

# Social and ecological transitions: Winemaking in California

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Greig Tor Guthey, Greig Guthey, Gail Whiteman

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## Abstract

With rising interest in sustainability, ecology is an increasingly important dimension of organizational research. Yet few empirical studies integrate local ecology into coevolutionary approaches where firms are key actors, and fewer still approach the question of sustainability and organizations from a systems perspective. In this paper, we ask how organizations can effectively participate in efforts to increase sustainability from a systems perspective. We develop an interdisciplinary framework for understanding firm-ecology relationships and then explore how this framework sheds light on regional planning and industrial practice in northern California's wine industry.

## Introduction

Porter (2006) argues that we need to take a systems perspective to adequately describe how firms affect natural systems and how they can contribute to increased sustainability. This is a new area for research. While studies on organizations and the natural environment have grown considerably over the last few decades (Bansal & Gao, 2006; Jermier *et al.*, 2006), only a few use systems theories (e.g., Allen, 1997; Boons, 2008; Loorbach *et al.*, forthcoming; Whiteman *et al.*, 2004). Instead, organizational research tends to focus on whether or not it pays to be green (Berchicci & King, 2007), on the various strategic approaches to framing environmental issues (Etzion, 2007; Jermier *et al.*, 2006), on the impact of regulation on firm behavior, and on measuring the environmental performances of organizations in terms of waste production, resource use, or the adoption of ISO 14001 (Bansal & Gao, 2006). But persistent sustainability problems—such as climate change or unsustainable agriculture—require more radical and structural changes within and between organizations (Rotmans, 2005) as they relate to the needs and constraints of the local ecology (Allen, 1997; Boons, 2008; Guthey, 2004; Lockwood, 2007; Whiteman *et al.*, 2004).

From a complex systems perspective, sustainability and resilience emerges from the coevolution of social, ecological and economic systems (Allen, 1997; Porter, 2006; Korhonen & Seager, 2008). As Seager (2008: 447) writes, “[t]he locus of study in sustainability science is on *the interaction between human and natural systems*” (italics in original). Capturing this interaction requires a multidisciplinary approach to organizational research which moves beyond a linear search for eco-efficiencies (Allen, 1997; Korhonen & Seager, 2008; Loorbach *et al.*, forthcoming). In this paper, we look to the fields of ecology and geography for theoretical tools that can help managers and researchers think about complex organization-nature relationships. We also empirically examine how organizations can effectively participate in efforts to increase sustainability from a systems perspective given the needs and constraints of a specific local environment.

In section one, we briefly review the growing body of work in organizations and ecology. Section two identifies how approaches from ecology can help clarify organization-nature relationships (e.g., Holling, 1986; Folke *et al.*, 2002). In section three, we draw upon research from economic geography to propose that organizations can usefully be viewed as powerful systemic actors that coproduce social understandings of “place” that has direct implications for sustainability. We then present empirical findings in section four to illustrate how organizations (including firms) have coevolved with a specific place through a case study of winemaking and regional planning in northern California.

Data for the case study was collected using documentary analysis, interviews, and observation in order to show how firms embracing environmental values can generate innovations in production processes and markets (Guthey, 2004). In Napa and Sonoma County, firms have contributed to an emergent set of policies concerning ecological protection, agricultural land preservation and promotion for more than 40 years with the result that firms and other stakeholders seem to be coproducing not just wine but also the ‘place’ associated with its production.

## Ecology in Organizational Research

Although corporate environmentalism has progressed from reactive responses in the early years to more proactive business strategies (see, e.g., Etzion, 2007; Hoffman, 1997; Jermier *et al.*, 2006), firms continue to focus more on reducing unsustainable firm-level behavior rather than on increasing the sustainability of the system via radical change across actors and levels (Ehrenfeld, 2005). This is surprising given that Starik and Rands (1995) provided an early framework for studying the relationship between the organization and other levels of analysis (political-economic, social-cultural, ecological and individual).

However, there are only a few empirical studies that can provide direction in this area (e.g., Allen, 1997; Boons, 2008; Loorbach *et al.*, forthcoming; Whiteman *et al.*, 2004).

That companies coevolve with other institutions and actors is well established in organization studies (Rodrigues & Child, 2003; Lewin & Volberda, 1999). And while the majority of coevolutionary studies “overlook” the natural environment due to their focus on institutional linkages, there is a growing body of work attempting to link ecology and organizations in new ways. For instance, a number of studies examine how industry in the Netherlands is adopting a systemic approach to sustainability. Boons (2008) describes how a network of firms in the Port of Rotterdam developed an emergent self-governance approach to link their production processes and reduce environmental waste and energy use following selective pressure by the Dutch government. Before this initiative, individual environmental managers were not fully aware of their collective impact on the local ecology. Bass (2008) found that local embeddedness (in cognitive, structural, cultural, political, spatial and temporal dimensions) within industrial systems in Rotterdam facilitated learning which helped businesses radically innovate. Similarly, in the densely urbanized social-ecological context of the Netherlands, Loorbach *et al.* (forthcoming) illustrate how businesses can coevolve with government-backed societal transitions in areas such as sustainable mobility. The key is to encourage social processes amongst innovative front-runners, who can then begin to self-organize and experiment with new approaches to sustainability. This is similar to Clarke and Roome’s (1999) case study of a Canadian utility. These researchers identified the important role of learning action networks in their case study of an energy company’s efforts to develop more sustainable practices. In their view, learning action networks enabled a broad set of stakeholders to engage in a continuous process of learning, action and change that was interactive and reflexive. As all of these studies show, there is tremendous value in studying emergent social processes in the coevolution of organizations that share or operate within related social-ecological systems.

Importantly, Allen (1997) and Whiteman *et al.* (2004) also highlight the need to better understand local ecological processes in order to evaluate organizational effects on the larger system. For instance, Allen (1997) argues that cities and regions are complex systems in which spatial self-organization occurs through the interaction of economic, demographic, and environmental factors. He argues that modeling can be used to identify the range of potential alternatives that arise from policy decisions over the long term. There is an “unsustainable hidden reality to urbanization,” he argues, which means that “decision makers are increasingly divorced from the reality of the natural system that really supports cities” (Allen, 1997: 19).

By contrast, Whiteman *et al.* (2004) explored the social-environmental impacts of multinational companies in high-latitude eco-regions in order to conceptualize how oil, natural gas or forestry companies interact with “socially and economically mediated ecosystems” (p. 371). They suggest more generally that business theory and practice need to move beyond an unduly narrow social or economic concept of organizational survival. Instead, they propose that regional ecosystem resilience is a more accurate measure of sustainable corporate governance because it shifts the objectives of the corporate board away from short-term individual firm benefits to the long-term viability of the nested social-ecological systems which firms rely upon and collectively shape.

Despite these examples, the concurrent examination of social and ecological processes within organization studies is not common. For instance, Loorbach *et al.* (forthcoming) do not explicate in detail specific ecological processes related to sustainable innovations other than more general descriptions of system constraints such as CO<sub>2</sub> emissions, air pollution and traffic congestion. In a related way, Whiteman *et al.* (2004) do not identify how ecological processes interact with existing social processes used and enacted by boards of directors. Yet a combined approach which examines the coevolution of social and ecological processes is required in order to understand the complexity of nested social-ecological systems. In this paper, we address this gap by exploring how and where social and ecological processes coevolve, and to do so, we first introduce aspects of systems thinking from ecology and economic geography.

## Complex Systems as Dimensions of “Real” Ecologies

Ecologists like C.S. Holling (1986) explore sustainability by identifying the resilience or vulnerability of *social*-ecological systems. A social-ecological system (SES) is the combination of natural ecosystems and social systems. An SES is believed to be resilient to the degree that it can absorb shock or ‘disturbance’ and either bounce-back to its original healthy state or coevolve to another stable state. Resilience is “the capacity of a system to absorb shocks while maintaining function” (Folke *et al.*, 2002).

From this perspective, the emergence of ‘adaptive management’ practices which anticipate complexity and surprise is encouraged. Adaptive management in conservation or natural resource management emphasizes flexibility, learning and the need to loosely couple local knowledge on ecological processes with institutional knowledge of social processes amongst organizational actors in a cross-scale manner (Folke, 2007). This literature perceives nature, society and economic organizations as part of several nested systems (Holling, 1986; Folke *et al.*, 2002; Whiteman *et al.*, 2004). Resilience is thus related to the adaptive capacity of a complex SES to adjust and adapt, and not simply to the ability of individual organizations to bounce back from social or economic crisis as would be the case when terms like ecology and environment are understood as metaphors for a set of institutions.

While resilience theory has proven robust in conservation management (Folke *et al.*, 2002; Ostrom, 2008), it has yet to conceptualize a concrete role for firms in social-ecological systems. In general, resilience theory conceives of corporate

activities as belonging to the 'economic' sphere of systems theory. The literature has yet to study how the actions of individual firms, and industries collectively, are integral coevolving parts of social-ecological systems. This is an important gap to address in ecology, because as Chapin and Whiteman (1998) argue, firms often actively seek ways to create disturbance in the social system to achieve competitive advantage over their peers. Such disturbances—while useful in creating competitive space for action—have unrecognized and perhaps unintended impacts on the resilience of local and global ecologies. Furthermore, how do firms and other system actors become aware of their own embeddedness (Whiteman & Cooper, 2000) in local ecologies and coevolve within specific locations with unique ecological characteristics as well as social and economic developmental paths and prospects? The opportunity is to use conceptual and practical tools from the field of geography that embrace the necessary relationships between ecology and industry, and not just the impacts of one on the other.

## Complex Systems as Places

The geographic concept of 'place' offers potentially useful ways of bridging the gap between our use of organizational coevolution and ecology's framework of social-ecological systems using complexity thinking. 'Place' is a rich term that incorporates the natural, cultural, social, political and economic dimensions of a given space and seeks to encapsulate not just local or industrial activity there but also larger scale influences and connection. Importantly, place is not a static concept but is considered an open and historically contingent process in a constant state of change through interaction and renegotiation of power geometries that extend from endogenous local dynamics to global processes (Pred, 1984, Massey, 1994; Paasi, 2002). "No economic landscape, place or region—however defined—stands still. Every economic landscape, place or region is a composite of simultaneous diversity and successive variation, of unfolding processes and historical sedimentation" (Pred, 1985: 7).

In this way, geographers understand organizations and societies as producers of place in ways that neither organization scholars nor ecologists often consider. Places are the result of, and also are themselves always, unique human-environment relations located in a specific location. A classic example of the production of place as a consequence of changing social relations is Cronon's (1983) *Changes in the Land*. This study shows how the beliefs, understandings, and uses of nature by North American colonists led to a different kind of ecology from that of Native Americans. English settlement involved a large-scale transition in eastern North American ecology because the practices, beliefs, and physical landscapes of Native peoples differed vastly from and were supplanted by settlers' understandings and uses of nature. Langston makes a similar observation about the Blue Mountains of Northeastern Oregon and Southeastern Washington; settlement physically changed the pre-settlement landscape and ecology of the Blue Mountains.

In a more metropolitan setting, Guthey *et al.* (2003) found that unique sets of consumers in the San Francisco Bay area are leading the way to new locally-based understandings of food and environment which drives innovation in food industries like dairy. Moreover, beliefs and ideas about nature influenced the sustainability of the system as a whole via the development of new institutions and industrial practices. From across these studies, local cultural patterns and beliefs about nature, environment and lifestyle influence the evolution of local ecology in complicated ways. In the following case study, we map out how a new understanding of place and ecology was tied to the development of the California wine industry.

## Organization-Ecology Relationships in California

Sustainability raises clear challenges for firms and industries alike but we have a number of examples of firms embracing or at least incorporating substantive interest in their impacts on the local environment that seem to extend beyond the usual individualized approach such as reducing paper waste through recycling or adopting ISO 14000 production criteria. In this case, we explore how organizations have been actively involved in planning for improved sustainability of economy, society and nature over a forty year period. In short they have not only been parts of a complex organizational system, but also critically aware that they are dimensions of a complex adaptive place.

The history of winemaking in California is often considered one of transition from one form of wine making—bulk production—to another form of wine making—premium production. An interesting facet of this transition is how long and how many different actors including the local ecology have been involved in the industry's transformation. The development of truly premium wine production has taken several decades of research and development involving state-funded university research, significant private investment and entrepreneurship, and fundamental change in people's understandings of human-environment relationships. These changes have led to further innovations in policy making, environmental management, and thus increasing attention to ecology and industrial practice in regional planning. Thus the northern California industry is an example of a complex social-ecological system. Together with a range of other organizations and nature, the industry has coproduced a 'place' with a unique set of beliefs, practices and conventions that are in a continuous process of revision (Guthey, 2008).

Napa County and Sonoma County are part of the nine county San Francisco Bay metropolitan area, a region with a Mediterranean climate generally characterized by a brief 3 month rainy season followed by a 9 month dry season with a high level of biodiversity. It is covered in mixed oak woodlands with chaparral and an understory of mixed grasses and shrubs (Hilty & Merenlender, 2004). In wetter and cooler sections, large stands of conifers (e.g., redwoods (*Sequoia sempervirens*) and

Douglas fir (*Pseudotsuga menziesii*) persist. In fact, Sonoma County is known as 'The Redwood Empire.' For the past 150 years, the region has been actively farmed for timber, truck and nursery crops, stone fruits, wheat, dairy, and most notably wine grapes with consequent impacts on ecosystem functioning. But while the ecology has changed over this period, it also forms the basis for ongoing environmentalism and restoration efforts. Of particular concern is the potential for landslides and slumping of vineyard development as a consequence of heavy winter rains which risks damage to public water resources including local streams and rivers with habitat for steelhead and salmon. Development affects dozens of other rare and protected species of plants and animals; approximately 81 special status plants and 68 special status animals—species identified under various protective federal, state, and local laws—are thought to live in Napa County alone (Napa County, 2004). Over the past several decades, a regional consensus has emerged which seeks to integrate environmental protection, agricultural preservation, and smart growth.

## **Wine firms as Producers of Place**

Firms were important players in building resilience into the agricultural industry over this time period. The problem facing the region from a winemaking perspective in the 1960s was that landowners were essentially speculating that housing development would be more profitable than the existing wine industry since the industry was locked into a low road with respect to quality and markets. Thus wine making was considered at the time a low performing industry and many people were hoping to get out of the business. As a result, housing development became the primary threat to a sustainable agricultural economy in the 1960s.

The influx of entrepreneurs into winemaking in this region after the 1950s promised a different sort of wine industry from the essentially bulk industry prior to 1960. These people were part of a broad social movement in the United States during the 1960s and 1970s, known as "The Back to the Land Movement," and associated with a migration of large numbers of people from cities and suburbs into the countryside. In Napa County, many people who attempted this migration were experienced managers who left positions in larger organizations out of frustration with bureaucratic process. They had a vision of small-scale farming as an improved form of enterprise, improved because it was supposed to be more innovative, smaller scale, and closer to the land. They also wanted to live in a place without the complications of urban life and with stronger emotional attachments and public engagement in community life, in short, a stronger sense of place. Thus from the beginning, producers were palpably aware that they were attempting to produce a 'place' that had social and ecological robustness.

In pursuing the seemingly diverse goals of agricultural production and communal living, the new cadre of wine producers helped transform an historically unregulated rural production space into a tightly regulated agricultural place geared to production of fine wines. The distinction between space and place is critical. Hudson (2006: 255-284), for example, argues that space suggests limited connection to a locale while place involves multiple connections and emotional ties to locale. In this case, firms helped induce both new forms of regulation and new understandings of nature-society relationships in Napa County and later Sonoma County. In fact, protecting the land from other types of development that detracted from the agricultural economy was absolutely fundamental to the success of the premium wine industry.

## **The Region as a Complex Adaptive Place**

Agricultural preservation in Napa County became possible because of the combination of industry interest combined with local voters, state legislation and a broad statewide planning movement in the 1960s. In the same year that environmentalists floated a proposal for making Napa Valley a nationally protected vineyard district, the California Assembly passed the California Land Conservation Act which empowered county tax assessors to assess land based on its use value rather than its full market value which is generally higher (Tryphonopoulos, 1967). In this way, state legislators hoped agricultural land might be preserved by shielding farmers from taxation based on their property's full development value. In order to gain these tax benefits, landowners enter into contracts that bar landowners from subdividing or otherwise developing their property for 10 years or more. In order to gain access to these benefits, counties had to implement agricultural zoning, which set the stage for changes to regional development policy in Napa County.

In a county like Napa—a place largely in favor of agricultural preservation but also suspicious of government—large lot agricultural zoning combined with state tax benefits provided a way around the suspicions of "nationalization" implicit in the national vineyard proposal (Sokolow, 1990; Medvitz, Sokolow & Kemp, 1999). The implementation of the agricultural preserve was nevertheless a difficult political project because it conflicted with deeply held beliefs about property rights and existing interests in subdividing agricultural land which held a majority vote on the county board of supervisors. The entire valley floor was zoned for one-acre subdivision. Yet many winery interests were not convinced this was the best alternative including firms like Schramsberg Vineyards, Volker Eisele Family Estates, Martini Winery, and Robert Mondavi.

Progressives also worked closely with a much broader community of interests. For example, San Francisco resident Dorothy Erskine helped to catalyze support for their cause. Erskine believed "Land is a resource, not a commodity subject to speculation and mindless use" (Walker, 2008: 136). She also owned a second home in Napa County which gave her insider credibility. And she was instrumental to convincing recent winemaker Jack Davies to work on policy to protect agricultural land in Napa County. In fact, Davies was not a conservation activist until after having dinner at her house at which point he became convinced that

“winemaking and the land were inextricably linked” (Conaway, 1990: 82-83).

Thus outsiders and insiders worked together to convince Napa County public officials and growers to support the development of a locally designated agricultural preserve using state law. Among the local officials important in the agricultural preserve effort were large landowner, grape grower, and Planning Commission member Andrew Pelissa; former County Supervisor Lowell Eddington who represented grape growers at the Napa County Planning Commission and Board of Supervisors; Board Member and Republican Dewey Anderson; County Tax Assessor George Abate, County Administrator Al Harberger; and Planning Commission Chair Felix Vanderschoot (Eisele, 1999: 106). Important grape growers, such as Louis and Louis Peter Martini and one of the Galleron brothers, eventually stood up in support of the proposal as well.

This coalition of urban activists, local officials, and winemakers and farmers eventually succeeded in convincing public officials that preserving agricultural land was good policy, but the agricultural preserve was neither a silver bullet to the question of agricultural land conversion, nor a uniform victory for proponents. Supporters originally wanted to have a 40 acre minimum parcel size. The Board of Supervisors reduced the minimum lot size to 20 acres in order to maintain majority support for the rezoning. They included new rules to allow landowners to sell off large portions of the property while still maintaining a house and one acre parcel, thus enabling a creeping residential estate growth in the preserve. While path breaking, the strategy has led to further subdivision, additional ecological constraints due to habitat fragmentation and increased sedimentary loading, and thus potentially decreased ecosystem resilience. Nevertheless the agricultural preserve was an important step forward, and was a step led in many ways by wine entrepreneurs in view of their efforts to build a new sense of place and a renewed wine industry focused on premium wine production.

Their effort signaled what appears in historical perspective to be an emergent process of additional policies and institutions to promote sustainability in the region. The agricultural preserve passed in 1968. By the early 1970s, the county began to plan for agriculture instead of housing. Voters then passed measures to limit population growth and to place land use decision making authority with the voters. More recent efforts include the Napa Green Certified Land Program developed by vintners, local agencies and conservation groups, a California Sustainable Winegrowing Program, a state-wide producer driven effort to promote sustainability in collaboration with multiple stakeholders, and new incentives in the Napa County General Plan for landowners who “incorporate environmentally sustainable practices that avoid or mitigate significant environmental impacts” (Napa County, 2008: CON-33). In short, sustainability involves many different scales, actors and institutions.

## Discussion and Implications

Northern Californian efforts to preserve agricultural land and improve environmental quality present a number of important insights into organizational relationships with nature. Organizations must take into account the unique dynamics of place in understanding and developing approaches to negotiating change. Our case study shows the importance of social embeddedness (Baas, 2008; Granovetter, 1985) and ecological embeddedness (Allen, 1997; Whiteman & Cooper, 2000) within a distinct place. In this case, a number of leading firms, firms organized into trade associations, and voluntary working groups have been able to influence regional policy and industrial practice over a long period. These initial steps towards creating a more sustainable agricultural economy were driven by entrepreneurship that envisioned a certain kind of wine industry and lifestyle in the wine region. The interesting point here is that the initial effort led to a cascade of policies, practices, public support and activism that also proved important in maintaining long term system resilience. Moreover local political actors, including firms, have been critical to generating the momentum to overcome rigidity in the existing social-ecological system so that overtime a movement focused on agricultural and natural resource conservation could emerge and begin to build a different sense of human-nature relationship in the region (Baas, 2008). The case also shows the importance of new emergent governance institutions to maintain multiple moments of stability within the shifting dynamic of local place (Boons, 2008).

The case helps deeper our understanding of systemic change within specific place-based economic activities that are transitioning towards greater sustainability. There were multiple forces and interests vying for influence over development policy in the region. And it was only through fundamental changes in beliefs and understandings of nature (and careful and strategic policy development) that a more sustainable basis on which to build a renewed wine industry emerged. The mechanisms for engaging in this process of policy development and change came from understanding and connecting with place at a deep intellectual level on the one hand, and also from engaging in a long term effort to build a new affective sense of place among multiple stakeholders. This was accomplished, in part, by the creation of local stories on the need for sustainability that in turn contributed to, and reinforced, this evolving sense of place (Baskin, 2008). In this process, firms played central roles in coalition building, research, and network development that ultimately increased the resilience of the regional agricultural economy as a whole.

The results of our study may have implications for many other firms which operate within complex nested systems linked together

Table 1

<i>Institutional Development in Napa and Sonoma County, 1965-2008. Sources: Guthey (2004), Jones (2008), Marcus (2004), Medvitz et al (1999), Napa County (1983), Napa County (2004), Napa County (2008), Sonoma County (2008).</i>	
1965	The California Land Conservation (Williamson) Act passed by state legislature.
1968	Napa County Agricultural Preserve passed by County Board of Supervisors.
1973	Goal One of Napa County General Plan becomes "Plan for Agriculture"
1976	The Land Trust of Napa County and the Sonoma Land Trust founded to promote private land conservation through tax easements, in fee-title ownership and donations.
1980	Napa County voters pass Measure A limiting population growth to 1% annually in unincorporated Napa County.
1990	Napa Voters pass Measure J requiring public referenda for all changes in agricultural and open space land use through 2020. Sonoma County citizens vote to create the Sonoma County Agricultural Preservation and Open Space District, a public sector land trust funded through a quarter-cent sales tax extended by voters in 2006 to 2031.
1991	Napa County Board of Supervisors enacts Hillside Ordinance/Conservation Regulations to address erosion control and stream setbacks.
1995	Napa Sustainable Winegrowing Group formed to address integrated pest management practices and to promote stewardship that optimizes ecological stability, reduces pesticides, and promotes soil health.
1999	Fish Friendly Farming certification program begun in Sonoma County to promote best practices for maintaining viability of salmonid species. Napa River Benthic Macroinvertebrate Study initiated to provide baseline and longitudinal data on the Napa River's health. Sonoma County Board of Supervisors approves Vineyard Erosion and Sediment Control Ordinance.
2000	Napa County Watershed Task Force releases "Phase II Final Report" detailing the findings and recommendations for managing county watersheds.
2002	Board of Supervisors establishes Watershed Information and Conservancy of Napa County. Napa County Vintners and Grape Growers initiate Napa Green, a version of Fish Friendly Farming for the Napa River
2005	Napa River Macroinvertebrate study shows both incredible richness and areas of concern along 30 different segments of the Napa River.
2008	Napa County General Plan revision includes incentives for landowners to implement environmentally sustainable practices. Napa County voters approve Measure P which extends Measure J to 2058 with minor revisions.

by specific local places. Our case study demonstrates that organizational actors exist within, change, and are changed by constantly shifting SESs (Holling, 1986; Folke, 2007; Whiteman *et al.*, 2004). Research on conservation management suggests that "[b]uilding social-ecological resilience requires understanding of ecosystems that incorporates the knowledge of local users. Thus the ecological ignorance of some contemporary societies undermines resilience" (Folke *et al.*, 2002: 8). Our findings extend this concept beyond conservation management and suggest that local users with a strong understanding of the cultural, ecological, economic and social dimensions of a specific place will be important for building future sustainability (Baas, 2008; Whiteman & Cooper, 2000). Conceptualizing nature-firm coevolution is thus a critical step in developing adaptive capacity. It can for example yield additional insight into sustainability because we can then identify firm roles and more holistically theorize stakeholder relations with local ecology and local 'places.'

Two shifts seem to be critical for researchers and practitioners alike in the context of sustainability and social-ecological systems. The first involves reconfiguring our understandings of economic performance (Korhonen & Seager, 2008; Whiteman *et al.*, 2004). As Folke *et al.* (2002) write "a fundamental challenge is to change perceptions and mind-sets, among actors and across all sectors of society, from the over-riding goal of increasing productive capacity to one of increasing adaptive capacity, from the view of humanity as independent of nature to one of human and nature as coevolving in a dynamic fashion with the biosphere." Adaptive capacity refers to the ability of an entire SES to adjust in some kind of sustainable manner. Of course, this raises the question of exactly how organizations might develop this capacity; hence the second necessary shift.

The second shift involves focusing and building the capacity within organizations for incremental adjustment, or multidisciplinary learning, that can lead to better outcomes over time for both nature and society (Boons, 2008; Clarke & Roome, 1999; Loorbach *et al.*, forthcoming; Seager, 2008). The resilience of complex social-ecological systems is related to the capacity of the entire system and its individual managers to *learn and adapt* to changing social and ecological processes (Holling, 1986; Korhonen & Seager, 2008; Whiteman & Cooper, 2000). Resilience is not defined solely as a recovery from social or economic crisis using existing practices, nor is it solely the recovery of the natural ecology alone. There has to be emergence of new practices, new social and ecological processes and new understandings of nature-society interactions. This involves institutional learning (Rodrigues & Child, 2003) and adaptive experimentation with the many relationships between ecology and organizations

(Holling, 1986). Conceived in this manner, the wine industry is a type of organizational field (DiMaggio & Powell, 1983) that is not only embedded in local and global social-ecological systems but also shapes these systems in distinct ways

Theory from geography and ecology can thus enrich the practice of researchers and managers alike by encouraging them to stretch their understanding of inter-firm networks to include organization-nature relationships emerging in specific places over time. As Lockwood (2007) noted, ecology is critical to organizing sustainable futures. And the challenges we face will involve complex interactions with a set of historically conditioned and place-influenced policies and practices that are emergent and necessarily linked to local ecologies. From this perspective, we see the challenges of sustainability as both deeply socially and ecologically embedded (Whiteman & Cooper, 2000), and subject to multiple levels of influence (micro-level, meso-level, and macro-level). But importantly, the challenges and opportunities arise out of and are created by firms, organizations, people and nature in place. Future organizational studies which seek to examine sustainability from a multidisciplinary perspective would be enriched with a simultaneous analysis of how social and ecological embeddedness in local place contributes or detracts from such activity. Integrating these dimensions of place into organizational theory provides ways of analytically conceiving of firms in relation to place and nature in a more systematic manner and provides a richer understanding of organizational performance within complex social-ecological systems.

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