"The Edge of Chaos"
Conservative Innovation

Creativity is the ability to introduce order into the randomness of nature.[1]

Do you take advice from more than one source? Do you test out new practices to see how valuable they are? Do you tell others about your time tested practices? Do you look to the experts of the past as well as those in the present? Do you take time to weigh novel suggestions against practices you know work well?

Introduction

Artists, writers, and visionaries have said that creativity is a profound expression of humanity.[2] While that may be, creativity isn't limited to humanity alone. Innovation is at the root of ecological processes. In the non-human natural world, we know innovation under the name of evolution.

One parable of evolution is known as the gene for gene hypothesis. In 1956, Flor observed that when flax developed a resistance to the agricultural rust Malampsora lini, the rust in turn evolved and overcame flax's resistance. Flor theorized that a host organism has a gene controlling its resistance to a pathogen. A pathogen has a corresponding gene that controls its ability to overcome a host organism's resistance. When a host organism's genes evolve, the dependent pathogen's genes evolve in response to survive.[3] This is coevolution. In coevolution, organisms that are mutually dependent on each other also mutually shape each other as they adapt to changes in their environment. [4]

However, innovation travels hand-in-hand with its complement, conservation. Conservation is the established knowledge of past traditions. If innovation is incorporating new ideas and practices into a system, then conservation is what tempers those ideas and makes them applicable to the situation. For example, a farmer might decide to grow a crop that her peers aren't growing in order to tap into a new market. However, the farmer's success depend on his or her knowledge of the plant itself, on how well-suited the crop is to the area, and whether the demand for the crop is enough to support the cost of its production. In order to be beneficial, the farmer's creativity must be informed by practical knowledge. Like innovation, conservation is a law of nature. In the case of the gene for gene hypothesis, the rust gene for pathogenicity co-evolved with the flax gene. Through evolution, organisms tailor themselves to their specific environments and situations. In a nutshell, co-evolution is informed innovation.

Conservation and innovation can contribute to a system or farm's resilience. But without the presence of both, the two can also cause trouble. The key questions of conservative innovation in resilience are: How can innovation and conservation complement each other? How does an innovation spread? And how is conservative innovation shaping the resilience of local food systems today?

To look at conservative innovation in Southern local food systems, we conducted both quantitative and qualitative research. In our qualitative research, we interviewed over 30 farmers, vendors, processors,

---

[1] Attributed to Eric Hoffer, longshoreman and author of True Believer and many other books.
[2] http://worldbooksdownloads.com/it/Explaining-Creativity-The-Science-of-Human-Innovation/p1295300958/
[3] http://www.annualreviews.org/doi/abs/10.1146/annurev.py.09.090171.001423?journalCode=phyto
[4] http://www.annualreviews.org/doi/abs/10.1146/annurev.py.09.090171.001423?journalCode=phyto

and farmer's market managers. This helped us define conservative innovation and develop an in-depth understanding of how it affects local food enterprises. Throughout the chapter, we use some examples from these interviews to illustrate how conservative innovation might look in practice.

As a farmer, food vendor, chef, or consumer reading this chapter, consider how conservative innovation applies in your enterprise, community, and food sources.

Adaptation in Complex Systems. An important distinction here is the difference between innovation and transformation. In literature on ecological resilience, innovation is also known as adaptability. Adaptation is here defined as "the capacity of actors in a system to influence resilience." [5] An adaptation is an incremental change. Its effects can be important, but ultimately its reach is limited. In a later chapter we discuss transformation. Transformation is a system-wide reaction to a strong disturbance.[6] The line between adaptation and transformation isn't always clear cut. Some changes may be adaptations at some scales and transformational at others.[7] We separate the two to differentiate between the mild adjustments used to make a system more flexible and the overarching, ground-shaking transformations that come after a wave of system-wide disturbance. However, both disturbance and adaptation take place within complex adaptive systems.

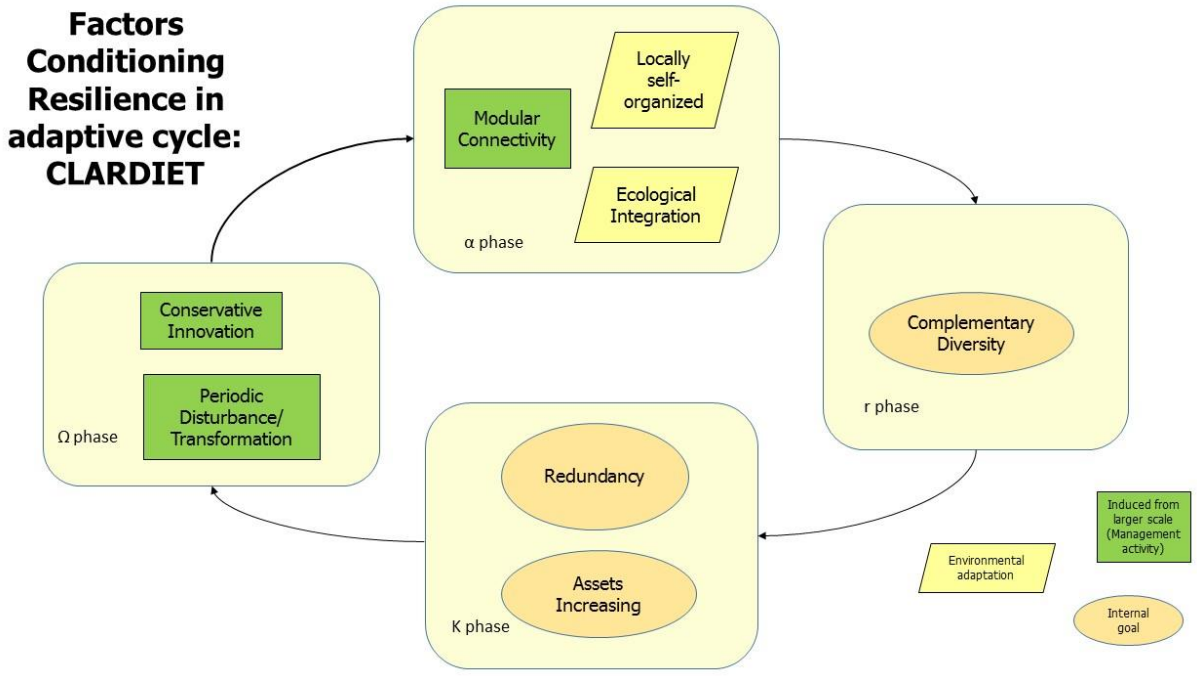

Figure 1. Relationships of the eight qualities of resilient systems. Note that transformation and innovation occur in and sometimes cause the omega or release phase which is required for the system to enter the alpha or reorganization phase.

The way that a complex adaptive system changes is determined by probability, not certainty. As a result, it is impossible to predict the future or even the past of a complex adaptive system.[8] This is because

[5] p. 2, ftp://131.252.97.79/Transfer/WetlandsES/Articles/walker_04_socio-ecology_resilience.pdf
[6] http://www.pnas.org/content/109/19/7156.full
[7] http://www.pnas.org/content/109/19/7156.full
[8] https://www.innovation.cc/peer-reviewed/rogers-adaptivesystem7finalv10i3a3.pdf

such systems contain an element of chaos. Chaos helps generate innovations, which in turn shape the course of a system. Usually the word "system" brings to mind organization and repetition. However, systems resort to chaos when they face a problem that their normal processes can't solve. Or, more elegantly put, "the edge of chaos is actually where complex systems go in order to solve a complex task."[9]

Innovation isn't usually a goal in and of itself. Instead, it's used as a tool in the face of new challenges. The chart in figure 1 depicts the relationship between conservative innovation and other aspects of resilience. Conservative innovation is a "management activity" used to achieve desired outcomes. As the chart shows, conservative innovation is perhaps most heavily used between the *α* (reorganization) and *r* (growth) phases. Although arguably conservative innovation is present at all stages of the adaptive cycle, it is primarily in times of crisis that a complex system will turn to the fringes of chaos for answers. When the system experiences disturbances, its usual patterns and technologies are no longer the best fit for the situation. In order to create a new "normal," the system will need to adapt.

Adaptation requires flexibility. When Delta Land & Community first drafted a hypothesis of the eight causal factors of resilience, the original name for this factor was conservative flexibility. While "innovation" trumped "flexibility" as the more intuitive name in the end, flexibility is perhaps most apt to describe how appropriate adaptation occurs. In order for an innovation to become widespread, it must be relatively easy to re-invent in ways that adapt it to differing circumstances.[10] In other words, the innovation must be flexible. Genrich S. Altschuller, the 1960s Soviet Navy patent, discovered something similar when he compiled his own theory of innovation (known as TRIZ) after sorting through thousands of patents. He categorized solution-oriented innovations into four levels. What he found was that the vast majority of innovations are actually adaptations (Levels 1-3, 95 percent) made to existing systems and technologies.[11] [12] That is, the innovations were flexible enough to adapt to new situations and problems.

Level	Description	Percent of Innovations (%)
1	Common design flaws addressed by well-known methods. No innovation.	32
2	Small improvements to existing technologies/systems addressed by well-known methods.	45
3	Major improvements to existing technologies/systems addressed by lesser-known methods.	18
4	Development of new technologies/systems to replace problematic old technologies/systems.	4

[9] P. 313, http://www.researchbooks.org/0671872346/COMPLEXITY-EMERGING-SCIENCE-EDGE-ORDER/
[10] P. 7, https://www.innovation.cc/peer-reviewed/rogers-adaptivesystem7finalv10i3a3.pdf
[11] http://www.triz.org/triz/levels
[12] http://ir.uiowa.edu/etd/233/

5	Discovery of new phenomena or creation of a new system.	1

Lessons from ecology show how different innovations are better suited to different environments. Plants largely propagate themselves in one of two ways: by resprouting from existing tissue (perennials) and by sending out seeds (annuals). Although both types might be present in any given climate, resprouting is especially prevalent in moist and fertile areas that are less prone to forest fire, such as rainforests and colder climates. Resprouting has advantages over seedlings in these areas because the aboveground portion of the plant can regenerate more rapidly. Seedlings, on the other hand, tend to survive better than resprouting plants in areas with a lot of disturbance, such as forest fires. Though it is difficult for both types of plants to survive arid climates, seeding plants tend to endure better, especially considering reduced competition from resprouting stems. Though each method of reproduction has a complex evolutionary history, and both are often present in an ecosystem. However, in each case plants adopted one of these two types of reproduction in response to their environments.[13]

In one of our case studies on socio-ecological resilience and local food systems, we came across a group of young urban farmers who launched a community garden:

> Their initial goal was to improve fresh food access in "food deserts," or places that "lack access to affordable fruits, vegetables, whole grains, low-fat milk, and other foods that make up the full range of a healthy diet." [14] One innovation that has become a popular approach to addressing food deserts is community gardening.[15] The young farmers found a plot of unused land nestled in the middle of one of the city's poorer neighborhoods and obtained permission to turn it into a community garden.
>
> The results of the garden are mixed. The farmers hoped that the neighborhood's inhabitants would see their work, become interested, and eventually take over. Though a few from the community have shown interest in the produce, very few have asked to help out in the garden. As time went on, most of the young farmers that started the project lost interest, and now only one member does most of the labor and managing of the garden. This does not, however, mean that the surrounding community doesn't benefit from the produce. In fact, much of the harvestable produce is taken by passersby. On the one hand, then, the garden is succeeding in improving fresh food access in the neighborhood.
>
> On the other hand, the garden work has not been taken on by the community as the young farmers initially planned. As a result, the one farmer who the bulk of the work has fallen to is discouraged by the disappearance of its harvest. The garden is now essentially run as a non-profit urban farm. The lone young farmer managing it sells the remaining produce at a weekly farmer's market, and he is considering putting a fence around the garden to prevent loss and damage. Though community gardens are being applied in cities across the country as a way to ease food deserts, not all are fully successful. In this particular case, none of the young farmers who started the garden lived in the neighborhood where the garden was started. Though the last farmer standing has developed some relationships with the passersby he sees daily, he is

[13] http://www.uv.es/jgpausas/papers/Pausas-Keeley-2014-NewPhytol_resprouting-seeding-model.pdf
[14] http://www.cdc.gov/Features/FoodDeserts/

not a part of the community. Having leadership from within the neighborhood itself can increase the chances of a garden's success and sense of community.[16] Although most of the young farmers are from the same city as the neighborhood's inhabitants, they occupy a different demographic and have limited ties to the neighborhood itself. This is an example of innovation applied without full understanding of the surrounding (social) ecology. When talking about socio-ecological systems, the spread and success of an innovation is a largely social process.

In this case the farmers who constructed the garden missed out on the conservative value of innovation, acting without sufficient consultation or understanding of the area. How often are solutions made by outsiders who don't fully understand the local problems? When it comes to conservation, or innovation, it requires parts of local self-organization as well to harbor local sensitivity and feedback for the future. How would you have addressed this city garden differently?

The Spread of Innovation. Innovation and its spread has been looked at in many ways. In his influential work on innovation, E.M. Rodgers talks about the "diffusion," or spread, of innovations.[17] Whether or not a technology qualifies as an innovation depends on how recently it has been introduced and how widely it has been adopted. The success of an innovation's diffusion is a social question. It depends on whether it has ultimately been accepted or rejected by a community. According to diffusion theory, there are four main stages a successful innovation goes through. Each stage is defined by the portion of the population in a given place that have adopted the innovation.

The theory divides any group of people adopting an innovation into **innovators, early adopters, early majority, and late majority**.

Innovators are the very first adopters. They are in the first lines of testing out a new idea or technology—and as such, they usually take big risks. Aside from the financial, ecological, or material risks of trying something new, innovators also take a big social risk by venturing outside of the norm. Some of these risks pay off—and many don't. Due to the risk innovators accept, we might categorize this first group as extremely high on innovation, but low on conservation.

The second group of adopters is known as early adopters. The early adopters often achieve optimal conservative innovation for resilience. Ideally, an early adopter will watch and observe as the innovator introduces a new idea or technology and deals with its consequences. Having witnessed the first trials, the early adopter can then apply lessons learned by the innovator. Early adopters take on an innovation while it's still new enough to give an advantage over competition, but temper it with the lessons learned from the innovator's risks.

The last two groups to adopt an innovation are the late adopters and the "laggards." In classical diffusion theory, the line between early adopters and late adopters marks a shift in the majority of the population. When over 50 percent of a population has adopted an innovation, the next most recent

[16] http://www.sciencedirect.com/science/article/pii/S1353829209000598
[17] http://books.google.com/books/about/Diffusion_of_Innovations_5th_Edition.html?id=9U1K5LjUOwEC

adopters are on the late side. Late adopters and laggards are potentially high on conservation, but failed to take advantage of the incoming innovation while it could still provide fresh edge.

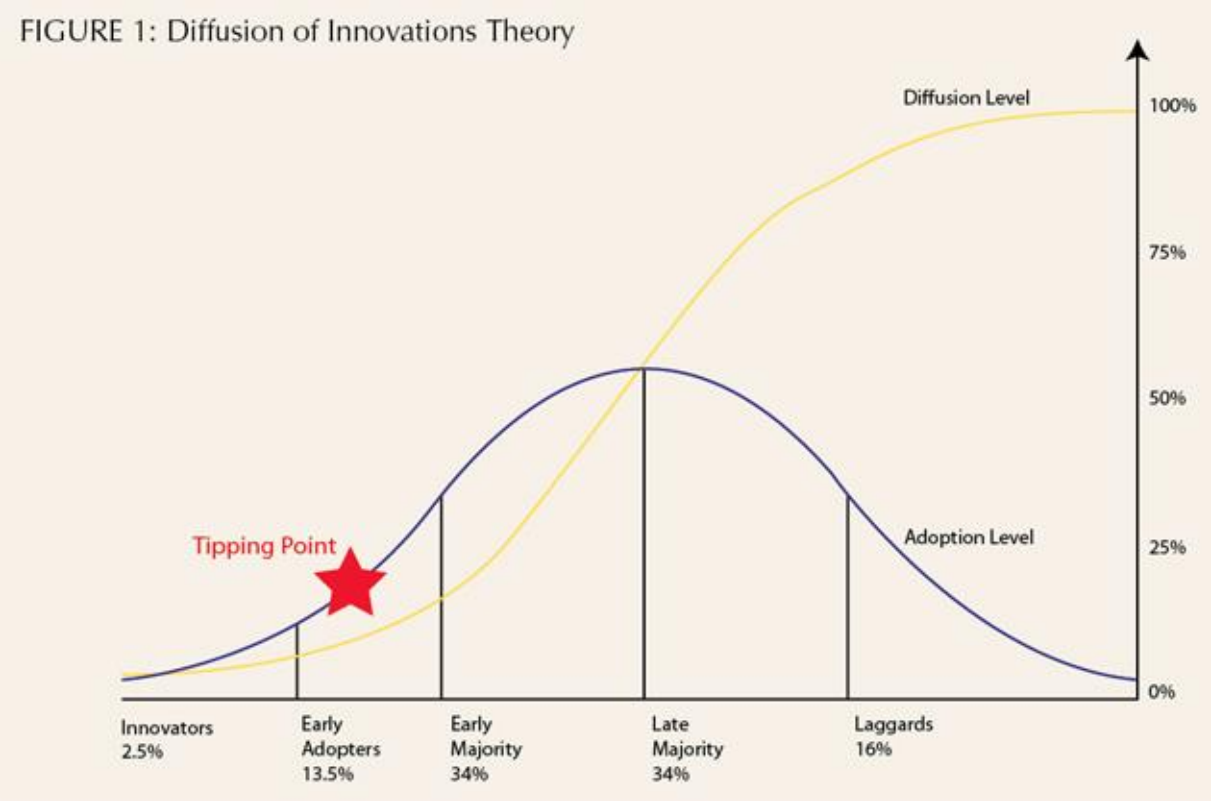

Figure 2 [18]

Early Adoption: A Case Study. One case of an early adopter we came across in our research is Laughing Stock Farms of Sheridan, Arkansas. Though the farm is both small and young, it succeeds by applying relatively new ideas in geographically appropriate ways. It draws on traditional farming knowledge to enhance the success of adopted innovations and to mold them to the region.

Laughing Stock is an example of conservative innovation applied. Josh Hardin, Laughing Stock's founder and manager, is a fifth-generation farmer. He grew up working on his father's farm and from there has gone on to higher education in agriculture. While studying in California, Josh met farmers who were growing new crops in new ways. He became interested in sustainable and organic agriculture. Now on his own single acre in rural Arkansas, Josh is applying lessons he learned from innovators in California to make a living as a small farmer. Laughing Stock Farms, though small and young, is a very early adopter of sustainable agriculture practices in Central Arkansas. It is also an early adopter of smaller practices under the umbrella of sustainable agriculture.

[18] https://sp.yimg.com/ib/th?id=HN.608014563176089001&pid=15.1&P=0

Josh combines his knowledge of Arkansas's agriculture, ecology, and market with innovations he witnessed on the West Coast. Many of the innovations Laughing Stock adopts are tailored to its small scale. With such limited time, labor, and land, Josh makes sure that the crops produced have a high value. He invested in organic certification for his land and sells locally to high-end chefs and grocery outlets. Many of the crops are in and of themselves high value, such as turmeric, goji berries, and heritage breeds. Though Josh sells some conventional items, like tomatoes, he has found that using hoops houses allows him to start growing and harvesting tomatoes earlier in the year than neighboring farms, raising the value of the product. In order to cope with organic practices and limited labor, Josh has made other innovations to his farm as well, such as an irrigation pump that draws out of a nearby pond, tying tomato plants up with strings instead of stakes, and intercropping. Though Josh gets creative with his farm, his knowledge of the land and the market are forms of conservation.

The Hardin family is well-known throughout Arkansas as an exemplary farm family. Josh, a fifth-generation farmer, moved to his father Randy's farm when he was a teenager and began learning the trade. Although Randy Hardin's many enterprises have often focused on selling locally, he uses conventional agriculture practices, such as the application of pesticides and growing GM crops. This farm is where Josh learned about agriculture, and he continues to devote part of each week to his father's farm. Though Josh supports the principles of sustainable agriculture and thinks it's a financially smart route for Laughing Stock, he believes that conventional agriculture has been the backbone of modern society, and that it will have an important role to play until we are able to figure out how to feed whole populations on local and sustainable models.

Josh also continues to seek agricultural knowledge. While managing Laughing Stock and working on his father's farm, Josh is finishing up a degree in agroecology in order to teach agriculture down the road. He also keeps in touch with friends on the West Coast, where new trends in health and food hit the market sooner than they do in Arkansas. Maintaining connections to other farmers, both locally and nationally, has been crucial to Laughing Stock's success.

Laughing Stock uses social networks to spur on innovation. Through local connections, Josh is able to keep an eye on what the market needs are in his area and develop relationship with other farmers, vendors, and restaurateurs. In maintaining connections on the West Coast, Josh is also able to see new trends before they hit the market and be ready to supply as demand hits Arkansas. Though Josh is one of the first in his immediate area to adopt new innovations, he usually does not play the role of innovator himself. By watching innovations succeed or fail on the West Coast, Josh gets a feel for how it might play out in Arkansas without taking on as much risk. For this reason, we categorize Josh as an early adopter. By maintaining strong local connections, Josh also minimizes his chances of being ostracized, a social risk most innovators take. Laughing Stock requires both conventional knowledge of the region and some creativity. However, applying moderation to the "edge of chaos" can be difficult—especially in agriculture.

Conservative Innovation in Agriculture

There has been an enormous amount of past research on innovation in agriculture. The introduction of new agricultural technologies initiated several revolutions in the way societies operate, from the initial displacement of hunting and gathering through the cotton gin to genetically modified organisms.

Agricultural innovation is a "combined technological, social, economic and institutional change."[19] New innovations in agriculture profoundly affect society at large.

Like ecological innovation, agricultural innovation is a co-evolutionary process. It shapes not only food supply, but land change, technological demands, and society itself. These things, in turn, shape agriculture—sometimes for the worse.[20] In the twentieth century, agricultural innovations walked hand-in-hand with a decrease in crop diversity. Up until recently, practices like seed saving and seed exchanges ensured genetic diversity in crop production. However, in the 1980s and 1990s, intellectual property instruments grew stricter. Seed saving and exchanging nearly disappeared. Studies in the Midwest showed that the loss of diversity over time was linked to lowered productivity. [21] Only recently have farmers in the Midwest and Great Plains area turned back to crop diversification as a method of mitigating the effects of climate change.[22]

In the face of wicked problems like climate change, there is more need than ever for "a concept of innovation backed by an incentive system that yields agricultural sustainability."[23] To make an agricultural system resilient, then, any innovation (or conservation) should be weighed by both its long-term and far-reaching effects. This is easier said than done. Research on agricultural innovation has suggested some new methods for problem-solving with agricultural innovations. In the past, most agricultural innovation studies focused almost exclusively on the latest technological fix. However, applying the latest technology without thinking through its effects on the broader system often just generates new problems.[24]

More recently, scholars have started to use system-based approaches to think about agricultural innovation. As the name implies, systems-based thinking considers how a new innovation affects not only the farm it's introduced to, but also how it affects the ecology of the land, the nearby community, and the broader agricultural system. Though this approach is still less popular, it continues to garner more attention.[25] One such approach to system-based assessment of agricultural innovations is System Dynamics Modeling (SDM). SDM takes five steps to approach systemic livelihood issues:

1. Articulate the problem.
2. Develop a "dynamic hypothesis" about what might be causing problems.
3. Create a simulation model of the situation.
4. Test the hypothesis on the model.
5. Use the validated model to assess the potential impacts of intervention possibilities.[26]

SDM was successfully tested on agricultural livelihood issues of small farmers in the Harar Highlands of Ethiopia. This model is a practical approach for solving problems on a farm system because it lets the examiner look the situation in all of its complexity. SDM assumes a complex, non-linear system that is *not* in a state of equilibrium.

---

[19] http://www.cascape.info/phocadownload/2014/2012_klerkxetal.pdf , p. 458.
[20] http://www.cascape.info/phocadownload/2014/2012_klerkxetal.pdf , p. 458.
[21] http://www.tandfonline.com/doi/full/10.1080/14735903.2013.806408
[22] http://www.ecologyandsociety.org/vol19/iss3/art45/
[23] P. 74, http://www.tandfonline.com/doi/full/10.1080/14735903.2013.806408
[24] http://www.sciencedirect.com/science/article/pii/S0261219413002950
[25] http://www.sciencedirect.com/science/article/pii/S0261219413002950
[26] Kassa, H., & Gibbon, D. (2006, May). Does The Sustainable Livelihood Approach Need A More Explicit Systems Perspective? Systems Dynamics Modeling To Facilitate Entry Points To Smallholder Farming Systems. In *17th International Farming Systems Association Symposium (17-20, November, 2002), Lake Buena Vista, Florida*.

As systems approaches emphasize, "new" is not always good. Often the revolutions that agricultural innovations bring have a mix of positive and negative consequences. Some scholars have argued that sedentary sustenance agriculture led to social stratification.[27] Eli Whitney's invention of the cotton gin set the stage for increased social division between the North and South, and eventually the Civil War.[28] GMOs are at the heart of the raging modern controversy over agriculture.[29] [30] On a smaller scale, individual farms and food enterprises consistently fail or harm their surroundings by adopting innovations inappropriate to their situation. The key to a successful innovation is making the existing system interact more successfully with the complex adaptive systems which determine whether it survives and prospers.[31]

Failed Conservation, Failed Innovation

Though innovation poses many risks, pure conservation can have equally bad consequences. However, conservation itself is necessary for resilience. The main purpose of conservation is the efficient use of resources. A farmer, for example, is limited in time, money, workers, and land. By sticking to tried and true traditions, the farmer has a pretty reliable estimate as to what he can produce given those constraints. Introducing a new technology or a new way of doing things on the farm puts the farmer's limited and precious resources at risk. People become locked into doing things a certain way over and over again for the sake of efficiency. [32] Efficiency, overall, is a positive and necessary trait for an enterprise with limited resources.

For example, many species have adopted innate survival mechanisms for the sake of efficiency. Our "innate" behaviors, such as eating, chewing, breathing, and crying when distressed, are unconscious motions that allow us to move through life with a much higher chance of survival. If we had to learn how to do these things, or think about them every time we did them, the daily task of survival would become a whole lot harder. Efficiency, or keeping up what you already know works, is a critical practice.

That being said, when efficiency stands in the way of flexibility, it can hurt our ability to be resilient in the face of new challenges. Efficiency only equips us to deal with situations we've already encountered. In agriculture, we are facing a slew of new challenges arising from climate change and globalization. Economic and ecological structures are changing. Efficiency is no longer enough.

When the desire for efficiency stops us from adapting to new situations, it becomes a "rigidity trap." [33] Practices that used to be efficient may not fit the new situation. The rigidity trap can lure farmers, entrepreneurs, and even whole organizations into using up all of their potential resources when going about "business as usual."

Even systems that are stuck in a rigidity trap are able to get out, but it takes some extra effort. Although individuals within a system may be able to change a properly functioning system, when a system becomes stuck in a rigidity trap, individuals alone are too weak to completely fix it. It will take strong,

[27] http://isite.lps.org/cmorgan/web/documents/WorstMistake_000.pdf
[28] http://dash.harvard.edu/bitstream/handle/1/3207344/Beckert_EmancipationEmpire.pdf?sequence=2
[29] http://www.environmentandsociety.org/sites/default/files/key_docs/ev_17no.1_carolan_michael_s.pdf
[30] http://www.tandfonline.com/doi/full/10.1080/14735903.2013.806408
[31] http://www.cascape.info/phocadownload/2014/2012_klerkxetal.pdf
[32] http://www.pmss2012.dei.polimi.it/materials/Sheffer_Westley_2008.pdf

innovative leaders to rally individual strength together and break the rigidity trap.[34] Since smaller systems are more malleable than large, steady systems, it will be easier to leave the rigidity trap on your own farm than to overhaul all the rigidity traps of our current agricultural system. However, every farm that escapes the rigidity trap moves the general population forward. In terms of adopting innovations, we could also say that every early adopter of a new way of thinking about agriculture contributes to winning over the early majority, the late majority, and even the laggards. The emergence of a thought shift in Oxford, Mississippi illustrates the relationship between conservation and innovation, and the perils of conservation without innovation and lack of conservation in innovation.

The Peril of Conservation without Innovation: A Case Study. Oxford is a college town, and like many college towns, it has a thriving food scene. The city also prides itself as a cultural hub of the South, and as such it draws food connoisseurs and top chefs. The result is an expensive, sophisticated culture where food is a luxury to be invested in. However, Oxford has another face, one less visible to the outside world. It harbors immense poverty. The local middle school has a 50 percent poverty rate. In order to serve the diverse populace of Oxford, two separate farmer's markets have appeared.

The first of the two was Mid-Town Farmer's Market. The Mid-Town Farmer's Market has more or less held the same group of farmers for the better part of its existence. It generally does not accept new vendors, and it sticks to a very traditional model. For instance, it has turned down vendors who hoped to sell shares in a Community Supported Agriculture (CSA) model rather than directly selling produce. In 2011, when the City of Oxford accepted a grant of $61,258 from the U.S. Department of Agriculture, the money was supposed to transform Mid-Town's vending system into one that could accept EBT and WIC. Allegedly, Mid-Town turned down the money and the changes. However, the grant still needed to go toward a farmer's market, and so Oxford City Market was born.

For all the ways that Mid-Town has remained loyal to its original model and vendors, Oxford City Market (OCM) tries new approaches. OCM is a city-run farmer's market, which means that its main organizer is a city employee. The market aspires to generate enough revenue to pay for its own organizer, but it's still a young enterprise. The main goal of OCM is inclusion. OCM accepts as many farmers as it can make space for, even ones that sell the same goods. It also used additional grant money to create an alternative way of paying farmers. Instead of customers paying farmers directly, customers buy wooden tokens worth varying amounts of money at the main desk, and then spend the tokens at each booth. This allows all farmers to accept payment from customers using WIC and EBT, even though not every farmer has the capacity to process EBT and WIC cards at their stand. OCM also reaches out in multiple venues with multiple languages to attract new customers. The whole philosophy that OCM takes—that farmer's markets should actively work toward inclusion—inspires a new, innovative approach to selling fresh food.

There are some benefits and pitfalls to each approach. Mid-Town is consistent and self-sufficient. The famers allowed to sell there are not allowed to sell competing goods, which helps their own profits. However, the market does not serve most farmers in the area, and customers only have one price option for each good since farmers can't compete with each other. OCM, on the other hand, is trying to serve as many farmers and customers as possible. Farmers in this market can compete with each other by selling the same good, but not all farmers are in favor of

[34] http://www.pmss2012.dei.polimi.it/materials/Sheffer_Westley_2008.pdf

that. Due to both its youth and its quest for inclusivity, OCM is a lot less stable than Mid-Town. It does not yet have its own land to use each week and it also isn't financially self-sustaining yet.

The two markets illustrate what we mean by innovation and conservation. OCM embraces all of the latest innovations in farmer's market-style vending. It tries to incorporate many farmers with unique products, it reaches out to customer that traditionally weren't wealthy enough to spend their money at the farmer's market, and it's designed a method of payment where all farmers can accept payment from EBT- and WIC-using customers. However, it struggles to find stability, and some of its experiments have failed. Mid-Town, on the other hand, takes an ultra-conservative approach. It is extremely stable, but it is also resistant to change. It relies on a small group of farmers and a small, though wealthy, base of customers. Should any one of these things change (as they are bound to), the whole market will suffer.

OCM is certainly taking a lot of risks, but it would also appear that Mid-Town Market has fallen into a rigidity trap. Its system is extremely financially predictable, which has enabled Mid-Town Market to become its own independent entity with a consistent location. However, this "efficiency" may be preventing the market from considering new approaches. Rigidity prevents it from expanding its base of vendors or customers. As the dynamics of Oxford inevitably shift, Mid-Town may struggle to adapt to its new environment.

How can we tell the difference between efficiency and a "rigidity trap"? Where do conservation and innovation meet? We define successful conservative innovation as a trait that doesn't hamper any of the other components of socio-ecological resilience—connectivity, local organization, asset building, backups, complementary diversity, ecological integration, and periodic transformation. Making sure both conservation and innovation are allowing for the other seven components to flourish, however, is a task in and of itself. It requires feedback. [35]

Feedback: What's really going on in the system? Feedback is when one part of a system talks to another part of the system. It allows farmers, entrepreneurs, farmer's market managers, etcetera to see how well their business or system is working. Ecological and social systems alike use feedback to test which of its innovations are the best for the system. [36] Feedback is most accurate when multiple pieces of the system are involved in the communication process.[37] Innovation is almost always a learning process, explored by trial and error. With any new innovation, there are bound to be errors. Feedback mechanisms are an efficient way to explore those errors and correct them.

Critically, feedback is characteristic of a non-linear, complex system. As shown by the complex adaptive systems model, socio-ecological systems are anything but simple. Non-linear systems occur when information from different steps in the process are looped back to earlier parts. Though they may reduce efficiency in the short term, when information channels double back they increase the long-term likelihood of the innovation to be beneficial on a wide scale. Feedback is a cooperative social process.[38]

Social Networks: The Spread of Ideas

[35] http://www.cascape.info/phocadownload/2014/2012_klerkxetal.pdf
[36] http://www.santafe.edu/media/workingpapers/98-01-014.pdf
[37] ftp://ftp.ige.unicamp.br/pub/CT010/aula%202/KlineRosenberg%281986%29.pdf
[38] ftp://ftp.ige.unicamp.br/pub/CT010/aula%202/KlineRosenberg%281986%29.pdf

The spread of ideas—old and new—is a social phenomenon. The social and cultural context in which an idea takes place heavily shapes whether the idea is adopted. [39] Actually, whether or not an idea is an "innovation or not depends on its context. According to classic diffusion theory, "if an innovation is an idea that is perceived as new, this boundary between innovations ought to be determined by the potential adopters who do the perceiving."[40] That is to say, what might be considered an "innovation" in rural Arkansas might be old hat on the West Coast.

Ideas use people as a mode of transport. In our case study with Josh Hardin, many of the ideas he's attempting in Arkansas come from his connections on the West Coast. We saw this illustrated again in another case study we conducted with Sequatchie Cove Farm just outside of Chattanooga, Tennessee. Bill Keener, Sequatchie Cove's founder, is widely credited as one of the pioneers of Chattanooga's thriving local food movement. However, when he began farming, he became acquainted with cutting-edge sustainable farming thinkers like Joel Salatin. He implemented ideas that the leaders of the movement had already done and brought them to Chattanooga. What might not be news to Joel Salatin may well be news to a small city in Tennessee. In ecology, innovation spreads physically, through genetics and reproduction. However, people don't necessarily have to wait generations to adapt. It's a question of being connected in the right ways.

Some types of social connections contribute to a flexible mindset, and others detract from it. There's a difference between how "bonding capital" (strong ties) and "bridging capital" (new social ties) affect the diffusion on idea. A tightly-knit small town where everyone knows each other is a good example of strong ties. Strong ties create a web of support that makes the risk-taking of innovation less dangerous.[41] On the other hand, it may also create an environment where there is a greater penalty for stepping outside what's considered normal or traditional. There's more social risk in innovation when strong ties are at stake. [42] Weak ties are also a mixed bag. Weak ties usually refer to loose connections, such as meeting several new people at a conference from different places. Finding new weak ties allows people with different backgrounds to swap ideas (innovations) freely.[43] The down side is that weak ties may also result in miscommunication. [44] Social networks are probably best set up for conservative innovation when there's a mixture of strong and weak ties present. Innovations travel more fluidly on weak ties, but strong ties are necessary to give them the support they need to take root.

Thanks to this, pushing an innovation past the elusive "tipping point" relies on the art of persuasion. In Rodgers's original model, the tipping point is the line on the graph between early majority and late majority (each comprised of 34 percent of the population).[45] As an innovation gains the momentum of the majority, some of the initial barriers can be overcome and it can diffuse more rapidly. To make something diffuse rapidly and successfully is the goal of all marketing strategy. It's no mystery why Malcom Gladwell's 2000 book "*The Tipping Point",* which claims that making an innovation widespread depends on three key principles, sold over 2 million copies. Successful innovation involves some social psychology savvy.

---

[39] http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1010&context=nrem_pubs&sei-redir=1&referer=http%3A%2F%2Fscholar.google.com%2Fscholar%3Fhl%3Den%26q%3Datwell%2B2008%2Binnovation%26btnG%3D%26as_sdt%3D1%252C4%26as_sdtp%3D#search=%22atwell%202008%20innovation%22

[40] p. 14, http://books.google.com/books/about/Diffusion_of_Innovations_5th_Edition.html?id=9U1K5LjUOwEC

[41] http://www.nature.com/nature/journal/v457/n7228/full/nature07532.html

[42] http://c.ymcdn.com/sites/www.plexusinstitute.org/resource/collection/5FD4ACEF-7B50-4388-A93E-109B0988049F/Moore-Westley-SurmountableChasms-2011.pdf

[43] http://www.nature.com/nature/journal/v457/n7228/full/nature07532.html

[44] http://pubs.cogs.indiana.edu/pubspdf/24837/24837_innovationnetworks.pdf

[45] http://books.google.com/books/about/Diffusion_of_Innovations_5th_Edition.html?id=9U1K5LjUOwEC

But it isn't enough for innovations to travel between individual farmers (although that's certainly a good place to start). In order for substantial agricultural innovations to succeed on a large scale, they also need to have support at an institutional level. [46] Horizontal diffusion, or "scaling out", is what happens when peers communicate ideas and innovations to others working at the same levels as them. Vertical diffusion, or "scaling up", refers to how innovations can spread through different levels of hierarchy within a system. Both are important to the success of an innovation. [47] Scaling out is seen when farmers from different places and social groups make connections. This allows an idea or innovation to cross over social and geographic boundaries. Scaling up requires the pioneers on the ground (in this case, farmers) to communicate their ideas to overarching agencies and policymakers that affect them. For example, a farmer might communicate his/her idea to extension agents, who then share their ideas with university researchers, who in turn influence policymakers. Ideally, the result is small changes in infrastructure that help the farmer's innovation succeed.

Some farmers take scaling up into their own hands when existing policy becomes frustrating. A group of small farmers in Mississippi is frustrated that Mississippi policy only allows independent farmers to have a thousand fowls at a time, though most states have a limit of 20,000. Beaver Dam Farms, in Starkville, is spearheading farmer advocacy to change the law. Beaver Dam finds its own innovation limited by the current policy. The farm primarily produces chickens and tomatoes, using the chicken manure as fertilizer for the tomatoes. They produce at a very small scale and without chemicals or manufactured fertilizers. However, the current fowl limit restricts their ability to grow the operation, which may be necessary to help the farm keep turning a profit. While advocacy is a root many innovative farmers turn to, a good system will actively provide venues for farmers to give feedback.

One of the main agents providing feedback will be institutional entrepreneurs. Many studies examine how entrepreneurship is related to creativity. There is less research on the impact entrepreneurs have on the broader system(s) they live in. Institutional entrepreneurs are people who use their social networks to spread innovations across scales. One of their key abilities is using social ties to move ideas upward in the hierarchy. [48] If systems change their policies to support an innovation, then it will be less socially and financially risky for independent farmer to adopt that innovation. The more boundaries and layers an innovation is able to cross, the more likely it is to succeed, and the greater its impact will be. [49]

Successful conservative innovation demands attention to many intricate components. One scholar boiled the recipe for conservative innovation in agriculture down to three key ingredients:

1. That the innovation is compatible with the rest of a farm's goals, equipment, and practices;
2. That the innovation and its implementation is supported by social networks, cultural norms, and support networks; and
3. That the innovation is appropriately supported by regulations from regional institutions.[50]

---

[46] http://c.ymcdn.com/sites/www.plexusinstitute.org/resource/collection/5FD4ACEF-7B50-4388-A93E-109B0988049F/Moore-Westley-SurmountableChasms-2011.pdf

[47] http://c.ymcdn.com/sites/www.plexusinstitute.org/resource/collection/5FD4ACEF-7B50-4388-A93E-109B0988049F/Moore-Westley-SurmountableChasms-2011.pdf

[48] http://c.ymcdn.com/sites/www.plexusinstitute.org/resource/collection/5FD4ACEF-7B50-4388-A93E-109B0988049F/Moore-Westley-SurmountableChasms-2011.pdf

[49] http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1010&context=nrem_pubs&sei-redir=1&referer=http%3A%2F%2Fscholar.google.com%2Fscholar%3Fhl%3Den%26q%3Datwell%2B2008%2BInnovation%26btnG%3D%26as_sdt%3D1%252C4%26as_sdtp%3D#search=%22atwell%202008%20innovation%22

[50] http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1010&context=nrem_pubs&sei-redir=1&referer=http%3A%2F%2Fscholar.google.com%2Fscholar%3Fhl%3Den%26q%3Datwell%2B2008%2BInnovation%26btnG%3D%26as_sdt%3D1%252C4%26as_sdtp%3D#search=%22atwell%202008%20innovation%22

These guidelines address innovation occurring at multiple scales. The first addresses the farm scale, the second the broader community scale, and the final addresses the overarching institutional scale. Whichever scale you participate in, conservative innovation can be a lived practice.

Conservative Innovation as a Practice: Honing Your Skills

Conservative innovation is a critical trait of a resilient enterprise or system. The questions we posed at the beginning of the chapter can help you gauge how your farm stacks up on conservative innovation and decide where improvements can be made.

Have you made major innovations on your farm in the last year?

Is creativity important on your farm?

Do you regularly try new things to make your farm work better?

The above questions get at the heart of innovation. If you say yes to these questions, you're probably one of the more innovative members of your community. Think back on which innovations have failed and which have succeeded. What were the consequences, positive and negative? What would you have done differently, if anything?

Do you maintain tried and true traditional practices?

Are you willing to alter your practices in the face of unforeseen challenges? If you aren't willing to change your practices, why?

Options: finances, organic standards, tradition, unsure of other options

Innovation can be a very positive thing, but it must be tempered by conservation in order to be practical. Even if you ultimately choose an innovation over "tried and true" practices, traditional methods usually have a valuable lesson to teach about the local ecology and culture. Answering yes to the first question probably means you're (also) practicing conservation. The second question is more ambiguous. Ultimately, staying flexible in the face of challenges is a mark of resilience. However, some farmers are very loyal to the values that inspire them to farm in the first place. For instance, many organic farmers we interviewed said that if they couldn't grow without manufactured chemicals, they'd rather no farm at all. Consider your own values. At what point does flexibility stop for you?

Do you have lots of options for pest control?

Do you have lots of options for fertility of crops?

Keeping your options open is ideal for flexibility. If you're saying yes to these questions, then you're able to keep both innovative methods and conservative methods on hand as necessary. A farm can use multiple methods to manage factors like pests and fertility. Just because a new method may work for now doesn't mean it will always work effectively. Having conservative methods available as well is a reliable backup.

Do you go to at least 4 trainings or seminars a year?

Seminars and trainings help farmers learn about innovations in their field. Perhaps even more importantly, they give farmers the opportunity to meet and exchange ideas, techniques, and tips. They also build connections between farmers who otherwise might not have met. “Weak” ties, or meeting new people, is crucial to the spread of ideas.

Have you changed your marketing strategy in the past year?

Do you use creative marketing strategies to promote your products?

Which of the following do you use for marketing?:

Options: Facebook, Twitter, website, other internet resource

Marketing is a good way to incorporate more innovation into your business. Thanks to the Internet, trying out new ways of marketing can be very financially low-risk. Social media accounts and even websites can be cheap or free, and dramatically effective.

Do you look for ways to add value to your products?

Do you look for alternative markets for lower-grade or damaged products?

Do you look for holes in the market to fill?

Do you try to bring unusual things to the market?

Are you creating your own market?

Trying out new products involves a little more risk, but it can also be extremely rewarding. A small-scale farmer in Arkansas discovered that he could sell amaranth, which grows abundantly on his farm, by calling it “hot-weather quinoa.” He noticed both the local demand for quinoa and how well amaranth grows in the area, and combined the two. The unusual item he brings to market has been an asset to the farm. There are endless ways to get creative with the type of products you could grow, or even with the products you are already growing by getting resourceful.

Have you ever felt stifled by regulations? If so, how did you respond?

Options: Changed tracks, stopped activity, used creativity to work around regulations

While most of the above questions deal with changes you can make directly to your farm, this one asks how the agricultural system and policies where you live affect your ability to innovate. Most innovators and early adopters, since they are culturally ahead of the curve, run into regulations that haven’t yet made room for a new idea or technology. How can you give feedback to your local representatives? What changes would better support you as a resilient farmer?

Conclusion

Every farm, community, and institution will need to make unique adjustments to ensure that conservative innovation is successful on all scales. No innovation is “one size fits all”; it can be molded to every unique situation based on traditional local knowledge. In order for policy to be supportive of

adaptations, it must provide room for flexibility. Different parts of a system can check in with each other through feedback. In terms of agriculture, this might look like talking to your local National Resources Conservation Service, submitting comments on emerging agricultural policies, engaging with farm advocacy organizations, and seeking advice from actual farmers in your area while contributing to the policymaking process. Conservative innovation is a social process, and as such it demands communication.