Boulder County and advocate for increased public land for food production. Transition Ft. Collins is not on the radar yet, but with the Transition Movement's concern about local sustainability in the post-peak oil times, discussions of land-use and local food policy will have a larger presence at the table. The local food movement may benefit greatly from the internationally organized and networked Transition Movement, provided that local food goals between the two movements unite.

Conclusion

Despite geographic, economic, and political barriers to economically viable local food production, producers and advocates continue to focus on education, marketing, and relationship building as the way to grow the movement. The survival and success of the local food movement, with its local focus, seems to be the local community. The attention placed on the relations of production helps the local food movement become a Builder and not a Warrior or defensive movement. Theiesen (2009), a local producer and advocate, argues that "relationships must be built. Local is not the answer alone and local is not synonymous with good. Relationships must be built." Individual education and relationship-building allows for individual change and commitment to the movement, however if producers cannot afford land and water in the Ft. Collins area, extend their market season, or cover cost of

production then the local food movement in Ft. Collins may be a passing trend.

The local food movement does not have a clearly defined organizational structure; however, localization movements are networked and linked together through the CSA movement, regional food groups, personal relationships, and international groups, such as Fair Trade and Slow Food. The local food movement's network of relationships and organization is indicative of a "network society." Castells (2000) argues that the network society does not destroy the capitalist system. Rather the network society shapes and structures capitalism and replaces the global capitalist class with a "global capital network." At the community level, the local food movement may be a limited threat to the global capitalist food economy. On the other hand, with a network of personal relations and interlinked community localization movements, the threat becomes more pronounced. The local food movement is a Builder movement that is open to a diversity of interests and is rooted in relationships of food between producer and consumer. Global policy aims and the counter-hegemonic presence of local food are still limited; however, that may be more due to the locally focused and early stages of local food than an inherent characteristic of the movement.

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