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## Building Resilience (Part II)



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## From the Editor's Desk

*Welcome to Part II of our look at Building Resilience – the theme of our 7th Annual Conference, held last January in Albuquerque, NM.*

*When we came together for our Conference, building resilience felt idealistic – like something that sounded good but was too abstract or too pie-in-the-sky to be taken seriously by the public at large.*

*My how have times changed!*

*In the intervening months, headlines across the country have been filled with all sorts of anxiety and woe, including soaring fuel prices, a sharp downturn in the economy, rising unemployment, and an expanding global food crisis. And that doesn't even include the ongoing anxiety over global warming.*

*All of a sudden, it seemed, we weren't looking very resilient as a nation.*

*But as the authors in this issue of our Journal explain, none of this should be news. Human history is full of surprises, as well as stress, innovation and change. What is different this time, however, is the size and scope of the challenges confronting us. But that means we need to build resilience now more than ever.*

*As we work to make building resilience practical, it is equally important to ponder the bigger picture – why we need to do it in the first place. That's the goal of these two issues of our Journal. I hope you've enjoyed reading them as much as we've enjoyed assembling them. And many thanks to all our contributors – who gave freely of their time and energy to this worthy project. We feel blessed by their support. Yours too!*

*Happy reading,*

*Courtney*

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Cover photo by Courtney White.



## Feature

# Expecting the Unexpected: Why Resilience Matters to People and the Planet

*by Lance Gunderson\**

For eons, humans were just one species among millions on planet earth. We weren't (and aren't) the biggest or the fastest, but we have developed a capacity to think about, manipulate and alter our world. Humans have always found ways to create images that depict their relationship with their environment, as indicated by cave paintings from millennia ago. We all know that images are representations or reflections that can only capture small pieces of our social reality. And with technology, we are not only inundated, perhaps drowning, in images. Given such media glut and sensory overload, what are those key images, what are those revealing images that define the new millennium of the 21<sup>st</sup> century? I think there are three that are particularly relevant:

1) Humans are now a planetary force. We are rapidly approaching the phase in the evolution of the planet where we as a single species are altering our world. Two relevant pictures come to mind: the tracing of increasing carbon dioxide concentrations in the atmosphere for the last 50 years, and the sharp increase in global temperatures over the past 80 years. Both reveal human induced global change. One shows how we have changed the earth's geochemical cycles, by pumping carbon from underground storages and releasing it (through land clearing and combustion) into the atmosphere. The rise in global temperatures indicates that these biogeochemical changes lead to unintended consequences, such as changing temperature and rainfall patterns.

Globalization has come to dominate the economic, social and political dimensions of our lives as well. We are connected through the Internet and media to the world, which allows for rapid spreading of information, be it for good or bad.

2) Surprises are increasing. One only need to open a newspaper, log on to a news website or turn on the television to get an indication of the never-ending string of surprises that appear to confront humanity. Some surprises such as jokes or winning a jackpot are welcomed. Others, such as earthquakes, hurricanes or six dollar a gallon gasoline are shocks that must be managed. Surprises occur when our expectations about the world differ from reality. Surprises are a consequence of living in an increasingly complex world,



Surprise on the Talek River, Maasai Mara, Kenya, Africa. (photo by T. Gadzia)

\* Adapted from a presentation made at The Quivira Coalition's 7th Annual Conference, January 17-19, 2008.

full of uncertainties. But are surprises increasing, or is it just that we are more aware of them? I don't know, but my guess is that they are rising.

3) The consequences of our actions are more severe. We live in a time when consequences of actions are great. Human wealth and infrastructures have never been greater on the planet. Losses from natural disasters are climbing exponentially, leading insurance companies to become primary funders in climate change research.

One inference from these observations is that our future will not be like our recent past. Indeed, many scientists are now indicating that the information from our recent history that we use to plan for the future (such as probability of floods or droughts) will have limited applicability in predicting the future. If that is true, we need to develop new ways of thinking about our relationship with our environment. As Albert Einstein once said; *"We can't solve problems by using the same kind of thinking we used when we created them."* The rest of this article is about different ways of conceptualizing or thinking about changes over time in human and ecological systems.

## Change and Stability

We live in a world of change, much of which we know about and expect. Our lives (except for people living in the polar regions) are structured around daily cycles of light and dark. In temperate areas, we anticipate and organize around seasonal changes, when we plant crops, when we harvest crops, when we send the kids to school, when we collect wood for heating. In tropical regions, we distinguish rainy and dry seasons and structure life around those conditions.

Humans (and any other organism for that matter) have three basic strategies for dealing with changes in our environment. One strategy is to ignore those changes, as the influences or impacts of change just don't matter to us. The second basic strategy is to attempt to control those changes. We heat and cool our houses to

control the indoor temperature. The final strategy is to adapt to those changes. We can't control sunlight and rainfall, therefore we must find ways to adapt to these environmental conditions. One of the large challenges presented by climate change is how to adapt to an environment that will change in ways that are only partly knowable and predictable.

For a variety of reasons, people attempt to control the inherent variation in ecosystems. We build dams in river ecosystems in order to control flooding during wet periods and to store water for dry periods. Dams dampen the fluctuations in river flows, by controlling the amount of water released. Ecosystems that have

evolved with fire are now controlled and contained to prevent damage. Outbreaks of forest pests and diseases are proscribed so that damage to timber resources is limited. In these and

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***"Control, stability and efficiency, have largely been met in many systems. However, there has been a cost associated with the attainment of these goals. That cost has been the erosion of a system property called resilience."***

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many other cases, we stabilize ecological processes in order to seek efficient economic and social outcomes. Another goal, along with control and stability, is to seek efficient use of resources.

These three objectives; control, stability and efficiency, have largely been met in many systems. However, there has been a cost associated with the attainment of these goals. That cost has been the erosion of a system property called *resilience*.

For many years, ecologists viewed ecosystems as groups of plants and animals in stable systems. A stable system is one that resists change. Stable systems operate so that if an outside force acts on the system, the system should return to the way that it was prior to the outside force, or to a pre-disturbance state. A good example is the room temperature in a heated house. Room temperatures are stabilized by a combination of a thermostat and heating unit. If a door is opened or cold air enters to cool a room, then the heater turns on until the room temperature rises to the set point, at which time the heater turns off. The system is designed to operate around an equilibrium state.

There are lots of other physical examples such as



Figure 1. Photographs of grassland (left) and shrub/woody (right) regimes in Australian rangelands. Overgrazing and removal of drought tolerant species can cause a transition from a grass-dominated landscape to Mulga shrub landscape.

sailboats or bridges that are designed for stability, or to operate around an equilibrium state. Some ecologists still use terms such as the balance of nature to describe the stability of ecosystems. Many ecosystems are stable. Many ecosystems that are influenced by external forces such as fires or pests or variation in rainfall or herbivores, return to similar plant and animal configurations after such events. These ecosystems are stable in the sense that they recover or return to pre-disturbance conditions.

For over three decades some ecologists have noticed that not all ecosystems returned to their prior state or condition after a disturbance. Scientists studying rangelands noticed the emergence of shrubs and woody plants after a drought in heavily grazed grasslands (Figure 1). Limnologists found that phytoplankton (algae) replaced rooted vegetation, turning formerly clear water lakes into green, muddy lakes. Wetland ecologists noticed the replacement of native plant species by other species after fires or droughts in freshwater marshes. Coral reef ecologists noticed algae replacing corals on reefs that were overfished, or reefs that had been used for sewage disposal.

In all of these cases, the plants and animals that had characterized the ecosystem were replaced by another group of biota. The structure and function of the prior system had been changed. These examples demonstrate that ideas like stability or equilibrium-centered systems were not adequate to explain all ecosystem dynamics. It is from these examples that the concept of resilience arose.

Scientists have defined resilience in different ways. One definition refers to stability—how quickly a system returns to a prior state after a disturbance. This is called engineering resilience. Boat designers, bridge, levee or dam builders, design and build these structures to stay in a certain state; a boat should stay upright through a range of forces, as should a bridge, dam or levee. The second definition is called ecological resilience and assumes that ecosystems can exist in different states or regimes (such as the rangelands shown in Figure 1). Ecological resilience has been defined as follows:

- the amount of disturbance a system can absorb and still remain within the same state or regime;
- the degree to which the system can learn and adapt to changing environments.

We now know that the property of ecological resilience is universal to ecosystems. Alternative regimes or states have been documented in hundreds of ecosystems; in dry systems, wet systems, hot systems and cold systems. Because humans have preferences for one ecological state over another, it is important to understand what mediates the transition among the states. Understanding transitions is key to managing systems around a desired state.

### Managing for Resilience

When we attempt to manage ecosystems, we generally seek to manage for certain states or regimes. For example, rangelands are much more valuable for



grazing when they are in a grassy state, rather than a shrubby state. Ecosystem management, therefore, can be simplified into two different objectives. One is to attempt to manage the resilience of a system in order to keep the system in a desired state. The other objective is to move the system from one regime to another. The second objective occurs when resilience is exceeded and the system undergoes a shift to another, undesired regime.

What do we know about managing ecosystems for resilience? That is, what actions can be done that help increase the capacity of a system for dealing with external shocks? There are a few general ideas. One is to nurture various forms of capital. In this case capital is used in a general sense to mean any accumulated material that can be used to facilitate system functions. Obviously monetary wealth is a form of capital, and it can be used to facilitate economic production. Fiscal capital can also be used to help systems recover after they have been disturbed or destroyed. Natural capital works in a similar way; soils are a form of natural capital that facilitate crop production, or provide the bed for plant regeneration after a fire.

Other forms of capital include things such as social capital, which is a network of trusted relationships, or intellectual capital, which is the ability to mobilize knowledge and understanding. In ecological systems, practices that buffer or control the impact of disturbances can also help increase system resilience. Prescribed fire management is such a practice in many fire-adapted systems. Some argue that regular exercise provides a similar function for humans.

Yet resilience can be overwhelmed or fail in many systems. Levees built to contain floodwaters in New Orleans were overwhelmed during hurricane Katrina. Overgrazed rangelands become more vulnerable to woody invasion. Over-fishing in coral reefs can result in the establishment of algae, at the expense of coral. All of these are manifestations of when resilience has

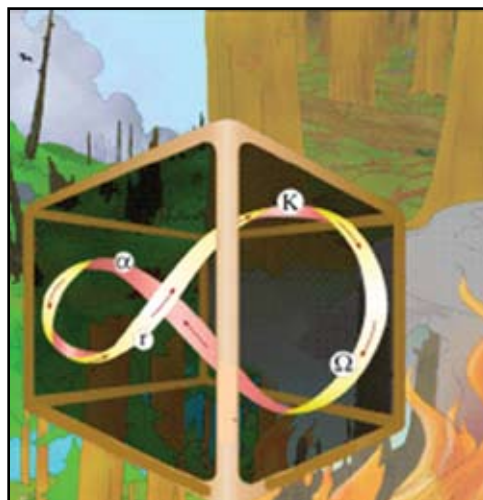


Figure 2. Cycles of Growth, Conservation, Disturbance and Renewal.

contracted to the point where the system is an accident waiting to happen—that accident is a regime shift.

Regime shifts often create surprises for managers, at least the first time they are observed, because of expectations that a system would remain in a more desired state. Another reason that regime shifts are surprising is that many times managers are focusing on maximizing some type of production, such as grass, meat, or milk and may not notice that

there are slowly changing aspects of the system (i.e., the system has lost resilience).

When faced with unexpected shifts in system state, managers have three choices on how to proceed. The first is to do nothing, which either ignores that a shift has occurred, or indicates that the shift is not important. In taking no action, a manager may assume (or hope) that the system will return on its own without intervention.

The second option for managers faced with a regime shift is to attempt to return the system to the previous (and more desired) regime. Many resource management problems, such as recovery of endangered species, restoration of habitat, or remediation of pollutant spills, are of this type. In all of these cases, the intent is to restore the system to a prior, or at least more desirable, state. The preferences about which state is more desirable are often difficult to discern, as are mechanisms and institutions for revealing those societal values. Some, such as the endangered species act, or the Grand Canyon restoration act, are codified in law. In other situations, individual landowners decide which regimes are preferable and which transitions they would attempt to pursue.

In most cases, regime shifts in ecosystems carry great uncertainties about what caused the shift and what can be done about reversing the shift. This is the context in which adaptive management was developed. Adaptive management is an approach to resource management that uses techniques to help managers learn

while managing in very uncertain situations.

The third option for managers faced with regime shifts is that the

shift may be irreversible. A simple example of this situation is making an omelet; once the eggs are cracked, stirred and cooked, it is impossible to return to what they once were (as Humpty Dumpty instructed us years ago). In resource systems, the extinction of a species is irreversible, so a lot of effort is placed on avoiding that state. Given a new regime from which there is no recovery, humans have no choice but to adapt. Climate change and the exhaustion of oil reserves pose situations from which there is little choice to adapt to these new situations. In these cases, the best approach for a manager is to foster experimentation in order to see what solutions are feasible and viable. Faced with such broad and irreversible changes, the foresight and creative abilities of humans are needed more than ever.

## Expecting the Unexpected

The implications of looking at the world through a resilience lens are many. One is that it questions our assumptions about change, as it is a very different mental model of how the world works. Resilience theory implies very different actions from those used to manage ecosystems during the 20<sup>th</sup> century. Resilience theory suggests that systems behave in ways that are, for the most part, unpredictable. Yet, most resource management practices that attempt to manage around an

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***“...we must continue to develop ways that help us to expect the unexpected.”***

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equilibrium (such as optimal harvest policies), or to stabilize key aspects of the system (such as

controlling flow in rivers), in the long run fail because of the hidden erosion of resilience. Because of the ways in which ecosystems are organized, and the ways in which humans intervene in those ecosystems, we are faced with not only a numeric complexity (lots of variables), but also a dynamic complexity (those variables interact in ways that produce surprising outcomes).

So we must continue to develop ways that help us to expect the unexpected.

Another implication of resilience theory is that systems are not only constantly changing, but that changes are abrupt or sudden. As Malcolm Gladwell would say, the system has reached a tipping point. Once a system tips or flips, then managers are faced with a possibility that the change is irreversible. The latter requires adaptation to a new system.

One way to cope with the unexpected is to develop new ways to learn and understand. We learn as much by failures as we do by successes, so we need to focus on actions that are safe to fail, for people and ecosystems. ‘Safe to fail’ policies provide room for mistakes, and the ability to learn from our mistakes. But such policies require institutions that build trust and social capital, and focus on learning by individuals and groups. I see groups such as The Quivira Coalition providing such functions that are missing in the formal government and regulatory world.

In closing, I make a few suggestions as to what we might do, how we might act given a resilience lens. I have four suggestions that hopefully will make us more resilient to future shocks and change, whether it is increased variation in climate, changes in energy availability or new political environments and institutions. The suggestions are to embrace change, encourage cre-



Volunteers construct bank stabilization structures called post vanes to help restore resilience to Comanche Creek, Valle Vidal unit of the Carson National Forest, NM, September 2007. (photo by T. Gadzia)

ativity, cultivate capital and act in ways that allow us to learn and adapt. Each is discussed in turn.

1) Embrace complexity and change. Managing complex systems requires approaches that understand and manage for change, not for stability and stasis. There is growing evidence that managing for stability in ecological systems erodes resilience, making them more vulnerable to change, rather than more robust to external disturbances. Management needs to be much more adaptive and flexible to deal with such dynamic systems. In many cases, we should seek to change rules that attempt to restrain or confine change.

2) Encourage Creativity. Our ability to adapt to a future, which will likely be a combination of the known and the unknown, will in large part be determined by our creativity. We need to foster new ways of conceptualizing and acting to solve old problems as well as new. New and novel approaches will be required to deal with the types and magnitudes of issues that we face.

3) Foster and Develop Social and Natural Capital. Social capital and trust are key ingredients for system resilience. They allow us flexibility in actions and the ability to tolerate occasional failures. Experience and wisdom are also forms of capital that are becoming less valued at a time when they should be more valued. Natural capital provides a buffer against management mistakes, as it is the foundation for renewal and restoration.

4) Learning our way into sustainability. Sustainability, like freedom and justice, is an admirable goal, but one that will be difficult (if not impossible) to achieve. It is an idea that guides our actions, much like the North Star or Southern Cross would guide navigation. We must explore alternative pathways and trajectories, as achieving sustainability is not like building a house, passing a law or putting a man on the moon. It is much more difficult.

I believe The Quivira Coalition is successful because it is an informal learning community, one where new ideas are posed, tested and evaluated. The Coalition is a safe place where assumptions are questioned, boundaries are challenged and limits are transgressed, all necessary ingredients for learning. Learning involves lots of experimentation: some actions will succeed, others will not. It will be our ability to learn,

adjust and modify actions that will determine our ability to achieve sustainability.

As we enter the new millennia, there seems to be at least one crisis per month, if not a crisis per week. Many are natural disasters: a cyclone, earthquake or flood. Resilience theory provides a framework to think and act in a world of recurring disturbances and to how we might find a better way to act in an uncertain world. Resilience is needed now, from individuals to the international community, to help cope with, adapt and renew our planet. 20

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## Colloquium

# Two Thousand Years of Human Adaptation to Climate Change in the Southwest: A Cautionary Tale

*by Eric Blinman\**

Archaeology attempts to reconstruct and understand the dynamics of human history, both beyond and within the scope of written records. Environment, population, economy, social relationships, religion, and world view are our subjects, and our interpretations (stories) are narratives of change and causation. Archaeology's long term perspective and detachment from our current lives allows us to explore underlying relationships, consequences, and possibilities that may be relevant to our future.

Human communities have lived on the high desert Southwestern landscape for more than 12,000 years, and we have been a significant presence in terms of population and impact for the past 2,000 years. In those 2,000 years, we have one of the most detailed environmental records in the world, along with an equally detailed record of the structure, growth, and decline of families, communities, and ways of life.

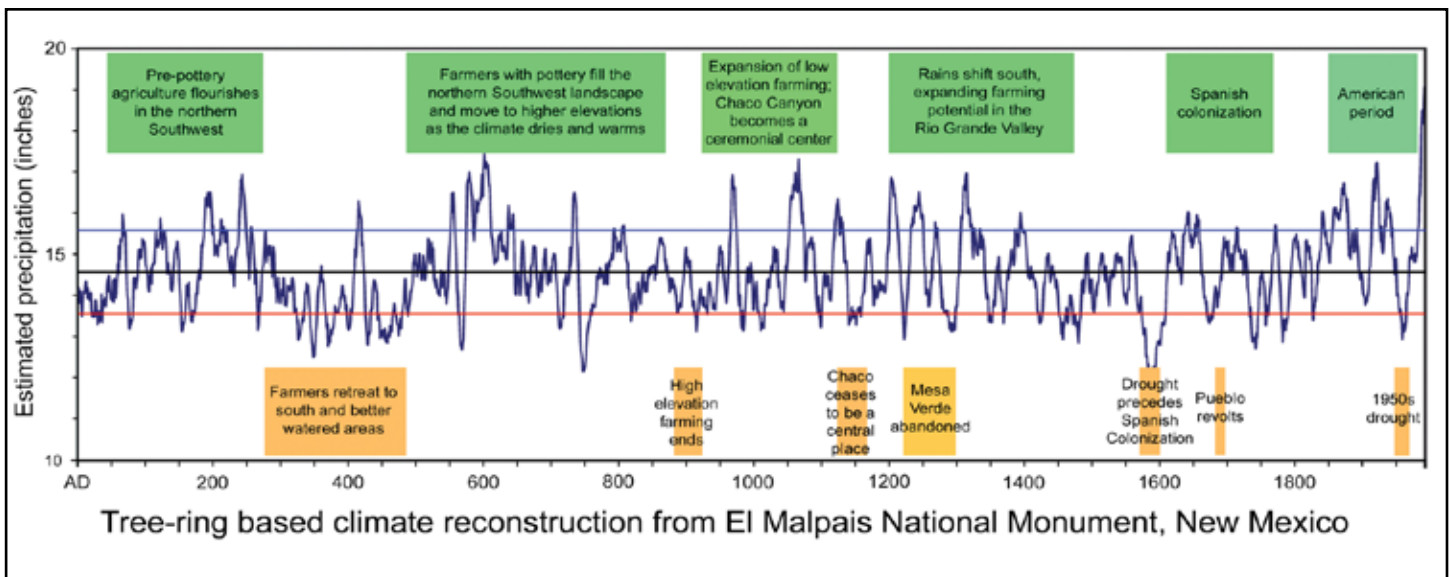
Past climate is reconstructed from detailed studies of growth rings from both living trees and archaeological wood. Low elevation tree growth responds to moisture, while high elevation trees respond to temperature. These dendroclimatic records are diverse, supporting models of climate and climate change both through time and across space. While tree-rings provide unparalleled detail in our perception of high frequency climate change (droughts), studies of pollen, soils, and animal distributions, including humans, help document longer term changes in climate.



Pueblo Bonito, Chaco Culture National Historical Park, New Mexico. (photo courtesy of Eric Blinman)

The climate record for the past 2,000 years is particularly rich, but this period is also most relevant to today's world since it is marked by increasing dependence on an agricultural way of life. Maize (corn), present for nearly 4,000 years, finally fueled increased population, sedentism, and social complexity. Ironically, maize dependence also destabilized the very communities it supported, since there was and is such a delicate balance between climate and agriculture in the greater Southwest.

\* Adapted from a presentation made at The Quivira Coalition's 7th Annual Conference, January 17-19, 2008.



Source: Office of Archaeological Studies, State of New Mexico.

Two thousand years ago, peoples speaking at least four different languages were making the transition from horticulture to agriculture on the Colorado Plateau and in the northern Rio Grande Valley. Pottery, the bow and arrow, and the stone axe were innovations over the next 500 years, but they facilitated rather than drove culture change. Instead the basic rhythms of adaptation were established by the relationships between people, maize, climate, and geography.

The underlying feedback between agriculture and population is the same around the world. A mix of wild and domestic foods moves inexorably toward reliance on agriculture as population increases, as wild resources are exploited to their limits, and as the only alternative is to increase the amount of domestic crops (or animals) in the economy and diet. If the agricultural potential will support it, population continues to grow, with greater and greater dependence on agriculture. Population growth is fueled by both increased fertility and decreased mortality. Birth spacing is decreased by sedentism and the availability of gruels as weaning foods. Stored foods moderate seasonal and year-to-year food stress, decreasing infant and mother mortality and increasing the reproductive lifespans of families.

A price is paid for these changes, however. Larger populations require more investment in social institutions that solve conflicts of interest between families and communities. Leadership hierarchies become necessary to communicate efficiently both within and

between populations, and freedom of choice and movement becomes increasingly constrained by the interests of others. At the most extreme, leadership becomes institutionalized, and taxes of labor or produce are required to support the overhead of social institutions. But the most important consequence of increased population is increased fragility of the economic system, the balance between resources and demand.

## Climate Change

In the Southwest, agricultural success has always been at the mercy of climate. Over the past 2,000 years, there have been at least seven climate transitions that have had significant impacts on cultural trajectories. Several of the climate transitions have been felt over multiple generations, while others have been heralded by abrupt droughts, instigating culture change within the span of a decade or two. These changes can't be described simply as periods of drought or plenty, but they represent distinct changes in climate states that affected where agriculture was successful and how reliable it was. In no case has there been a stable period of climate that lasted for more than two centuries.

At low population densities, climate change was met with movement to areas where rainfall or growing season length were more conducive to reliable agriculture. For most of the 2,000 years, this meant simply moving up or down slope to capture more rainfall or longer growing seasons as rainfall or temperature changed.



Growth rings, also referred to as tree rings or annual rings, can be seen in a horizontal cross section cut through the trunk of a tree. Visible rings result from the change in growth speed through the season of the year. (photo courtesy of Eric Blinman)

However, there have been two dramatic changes in continental weather patterns, resulting in changes in the timing and geography of monsoon rains. “Adjustments” were no longer possible, and complete abandonments of regions were the only way to maintain peoples’ expectations of a proper way of life.

Failures of the balance between economies and climate had repercussions in proportion with the fragility of the economic systems and the pace and nature of the climate changes. Most changes were felt initially as droughts or shortened growing seasons. People were accustomed to both as part of normal variability, and extra effort was put into technology (primarily water harvesting) or more extensive farming in an effort to survive. Only when storerooms were empty and alternative foods were exhausted did communities come to grips with the need for drastic change. Communities with higher population densities were more stressed, and there is evidence of violence as communities collapsed and gave up their expectations for a return of “normalcy.”

In the face of most cases of climate change, the new climate regime was greeted with optimism, and both population and social institutions rebounded in new geographic settings. Communities and cultures built on the foundations of the past, successfully to the

extent that the population and their expectations were within the carrying capacity of the new climate-economic system. Such success was reflected in cultural florescence such as the exuberant expression of religious belief in Chaco Canyon. Fueled by 11<sup>th</sup> century climate-supported surplus, Puebloan communities invested overhead in monumental architecture, ritual celebrations, and social hierarchy. When 12<sup>th</sup> century droughts heralded the next climate change, surplus could no longer sustain the centralized expressions of religious belief, although local expressions continued for another century until even local agriculture was no longer sustainable over much of the area.

When climate change was even greater in scale and impact in the 13<sup>th</sup> century, we see a complementary geography of disaster and new possibilities. Reliable agriculture was no longer possible over most of the Colorado Plateau due to disruption of the timing and penetration of monsoon rainfall, resulting in the “mystery of the Anasazi.”

At the same time, agriculture was suddenly both possible and successful in new areas, such as the Galisteo Basin south of Santa Fe. Farmers quickly took advantage of newly opened territories, homesteading gave way to hamlets and then to villages. Eventually local populations reached the point where conflicts of interest and fears supported the formation of large pueblos of hundreds of families. Old religious ideas associated with the previous failed ways of life appear to have been abandoned in favor of new ideas, and the modern foundations of Pueblo culture were established.

However, in keeping with the fickle nature of Southwestern climate, by AD 1500, the “new” climate was changing for the worse, communities were struggling to survive economically, and the social and physical health of Pueblo peoples were in decline. In this setting, Spanish explorers and colonists entered the Southwest. Thanks to the effects of climate change they encountered much less resistance than they would have found a century earlier, and their new crops (wheat and barley) and domestic animals changed the climate-economy balance in the region. However, even the Spanish were not immune to climate change, and optimistic hopes for areas such as the Salinas Pueblos



failed first economically and then under pressure from non-farming peoples.

## Lessons

The record of the past two thousand years is both optimistic and pessimistic. Human populations have adapted and persisted with remarkable resilience, as reflected in the long term by the survival of Pueblo communities that are an important part of today's multicultural landscape. However, resilience has been necessary in the face of both natural and cultural factors. Most importantly, climate stability has been the exception in the Southwest, and expectations for more than 200 years of any specific climate state are unwarranted. Despite a history of repeated crises and collapses, human survival rests principally on our economic adaptability and our ability to survive demographic collapse through our great reproductive potential.

On the pessimistic side, our human expectations are abandoned with difficulty. Communities tend to confront change with faith and denial, persistently trying to maintain economic and social systems until it is "too late." Extra effort and technological innovation in the face of climate change is rarely enough, and eventual adjustments tend to be catastrophic. Populations are brought closer to balance with resources through lower fertility and increased mortality, and the latter often includes conflict as social rules are challenged by the needs of individual, family, and community survival. Migration tends to be the ultimate solution to the desire to maintain values and lifeways in the face of climate change, but the effectiveness of migration depends on both social and environmental factors.

Our present society has a relatively unique opportunity for what might be called proactive adaptation. Unlike our predecessors, we can anticipate that our climate will change, regardless of cause. We should expect crises due to climate change to be independent of any particular climate model, although human influences on climate change may create unique conditions that require unique responses. We should expect denial in the face of our desire to maintain the status quo, and the current debate between "Science" and "Politics" over what we should do about climate

change can be seen as our struggle to resist changing our expectations.

The basic truth is that human population increase is unsustainable. Adjustments will occur whether within or outside of our control, and famine, disease, and conflict have been effective agents of population reduction in the past. Those correctives are not inevitable, but we will need to develop and embrace alternatives to growth-based economic and social models in order to "thrive" in a sustainable society. The more we can consciously keep our population and expectations below the carrying capacity of our climate-influenced economy the more resilient our society will be in the face of inevitable change.

The first step toward proactive adaptation should be a conscious assessment of values—what do we see as the most important beliefs and expectations that should be passed on to our children and their children. Those values, aided by an understanding of the successes and failures of the past, will be the best guide for our compromises and decisions moving forward. 22

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Photo by Eliza Wells Smith

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## A View from the Field

# Reflections on a Resilient Heritage Ranch

by Tuda Libby Crews

The Spanish word *tranquilo* describes the ambience here; it is soft, quiet, and romantic. A sense of place flows gently over the land. Colorful buttes of red sandstone formations rise from the plains dotting the rangeland. Picturesque black hills with jutting outcroppings of lava rock flank the *llanos*. The air is clear. Skies are azure blue. Breathtaking sunsets are magenta, lavender, and orange. Ten miles of Ute Creek flows through the ranch. Our home is Bueyeros, New Mexico, in Harding County. One hundred-thirty years ago, over two hundred and fifty people lived here. Today, the population is five.

Rising from the center of this tiny village is a beautiful 114 year-old mission church. It is the cornerstone of the community and spiritually connects us to the land. It is a family touchstone. Our great-grandfather was instrumental in building the church, and generations of our family have served as Majordomos to help care for it. The church is a resilient beacon of faith drawing relatives back to the family ranch for baptisms, weddings, and funerals. I was born and raised here and I connect to the land on the deepest level; a love affair with the land begins early and grows life-long. Seven generations of my family have lived on this land keeping the ranch alive through the horse-and-buggy days, World War I, the Dust Bowl, the Depression, World War II, grasshopper invasions, droughts and inheritance taxes. We're a tough bunch. We're now dealing with 21st century volatile market trends, global warming and another severe drought cycle, yet I still have faith in our ability to keep the ranch in the family for the next seven generations. Faith, as belief in our hopes and conviction of our dreams, fuels my husband and me. And it is faith that will bring our children back to the ranch. We are here to stay.

Close to five decades ago Jack and I married young and moved to Wyoming where we raised Libby and

Ted. In Cheyenne, we enjoyed a good life for thirty-five years, although my heart never left New Mexico. I was elated to return. For us, highlights at the ranch are when our kids visit. Libby and her husband, Peter Wood, and their daughter, Bella come from Wyoming. Our son, Ted, and his identical twin sons, Bennet and Seth come from Phoenix. My Mother, Esther Libby, died in 1980; my Father, Norman Libby, passed away in 1991. The five siblings were not willing to hold the family business together. They agreed to a legal corporate



Jack rotates cattle through fresh pastures. (photo by T. L. Crews)

spin-off, split-up allowing each sibling to own a portion of the large original ranch. The process was time-consuming, costly and emotional. Although painful then, I realize now the decision worked out for the best. The land is still in the family and now each sibling manages their own business operation. Importantly, in succession planning each sibling has the gift of dealing only with their immediate family members. Before we returned to the ranch, Jack and I attended Kirk Gadzia's Resource Management Services week-long Holistic Resource Management (HRM) program to seek knowledge on managing holistically. Kirk's interactive class

stimulated fresh ideas on range management, water development and riparian restoration. With a fresh perspective and an action plan we would begin managing under the new ranch standards in land restoration.

## Moving Back

We moved to New Mexico in 2001 and were thrust into a task so large our adult children thought we had taken leave of our senses. The ranch was in disrepair and we needed a place to live. With creativity (and sweat equity), a small 130 year-old adobe house was transformed into a charming casita furnished with old family furniture and 1940s collectibles. I tell people everything in the house is old, including me. Restoring the land was not as simple; on over 14,000 acres there were four large pastures, four sources of stock water and Ute Creek was severely infested with Salt Cedar. With forty-plus years of closed line-breeding, the straight Hereford cow herd was wild and productivity had declined. Half of the rangeland was exposed bare ground from a decade-long drought of three to four inches of rain per year.

Riparian restoration was a priority. We sought technical guidance and developed cost-share partnerships with the Natural Resource Conservation Service (NRCS), Ute Creek Soil & Water Conservation District and the New Mexico Water Trust Board. Several miles were fenced-out on the west end of Ute Creek treating Salt Cedar to restore the underground stream. Habitat development partnerships were created with the National Wild Turkey Federation and the New Mexico Department of Game & Fish. Over the next three years these partnerships addressed Salt Cedar eradication, erosion control, tree planting, grass seeding, wildlife habitat and water development. Working cooperatively with exceptional agency men and women for the good of the land was a very satisfying experience. Within

four years measurable outcomes included water flowing in the creek year-round with sedges and willows lining the stream. Volunteer cottonwoods, bird species and wildlife species increased. On the east side of the creek, we contracted with USDA's Continuous Conservation Reserve Program (CCRP) for a 15 year period focusing on riparian restoration. Fencing off Ute Creek became the foundation of the rotational grazing system, which over four years evolved into 45 miles of fence. We have eighteen pastures now, each named in Spanish to honor my Spanish heritage.

We developed 18 sources of stock water fed by eight miles of pipeline and two 10,000 gallon water storage tanks. The resilient land responded to timed grazing,

and, in 2004, Mother Nature helped us out with twenty-two inches of rain. That year, New Mexico State University's monitoring data calculated 1,420 lbs. of forage per acre indicating abundant grass and excellent recovery.

With no improvements and a herd of wild cattle, we had Eddie Garcia build us a good set of pipe working corrals designed by cattle handling expert Dr. Temple Grandin. The set of pens have dramatically re-

duced stress in cattle handling. The two of us can work cattle safely and efficiently, and our grandkids find the cat-walk a delightful playground.

Jack led the charge on herd improvement by culling and focusing on genetic selection using Estimated Progeny Differences (EPD) for selective traits. For the past three years we've leased bulls from the Profit Maker Sale in Ogallala, Nebraska. Today, Black Angus crossbred cows produce quality calves that perform in the feedlot and on the rail. The cow herd's disposition has changed; Jack has the cows so gentle most of them will eat from his hand. In addition to low-stress handling, the calves are all natural. We do not use antibiotics or growth hormones on our calves. Our



Bueyeros Creek's riparian area just north of the house near the wild bird sanctuary. (photo by K. Gadzia)



adult kids influenced the decision to raise natural cattle, as they represent consumers demanding healthy food for their families.

I turned 60 in 2004; to celebrate we invited relatives and friends to a bash at Bueyeros. In lieu of gifts, my adult kids encouraged me to do something I had long-wanted. I asked my friends and family to help me create a Wild Bird

Sanctuary. Birthday gifts toward the sanctuary rose to over \$2,500. Working with the U.S. Fish & Wildlife New Mexico Partners Program, NRCS folks, and the National Wild Turkey Federation, we established the 23 acre Tuda Libby Crews Wild Bird Sanctuary. Gifts, personal investment (and more sweat equity) became the cost-share for a drip system, trees, bird houses, a new fence, grape arbor and wildlife water guzzler. Perhaps one day the Wild Bird Sanctuary will become an additional source of ranch revenue. Who knows?

## Education

One of our ranch guiding principles is an annual educational event. We've hosted several wild bird workshops, including a 4th & 5th grade Kid's Wild Bird Workshop and students from four rural schools attended. In August of 2005, the Quivira Coalition held a Collaborative Ranching in Action workshop, and we've annually hosted tours for the NRCS, Resource Conservation and Development Program (RC&D), and New Mexico State University. Another guiding principle includes building community. To draw kids and grandkids back home, we ranch families must enhance our



Corrals designed by Dr. Temple Grandin provide efficient low-stress cattle handling. (photo by T. L. Crews)

rural communities' economic health and quality of life. Harding County has 45,000 head of cattle and a population of 704 people (the smallest in the state). Buildings are empty and jobs are scarce. We have fewer than twenty couples of reproductive age. It seemed important to focus on "growing home".

Kirk Gadzia suggested contacting Remelle

Farrar, Director of the Texas Prairie River Region, to learn what folks from Canadian, Texas had done with nature tourism to save their rural economy. In 2006, the Quivira Coalition featured Remelle and wildlife biologist, Bob Rogers as presenters at the Annual Conference. I felt moved to share the Canadian story with folks in our community and was awarded a grant from the Playa Lake Joint Venture to hold an educational event on nature tourism. The Quivira Coalition was one of the generous sponsors when Ute Creek Cattle Company (UCCC) hosted 111 guests on August 11, 2006, for a Field Day at Bueyeros called "Discovering New Ranch Dollars through Nature".

The audience was motivated and inspired by the Canadian story. Introducing the potential for nature tourism raised awareness of the beauty of this landscape for bird watching, wildlife photography and nature hikes. Nature tourism multiplies quality of life enhancements which in turn make a community more inviting for our youth. Although exponential fuel cost reduces the likelihood of expanding a



Niece Ashlee Burns, and Libby Crews Wood adjust a feeder in the wild bird sanctuary. (photo by T. L. Crews)

tourism economy, it is still possible to draw visitors from urban areas such as Albuquerque, Santa Fe and Amarillo. Tourists seeking an authentic outdoor experience can enjoy the picturesque landscape, see birds and wildlife, enjoy the fresh air and spend time with friendly people.

Once the ball began to roll, good things kept happening; Remelle Farrar invited Harding County to join Ogallala Commons (OC) to initiate a rural revitalization program. Headed by Dr. Darryl Birkenfeld, the resource network interacts with commonwealth communities on assessing and prioritizing, conserving natural resources, growing leaders, engaging youth, supporting entrepreneurship and harvesting wealth. Our youth participated with us in a community asset evaluation



Under the big tree, Jack enjoys a picnic with grandchildren, Seth and Bennet Crews and Bella Wood. (photo by T. L. Crews)

and deemed our resiliency, culture, delicious chile, and fiber optics throughout the county to be among our myriad strengths. We held a contest and named the grassroots revitalization group “Amigos Bravos” (meaning Brave Friends), and a few men and women began changing the course for a 21st century Harding County.

When I was a girl in the 1950s, Harding County was a bustling place with a population of over 3,000 residents. In Roy there was a doctor, barbershop, five & dime, bakery, a movie theater, several cafés and bars, and a mercantile. Mosquero had several cafés, a bar, hotel, and gas station. Bueyeros had a school, a post

office and several families lived here. Ninety percent of those businesses do not exist today. The August 13, 2007 issue of USA TODAY ran a cover story “Life on the Great Plains is anything but plain and simple” with the writer relating to the declining economic health of rural America.

On page four a graph showcased Harding County, New Mexico. Sadly, we were the biggest losers....of population, that is. Between 1950 and 2006, Harding County’s out-population migration led the nation by a whopping 76.2%, a dubious distinction and a troubling truth. The national news affected Harding County folks like a bop on the head; it got our attention and roused a few more friends and neighbors to action in revitalizing the county.

Amigos Bravos sponsored a contest on “Why I Love My Community” to raise awareness of the good things we enjoy here. To promote positive thinking, winners’ stories were published in the student generated newspaper, the Harding County RoundUp. In 2007, Mosquero School was one of four New Mexico “Partners In Learning” schools selected by Microsoft’s rural revitalization project focusing on the school as a catalyst for economic development. The Mosquero School Media Department received a \$125,000 grant for the Media Entrepreneurs program. We’ve realized immeasurable benefits from the Microsoft partnership, and importantly, their support gives us clout. Microsoft mentors youth through technology and entrepreneurship, Ogallala Commons teaches how to grow leaders, and the Harding County Economic & Community Development Corporation supports our efforts. We see a cautiously optimistic momentum growing within our grassroots Amigos Bravos organization.

## Leadership

Rural communities must engage in early leadership development and encourage and support youth to return home as young adults. In February of 2008, Ogallala Commons and Amigos Bravos directed “Youth Engagement Day” jointly hosted by the Roy and Mosquero High Schools. My fence-line neighbor and dear sister, Mary Libby Campbell, spearheaded the event. Students were invited from Harding, Quay, Colfax and

Union Counties for a day of service-learning workshops and a village tour.

The message to the kids was “think about investing in your communities now, and after college, consider returning to start your own business, live, work and raise your families at home”. Ranch families are famous for sending their kids off to get an education so they can get a good job in the city, and so they do. Basically, that message is telling them to live somewhere else. Without young families settling down “at home”, rural communities die. Harding County has strong school leadership; our Superintendents, Rick Hazen of Roy and Bill Ward in Mosquero, cooperatively support student activities. In April, Ogallala Commons and Amigos Bravos sponsored a Youth Entrepreneur Fair & Business Fair again hosted by Roy and Mosquero schools. Students from the four counties were invited to participate in a business plan competition with a first prize of \$1,000. Fifteen young entrepreneurs competed for over \$4,000 in prize money and 23 businesses were proudly represented at the Business Fair. It was a huge success.

Each Harding County student business plan stated in their narrative, “I want to help my community”. I become emotional realizing these kids get it, and how powerful that is. Students from Roy won the \$1,000 first prize for their business, “Rough & Tough Embroidery Company”, which was highlighted with a \$10,000 grant from ENMR Plateau Communications. Folks in Harding County tip their hat to its new start-up, student-operated business. The key to rural revitalization is encouraging our youth to return home as the next generation of leaders and think creatively about starting businesses for themselves.

These are trying times for urban and rural areas. Rising unemployment, higher fuel, food and utility costs, and the low value of U.S. dollars affects people all over the United States. We cannot control weather, markets, or the economy, however, they affect our businesses. These conditions threaten sustainability, and even the very existence, of family farms and ranches responsible for growing food for our nation. It’s possible we may see a revival of the WPA and CCC programs; instead of

building dams and schools, men and women may be toiling the ground manually to grow food for the hungry. Perhaps never before has the call for resiliency held more on the line. Interestingly, the Spanish word for resilience is *elasticidad*, meaning elastic, which Webster’s defines as “capable of adapting to change or a variety of circumstances”.

The country is under siege from global climate changes spawning extreme weather, extended droughts, hotter temperatures and consistent high winds. Food costs are increasing because beef, pork and poultry depend on corn as a finishing ration. Transportation costs are passed on to consumers. Twenty-first century



The 114 year-old Sacred Heart of Jesus Mission Church in Bueyeros, a community landmark. (photo by T. Gadzia)

agriculture farm and ranch families face increased operating expenses as fuel and corn escalate to heights yet unknown. Courtney White, Executive Director of The Quivira Coalition, calls the 21st century “the Age of Consequences” and a time to deal with cumulative effects of action and inaction.

Personal responsibility is under our control; our ranch is focusing on mitigating operating costs, controlling spending, increasing quality and efficiency, reducing labor and travel, and seeking profitability. We’ll monitor the drought plan and destock. I planted a garden. We recycle, conserve water and drive a Prius. We installed fluorescent bulbs and turn off lights when we leave a room. Our good health is a priority. We’re trying to be more neighborly and offer to do errands for friends when we go to town; they’ll reciprocate. We’re





Ted Crews delivers his mother's 1958 Willys Utility Wagon to her after a two year restoration process. Tuda Libby Crews used to drive her brothers and sisters to school in Rosebud NM as a young girl. The jeep sat exposed to the elements next to a barn for over 30 years until being lovingly restored (for more on the story check out <http://www.utecreekcattlecompany.com/willys.htm>).



it from our children." Jack and I have borrowed the land from our children, and when the time comes for us to pass-on, we'll return it to Libby and Ted in its best condition, ready for them in their lifecycles to borrow it from Bella, Bennet and Seth, who then have the responsibility of caring for the land for their children. We find this rite of passage a guide for sustaining our heritage ranch. We have faith in it.

Vision is essential. Empowered, we've taken action to make good things happen. We began with the end in mind fully believing the outcome of the course we're on shall result in fulfillment and achievement of our goals. Faith is belief in the conviction of our hopes and dreams. Steadfast and with clear intention, Jack and I hang our faith on each day. Drawing upon that same faith are seven generations before us. 22

restoring the post office into the Bueyeros Post Office Museum to honor early settlers of the community. One day, it may be of interest to tourists.

Entrepreneurship is an option for augmenting income. There is a world marketplace online and the sky is the limit for courageous, innovative thinkers with a willingness to embrace change. We involve our kids and ask what they want to do. Heritage ranching is about passing it down.

Depending on people and what they are willing to do to make things work, estate planning is crucial to a farm or ranch operation. At great length we've discussed with Libby and Ted our desire to keep the ranch in the family. The succession plan replicates the Trigg Family model, (Quivira Coalition Journal 30, March 2007, A West that Works: Crossing the Generational Divide by Linda Decker, p. 18-21). We've considered other options including selling cattle and leasing the grass out when forage is available. The ranch could become a nature center or a wildlife educational institute, or a corporate retreat. We are flexible and open to new visions for land productivity and business opportunities to keep the ranch in the family.

A Native American proverb rings true and has become our mantra, "We do not own the land,...we borrow

*Tuda Libby Crews & Jack Crews of Ute Creek Cattle Company received the 2006 Excellence in Range Management Award from the New Mexico Chapter of the Society of Range Management.*

[www.utecreekcattlecompany.com](http://www.utecreekcattlecompany.com)  
[www.hardingcounty.org](http://www.hardingcounty.org)  
[www.ogallalacommons.org](http://www.ogallalacommons.org)



Tuda Libby Crews and Jack Crews with their 2007 Quivira Coalition Leadership Award plaque during the January 2007 Clarence Burch Award Ceremony. (photo by Gene Peach)

# The Break of Day

## On Normality

by Courtney White

Off and on for the past few years, whenever I could catch a break from the daily routine, I would indulge myself by musing on a question that had no real utility: *is this normal?*

By that I mean: can life at the start of the 21<sup>st</sup> century be considered *normal* by any stretch of the historical imagination? Are the nature and scale of our present national economies, for example, or their social and ecological consequences, *normal*? In other words, do they fall within some range of variation for “normal” human activity? For many political and business leaders, of course, the industrialization and globalization of our economy fits a pattern of ‘Progress’ that’s been in place since the Civil War and thus appears to be perfectly natural. But I wonder: is this pattern normal or is it an exception?

What about the size of the human population globally or its exponential rate of expansion – are they normal? What about our rates of consumption and waste, as well as our complete disregard of natural limitations? What about species extinction? Or global warming? Or how fat we’ve become? Is this normal or an anomaly? Or have we accepted these conditions as the “new” normal even though we understand them to be exceptional? If so, what does that mean for us or the planet in the long run?

Luckily, the grind of the day job doesn’t allow me to muse on this topic for very long, or else I might start drinking heavily. That’s because I suspect that the an-

swer to my question is not a happy one: *this isn’t normal*. Not by a long shot.

Take energy, for instance. The extraordinary infusion of energy calories in the form of cheap fossil fuel over the past 150 years, and the incalculable effect it has had on the project of civilization, is certainly *not*

*normal*. It is, in fact, quite unprecedented – as are the consequences, both positive and negative, of this motherlode of oil riches.

Of course, all this energy has created an exceptional condition of prosperity and convenience that we don’t mind one bit. Life has steadily improved for nearly all Americans since the close of World War II, and most want it to stay that way. Besides, it *feels* normal now. That’s because sixty years of energy wealth, like any gold strike, has a way of creating its own sense of normality – fooling us into believing that *this* particular vein, unlike every other motherlode in history, will *not* run dry.

This is why the Arctic National Wildlife Refuge, among other

places, will eventually be drilled. It’s not just rapacious oil companies or another bout of capitalistic ‘gold fever.’ It’ll happen because our “new” normal demands it. We will resist acknowledging the exceptionality of our economy until the last well has been sunk.

As I said, there are good reasons to start drinking heavily.

But there’s been a development recently that has



“Old” versus “new” normal. Boston, MA. (photo by C. White)



lifted this entire question of “normal” out of the realm of indulgent speculation and placed it squarely in the real world of practical “dos and don’ts.”

You can hear echoes of it in the daily news headlines when words such as “uncharted waters” and “whole new ball game” are used by experts to describe the effects of record oil and gasoline prices, the housing/credit meltdown, and the spreading global food crisis. You can also detect it in the frustration and anger expressed by many Americans at their deteriorating economic circumstances.

The best way I can sum up this new development is like this: *there is no more normal*.

## At Sea

Much of the unprepared path we face involves climate change. I am not going to argue here for or against the role of anthropogenic forces (industrially produced greenhouse gases) in global warming. Instead, I would like to focus on what climate change *already* means for our sense of ‘normality’ and its implications forthwith (have a drink handy).

By way of illustration, I’ll cite three scientific articles that I read recently.

In the first, titled “Climate Change and Forests of the Future: Managing in the Face of Uncertainty,”<sup>1</sup> three researchers say that current concepts of forest management, which are often based on a forest’s historical range of variability – a cycle of ecological ‘boom and bust’ over decades that is considered to be normal – are no longer adequate. As a consequence of climate change, they argue, managers can no longer rely on past forest conditions to provide targets for the future. All bets are off.

“The earth has entered an era of rapid environmental changes that has resulted in conditions without precedent in the past no matter how distantly we look,” the authors write.

Certainty in forest management has been replaced with uncertainty. This means we must manage our forests in new, creative and flexible ways. “Managing in the face of uncertainty will require a portfolio of approaches,” they write, “that focus on enhancing ecosystem resistance and resilience.”

These management approaches include: flexibility in decision-making, a willingness to take risks, the capacity to reassess conditions frequently, the ability to change course quickly as conditions change, actions that emphasize ecological processes rather than structure and composition, and an expanded land management toolbox (not to mention money to pay for all of the above).

The goal of these approaches is to create conditions that allow forests to retain as much of their original ‘shape’ ecologically as possible. This ability to ‘bounce back’ after a shock or surprise – to keep one’s shape – is called resilience. A wildfire is a good example of a



Prescribed thinning prior to burn in Ponderosa Pine forest on Valle Grande Ranch, Rowe, NM. (photo by C. Conley)

shock to a forest system – and a good test of a forest’s ability to bounce back to health. Promoting resilience, say the authors, is the most commonly recommended option for foresters dealing with the uncertainty caused by climate-change.

“Resilient forests are those that not only accommodate gradual changes related to climate but tend to return toward a prior condition after disturbance either naturally or with management assistance,” they conclude.

In the second article, a group of water management experts declare dead the concept of *stationarity*<sup>2</sup>. This is the idea that natural systems fluctuate within an unchanging envelope of ecological and climatological variability. Stationarity means *normal*, in other words,



which makes it the core premise on which water-resource engineering training and practice are based, they observe.

Before you can build a dam or plan to tap a river for irrigation, for example, you need to know how much water a particular watershed could deliver and when – which means rain, which means clouds, which means climate, which means predictability. Planning requires stationarity.

But it no longer exists.

“In the view of the magnitude and ubiquity of the hydroclimatic change apparently now under way,” they write, “we assert that stationarity is dead and should no longer serve as a central, default assumption in water-resource risk assessment and planning. Finding a suitable successor is crucial for human adaptation to changing climate.”

Stationarity is dead because global warming has altered the amounts of precipitation, rates of evapotranspiration, and rates of discharge of rivers, they write. This means, as with forest conditions, the past expectations of the natural range of variability no longer apply to the water cycle. And there’s no way to turn back the clock.

“Stationarity cannot be revived,” they conclude. “Even with aggressive mitigation, continued warming is very likely, given the residence time of atmospheric CO<sub>2</sub> and the thermal inertia of the Earth system.”

We are at sea, in other words, regarding the future of our water supply. It gets worse (get ready with that drink).

The lead author on the third article, which is titled “Climate Change and Trace Gases,” is Dr. James Hansen, who is perhaps America’s preeminent climatologist. He is also the Paul Revere of global warming.

In a lengthy technical analysis, he and his colleagues argue that the Earth has been whipsawed between climate states for millennia, alternating between temper-



Ice rapidly melting on a Greenland glacier ([www.gsfc.nasa.gov](http://www.gsfc.nasa.gov))

ature highs and lows on roughly a 150,000 year cycle. Cooling periods lasting 100,000 years were followed by quick jumps in global warming, resulting in a pattern that could be studied for its predictability – until recently, that is. The current run-up in temperatures, however, does not fit the pattern.

“Recent greenhouse gas emissions, place the Earth perilously close to dramatic climate change that could run out of our control,” they write. “Only intense simultaneous efforts to slow CO<sub>2</sub> emissions and reduce non-CO<sub>2</sub> forcings can keep climate within or near the range of *the past million years*.” [emphasis added]

But it was another conclusion that caught my attention. We live in a 12,000-year old period of time called the Holocene, which is noted both for its warmth and climate stability. This latter condition is unusual; historically the planet has either cooled down enough to expand the Laurentide and Fennoscandian ice sheets, or warmed up enough to reduce the size of the ice sheets covering Antarctica and Greenland over relatively short periods of time. But neither has happened for 12,000 years.

Until now. In fact, the warming of the past several decades, say the authors, has brought today’s temperature to or near the Holocene maximum. And given the rate of greenhouse gas emissions, that maximum is certain to be exceeded – if it hasn’t been already. And they note that the evidence is manifest: the current rapid melting of the world’s ice sheets.

“The Earth, and the creatures struggling to exist on the planet, has been repeatedly whipsawed between climate states,” they summarize. “No doubt this rough ride has driven progression of life via changing stresses, extinctions and species evolution. But civilization developed...during a period of unusual climate stability, the Holocene, now almost 12,000 years in duration. *That period is about to end.*” [emphasis added]

The end of the Holocene is upon us?

They conclude: “*Rapidly rising temperatures in the past three decades evidence that the Earth is now substantially out of energy balance and indications of accelerating change on West Antarctica and Greenland indicate that the period of stability is over.*”

You can have that drink now.



“Little” normals - the only ones that matter. (photo by C. White)

This is where resilience comes in.

In ecology, there is a principle called the Adaptive Cycle in which a system (forest, swamp, desert, etc) passes through a sequence of phases over time, including rapid growth, maturation, breakdown,

## On Shore

For the past year or so, I’ve employed the metaphor of a hurricane to describe our global predicament. The hurricane stands for the combined forces of change that are rapidly bearing down upon us – global warming, energy depletion, food security, water scarcity – all of which I’ve logrolled into something I’ve called the *Age of Consequences*.

As I’ve written before, we need to do two things: work to lower the hurricane’s wind speed as much as possible (reduce greenhouse gas emissions, for instance) while simultaneously beefing up our defenses on shore. We don’t know precisely when or where the hurricane will strike, or how much destruction it will actually cause, but we do know that landfall is inevitable and so we must do everything in our power to prepare – such as build up local food systems.

But this “no more normal” business has added a big wrinkle to the picture.

Now I wonder: perhaps a hurricane is the wrong image. After all, hurricanes move along and eventually clear out, right? And after the rain and wind have stopped, doesn’t a community try to ‘return to normal’ as soon as possible? Once the sun comes out we get busy picking up the pieces of our homes and lives and begin the long process of getting back to the way things were before the storm struck.

But what if the storm never stopped? Or perhaps more importantly, what if, under climate change, we weren’t exactly sure which ‘normal’ to return to?

reorganization, and rapid growth again. The critical moment is *breakdown*, such as what a fire – or beetle infestation – does to a forest. After the ecological disturbance has ended there follows a period of recovery and reorganization, followed by growth and maturation, such as new trees after a fire for example, and so on.

Resilience is the ability of a community to hold its shape after a breakdown. When communities aren’t resilient, they can cross ecological thresholds into a new state, such as when a forest becomes a grassland after a particularly intense fire. There are social thresholds too, such as the demise of so many farming towns in the Midwest during the Dust Bowl. Or what prolonged drought did to many prehistoric villages in the Southwest.

What, then, are the differences between communities that are resilient and those which are not? I think a place to start is with what I call the ‘little normals.’ These are things that have been remarkably persistent over the millennia: such as the way water moves across the land, or the love a parent feels for a child. The metabolism of a grass plant hasn’t changed significantly in millions of years; it needs rain and minerals, of course, to thrive, but otherwise it functions ‘normally’ – as it always has. It is the same for human communities too.

We still need food to live. We like to work and enjoy relaxing, as we always have. We need a sense of community, we like to belong, we prefer marriage and the

family-scale household over anarchic social arrangements. We like to live in proximity to other people. We feel a deep affection for animals. We are moved by spiritual concerns.

These are examples of 'little normals' that I think remain largely unfazed by the changing nature of the 'big normals.' Global warming is a 'big normal' with big consequences, but it doesn't alter our need to be loved, to care for other creatures, or to be remembered. The global supply of oil may soon peak and decline, causing all sorts of rearrangements in our daily routines, but it won't change our need to eat, to play, or make music. Expanding population pressures and diminishing food stocks mean increased suffering globally, but they don't mean we stop laughing.

Resilience means seeking out the 'little normals' – the constants in human nature, including the behaviors, institutions, and durable scales, to paraphrase Aldo Leopold, that have stood the test of time – and reengaging with them meaningfully.

As an example, here's a quote from Dr. Fred Provenza that I found in classroom materials he prepared for his students at Utah State University this spring:

"With the advent of peak oil and the return to local economies...we will learn once again what it means to be locally adapted to the landscapes we inhabit. There will also be a need to produce livestock in ways that match seasonally available forages with production needs, and that match animals anatomically, physiologically and behaviorally to local landscapes by culling animals unable to reproduce with minimal help from humans and creating grazing systems that enhance the well-being of soils, plants, herbivores and people."

What Fred is describing is the foundation of what some of us have begun to call a new agrarianism – the integration of food, fuel, forests, wildlife, restoration, grassroots action, and many other local activities that make up the stuff of resilience and help us keep our shape in this era of uncertainty.

We know the storm is coming, and in many places it has already arrived. We know that there is no more normal from here forward in the big picture – and that things will be different at a variety of scales, perhaps very different. The question now is how to keep our shape – how to avoid a catastrophic breakdown that

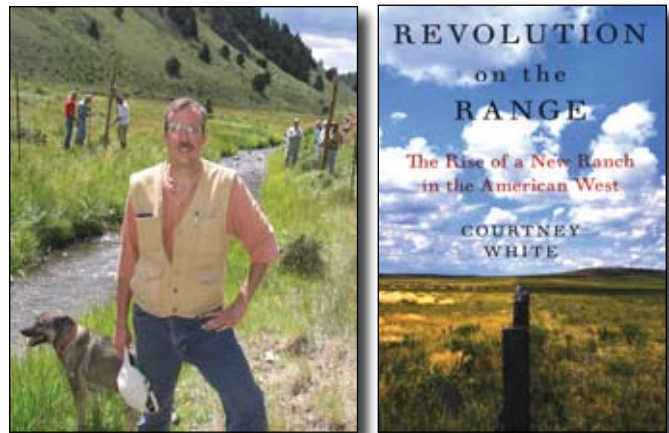
pushes us over important thresholds from which a return is not very likely. The answer, it seems to me, lies among the "little normals" of our lives. This is where we should turn our attention. 22

[1] "Climate Change and Forests of the Future: Managing in the Face of Uncertainty" by C. Millar, N. Stephenson, and S. Stephens. *Ecological Applications*, vol. 17, no. (8) 2007, pp. 2145-2151.

[2] "Stationarity is Dead: Whither Water Management?" P.C.D. Milly, J. Betancourt, M. Falkenmark, R. Hirsch, Z. Kundzewicz, D. Lettenmaier, and R. Stouffer. *Science*, vol. 319, no. 5863 (February 2008), pp. 573-574.

[3] "Climate Change and Trace Gases." J. Hansen, M. Sato, P. Kharecha, G. Russell, D. Lea, and M. Sidal. *Philosophical Transactions of the Royal Society*, no. 365 (May 2007), pp.925-1954.

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Courtney's new book *Revolution on the Range, The Rise of a New Ranch in the American West*, published by Island Press, is available through The Quivira Coalition website: [www.quiviracoalition.org](http://www.quiviracoalition.org). Click on the On-Line Store button.



## Research

# Local Beef: An Opportunity to Seize, part 2

By Sarah Laeng-Gilliatt

A Joint Project of The Quivira Coalition and the New Mexico Acequia Association.

*[This is a continuation of the article published in Journal No. 32. The article in its entirety will be published on our website. This article was written in the fall of '07. Note that some numbers may have changed since then, though not significantly.]*

### **Promising Initiatives in Localizing Food**

Across New Mexico and the US, there are a number of initiatives to build food sovereignty. People are taking ownership of their local food systems, and thus building local resilience and self-reliance. Two local projects in New Mexico are described below, as well as a strategic range of efforts in Woodbury County, Iowa. It is apparent that change will require rebuilding the capacity and infrastructure of the vast and complex web of relationships and capabilities that characterize a viable food-shed – from production to processing, distribution, marketing and finally to an educated consumer base.

#### **1) The Mobile Matanza**

Twenty years ago, Pati Martinson and Terrie Bad Hand started the Taos County Economic Development Corporation (TCEDC), an organization that seeks to guide Taos' economic development and create growth that does not undermine the largely agrarian and land-based culture. TCEDC recently launched a new program – the “Mobile Matanza,” a slaughtering unit that travels directly to small-scale livestock producers within a 100-mile radius of Taos to provide an essential service and fill a void created by the ever-shrinking local meat processing infrastructure.

Inspired by mobile slaughtering units elsewhere – throughout Europe, and some in Hawaii, California, and Washington state – TCEDC's Mobile Matanza project provides ranchers in northern New Mexico access to a facility where they can slaughter and de-hide cattle, pigs, sheep, goats, bison and yak. The meat is then processed (aged, cut and wrapped) and delivered to markets selected by the producers. The



The TCEDC's Mobile Matanza. (photo by S. Laeng-Gilliatt)

Mobile Matanza can make the rounds in northern New Mexico, processing up to six head of cattle, 32 hogs, or 48 lambs a day, before making deliveries to meat processing facilities or returning home to the TCEDC office. TCEDC also has a certified commercial kitchen in town that producers can use to create “value added” products, like sausage. Another advantage of the Mobile Matanza is the ability to provide custom cuts of meat. As TCEDC's Gilbert Suazo says, “We don't want to be your standard cut and wrap.”<sup>24</sup>

TCEDC's focus is on helping low-income farmers and underserved communities. They do this in many ways. They have a strong educational component, building on the vast knowledge of local producers to strengthen business skills. They provide assistance with the permitting process, labeling, state and federal regulatory requirements, cooperative marketing, consumer education and building relationships with local grocery stores. TCEDC's program helps livestock producers interact with a full range of markets – from high end restaurants that want gourmet cuts and grassfed/organic products to institutional markets such as schools, prisons, and food banks.

The TCEDC's Mobile Matanza, however, does not operate without challenges. In an economy that has seen fossil fuel prices soar, the principle challenge to the Matanza right now is, in fact, its mobility. Currently the Mobile Matanza, housed in a semi-truck, gets eight miles/gallon (when pulling the trailer empty), but with only minor modifications, it has the potential to run on biodiesel fuel.

In addition to the rising cost of fuel, northern New Mexico ranchers are also faced with the challenges of rising feed and production costs, skyrocketing real estate values and associated property taxes, decreasing water supplies, and other challenges. In response, area ranchers look to the Matanza to help them not only hold on to their traditions, but also increase their capacity and income. When TCEDC conducted a survey of ranchers and inquired whether ranchers thought they would use the Matanza, they received an overwhelmingly positive response rate of over 90%.

The dedicated group at TCEDC has high hopes for this program, as do many livestock producers in northern New Mexico. The region provides fertile ground for such a project and all parties involved are encouraged by the vital role the Mobile Matanza can play in helping to sustain local agricultural communities.

## **2) La Montanita Co-op's "Food Shed" & "Freezer Beef" Projects**

La Montanita Co-op, incorporated in 1976 with stores in Albuquerque, Santa Fe and Gallup, is owned by its 14,000 members. Responding to the fact that our "current food system is dependent upon the unsustainable economics of transporting the majority of our food very long distances," the Co-op has dedicated itself to creating a more resilient system that (1) promotes local food production and distribution; (2) decreases our reliance on the long distance transport of food; and (3) ultimately reduces our region's carbon footprint. They call their program the Food Shed Project,<sup>25</sup> playing off the more common term 'watershed,' and define the term 'Food Shed' as the "flow of food from the area where it is grown and processed to the place where it is consumed." The Co-op's program intends to relocalize that flow.<sup>26</sup>

The Co-op has also responded to the fact that many



Pati Martinson and Terrie Bad Hand at the dedication ceremony for the Mobile Matanza. (photo by C. White)

small agricultural producers find that direct marketing to the public is difficult and not an efficient use of their time. The Co-op, therefore, provides an alternative for local retail. "Farmers and producers throughout this region can either sell their products direct to Co-op locations or utilize the services of our Cooperative Distribution Center's (CDC) warehouse to expand their markets and save on gas and transport costs. The CDC also offers local producers post-harvest and production cooler/freezer space and storage."<sup>27</sup>

Steve Warshawer, in charge of enterprise development for the Co-op, contends that livestock should be the heart and soul of New Mexico's agricultural system because animals themselves can help build soil fertility in this arid landscape. Otherwise, he says, in addition to crop rotation and green manuring, organic farmers need to import seaweed or other inputs, often from far away, to improve the soil. The Food Shed Project, therefore, is working with livestock producers to further develop the meat industry in New Mexico.

As a sub-program to the Food Shed Project, the Co-op has researched a Freezer Beef Project<sup>28</sup> – a program with the goal of "improving economic opportunities for participating ranchers while rewarding them for good land stewardship practices."<sup>29</sup> According to Warshawer "freezer beef" is simply a volume meat purchase that is processed and immediately frozen by the processor

and purchased and stored by the individual or family. In the past, in many towns, 'meat lockers' were rented out and families purchased their meat in the fall, when the largest amount of beef is processed, and stored the meat in their own locker. . . [now] lockers have been replaced with freezers [in homes]."<sup>30</sup>

Through this project, the Co-op initially considered selling beef in halves and quarters, and later offering smaller quantities. Purchasing a half animal, or "side" of beef, is the most economical way to buy beef from the standpoint of the consumer, and it also benefits the rancher in that there are no remaining parts that need to be marketed elsewhere. Each side consists of ~150 - 225 pounds of meat, custom cut, wrapped, and ready to be defrosted and cooked. Generally, about thirty pounds of the total weight are the prime cuts, and the remaining meat is ground beef, stew meat, fajita meat, steaks, and roasts. This grass-fed, grass-finished, and organic beef averages \$6 - \$7 per pound, which is only \$1 - \$2 more per pound than commodity prices, but for a superior product. The Co-op has found that less desirable cuts do not sell as well when marketed on their own, and thus this pricing scheme is an attempt to balance the prices of the less desirable cuts with the prime cuts.

The Co-op has also researched the possibility of offering \$100 - \$250 "special cuts packages" that would have higher per pound prices. The trouble with this sort of marketing is that the Co-op is bound to sell all the good stuff and be left with an abundance of the less desirable cuts. In response, the Co-op has approached a number of ranchers to ask if they would be willing to do the direct marketing of the lesser cuts to institutions like schools and hospitals.

A central goal of the Freezer Beef Project is to build a successful purchasing strategy for middle and lower income families. As Steve Warshawer says, "direct marketing can be elitist and classist. Only a select few have the resources and time to secure specialty local foods under the limiting conditions of direct marketing and these are generally the more affluent buyers. People of lesser income are not the buyers of filet mignon and other prime cuts. The people who prefer those cuts are not being asked to pay what it really costs to produce those cuts. Surplus ground beef and

roasts are a constant problem, throughout the meat industry."<sup>31</sup>

Warshawer goes on to say that "One way to address that problem and make higher quality local food accessible to more people would be to proportionally raise the price of the prime cuts, to support radically lower costs for the ground beef and other cuts. If affluent buyers want filet mignon to be available, it is important they spend \$30 a pound, enabling us to offer ground beef at \$1.99 - \$2.99 a pound, so that we don't have the surplus of lower grade beef that is so problematic." But it's not just by paying that the affluent can be part of solutions; it is also by changing lifestyles and by conserving, Warshawer is quick to add.<sup>32</sup>

Robin Seydel, Membership Director at the La Montañita Co-op, explains that the promotion of beef that is born and raised in New Mexico is the consumer education component of the Freezer Beef Project. Buying local meat helps to maintain local production capacity for a strong local food-shed.

Seydel adds that in addition to contributing to land health, local grassfed beef also contributes to human health. Not only do local consumers build a relationship with local producers, and in doing so, acquire quality production standards, but local, grassfed beef also meets the demands of a market that wants meat containing good cholesterol, conjugated linoleic acids, low fat content, and few of the endocrine disrupting chemicals that are often concentrated in fat. Local producers usually raise grassfed beef that meets consumer health concerns by not using hormones, antibiotics or processed feeds.<sup>33</sup>

Given that one of the principle goals of La Montañita's project is to reward good land stewardship, local environmental health is an inherent byproduct of the program. In addition, the development of local meat production and processing systems represents a tremendous economic development opportunity.

### **3) Woodbury County, Iowa**

A local food system is a complex web. Rob Marqusee, the economic development planner from Woodbury County, Iowa, points out that any one strategy for creating a local food network is rather meaningless in itself if not included in an over-arching strategy for a



region. Woodbury County, Iowa, is leading the way in developing a model for such an overall strategy in hopes of making organic and localized agriculture a key part of Iowa's economy. The county has a number of different tactics that all mutually reinforce each other. First, the local county government is playing an important role by demonstrating its commitment to helping local, organic farms. In June of 2005, they passed a law that gives farmers a 100% tax rebate on land converted to organic production (for up to five years). Currently there is a proposal to make the property-tax break applicable statewide. Then, in January 2006, the county legislated that food bought by the county must be organically produced and processed within a 100-mile radius, if such food is available.

The commitment of Woodbury County's government to local, organic agriculture has spawned a number of other efforts. The local community college has created a degree program in organic agriculture and Woodbury County has provided 15 acres as a farm laboratory. In addition, Woodbury County has hired a local foods broker. The county also now has a restaurant that strives to serve 80% local food, and a food education center. Lastly, Woodbury County is home to a cooperative of 30 farmers and several meat producers with an umbrella insurance program for all the producers in the co-op.

Woodbury County aims to create a local demand-driven system so that farmers can be assured of a stable market. A grassroots group of chefs, farmers, educators, healthcare professionals, and consumers, called *Sustainable Foods for Siouxland*, promotes local, sustainable agriculture. The group has bought processing equipment, is working towards a regional food label, and has helped to make a local farmer's market a year-round event. Woodbury County has an organic farmer network, a vibrant mentoring program, a web-site that has an exchange board - where, for example, one can post an ad for land needing a farmer, or a farmer needing land, and an annual Organic Growers Conference.

The Center for Transportation Research & Education and the Leopold Center for Sustainable Agriculture at Iowa State University have developed a computer program called the Iowa Produce Market Potential Calculator. This program calculates supply and demand

for the entire state, as well as by county, for the 37 fruits and vegetables that are most commonly grown in Iowa. For example, Woodbury County consumes over 1,872,000 pounds of tomatoes annually, but only produces 150,000 pounds, losing a possible \$640,000 in farm revenue each year. The calculator informs farmers and economic development planners that if, for example, 25% of the tomatoes consumed in Woodbury County were produced there, this would provide farmers with \$118,000 more in farm revenue than what they are currently earning at current production levels.<sup>34</sup>

Lastly, the upcoming Woodbury County Comprehensive Land Use Plan includes farm preservation and conservation development, and the development of a local produce and meat brand or label. Each of these individual efforts becomes more viable in combination with the larger regional effort, and they all work together to support a common vision for a strong local economy with agriculture at the center.<sup>35</sup>

## Concluding Themes

### 1) Scale and Size

Scale and size are complex issues, with many dimensions, for both producers and consumers, but a few basic points are important to this discussion. For local supply to meet local demand, at least in terms of staple goods, the most efficient scales must be identified. There is increasing research showing the relative efficiency of local and regional scale production.<sup>36</sup>

The three case studies above profile groups working at different scales of production. The Mobile Matanza has the capacity to process eight animals daily; La Montañita Co-op's Food Shed Project has a goal of distributing 20 times as much food as they do currently; and Woodbury County not only advocates for local consumption of locally produced food, but also works to build export markets for organic food from their region (the export work was not discussed above because the author believes their local-to-local work is more groundbreaking and promising in our current economic climate that privileges large-scale production for export).

The Mobile Matanza work shows clearly how vital

it is to actively protect and nurture very small scale production, for it supports values – subsistence living, tradition, culture, a land-based lifestyle – that other scales simply cannot provide with the same degree of richness, depth, and meaning. This is important everywhere, but is especially crucial in New Mexico.

Furthermore, it is important to question commonly-held beliefs about large-scale production. The academic literature actually points to the fact that economies of scale and size are often overrated.<sup>37</sup> Ken Meter of the Crossroads Resource Center, who analyzed research done on economies of size, states that “farms, rural businesses and food processors have all become larger than economies of size would dictate. . . . The academic literature shows that firms have become larger not because of economic efficiency, but rather due to a cluster of more important influences: (a) access to capital; (b) federal taxes, incentives and subsidies; (c) advertising presence; (d) accumulation of power by larger firms; (e) artificially low energy costs; and (f) economic infrastructure that fosters expansion.”<sup>38</sup>

Meter writes, “Underlying all of these is the assumption that larger is more efficient. However, that assumption is more robust than the economic reality.”<sup>39</sup> Furthermore, as local food advocate Michael Shuman points out, there are many current trends, such as the price of oil and growing environmental consciousness, which are actually serving to *shrink* economies of size.<sup>40</sup>

All agricultural producers, but especially small-scale producers, must constantly examine issues of scale, asking themselves ‘what is my ideal scale of production for efficiency, financial viability, and quality of life?’ Sometimes the considerations and interests of large corporations, as opposed to family-scale producers, are different from those of the communities they serve. As Meter writes, “larger firms may create problems for communities. Concentrated power creates barriers to entry for smaller businesses, and tends to create social relations of dominance and dependency, extractive economic relationships, and externalized costs. While any given firm may tally these as positives for the firm, all are negatives for both rural communities and the broader society.”<sup>41</sup>

## **2) Strengthening Local Food Systems as an Economic Development Strategy**

As the initiatives discussed above demonstrate, there are many communities where leaders are convinced that local, organic agriculture can be a major engine for sustainable economic development, and people are investing time, money, policy and a great deal of creativity in this sector.

As Michael Shuman characterizes it, localization involves moving away from the usual economic development path that focuses on: (1) recruitment - the luring of large businesses to one’s area through subsidies in the hope of garnering jobs; and (2) trying to export one’s products far and wide. Instead, communities should focus on local ownership and import substitution, that is, building local self-reliance and community resilience.<sup>42</sup>

Local control over a food system has many benefits. Not only does it generate revenue and strengthen the local tax base, but it also increases the circulation of money through a local economy. This idea of keeping revenue circulating in a relatively closed system is called the “local multiplier” and it is the basic building block of a strong local economy. An example of a multiplier might work like this: a local school buys food from a local farmer, the local farmer buys compost from a local rancher, the rancher sends his daughter to UNM, which in turn buys food from another local farmer. The more times, and the more quickly money circulates throughout the local economy, the healthier that economy becomes.

Another benefit of local ownership is that local businesses are usually deeply rooted in a particular community and thus are much less likely to leave and create a hole in the local economy. Furthermore, a region can decide to increase environmental and labor regulation and local businesses are far more likely to adapt, as opposed to larger corporations, which are likely to move their businesses to places where the standards are not as highly regulated. And lastly, as Shuman notes, local businesses are much more apt to succeed than non-local businesses; the latter need very high rates of return, whereas the former merely need to be making a profit.<sup>43</sup>

The second point on which Shuman focuses is

import substitution. This involves analyzing what people consume and where it comes from. If it is imported, or bought from a non-locally-owned store, money immediately leaks out of the local economy and doesn't build the multiplier.<sup>44</sup> A recent study in Chicago by the Andersonville Development Group showed that for every \$100 in consumer spending with a local firm, \$68 remains in the Chicago economy, as opposed to only \$43 remaining local when the consumer shops at a chain firm.<sup>45</sup>

Shuman suggests being strategic about localizing. The first step is to analyze where the biggest leakages exist. From there, the community must clarify their goals, assess local assets, and lastly, work to create businesses that fill the biggest leaks. He also encourages communities to work on many levels, all of which should mutually support each other, including local planning, local entrepreneurship, local investing, local purchasing, and local policy-making. With regard to policy-making, Shuman suggests that subsidies go to locally owned businesses, which they rarely do.<sup>46</sup> Perhaps state governments should make the decision to only subsidize locally-owned farms that are socially and ecologically responsible and primarily sell within the state.

A focus on economic development also leads communities to consider the economic impact of losing agricultural land to development. Given rising property and estate taxes, and the extreme financial pressure farmers *already* bear, selling one's land to developers often appears to be the only viable option for economic independence. Municipal and county leaders also are often tempted to sell agricultural land in return for what may seem to be a more lucrative housing development. Because of these dynamics, the landscape of northern New Mexico is being transformed with agricultural land disappearing every year. Where

once cattle grazed, ranchettes now sit on subdivided 40 acre plots. Rancher and founder of the New Mexico Acequia Association, Harold Trujillo, describes how traditional ranchland near his property in Mora County now sits adjacent to an area that recently forgot its farming roots and became the gentrified community of Rio de la Casa.<sup>47</sup> In order to shift future development priorities, we need to know more about the realized value of such developments in comparison to the value of a community's ability to grow food and feed itself. A national study on the economics of developments recently found that the cost of providing services to developments often outweigh the economic benefits of the developments themselves.<sup>48</sup>



Direct marketing grassfed beef at The Quivira Coalition's 2007 "Roundup of Local Flavors", September 14, 2007. (photo by T. Gadzia)

Another gain from localizing food systems is that more of the food dollar stays with the farmer, instead of going to "the middle man." Joel Salatin, local food leader and author, explains that farmers today typically only receive 19 cents of the food dollar, with beef capturing a bit more than that, and produce garnering a bit less.<sup>49</sup> Through direct marketing, however, local

producers can retain more of the food dollar.<sup>50</sup>

Direct marketing is labor intensive for a small agricultural operation. In order to make it an economically viable way of producing and distributing local meat, the consumer needs to understand all of the steps involved in creating income for a rancher beyond just raising a healthy animal. Direct marketing entails: dealing with customer questions and orders; transporting live animals to a processor; working with the processor around cutting instructions; attending to details related to packaging; paying extra costs to register and produce labels; meeting regulations on labels; having affidavits of production standards on file; picking up the meat; paying the cost of cold storage; transporting the meat to and from farmers markets; and investing in a portable store to take to market



(with tables, an inverter, a freezer, computerized record keeping equipment, a charge card machine, etc). All this is added to the full-time duty of running a ranch. Given the extra responsibilities of direct marketing, it is clear why many beef producers prefer to sell their cattle into the conventional distribution system, thus letting the production chain take on much of the work.

## Conclusion

The promises of local beef present northern New Mexicans with tremendous opportunities for culturally wealthy, vibrant communities in deep, practical connection with the nurturing ecosystem, as well as economic development, greater access to healthy food, and real choices in what we eat. Historian and acequia

*parciante*, Estevan Arrellano describes so passionately how people today eat ground beef from McDonald's or Lotta Burger, but like they did traditionally, people could instead cook *morcilla* for blood tacos, make *carne desebrada*, or eat *tacos de lengua*. These traditional dishes not only bolster fading cultural customs, but also require using most of the animal, and therefore waste little in the process.<sup>51</sup> Hopefully people will remember how to live more slowly, rekindle a taste for local specialties, revive traditional recipes, develop new ones, and spend time eating with one another. Perhaps in northern New Mexico all segments of society can relish the delights of forgotten delicacies.



(Contact Sarah Laeng-Gilliatt at sarahlg@comcast.net)

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### End Notes (continued from Part I)

24. From a conversation with Gilbert Suazo at Taos County Economic Development Corporation, October 5, 2007.

25. The Foodshed Project will be given a new name in the near future.

26. From a conversation with Robyn Seydel at La Montañita Co-op, September 5, 2007. For more information on the Co-op, see <http://www.laMontañita.coop/>.

27. Ibid.

28. The freezer beef project has been put on hold since the time this article was written. Nevertheless, the skillful conceptualizing done by people at La Montañita remains highly instructive, and it certainly is a great initiative for someone to take on.

29. Warshawer, Steve. 2007. "Beneficial Beef: Freezer Pilot Project." The Co-op Connection, September Issue: pg. 1.

30. Ibid.

31. From a conversation with Steve Warshawer, September 4, 2007.

32. Ibid.

33. See endnote 26 above.

34. Calculations derived from the Iowa Market Potential Calculator, see [www.ctre.iastate.edu/produce/produce/](http://www.ctre.iastate.edu/produce/produce/).

35. For more information on Woodbury County, see [www.woodburyorganics.com](http://www.woodburyorganics.com).

36. Rosset, Peter. 1999. "The Multiple Functions and Benefits of Small Farm Agriculture, in the Context of the Global Trade Negotiations." Institute for Food and Development Policy (Food First), Policy Brief No. 4; <http://www.foodfirst.org/en/node/246>, accessed on June 3, 2007.

37. Meter, Ken. 2004. Unpublished manuscript. "Economies of Size Considerations for Hiawatha Fund." Minneapolis: MN, Crossroads Resource Center, pg. 3.

38. Ibid.

39. Ibid.

40. Shuman, Michael H. "Amazing Shrinking Machines: The Movement toward Diminishing Economies of Scale." New Village Journal: Building Sustainable Cultures, Issue 2; [www.newvillage.net/Journal/Issue2/2amazing.html](http://www.newvillage.net/Journal/Issue2/2amazing.html), accessed on January 3, 2008.

41. See endnote 37 above; pp. 3-4.

42. From a public talk by Michael Shuman, "Going Local in New Mexico" in Santa Fe, New Mexico, April 6, 2003.

43. Ibid.

44. Ibid.

45. Civic Economics. 2004. The Andersonville Study of Retail Economics; <http://www.andersonvillestudy.com/AndersonvilleStudy.pdf>, accessed on September 20, 2007.

46. Shuman, Michael. 2006. The Small-Mart Revolution: How Local Businesses are Beating the Global Competition. San Francisco: Berrett-Koehler Publishers. Also see articles by Michael Shuman in the Institute for Nonviolent Economics Newsletter, March 2005; <http://www.nonviolenteconomics.org/INE%20Newsletter,%20March%202005.pdf>

47. From a conversation with Harold Trujillo, October 2007.


48. See American Farmland Trust, Cost of Community Services Studies; [www.farmland.org/services/fiscalplanning/default.asp](http://www.farmland.org/services/fiscalplanning/default.asp), accessed on December 18, 2007.

49. Salatin, Joel. "Building a Local Food System that Works." A talk at the Holistic Management Conference, Albuquerque, New Mexico, November 2, 2007.

50. Morris Grassfed Beef Summer Newsletter. 2004. pp. 1-2; [www.morrisgrassfed.com/Newsletter/Summer\\_2004.pdf](http://www.morrisgrassfed.com/Newsletter/Summer_2004.pdf), accessed on January 2, 2008.

T.O. Cattle Company – Morris Grassfed Beef in California itemizes their invoices to explain to their customers where their beef dollars go. They write: "\$2.38/lb. (hanging weight) goes to T.O Cattle Company, \$23 per split-half goes to Los Banos Abattoir, \$0.65/lb. goes to the butcher, \$15 per customer is for delivery (refrigerated truck rental and gas), and extras, such as money for organ meats, goes to T.O Cattle Company." They value the other businesses that get paid in the process, writing "When you buy local food, you are not only supporting small family farms, but all of the businesses that make up a local community. The above businesses appreciate your support too."

51. From a conversation with Estevan Arrellano, September 2007.

 A list of additional resources will be available in the on-line version of the article.



Upper left: Bennet and Seth Crews, at one years old, sons of Ted Crews and grandsons to Tuda Libby Crews and Jack Crews, reflect thoughtfully after a hard ride on their grandparent's ranch in Bueyeros, NM (photo by Ted Crews). Upper right: Skye Franklin discovers plenty of bugs along Comanche creek. Middle left: friends celebrate making it to the top of Little Costilla Peak at 12,584 ft. Middle right: Valle Grande Ranch calves. Lower left: Tamara Gadzia and Bill Zeedyk walking Gold Creek (photos by A. Anderson). Lower right: "fire in the sky", Shuree Lodge, Valle Vidal (photo by T. Gadzia).





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