Modelling Early Food Production in the Mid Holocene of the Eastern Sahara

Andie Byrnes 2018

Appendix D – Responses to opportunity and resistance to change

This short appendix, including a brief case study, looks at how opportunities may or may not be taken up by groups when presented with them, even when pressure is applied for the opportunity (in this case a new economic paradigm) to be adopted.

D.1 Opportunity

Opportunities are ideas, technological innovations or imports, new production possibilities (including new animal and plant types, favourable climatic change, production surplus or any other innovation, adaptation or adoption that may be leveraged by an individual, household or group in order to improve livelihoods. As Ingold says (1981, p.126) every innovation "whether of local origin or introduced from outside, represents just one of a potentially infinite range of possible solutions to a given problem." Some of the solutions to vulnerability will depend on new opportunities but opportunity may also represent improvements and refinements to an already successful lifestyle. Diversification of resource base, knowledge about new technologies and the availability of new products or materials or new markets may be entirely dependent on new options becoming available (Dixon *et al* 2001, p.13). The introduction of sheep and goat into northern Africa and the decision of groups to adopt them, followed later by the introduction of domesticated wheat and barley are examples of opportunities that were taken up and which that can be detected archaeologically (Shirai 2010).

In both present and past communities they may represent an ambivalent component because as well as bringing something potentially positive, what are presented as opportunities frequently represent risks (Abrahams 1996; Eyhorn 2006; Vlasich 2005). Lightfoot and Martinez (1995, p.485) emphaize that although new ideas and materials often come from other ethnic groups in the process of exchanging goods and marriage partners, people often choose to resist innovation, preferring loyalty to their traditional livelihoods and ideologies. Even when opportunities are taken up and incorporated into an existing livelihood system they may also be regarded as high risk, alien interlopers that present as much of a threat as a potential benefit not only to existing economic practices but to family well-being and community identity (Vlasich 2005). The lesson from development economics is, perhaps unsurprisingly, that the only changes that will ever be acceptable to groups being challenged with environmental deterioration or unsustainable livelihoods are those that emphasise that new technologies and innovations only work when they are compatible with existing environmental conditions, social mechanisms and traditions (Masood and Schaffer 2006; Streeten *et al* 1981; Terrell and Hart 2008). The value of traditions to groups has often been underestimated (Morgan 1992; Ness 1994; Seeley 2006; Ortiz

2005; Vlasich 2005) but it has become clear that groups will fight to preserve their traditions in the face of the need to change livelihood strategies (e.g. Koenig 2006), will resist attempts to change them to systems that, whilst offering apparent improvements in productivity may undermine traditional processes (DID 2000; Vlasich 2005), and will suffer when changes imposed on them force changes in their routines and values (e.g. Cliggett 2005). Even when modern groups are willing to adopt new technologies and strategies, adaptation is not a foregone conclusion when choices about livelihoods have to be made and education is required to introduce them (DID 2000). Sayer and Campbell (2004, p.69) emphasize that innovation is an inherently social process rather than a logistical matter of technological transfer.

Opportunities are often taken up slowly, on an experimental basis and in a way that does not radically redesign existing functional strategies (Dennell 1983, p.175-6) and are only considered to be innovations if accepted by the group (Torrence and van der Leeuw 1989, p.11). The costs of taking up an innovation that fails may be high so must be carefully weighed (Mellor 2008, p.214-226).The risk of taking up a novel idea is judged on the basis of past experiences (van der Leeuw 1989, p.316) but also, when available, on the experiments of others. There may be a period during which some members of a community, early adopters, choose to take a risk by incorporating a novel way of doing things, whereas others will wait to see how that risk pays off (Bargatzky 1989; Layton 1989). Mokyr (1990, p.158) suggests that heads of extended families will be more cautious than heads of nuclear families because of the greater number of people depending upon their decisions. In this way the perceived values of a new production technique, idea or strategy can be evaluated without being committed to absolutely. The following account from an analysis of cotton farming in India is telling, repeated at length in order to illustrate the point (Eyhorn 2006, p.44-5):

> *During exploratory studies in the research region we interviewed organic cotton farmers about their decision to convert to organic farming. Some of them preferred to follow farmers who had adopted the new system earlier and whom they considered as being progressive farmers. Others initially were afraid of yield losses which 'would make them feel ashamed in front of their neighbours.' It became obvious that the personality of the individual farmer, his self-image, and his aspirations concerning the future of his family also played an important role in the decision making process.*
>
> *Emotional attachments to the agricultural practices of their ancestors were emphasized by some farmers . . . .These statements and observations illustrate that rural livelihoods are not a mere combination of different assets, but also involve dimensions such as world views, traditions, role models, gender aspects, emotions, personal attachments, ambitions and self-image.*

A similar scenario is described by Sayer and Campbell (2004, p.69) when talking of a resource management problem in southern Zimbabwe, illustrating again that even internal innovation can be difficult:

> *The social pressure and norms in the society did not leave much freedom for individuals to innovate. 'Natural' innovators were the object of jealously and were often avoided and victimized rather than copied.*

They go on to discuss differentiation between passive and active adopters: those who watch the experiments of others and wait to see what happens and those who carry out experiments and try difference things:

> *Active adaptive management requires that managers probe the systems to explore the fullest range of outcomes. It is important to recognize that leaving by day is a long and time-consuming process. It is clearly a risky strategy – and particularly so when the experiments are being implemented on the only set of resources of a kind: the ones upon which you and your family are totally dependent. It is understandable that people who are dependent upon poor resources are cautious in their experimental management: they tend to be conservative as they cannot afford to take risks (Sayer and Campbell 2004, p.102).*

One view is that those most likely to accept economic change are those who are living under conditions of high security and sustainability and low risk. In Mali conditions were sufficiently secure to encourage some groups to adapt to new crops, and cotton growing became successful (Lavigne-Delville 1997, p.151). On the other hand, there are also circumstances under which groups may adopt new livelihood strategies and accompanying social structures when they interact with, or are imposed upon, by different systems, handling both risks and benefits (Cliggett 2005; DID 2000). According to the DID benefits could include increased income, sustainability of natural resources and security, together with reduced vulnerability.

In all scenarios, leaders and groups must be able to incorporate new knowledge, ideas and technology into their own reality and their own value systems. Suggestions can come from outside but the impetus and the mode of assimilation with existing ideas and ways of doing things has to come from within (Hagmann *et al* 2002; Mortimore (1998). Where opportunities were taken up and change did occur, corresponding changes in cultural output and ideological conceptualization could also be expected (Hesse 1982; Smith, A.B. 2005, p.201).

An example of the tension between opportunity and tradition is given below, taken from the analysis by Vlasich (2005) of the resistane of Puebloan Indians to new ideas, subsistence strategies and technologies imposed on them from outside.

D.2 The Puebloan Indians of southwest North America

The Puebloan Indians of southwest North America provide a long history of examples of resistance to any changes that might impact on their traditional practices and beliefs. The Anasazi established settled agriculture in a semi-arid region and this endured for 3000 years until the arrival, in 1540, of Spanish forces and, in their train, a complete Spanish economic and agricultural infrastructure. The Puebloan Indians found themselves confronted by a culture that tried to impose new crops, implements, and regulations among the natives Puebloan Indians. James Vlasich says that some of these new ideas were adopted, “but generally speaking only the most expedient blended in with native institutions” (Vlasich 2005, p.8). In the early 1600s the new governor of New Mexico brought sheep, horses and cattle and range animals were introduced into the Puebloan lands for the first time. Without fencing, and without sufficient management, these animals moved towards the richer land that flanked the river, both consuming Puebloan crops and causing damage to irriga-

tion channels (Vlasich 2005, p.23), which only stopped when legislation was introduced to provide a zone of exclusion of animals from farm land.

Puebloans did take up stock raising, encouraged and trained by the Spaniards but only as a secondary activity. Attempts by the government at the turn of the 20th Century to bolster Pueblo agriculture with new ideas, technologies and education were only successful to a very limited degree, due to the conflict that these new ideas represented with the Puebloan traditions and was confined mainly to the introduction of new crops into the Pueblo cultivation mix, together with some implements: "Agriculture defined the Pueblos throughout their history. It became a symbol for their culture in much the same way that buffalo identified Plains Indians" (Vlasich 2005, p.xv). Pre-Spanish foods dominated over new introductions like fruit trees, wheat and barley: "Acceptance of the new items did not change the Pueblo standard of living since they continued limiting their crop production to community needs." (Vlasich 2005, p.27). Traditional tools were preferred even where more efficient Spanish tools were available. Even children in the Puebloan culture rejected modern practises, learning instead from the experience of their families.

Frank Hamilton Cushing, who became inducted into Zuni life in the 1800s, observed that even with the introduction of new animals, plants and some tools, the basic agricultural procedures and processes were all traditional, and the results were undeniably successful (p.97-8). It still involved subsistence level agriculture with surplus produced for acquiring necessities. Adoption of new ideas was highly selective and happened only where there was clear benefit and only where cultural traditions were not interrupted.

By the mid-1800s the US supplanted the Mexican government. A more active attitude was now taken to an involvement in Puebloan agriculture, with an economic motive for modernizing them. The US wanted to change Puebloans from a subsistence to a credit economy using trading posts to exchange goods. In the 1870s new schools were introduced to modernize Pueblo farmers. By the late 19th century the most significant change was the introduction of metal tools on a widespread basis, replacing bone and wood items, even though metal tools were difficult to replace when broken. They were basic tools but they raised efficiencies, which meant that less manpower was needed and people were freed up to diversity their economic base. Between 1890 and 1920 the Bureau of Indian Affairs agents "offered numerous suggestions on ways to maximise acreage. While their advice would have led to increased production, many of the Indians were satisfied to raise only enough crops to feed their village" . . . . Resistance to outside change had been a Pueblo characteristic for centuries, and because of this attitude, the agents' innovations were accepted slowly" (Vlasich 2005, p.131-132). In the late 19th century there was increased interest in developing arid regions so training programmes were introduced to update Indian methods, with government farmers working with Puebloans to introduce crop rotation, new plant choices, new ploughing and planting techniques and new standards of crop maintenance. "Anthropologists have noted that the Pueblos had a proclivity to resist dramatic changes in their culture while adopting certain foreign modifications. This practise, dubbed 'compartmentalization' entailed integration of only those innovations that did not cause major alterations in the Pueblos' ancient cultural traditions . . . . The Bureau of Indian Affairs recognized that any farm program it initiated that ignored this Pueblo trait would be doomed to partial acceptance at best." (Vlasich 2005, p.188). In addition, engineering projects were introduced to improve irrigation. In 1912 the first threshing machines were installed to replace the prehistoric methods employed. This increased efficiencies and raised production, reducing the need for manpower and freeing up Puebloans to find other incomes and diversify the economy.

The more ambitious of the new ideas were only accepted when modernization programmes took Puebloan beliefs into consideration and, at the same time, economic stresses combined with a considerable growth in population reduced Puebloan resistance to change during the Great Depression: "As their population grew and money became tight, a culture heretofore resistant to change gradually adjusted" xiv. The Puebloan population had increased by 20% to 11,346 from 9000 at the turn of the 20th Century, and the income that had been derived from craft and leisure activity dried up as Americans faced a jobless future. Even in the face of real economic problems, the Puebloans resisted government programmes to improve the land and its physical infrastructure and to introduce modernization, preferring their traditional subsistence approaches. Eventually it was via school rooms rather than adult training and legislation that changes in attitude began to be introduced, which bore fruits particularly during the Second World War when manpower was taken away from the Puebloan lands, girls were given vocational training in modern agricultural techniques and labour saving technology was accepted to replace the loss of Puebloan men. For the first time fertilizers were successfully introduced, an innovation repeatedly rejected by the Puebloans due to its incompatibility with existing traditions.

After the Second World War some Puebloans abandoned some of their ceremonies for the growth of crops and hopes for good climatic conditions and even those involved in agriculture needed to diversity economy to survive. New employment opportunities included mining, recreation and ranching, but others still hung onto traditions even with the adoption of modern techniques and establishment of a more diversified economy. Ranching presented its own particular problems: "In some ways the problems for Pueblo ranchers were more difficult than those of strict agriculturalists. The vastness of the areas they controlled meant higher cost in applying soil and moisture conservation methods. Plants and animals need water, but stock required feed that was expensive to produce" (Vlasich 2005, p.254).

Between the 1960s and 1970s there was a tension between the need to engage in the modern world due to the decline of the effectiveness of Puebloan agriculture and the desire to reject ideas and methods that were inconsistent with their own traditions. By 1964 one quarter of the Puebloan Indians were living off the reservation and those remaining eked out an existence, taking advantage of new government programmes to regenerate land, improve ranges and improve access to water. Problems continued throughout the 1970s, with Puebloan agriculture struggling. Many explanations have been offered to explain the decline of Puebloan agriculture at this time, but appears to have been caused by a mixture of different pressures all occurring more or less simultaneously. These include water shortages due to drought, siltation, disputes over water rights, soil erosion, significant population increases, the upheavals of the Second World War, the introduction of welfare and the corresponding decline of self-reliance, transfer of land from one generation to another resulting in small and highly dispersed holdings, the inability to afford new technologies, and the economic unviability of agriculture when it was no longer the primary system (p.222-241 and 285-286) More problem-orientated government initiatives and the improvement of education helped to enable some Puebloans to survive and in the 1990s there was a revival of traditional methods and some regeneration of Puebloan land. Puebloan life continues in a modified form, still supporting economic and cultural traditions.

All of the above demonstrates that it is very difficult to change traditional methods when existing methods are both successful and bound up with clearly defined social traditions and land ownership and management systems. "It was inevitable that some of the colonial innovations would be adopted by the Pueblos. This does not mean that the Pueblos became assimilated into the mainstream of Spanish culture. On the contrary, they resisted dramatic changes in their lifestyles and integrated only those changes that did not cause major alter-

ations in their ancient cultural traditions" (Vlasich 2005, p.24).