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Resilience in Agriculture: Small- and Medium-Sized Farms in Northwest Washington State

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The research reported here uses resilience thinking in examining farmer responses to disturbance scenarios in the North Puget Sound region of Washington State. Through farmer resilience workshops based on plausible disturbance scenarios of climate change, seasonal flooding, energy price spikes, and rapid urbanization, farmers identified further threats to farm systems, possible thresholds of undesirable change in farm systems, and adaptive strategies useful in addressing the examined threats. It is clear that adaptive strategies become more complex at scales beyond the farm level. Further, individual commitment to a rural, farm lifestyle was an important component of whether a farm operation would thrive within larger nested systems. At the same time, farmers in the study recognized the need to re-frame agricultural policy in the United States away from emphasis on the stabilization of prices, and more towards farmer autonomy within agreed-upon guidelines.

KEYWORDS socioecological resilience, agricultural policy, adaptive capacity, disturbance scenario, stability, small farms

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INTRODUCTION

Rural agricultural communities are a vital part of Washington State’s economy, contributing some $6.4 billion annually (Washington State Farmworker Housing Trust 2008). In particular, the North Puget Sound region is among the largest agriculturally productive areas in Washington State west of the Cascades. The sector provides a strong economic base for the region in its production of dairy products, raspberries, cattle, seed crops including potatoes, hay, and nursery greenhouse products—most of which are exported outside the region. In 2007, Western Washington had 117,060 farms spread over 1,019,858 acres. Of these, 15,986 farms had less than $100,000 in sales (United States Agricultural Census 2007). Although the western counties of Washington have 43% of the number of farms in the state, the farms only occupy 7% of the total farmland in the state; this suggests a size distribution of farms leaning toward small and medium sized. The larger Pacific Northwest region also is home to a strong locavore culture of support for local food production and marketing (Giombolini et al. 2011), with numerous farmers’ markets, community supported agriculture (CSA), as well as citizen involved agriculture (CIA) operations and the featuring of local products in even larger chain stores.

Yet, despite such marketing patterns and opportunities, the agricultural sector in the North Puget Sound area of Washington is at risk. For example, many primary operators are aging, and many of the region’s youth are seeking careers outside the agricultural sector (Schiller 2007). Beyond the precarious economic situation many individual farms confront, the agricultural sector faces several additional threats resulting from environmental constraints and rapidly urbanizing societal contexts. Such threats create uncertainty for the agricultural sector’s future in the region.

This article uses resilience thinking to situate and examine farmer response and adaptive capacity upon exposure to disturbances such as climate change, urban encroachment, flooding, and sharp increases in energy costs in three counties of the North Puget Sound region. The work presented here is based on a larger investigation of sociophysical and economic policy threats to agriculture (Berardi et al. 2011). In this article, we discuss farmer concerns and interests in an agricultural policy in the United States that recognizes dynamic and changing economic and physical conditions, and rewards innovators attempting to reduce vulnerability of their farms.

RESILIENCE

Resilience thinking (B. Walker and Salt 2006) offers a useful framework to analyze agricultural issues because it focuses attention on the unpredictable nature of disturbance and management options that accommodate such
unknown threats (Conway 2007). Scholars have defined resilience as the amount of change a system can undergo, while retaining similar function and structure. When considering socioecological systems, the definition expands to include the social system’s ability to organize itself and to increase its capacity to adapt to changing conditions in the socioeconomic and natural environments (The Resilience Alliance 2010). Resilience frameworks focus on the persistence and adaptability of systems, assuming that among all possible variable configurations, there exist multiple “basins of attraction” (B. Walker et al. 2004) or stable states (Holling 1973), in which system structure and function maintain relatively stable relationships with each other. Extreme events stress system organization to a point where a nonresilient system crosses a threshold between basins of attraction and reorganizes in a new stable state with a different system structure and function. A resilience framework makes no normative claims concerning change between stability regimes (Atwell et al. 2010; Gunderson and Light 2006); desirable and undesirable regimes can both prove resilient, that is, resistant to change brought on by system disturbance.

Central to a resilience analysis is the claim that system disturbance, with the ability to influence change between stability regimes, is both recurring and varying in magnitude (Folke 2006; Berkes 2007), and ultimately unpredictable (Gunderson and Light 2006). Disturbance can occur as weather events (Myers 2008), as natural hazards (R. J. T. Klein et al. 2003; Keil et al. 2008), or even as the result of economic development initiatives (Olsson et al. 2004).

Scholars have examined questions related to how regions, organizations, and individuals absorb disturbance and adapt to change (Milestad and Hadatsch 2003; Marshall et al. 2007; Maguire and Cartwright 2008; Norris et al. 2008). Resilience concepts and ideas thus offer a useful framework within which to examine how farms and farm operators might adapt to rapid changes and extreme events in socioecological contexts.

B. Walker and Salt (2006) argue that resilience thinking provides a model for sustainability in managing the complex interactions between humans and their surrounding environment (Olsson et al. 2004). Certainly, some degree of flexibility is needed in management strategies of complex systems to maintain desired system function. In this sense, resilience can offer an approach for understanding complex systems, which are unpredictable (Berkes 2007), and for which surprise and change are inevitable.

Agro-ecosystems form such complex systems (Jackson and Piper 1989), and current management regimes focusing primarily on large-scale production of single-species are increasingly coming under scrutiny in scholarly and popular literatures (Pollan 2006; Altieri 2009; Campbell 2009). While resilience frameworks have generated considerable interest over the past decade, research examining the U.S.‘s agricultural sector through these frameworks is still in its infancy (Atwell et al. 2010). This article addresses
resilience in northwestern Washington’s agricultural sector by discussing adaptive strategies to reduce vulnerabilities to typical threats; these results are based on a two-year research project focused on risk reduction and increasing farm prosperity.

METHODS

This research followed an approach epistemologically sympathetic to Robert Chambers’ Rapid Rural Appraisal (Chambers 1983; Berardi 2002). Through an iterative process of exchange and collaboration with key informants, including stakeholders working in the agricultural sector, and academics with relevant expertise, the research team developed four plausible disturbance scenarios (climate change, seasonal flooding, energy use, and urbanization). Researchers then selected and adapted relevant county-specific scenarios, and held a workshop in each of three study counties during February of 2010.

The researchers selected workshop participants from a three-county area (see Figure 1) of Washington State: Snohomish County, bordering the greater Seattle area and increasingly focused on producing agricultural goods and services for agroeco-tourist and urban markets; Whatcom County, bordering British Columbia, Canada and dominated by dairy and berry production; and, San Juan County, consisting of an island archipelago (with only four main islands serviced by the Washington state ferry system). Farmers from each of these counties experience different threats and were purposefully selected based on size and type of operation, plus years of experience in farming, to achieve the greatest diversity and possible range of perspectives. Snohomish is vulnerable to flooding and urbanization stress; Whatcom, too, is vulnerable to flooding and urbanization, as well as energy price hikes. Additionally, Whatcom County, being situated on the Canadian border, experiences urbanizing and farm-expansion pressures from the proximate metropolitan Canadian population. Land, housing, and gasoline, among other items, are less expensive south of the Canadian border, and thus attractive to Canadian investors. San Juan County is particularly vulnerable to urbanization pressure from those seeking vacation homes; its island geography makes the county uniquely vulnerable to energy supplies and price spikes. One common threat farmers in all three counties face is vulnerability to climate change impacts.

Skagit County, which lies between Snohomish to the south and Whatcom to the north, was considered for the present research as well, but was, ultimately, removed from the study sites due to funding constraints as well as the county being the focus of intense scenario planning and study (Envision Skagit 2060 Citizen Action Committee Final Recommendations 2011). Specifically, the study focused on economic development, sustainability, and smart growth, using a citizen action committee’s recommendations.
Researchers examined three proximate, but geographically distinct counties: San Juan, consisting of isolated islands; Snohomish, on the urban fringe of greater Seattle; and Whatcom, bounded by the Canadian border to the north and the Chuckanut Mountains to the south (color figure available online).

Additionally, Skagit County presented similarities to Whatcom County in terms of scale of operations and trade outlook, making Snohomish County, with its smaller farms, the more desirable choice in terms of diversity of study participants. Further, Snohomish County borders King County and the Seattle Metropolitan Area to the south, and is presented with greater urbanization pressures. Thus, selection of the three counties present in this study offered the greatest breadth of disturbance scenarios and study participants, especially given funding constraints.

Preliminary participant lists were generated after consultation with numerous farm and food agencies and organizations. This included nonprofits, such as Whatcom County’s Whatcom Farm Friends and Sustainable Connections, county land preservation groups, general farm advocacy associations, as well as Extension and Farm Services Agency contacts. Farmers were then selected on the basis of their representativeness of county crop and livestock farming. Selected participants presented a range of experience levels. One-third of the participants had greater than 20 years’ experience farming, and many of these had taken over an intergenerational family farm. One-sixth of the participants had between five and 20 years’ experience.
Two participants were recent start-ups, not from farming families, with less than 2 years' experience in running their own operation. The emphasis on selecting from a range of farming experience allowed for better exploration of adaptive capacity, resulting not only from wisdom gained through practical experience, but also rapid and successful innovation resulting from knowledge from a variety of sources.

Participation was solicited via e-mail and internet contact and phone calls. Approximately 10% of the farmers contacted did not participate due to time conflicts. In total, 42 participated, allowing for concerted small-group discussion within the three workshops. The total number of participants reflected a significant commitment of time in a population that rarely takes time away from work. In studies similarly examining stakeholder perspectives on a particular issue or sense of place within a larger context, the total number of participants was comparable to or less than that of the present study. For example, Alper and Hammond (2010) examined the perspectives of 46 stakeholders on management of the international border between Washington State and British Columbia, Canada. Atwell et al. (2010) examined tradeoffs between ecosystem services and food and energy production through a participatory workshop and follow-up interviews with 14 leaders working in the Iowa agricultural sector.

Approximately half of the workshop participants were market garden/nursery/orchard operations, with the remaining distributed between beef and/or hay operations and dairy. Whatcom County participants included eight dairies, two raspberry growers, one orchard, seven market gardens, and two nurseries. Snohomish participants included two dairies, one beef operation, one hay operation, two market gardens, and two flower/herb farms. While the fewest in total participants, over half of Snohomish participants represented multigenerational farms. Participants from San Juan County included eight operations focusing on meat and animal products (cattle, sheep, goat, pork, and poultry), one nursery, one flower/herb farm, one vineyard, and three market gardens. All the farms had less than $250,000 in annual sales, qualifying for status as a small-to medium-sized farm, according to USDA classification schemes (United States Department of Agriculture 2010).

Workshop participants represented a mix of agricultural producers in terms of crops and livestock raised, management style, age, experience level, and marketing patterns consistent with the county in which the workshop was held. Such a mix was intended to offer robust and diverse participation. Workshops were facilitated by a professional facilitator and digitally recorded while individual researchers observed and took notes. Recordings were later transcribed in full for analysis and interpretation.

Each workshop followed the same format. Researchers introduced the concept of resilience and discussed two case studies of farm and food vulnerabilities: 1) threats arising from salt water intrusion in the Goldburn-Broken Catchment (B. Walker and Salt 2006); and 2) Hurricane
Katrina impacts on gulf aquaculture (Buck 2005) and Midwestern farming (Commodity Credit Corporation 2006; T. Walker 2005). In both examples, extreme events had weakened or permanently altered farms and agricultural communities. The examples modeled the scenarios presented, balancing human- and naturally induced threats, as well as slow- and rapid-onset events.

The participants were then introduced to one of several system disturbance scenarios written specifically for their county. Participants were divided into small groups of three to six participants and asked, in a series of small group discussions or activities, to consider the challenges and opportunities each scenario presented, the resources needed to adapt, long-term impacts to the sector, and the types of knowledge and experience that would influence adaptation. Each participant received a set of discussion prompts concerning challenges, needs, resources, and long-term impacts likely to affect adaptation, as well as resilience concept notes. Participants were encouraged to discuss the scenario impacts from their perspective, thus situating their farm system within the larger sector. Eventually, a new system disturbance scenario was introduced, and the process was repeated. Prior to the beginning of another scenario, participants were encouraged to rotate between small groups to allow for the greatest amount of interpersonal exchange.

Each workshop concluded with a full group discussion of the commonalities across scenarios, especially ways in which farm vulnerabilities or adaptive capacity characteristics were similar across different scenarios. The workshops in Snohomish and Whatcom Counties lasted approximately 8 h, while the workshop in San Juan County lasted less than 6 h to accommodate ferry transfers between islands.

SYSTEM DISTURBANCE SCENARIOS

With assistance from key informants and experts mentioned above, researchers developed four separate likely system disturbance scenarios, unique to the study counties. The time periods projected ranged from 2022 in the case of the flooding and urbanization scenarios, to 2050 in the energy costs scenario, to 2080 in the climate change scenario. The dates used were determined in consultation with academic experts and key stakeholders in the agricultural sector. Flooding presents an immediate annual threat, while the effects of climate change might not be apparent for decades. Selection of scenario events was determined by the likelihood of event occurrence and a county’s vulnerability to the selected disturbance. For example, for San Juan County, in which flooding is not a major concern, researchers did not discuss the flooding scenario. The four drafted scenarios balanced human (energy costs and urbanization) and environmentally occurring (climate change and flooding) disturbances as well as relatively slow-onset
(urbanization and climate change) and rapid-onset (flooding and energy cost spikes) disturbances. As the North Puget Sound region is situated along an active subduction zone, a major seismic disturbance-scenario was considered, but ultimately not examined due to funding constraints. The following is a brief discussion of the four scenarios chosen.

**Sharp Increases in Energy Costs**

Sharp increases in energy costs affecting agriculture have been noted by researchers for some time (Pimentel et al. 1973) and will likely continue as demand for fossil fuels increases in the future (Berardi 2009). Increased energy costs affect both direct and indirect costs on farms (Pimentel et al. 2008). For example, diesel fuel, as well as conventional fertilizer is susceptible to variability in terms of cost and available supply. Moreover, not all increases in input costs can be immediately passed on to the consumer. Thus, a scenario in which input costs rise sharply presents risks to small- and medium-sized agricultural producers.

An increase in energy costs will also have significant indirect effects on small- and medium-sized producers through decreased regional job market growth (Zhang et al. 2001). Such conditions, amplified throughout the entire food system, could lead to even more households seeking the lowest cost food products, which generally are produced by larger operations outside the region with lower per unit production costs.

**Extreme Flooding**

Western Washington is a highly flood-prone region. Seven major rivers experience flooding on a regular basis, three of which have flood plains with a large agricultural output. Over the past two decades, several severe flooding events have significantly affected the region.

In 1990, Snoqualmie Valley farmers lost to flooding over 500 head of livestock and significant amounts of feed grain. Sixteen years later in 2006, another flooding event severely damaged fences, crops, bulbs, livestock, hay, and equipment (Department of Natural Resources and Parks 2008). Lewis County experienced significant flooding in December 2007, killing livestock and disrupting operations (Green et al. 2008). Whatcom County, which experiences minor to moderate flooding yearly, has yet to experience the severity of flood events experienced by other Western Washington river systems.

**Increased Climate Variability**

In the North Puget Sound region, flooding is linked to another major ecological change: predicted climate change. The region’s climate variability is strongly shaped by two large-scale patterns, the El Nino/Southern Oscillation and the Pacific Decadal Oscillation (Mote and Salathe 2009). Adding to natural decadal variability, climate change research predicts an increased
cool season precipitation variability (Stewart et al. 2004), declining snow water runoff (Hammer et al. 2001), and earlier spring peak runoffs in the region (Brun 2003).

Intensified Urbanization

Several counties in the North Puget Sound region, historically significant agricultural producers, have experienced serious farmland loss due to the growing demand for residential expansion over the past several decades (L. Klein and Reganold 1997; Berardi and Lunde 2008). As residential developments expand into agricultural areas, farming as a viable economic activity is threatened due to rising land values (Heimlich and Barnard 1992) and actions such as nuisance ordinances. Land becomes too expensive to purchase for agricultural use and is often bought for development and bigger profits subsequent to subdivision of the land (Schiller 2007). In King County, for example, farmland has steadily disappeared due to urban encroachment since Seattle expansion began in the 1950s. By the late 1970s, 80% of the farms existing in 1945 were gone. Currently, Snohomish and Whatcom Counties are experiencing similar urban population booms and loss of farmland to residential development.

Transcripts and Content Analysis

Following the completion of the workshops, all recordings were transcribed in full by a professional transcriber and thematically analyzed separately by the three authors. In this open coding phase (Strauss and Corbin 1990), perception of threats and the means by which responses and adaptation were possible or hindered were assigned preliminary codes by each member of the research team.

Following completion of the initial coding process, researchers’ individual thematic analyses were used to validate and expand upon the initial identification of themes. Overlapping themes between two or more researchers received greater attention than those noted by only one researcher. Through this process of coding the transcripts and examining the themes, patterns were identified. Subsequent to the emerging patterns, researchers developed a two-axis matrix through which to interpret and structure the themes. Along one axis, themes were separated by scale; along the other, themes were separated by components relating to adaptation and threat (see Figure 2).

RESULTS AND DISCUSSION

Workshop participants’ discussion followed a basic pattern across all three counties. Participants recognized an entity, what the resilience literature calls a system. Participants then discussed how individual farm systems
FIGURE 2 The authors developed a two-axis matrix to interpret and structure participant responses to disturbance scenarios.

were negatively affected by the threats outlined in the scenarios and positively affected by tools and resources available to those within the system. Participants also briefly discussed thresholds, or points at which agriculture was no longer possible, in the system discussed. The basic structure of this understanding of resilience can be represented by the following equation:

\[
\text{If } \text{System} - \text{Threat} (1, 2, 3 \ldots) + \text{Adaptive Strategy} (1, 2, 3 \ldots) \geq \text{Threshold}, \text{ then the system does not collapse due to Threat} (1, 2, 3 \ldots).
\]

where System represented the defined ‘system,’ at the farm, community, or policy scale; Threat represents the concerns, vulnerabilities, and threats negatively influencing the system; Adaptive Strategy represents tools, resources, and strategies aimed at maintaining or shifting the system to a desirable state; and, Threshold represents the point at which the system changes qualitatively, that is, where farming at the individual business or regional sectoral scale is no longer viable.

Participants’ remarks were to be understood on separate but interconnected scales. At the macro scale, participants largely referred to events and processes that were intangible. A feeling, not of helplessness, but of lack of personal effectiveness seemed to dominate. The intermediate or meso scale concerned extended networks of family, friends, and advocacy groups. Discussion at the meso scale did not convey the same lack of personal-effectiveness undertones that discussion at the macro scale did; at the meso level, discussion centered on ideas of community, relationships, and their implications in the success or failure of farming operations. Remarks at the
FIGURE 3 Theme frequency across all counties and disturbance scenarios.

<table>
<thead>
<tr>
<th>System</th>
<th>Threat</th>
<th>Threshold</th>
<th>Adaptive Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Scale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional</td>
<td>34</td>
<td>Economic</td>
<td>35</td>
</tr>
<tr>
<td>Economic</td>
<td>13</td>
<td>Dependency</td>
<td>33</td>
</tr>
<tr>
<td>Geographic</td>
<td>9</td>
<td>Lack of Time</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ownership and Succession</td>
<td>8</td>
</tr>
<tr>
<td>Community Scale</td>
<td></td>
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</tr>
<tr>
<td>Infrastructure</td>
<td>19</td>
<td>Social Infrastructure</td>
<td>37</td>
</tr>
<tr>
<td>People</td>
<td>13</td>
<td>Physical Infrastructure</td>
<td>36</td>
</tr>
<tr>
<td>Relationships</td>
<td>12</td>
<td>Relationships</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Social Infrastructure</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Physical Infrastructure</td>
<td>4</td>
</tr>
<tr>
<td>Food System</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government Policies</td>
<td>21</td>
<td>Regulations</td>
<td>56</td>
</tr>
<tr>
<td>Economic</td>
<td>16</td>
<td>Uncertainty</td>
<td>30</td>
</tr>
<tr>
<td>Public Ethos</td>
<td>15</td>
<td>Paradigmatic</td>
<td>30</td>
</tr>
<tr>
<td>Climate</td>
<td>7</td>
<td></td>
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</tbody>
</table>

micro level focused on the individual farm and the farmer and/or household farming the land. Discussion at this level, as would be expected, was the most personal, focusing on tangible aspects of everyday life. Participants conveyed the sense of their own land as a system within their control.

The results showed that farmers saw their operations as embedded within larger-scaled entities with aspects of the larger systems posing threats or creating opportunities (see Figure 3). It was also clear that farmers’ perspectives differed depending on individual context. It was helpful to see the participants’ views through a resilience framework because of its focus on ecological connections across scale. In particular, the farm scale was embedded within the larger policy scale in the categories of farm systems, threats to farm systems, adaptive strategies, and thresholds. Throughout the rest of this article, we discuss farmer perspectives on threat and adaptation in relation to this embeddedness of the farm scale within the larger policy arena.

System Characteristics

Participants were encouraged to articulate the perspective by which they were describing scenario impacts. They did so predominantly by situating themselves within the context of larger macro-scale processes and events; participants thus displayed a keen sense of being situated within a larger socioecological system. They spoke of such a system in terms of vulnerability to climate change, government policy concerning farming practices, the globalizing economic system, an antagonistic public ethos, and building a body and system of knowledge production which influences consumer choices and the direction of public policy. Despite this knowledge of the existence of
a larger socioecological system around them, participants conveyed a sense that the general public, including themselves, did not understand its behavior. Although participants acknowledged that consumers, and they, could not completely understand system behavior, participants nevertheless engaged in heated speculation as to what was necessary for consumers to become more aware, appreciative, and supportive of farming in general.

Participants gave considerable discussion to the larger socioecological system of food processing, marketing, transportation, and consumption—a production system of which they are a small part. In discussing food production, participants relied upon recent popular arguments concerning scale and lack of transparency (Schlosser 2001; Pollan 2006; Kenner 2008), noting that the food system as presently structured, treated food and feed as economic commodities, indistinct in larger economic systems from car, fabric, or electronics production. In the process of mass production and trade, participants saw food and feed production as driven by creating favorable profit margins (i.e., decreasing the costs of production) in whatever way necessary. Production then moves to regions with the best growing conditions and the lowest economic and regulatory barriers. Thus, from participants’ perspectives, the larger socioecological system actively shaped agricultural landscapes. Indeed, while participants discussed the food system at length, many admitted to being unable to understand its complexity or the variables that drive it. Participants saw the general public as possessing a similarly narrow understanding (for more on this, see Schwartz and Sharpe 2010).

Indicative of this lack of understanding of the larger socioecological system is the disconnect between the general public’s valuation of an agricultural landscape and the incomplete understanding of the economic processes that threaten its integrity. One participant stated, “people are coming here because they value rural qualities, but it seems there’s a disconnect between valuing it and understanding what it takes to keep it that way and why it is there, and how to preserve the farmland” (San Juan County). Another participant stated that the majority of the consuming public did not support local producers and that “they do not get the relationship between living with the landscape and supporting the landscape” (San Juan County). Through this dialectical relationship, participants saw the consuming public and producers influencing and shaping each other, although the sense over the course of this research was that changing the nature of the relationship is a difficult task.

Complicating the large-scale socioecological relationships between society and the agricultural landscape were the small-scale socioecological relationships between the farmer and land he or she manages and works. Participants situated themselves within the larger-scale food system, discussing their operations as smaller systems in terms that differentiated them from other producers, thus, defining the identity of their farm operation.
Participants characterized these multi-scalar, dynamic systems geographically, personally, and economically (Figure 3). Such participant characterization served to define the system identity, a key component in the process of devising ways to measure resilience (Cumming et al. 2005).

The specific geographic characteristics of each farm, which might include soil fertility, drainage, and slope, guide a farmer in how she or he manages the land. Part of the physical system identity included past land use practices, transportation network availability, and location and potential markets. Such geographic characteristics at the farm scale determined whether a farmer will produce wheat, beef, or blueberries. At a larger scale, climate similarly influenced potential crops, the need for irrigation, and other variables concerning the growing season such as pest outbreaks and control. The uncertainties posed by climate change occupied much participant discussion. Perhaps because the climate change scenarios were projected the furthest out in the future or possibly the politicized and contested term climate change piqued participants’ interest—this disturbance scenario led to greater discussion. Whatcom County and Snohomish County participants both discussed climate change at length. However, the two counties’ discussions differed in tone: while Whatcom County participants were prone to debating impacts and potential strategies, Snohomish County participants were resigned to farming gradually fading from county life as a result of the combined disturbance scenarios. Throughout most of the workshops, participants displayed a keen sense of the geographies of their farms, with awareness increasing with years and generations of experience.

Personal characteristics formed a part of the farmers’ identity and included attachment to the farmland and lifestyle, and a sense of independence and pride that participants felt set them apart from others. While less easily measurable than climatic and financial characteristics of each operation, participants saw personal attributes unique to the farmer as playing a major role in resilience and the ability to adapt. Many participants voiced an attitude similar to “you either have it or you don’t,” expressing a sense of inevitability in farm and farmer survivability. Among these “have it or not” farmers, emerged several archetypal themes.

One clear farmer archetype of vulnerability was that of the older farmer, situated in a multigenerational farm family. This farmer predominately farmed conventionally, using chemical inputs and marketing his or her product as a non-niche, undifferentiated commodity. Among other issues, this farmer was facing challenges in passing the business to the next generation. Pessimism, wrought with the emotions of making a decision to end a chapter in family history, was a common theme among this archetype. Another archetype was that of the younger farmer possessing entrepreneurial spirit and idealism and with few familial links to the sector. This farmer may have used unconventional production methods and markets
through CSAs, farmers’ markets, U-pick operations on the farm, or other niche markets. This farmer faced the challenges of developing a long-term business without reliable and consistent access to adequate farmland. Yet, another archetype emerged as the part-time recreational or lifestyle farmer. This farmer generally used nonconventional production methods, but relied heavily on off-farm income. This farmer sold products marketed as, for example, grass-fed beef or beyond-organic vegetables and relied primarily on a well-heeled local clientele. While rapidly urbanizing populations provided a greater market for this farmer, farmland may have been in critical short supply. Farmers in this category were among the most outspoken among the participants—perhaps because they could afford to be outspoken and opinionated. Their entire income was not threatened by loss of market edge if their strategies were shared.

Perhaps, they had the most to gain by being outspoken and critical of the current economic configuration. Their clientele would want critical opinion and outspokenness.

While, ultimately, each participant’s personal attributes were unique, most participants verbalized some connection to the land, individualism, and resourcefulness as part of their identity. The combination of the physical geographies and personal farmer attributes of each individual farm comprised a microcosm, a system that contained its own identity, individual threats, personal resources, and extinction thresholds. For example, one farmer may have been more prone to prioritize high-quality pasture for his dairy cattle, another might have focused on year-round concentrates feeding—each of these situations would have different kinds and levels of risks.

Consumer attributes also played a role in influencing farm production. One of the larger forces changing the landscape of agricultural systems was the relatively recent consumer desire for organic and locally produced products, particularly among young urbanites. The augmented desire for such food has increased the viability of commercial and smaller niche farmers’ use of nonconventional, low-input production methods (Hughner et al. 2007). It is interesting to note that although many participants were using or experimenting with such methods, the majority of the dairies maintained a conventional production regime.

Participants saw money and profitability as the drivers within the larger system. Participants recognized that most farm operators were not exempt from the desire or need to cut costs wherever and whenever possible. Indeed, the profit motive was not always referred to in negative terms. At a certain point, participants conjectured that processes some might view as negative, such as consumer desire for increasingly inexpensive foods and the scale and methods of production required to sustain low prices, would reverse and/or be changed by the lack of profitability in prevailing operating schemes. An example given by one participant referred to inefficient energy
usage habits changing due to rising energy costs. In such a scenario, the system would correct itself.

Participants also discussed farming systems in terms of the regulatory framework in which their farm was situated. The legal and regulatory frameworks at the county, state, and national levels in part defined the constraints on the system. In narrowing the range of adaptive strategies, participants saw government regulation, especially regarding duplication of regulatory actions and time spent on regulatory compliance, as a threat.

Threats to Farm Systems

Participants identified challenges arising from societal perceptions, the lack of certainty due to climate change and future regulation, and economic volatility as key overarching challenges. In different ways, participants saw these challenges as jeopardizing the viability and persistence of individual farms, especially in combination with system disturbances explored in the workshop scenarios. Many of these challenges arose from dependencies related to the larger scales in which the farm was situated. These included climatic shifts and uncertainties in how to prepare for them or investing heavily in a strategy (e.g., riparian buffers) that may become difficult to manage due to shifting regulations regarding salmon habitat protection. However, challenges also arose at the farm scale, such as in farm ownership transfer.

One social concern that arose consistently in different discussions was that of farm ownership and succession. Participants saw the lack of children wanting to take over their operations as a threat to whether or not the farm would survive. While participants noted that some youth were interested in farming, general interest in the occupation was declining. Furthermore, several participants lamented that many of the young people interested in farming were more idealistic than practical, with little or no knowledge of the skills and processes necessary to keep a farm functioning. Other participants agreed that the lack of younger farmers to take over farm operations was a concern, although argued that lack of interest was directly related to dismal prospects for farm profitability.

Clearly, farming, as an occupation, has to be sufficiently financially enticing to attract and retain youthful entrepreneurial talent. Without a profit motivation, participants saw the decision of farm-raised youth to pursue 9-to-5 jobs with larger paychecks, benefits from secure jobs, and paid vacations as justified.

Participants’ discussion frequently focused on themes involving threats around the lack of certainty—for example, in market prices. This was especially true at the macro scale, where processes are complex and not necessarily visible on a day-to-day basis. Tangential to these uncertainties were the perception of regulatory threats. While some participants saw regulation as originating from good intentions, and some saw government regulation as
inherently misguided, several major concerns nevertheless were commonly raised concerning regulation.

Regulatory restriction was primarily viewed as stifling the flexibility and creativity needed to effectively run an agricultural operation. A major factor behind this stifling, participants discussed, was the disconnect between those that craft the rules, regulations, and policy, and those on the ground that have to work around the limitations imposed on them. One example given was the redundancy in paperwork, certification standards, and regulatory inspections among agencies—particularly for small- and medium-sized farms. For example, Washington State’s Department of Ecology (DOE) may require multiple and similar inspections of waste management systems as that of the Environmental Protection Agency (EPA), and, thus, two different inspections were needed to satisfy both agencies on basically the same grounds and performance standards. Another participant noted the difficulties presented to farmers in passing on the farm to the next generation by confounding estate taxes. Because of the lack of cash flow, inheritors would have to sell part or all of the operation to finance such taxes at the time of transition.

In general, participants discussed numerous economic challenges to their operation’s viability. Various aspects of the cost of doing business were the most salient threats in participant comments, where the flexibility to switch production regimes depended on the ability to finance such adaptations—and be profitable. Although participants claimed smaller farms were more nimble than larger farms, that is, able to respond more quickly to market signals and trends, some crop choices complicated such abilities, regardless of scale of production. Berries, for instance, require a substantial initial investment and high seasonal labor costs. Modifying the scheduling of field operations, to take advantage of workforce availability or to reduce the risk of (forecasted) pest damage suggested a need for farmer fiscal flexibility. Concerning the financial savvy needed to navigate such challenges, one participant stated succinctly “you’re only as good as your banker” (Snohomish County).

A major challenge that participants discussed as occurring at the microfarm scale was the dependence on variables from other scales over which they had less control. Participants with livestock, especially dairy producers, saw these dependencies as a particularly serious threat, relying on the steady rhythm of shipments of feed into and milk from the farm and an adequate transportation infrastructure. Lengthy disruption of these rhythms could have serious consequences for the operation. In relation to this threat, Whatcom and Snohomish participants found flooding particularly threatening.

Thresholds

Participants briefly discussed points at which the farm system crossed a threshold after which the identity of the system would shift. At the micro
level, one such shift frequently occurred following the death of the primary operator of the farm and in the absence of anyone available to take over the operations. Such an event might have resulted in the loss of the land to developmental pressures or neighboring farms buying up the land and infrastructure and incorporating it into their operations.

In other cases, participants claimed that at some point the best use of the land might no longer be agriculture. This argument related to some of the threats faced at the micro level such as the degradation of soil fertility to a point where the land would become sufficiently marginal so as to be significantly below general market value. While many scholars make the distinction that thresholds represent a point of change away from a particular system state and not necessarily a shift to a less desirable system (Berardi et al. 2011), workshop participants largely discussed thresholds in terms of moving from a desirable system identity to a less desirable one.

Adaptive Strategies

Participants identified several strategies and resources that might assist in farmers adapting to threats and changing circumstances. Participant suggestions were wide-ranging and included strategies they had used to respond to the challenges that would exacerbate the disturbance scenarios, strategies they had seen others use, or hypothetical solutions to threats given in the disturbance scenarios based upon their own successes elsewhere. Such strategies and resources for adaptation fell under economic, personal, and planning categories at the farm level, and government programs and education at the policy level.

Participants discussed strategies and resources that might allow them to better handle some of the economic threats they faced. Adaptation suggestions included reducing costly external operating inputs, such as goods and services acquired off-farm. Participants generally discussed adapting operations to lower capital needs and to carry lower amounts of debt, as well as specific changes such as in marketing approaches of the farm. Participants noted the need to find a market niche where the farmer would be more able to set the price and not be constrained by intense competition. Participant comments on resilience and adaptive strategies ranged from making sociotechnological improvements, such as those involving more efficient irrigation practices, to having reliable equipment such as backup generator systems.

Participants often discussed personal attributes, relating to their views as to farmers either having the ability to manage their operation or not. Thus, many participants argued, adaptability and resilience might have more to do with the farmer’s personal tenacity and hopeless optimism than with specific strategies of input reduction or diversifying production.
In some ways, the answers most valuable to this research were the least obvious—they related to farmer knowledge and experience. For example, several participants noted the need for multiple skill sets if a small farmer wanted to succeed. In addition to being attuned to the weather, a small farmer also needed to be comfortable doing a mechanic’s work as well as possess financial savvy, and business acumen. Additionally, small farm management required the social ability to navigate a world of neighbor relationships and media presence where farming practices were becoming increasingly politicized (and scrutinized). Such skill sets took time and experience to develop, and required a mindset open to continual learning and creativity, as well as a fair amount of what some participants considered luck. Some of these characteristics could be developed and perhaps even influenced by government policies, but participants generally thought that it was the passion for the occupation that was the most important factor to their continued resilience in the face of disturbance.

Participants also saw the ability to plan strategically as necessary to enhancing small farm resilience and adaptability. For example, participants saw the stability created by one person, either the farmer or a long-term landlord, that is, owning farmland, as necessary to plan longer-term strategies in farm development and land use. In terms of short-range planning or management, participants saw access to accurate information as critical—for example, concerning weather systems and flood levels as necessary to planning short-term responses to flood events. Early knowledge of flood dynamics, for example, may not completely eliminate loss, although participants viewed such knowledge as having the potential to decrease losses substantially.

In terms of tools and strategies to be applied to concerns and threats at the policy level, participants largely spoke in terms of government programs taking a facilitative role in farmers helping themselves. Such views focused less on present government programs of price supports and disaster insurance and more on funding infrastructure improvements, internship programs, and practical research partnerships with universities. However, the participants’ views as to what tools and resources could be implemented at the macro level predominantly remained within the context of government support (e.g., with conservation programs and crop diversification strategies authorized by the U.S. Farm Bill). Departing from this idea somewhat was the understanding that public education serves as a tool to increase the small-scale farmers’ ability to adapt to changing economic, environmental, and cultural conditions in the future. Participants saw, then, government support and education as a means of fostering adaptive capacity in small-scale producers.

Participants also discussed direct government support as a means of enhancing small farm resilience at the macro level. Such support included shifting subsidies in greater favor of smaller producers. Subsidies would thus
have the effect of supporting current small producers and encouraging future small farms. Such subsidies might support physical infrastructure as well as the social infrastructure of enabling knowledge to be passed from one generation to the next through internship and educational programs. In this view, government support represented an effort to educate the next generation of farmers and provide the means by which they could indeed farm. Government support to decrease the need to sell all or part of the farm to finance a retirement, for example, could assist in the transition.

Participants also discussed public education as to the realities facing the agricultural sector as being a key strategy in promoting the resilience of smaller scale producers. In this respect, the ethos and will of the general public played a large role in shaping the system and steering its evolution, such as the prevalence of nuisance complaints by non-farming neighbors, purchasing a diversity of fresh produce, or paying extra for locally branded foods. As discussed above, participants recognized this ethos and will as a significant force in maintaining rural landscapes. Influencing the direction of such a force would then play a major role in participants’ shaping of a system they felt was supportive of farm communities.

CONCLUDING REMARKS

It is clear that participants saw farm system adaptation to disturbance as an intricate process influenced by interactions occurring over several different scales. While participants had many ideas as to adaptive strategies, the complexity of the food system itself emerged in discussion, leading to opinion, conjecture, and some disagreement among participants.

Clearly, a desirable system for one participant’s farm-system may not be desirable for another. Participants saw potential conflict if farmers and members of the public within the system contest the desirability of certain competing system states. In the case of many participants, owning and working farmland in a manner consistent with family and cultural history comprised a desirable farm system at the farm scale, although, as financial needs shifted, so did acceptable characteristics of the system. The once desirable characteristics of family tradition become superseded by short-term realities. Thus, while the county public may desire farmland and open space, an individual owner may want to change operations in such a way that might conflict with the county public’s idea of what farmland ought to be. Such changes might take the form of pasture being converted to a manure lagoon, land previously held in conservation acreage converted to fenced pasture, or might even include the financing his or her retirement with the sale of a family farm to nonfarm development.

Moreover, the ways in which the participants discussed resilience at times contradicted (at least some of) the basic characteristics the researchers
had come to understand constituted resilience from the literature and other research. Most notably, the literature presents system resilience as the ability to persist in a distinct state by adapting to change and disturbance (Holling 1973; Carpenter et al. 2001; Gunderson et al. 2010). While themes of adaptability and individual tenacity abounded, highlighting the unpredictability of farming and the need to be able to roll with the punches, many participants discussed the need for some sense of stability, ironically, through programs established at larger scales (county, state, nation). However, participants later complained of the government policies that had encouraged such stability in the national food system by encouraging overproduction and cheap available food through subsidies. Some participants’ desire for a shift in subsidies from support of mass production to support of small family farms is a case in point. While the focus strategy shifts, the underlying attempt to “engineer” the system to a desired state remains the same. Similar assumptions as to the extent to which a system operates across space, time, and society have met with disastrous results in New Orleans after Hurricane Katrina (Berardi et al. 2011), with consequences for agriculture. The basic tenets of resilience thinking suggest that change is certain, especially in complex biological and sociological systems. Additionally, participants’ strong desire for long-term stability through ownership and advanced knowledge of environmental conditions highlighted their reasoning that safety lies behind the walls of stability. Such systems have proven to increase exposure to disturbance when actual disturbances exceeded the assumptions of such stabilizing systems, as was the case of New Orleans’ levee system during Hurricane Katrina. Certainly, the desire for stability is understandable. However, stability may negatively influence system resilience in the longer-term by generating complacency and decreasing system feedback that otherwise would serve to improve the system, as discussed in Berardi et al. (2011).

Study results concerning individual tenacity, flexibility, and possession of a diversity of skill sets to support farmer livelihoods correspond well to findings in the socioecological resilience literature (Keil et al. 2008; Marshall and Marshall 2007; Cinner et al. 2009; Swanson et al. 2009). Further, study participants from a cross section of agriculture in the North Puget Sound region—from small-scale, first-generation recreational farms to multi-generational conventional and niche-marketed farms—agreed that further attempts to stabilize the agricultural food system in a different state, through regulation and subsidies, would be problematic, given the changing nature of the occupation and its relationship with the larger societal system. We conclude that farmers in the study recognized the need to re-frame agricultural support and farm policy in the United States away from emphasis on the stabilization of prices, and more towards farmer autonomy within agreed-upon guidelines. Innovative, adaptive practices that may emerge will move the agricultural sector towards reducing vulnerability and, thus, increasing resilience.
Research can aid this effort at increasing farm resilience. Further research will help to elucidate what is the appropriate mix of subsidy strategies and policies to encourage system feedback, develop adaptive strategies, and reduce farm and farmer vulnerability through various risk-reduction approaches.

REFERENCES


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