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Social-ecological Memory in Korea's Traditional Village Landscapes:

Ethnographic and Spatial Approaches

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김 고 운

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이 논문을 도시계획학 박사학위논문으로 제출함

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Abstract

In nurturing resilience in social-ecological systems (SESs), memories of ecosystem stewardship practices that are retained by actors of SESs—referred to as *social-ecological memories* (SEMs)—play vital roles, particularly relevant in the face of change. This dissertation investigates the ways in which SEM is created, mobilized, and manifested to cope with disturbances and changes by employing various social and ecological resources while maintaining the system's identity, also referred to as *resilience*. It proposes SEM as a person-practice-place complex with crucial individual components. In other words, SEM that nurtures social-ecological resilience involves (1) memory carriers as the primary agents of SEM (*person*); (2) ecosystem stewardship practices based on local observations and experiential knowledge that has undergone a learning-by-doing process (*practice*); and (3) physical sites in which the person has experienced and learned through practice about ecosystem management, complex systems thinking, and the link between nature and humans. In this regard, this dissertation explores the characteristics of each indicator of SEM with individual cases concerning Korea's traditional village landscape (KTVL) and highlights their implications in the context of social-ecological resilience. Landscape here is understood as a unit of SES that is significant for its adaptive qualities. This adaptation is a feedback loop comprising the potential of the land and the ways in which humans make a living from it based on their knowledge systems and cosmologies. Additionally, I focus on traditional ecological knowledge as a type of SEM that has undergone vigorous trial-and-error over time, because in certain circumstances there is a reluctance to innovate and adapt in the face of change within an SES. In studying SES concerning KTVL, I use both autobiographical and historical memories as sources for analyzing the SEM. For instance, in **Chapter Three**, I use Park Wan-suh's novel *Who Ate Up All the Shinga?* as an example of autobiographical memory to analyze aspects of ecoliteracy and place attachment as reflected in SEM. Ecoliteracy is defined as ecological knowledge with regard to the names of living and physical components, practices of the resource management system, and landscape management systems. Worldviews and cosmologies that are closed related with person-place attachment are also delineated. These observations exemplify how memories of person-practice and person-place interactions are manifested in forms of ecoliteracy and place attachment. The study also shows how SES in relation to KTVL is highly influenced by village landscape management practices within a watershed. In **Chapter Four,** I explore the role of SEM in fostering the adaptive capacity of a

community through its synergy with other sources of resilience such as leadership, and with cross-scale and cross-level interactions. The result of ethnographic study conduced in a rural area in South Korea indicates that SEM concerning village landscape configuration is reinforced through land use changes and scale-related issues brought about by top-down policy processes. Although the evidence used here focuses on villagers' attempts to cope with flood damages, it demonstrates the importance of SEM in allowing for community-based resilience practices. In **Chapter Five,** I draw on historical records as types of historical memory to define the social-ecological identity of KTVL with emphasis on Korea's traditional village grove and to assess the current spatial identity of the landscape. With the analyzed spatial identity, I was able to locate potential traditional village grove sites in KTVLs that are not in the current governmental data. Although cognitive dimensions of SEM highlight the place-based values of physical environments, based on an SES framework, this dissertation claims that person-practice-place dynamics are also manifested through the spatial characteristics and spatial resilience of a place. It concludes that person-practice-place interactions are central to SEM, which plays a critical role in allowing for ecosystem stewardship in various regions. Institutions to support SEM-based stewardship activities and conservation strategies to protect physical sites in which SEM is accumulated and stored are needed for the maintenance, transmission, and mobilization of sources of resilience.

Keywords: Social-ecological memory, Resilience, Social-ecological systems, Landscape management, Korea's Traditional Village Landscape, Traditional Ecological Knowledge
***Student Number*: 2013-30699**

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CHAPTER ONE

Linking People with Ecosystem Stewardship Practice and Cultural Landscape

Sometimes you will never know
the value of a moment
until it becomes a memory.
–Dr. Seuss

A person with self-esteem, a good network of family members and friends, and relationships with others and his or her environment has a good chance of maintaining his or her identity when experiencing disruptions due to change, adversity, or stressors. An ecological system is similar. The network of species within a certain ecological system (including the imperceptible insignificance of some species to the system's existing structure and function), the dynamic interactions between species themselves and the environment, and the combined whole of the structure—called "ecological memory"—make it possible for a system to reorganize or renew itself after disturbance (Bengtsson et al. 2003). This is metaphorically similar to an individual's personal memories helping him or her become a stronger, or a more resilient, person through difficulties and challenges.

The memories of two or more people that store the experiences, knowledge, and information of a living past and influence the behavior of a society or a group are referred to as "social memory" or "collective memory," first analyzed as an academic concept by the French scholar Maurice Halbwachs in the early twentieth century (Halbwachs and Coser 1992 [1926]). Because the current era requires a more adaptive and innovative response to environmental feedback like climate change, researchers have begun to discuss the role of memory both in social and in ecological contexts, particularly in relation to the accumulated practice, experience, and knowledge of ecosystem management by a group or a community. Such memories are referred to as "social-ecological memory."

It has been suggested that social-ecological memory (SEM) plays an important role in nurturing social-ecological resilience (Berkes and Folke 2000, Barthel et al. 2010, Nykvist and Heland 2014). Definitions of social-ecological resilience vary, focusing on factors such as how a system responds in the face of change, including its capacity to absorb or buffer shocks (persistence); the capacity of the system to adapt to change (adaptability); and the capacity of the system to

change its channel of development (transformability). Here, I define resilience as the capacity of social-ecological systems (SESs) to adapt to disturbance and to shape change by learning and employing sources of resilience such as ecological, social, and social-ecological memories, all while maintaining the system's fundamental identity.

The Korean Peninsula presently suffers from a number of social and ecological problems, such as fine dust, income disparity, and aging population, not to mention abnormal weather problems that have arisen due to climate change. Due to their complex nature, these are by and large considered to be "wicked" problems, which according to Rittel and Webber (1973) are characterized by a lack of definitive formulation, stopping rule, true-or-false nature, and immediate or ultimate solution. Rather, one must understand the context of a wicked problem before approaching possible solutions, and these solutions are likely to express themselves as "bettering" or "worsening" effects, with every trial and attempt counting significantly toward consequences or another set of wicked problems. To minimize the risk of selecting "bad" or "worse" solutions to current issues, we must carefully examine the issues' context, integrating different types of knowledge. In this process, SEM may function either as a desirable source of renewal, innovation, and reorganization, or as an undesirable source of traps, rigidity, and path dependency (Nykvist and Heland 2014). Thus, there is reason to examine the nature of SEM so that the system may employ it in an innovative, desirable way.

Unlike social memory, SEM explicitly includes the attributes of *practice* (or experience) of ecosystem management, and *place* where ecosystem management practices occur. In this dissertation, therefore, I regard SEM as a concept comprising three pillars (Figure 1.1): person, practice (or experience), and place.

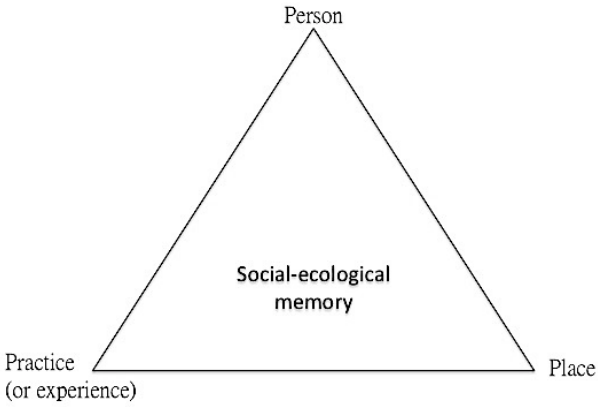


Figure 1.1 Three pillars of social-ecological memory.

Person may refer to the main agent of a memory and other individuals who influence or share practice with the main agent. In SESs, individuals are regarded as potential stewards who can carry out stewardship activities in their communities

(Chapin et al. 2009). *Practice* refers to the past habitual activities and experiences of individuals in relation to ecosystem stewardship (management), and it has the potential to encourage individuals to become stewards wherever they reside. There is good chance that this practice is the result of long-term interaction between person and place, thus incorporating cultural, historical, and even spiritual aspects into its character. Finally, *place* is the physical site in which the person has experienced and learned through practice about ecosystem management, complex systems thinking, and the link between nature and humans. Barthel et al. (2010) labeled this type of physical sites in urban areas "pockets of social-ecological memory." These physical sites may vary in spatial-temporal scale, but all have had their "spatial identity" influenced and shaped by endogenous and exogenous variables within SESs, apart from its "place identity" established upon people's experiences and interaction with place. In other words, in an SES research, spatial characteristics of a certain SES have critical influence on the resilience of the system (Cumming 2011a), making point to the importance of integrating the concept of place and space within the scope of research.

This dissertation is thus about the person, practice, and place aspects that constitute SEM, with focus on SEM in Korea's traditional village landscapes (hereafter "KTVL"). More specifically, my aim is to find characteristics of each pillar of SEM in relation to KTVL, and to discuss their implications in the context of social-ecological resilience. In Korea, the traditional village landscape has been the most distinctive cultural landscape, surviving in its basic form over the past few hundred years. I regard the village landscape as a physical manifestation of a well-defined SES demonstrating resilience. Of course, while the village landscape itself may have survived in its general form for centuries, some landscape components and the socioeconomic systems with which it interacts have undergone dramatic changes in the last century, particularly since the Japanese colonization in the early twentieth century and the Saemaeul Movement Project in the 1960s and 1970s. However, changes in the socioeconomic system are not the focus of this dissertation. Instead, I focus on the cognitive dimension of KTVL—that is, the landscape's meaning to a person or a community in a given social-ecological context, and its physical (spatial) characteristics as a result of nature-human interactions.

The discussion thus far has shown that my focus counters that of conventional science at least in three ways. First, I place emphasis on small and localized efforts to enhance social-ecological resilience. Second, I regard experiential (or non-expert) knowledge as a valuable source for local ecosystem stewardship. Third, I

rely heavily on (cultural) landscape perspectives in approaching social-ecosystem resilience.

NEW ORIENTATION FOR SOCIAL-ECOLOGICAL RESILIENCE

Shifting focus to small and localized efforts

Although social-ecological memory is considered a critical source of resilience (e.g., Folke et al. 2002), only a few studies with empirical evidence have examined how memory is mobilized and effective in enhancing resilience. In particular, Barthel et al (2010) and Krasny and Tidball (2015) explore social-ecological memories retained by urban dwellers, mostly moved from rural areas to cities, and show how their memories of gardening practices are employed in places distant from their origins, including Stockholm allotment gardens and New York oyster gardens, respectively.

What do gardening practices in cities signify in the context of social-ecological resilience? At the moment, the majority of the world's population lives in urban areas. Furthermore, six out of every ten people will live in a city by 2030, and seven out of ten by 2050 (UNPD 2016). This explosive city growth implies a recognizable migration pattern from rural to urban and from undeveloped to developed regions, which are subject to complex environmental, social, and ecological problems. Korea is no exception in this sense; the Seoul-Incheon area ranked as the fourth largest urban area in the world in 2016 (Demographia 2016).

Although governmental efforts to make urban life more sustainable are essential, it is also of importance to note that governance of sustainable development should include public participation in ecosystem stewardship and decision-making as a vital component. In light of this, grassroots initiatives and activities, particularly at the community-level, have been introduced as an alternative approach to sustainability (Seyfang and Smith 2007). In the resilience context, a community with reservoirs of diverse knowledge systems and SEM means more resources are available to draw from in the face of change, allowing innovation and adaptation at both the individual and the community levels.

In particular, because of this demographic transition from rural to urban and from undeveloped to developed, the role of SEM in promoting public participation in ecosystem management in cities becomes more appealing and engaging. In other words, immigrants from undeveloped or rural areas with some knowledge of their local ecosystem stewardship are seen as potential knowledge carriers, which may provide vision and inspiration for new ecosystem stewardship in cities. Krasny and

Tidball (2015) coined the term "civic ecology" to refer to community-wide environmental stewardship practices and the role of these practices in an SES. They have noted the significance and implications of these activities—what they call "civic ecology practices"—in their preface:

> Whereas the impacts of any one civic ecology practice are small and localized, together the feedbacks and networks among myriad practices have important outcomes for individuals, communities, and ecosystems. Although small in scale, they provide the hope and the determination to continue in the face of ever-greater stresses, or possibly even the collapse of local-social-ecological systems, brought about by climate change.

Shifting focus to experiential knowledge

In the past, ecological researchers faced the challenge of inadequate knowledge or data concerning ecological problems, whereas today's ecological researchers face the challenge of developing tools to handle complex, multidimensional information (Reichman et al. 2011). Previously mentioned studies on SEM highlight the linkage between people's former knowledge and experience from their hometowns and their ecosystem stewardship in cities to approach ecological issues. These individuals are indeed living evidence that non-expert knowledge and practice contributes to local social-ecological resilience.

Although many scientists and experts are skeptical of indigenous and local knowledge, the current scientific knowledge on biology has also undergone tests of verification in apprenticeship with local knowledge holders (Berkes 2008). It is in this sense that a number of studies acknowledge the importance of SEM, even though many researchers do not explicitly use the term "social-ecological memory." Instead, a number of studies focus on the alternative knowledge systems of local ecosystem stewardship practices. For example, Berkes and other TEK researchers have clarified how the knowledge systems held by local and indigenous groups, not by experts, contribute to building resilience and adaptive capacity in an SES, with particular focus on the community level (e.g., Berkes et al. 2000, Berkes and Seixas 2005, Berkes and Turner 2006, Berkes 2008, Berkes 2009b).

Berkes et al. (2003) argue that social memory should encompass ecological knowledge and understanding as aspects that are fundamental to the feedback linkages between ecological and social systems. In this sense, much of Berkes' work emphasizes exploring the ecological knowledge and practices of indigenous communities or local groups, and he describes this type of experiential knowledge

system as “traditional ecological knowledge” (Berkes 2008). Furthermore, Berkes et al. (2000) have shown that indigenous groups demonstrate a diverse array of local ecosystem management practices, including multiple species management, resource rotation, succession management, landscape patchiness management, and other methods for managing ecological changes.

Although various terms are used and preferred by different researchers to address experiential knowledge systems of this type (Table 1.1), including “local ecological knowledge,” “indigenous ecological knowledge,” and “traditional ecological knowledge” (TEK), Berkes prefers the latter, which he coined in his work (1993) to signify historical and cultural continuity while still acknowledging the fact that an SES is in a dynamic process of change (Berkes et al. 2003). He argues that TEK is often found in nonindustrial or less technologically advanced societies (Berkes et al. 2000). In fact, there is evidence that people in less advanced communities are more ecoliterate than those in advanced communities (Pilgrim et al. 2007, Pilgrim et al. 2008). However, it is also important to note the significant possibility, based on the influence of globalization, that more and more TEK-holders live all across the globe, regardless of community advancement.

Table 1.1 Comparison of different terms referring to alternative knowledge systems (adapted from Berkes 2008, Berkes et al. 2003, Olsson and Folke 2001)

Local ecological knowledge	**Indigenous ecological knowledge**	**Traditional ecological knowledge**
A generic term for ecological knowledge generated through observation of the local environment in any society, possibly in the mixed forms of practical and scientific knowledge.	Local ecological knowledge held by indigenous groups; often interchangeable with traditional ecological knowledge.	A cumulative body of knowledge, practices, and beliefs, evolving through adaptive processes and handed down through generations by cultural transmission, concerning the relationship of living beings (including humans) with each other and their environment.

An insightful implication of his work is that local or indigenous communities have often developed their own knowledge systems to monitor, respond to, and manage ecosystem processes and functions in ways that enhance ecological resilience (Berkes 2008). For resource-dependent communities, developing such a knowledge system or producing ecoliterate generations to conserve biodiversity would have been the only options for survival (Pilgrim et al. 2007). Nevertheless, as Nykvist and Heland (2014) indicated in their work, not all SEM is ecologically adaptive and helpful in enhancing resilience; thus, not all traditional practices are

ecologically adaptive. In fact, in some cases the practices of indigenous communities have become maladaptive over time, owing to changes in the SESs (Berkes et al. 2000). Considering this, Berkes et al. (2000) highlight the following characteristics of TEK:

> First, it is holistic in outlook and adaptive by nature, gathered over generations by observers whose lives depended on this information and its use.
> Second, it often accumulates incrementally, tested by trial-and-error and transmitted to future generations orally or by shared practical experience.

Since the world is constantly undergoing dynamic processes of change, we must subsequently redefine what is *traditional* (Berkes et al. 2003). In addition, it is important to continue questioning whether TEK is ecologically adaptive in today's context. However, the worldview that prioritizes ecological sustainability of a community with a holistic understanding of nature, while simultaneously enhancing livelihoods and adapting to disturbances, should never be neglected.

From a resilience perspective, TEK research contributes to building resilience and adaptive capacity in an SES by presenting cases of experiential knowledge in enhancing social-ecological resilience. For instance, it addresses the importance of promoting community-based conservation practices by local resource users (Berkes 2007, Herrmann and Torri 2009) and it offers additional options and opportunities for an SES in the period of renewal and novelty (Berkes et al. 2000). Therefore, some studies encourage considering of TEK and Western science as complementary (Huntington 2000, Chalmers and Fabricius 2007). These complementary perspectives are particularly relevant in obtaining a nuanced understanding of local scales, in which populations depend closely on their ecosystems.

In rural contexts specifically, communities often possess ecosystem-like concepts about explicitly defined spaces, and have developed adaptive mechanisms based on their cultural and historical experience with disturbances and ecological surprises (Gadgil et al. 1993, Berkes et al. 2000, Colding et al. 2003, Ruiz-Mallén and Corbera 2013). Given this, it is worthwhile to explore TEK as a type of experiential knowledge encompassing SEM, but to date the interconnectedness of Korea's TEK (KTEK) and resilience is not yet well understood, nor has it been systematically analyzed. This shifts our focus naturally to rural (cultural) landscapes.

Box 1.1 Korea's Traditional Ecological Knowledge

Although a number of local studies address the traditional aspects of rural landscapes, the social aspects of traditional practices, and the spatial-temporal dynamics of rural landscapes in Korea, interdisciplinary efforts to collect relevant data and discuss them in light of sustainability began only in the early 2000s. Under the theme of *traditional ecology*, 14 seminars were held through a five-year (2002 to 2007) collaboration by a group of Korean experts in various fields, including natural scientists, social scientists, anthropologists, and artists. The fruits of this collaboration have been amplified in the two volumes of *Korean Traditional Ecology*, edited by Dowon Lee (2004, 2008). In the preface of the first volume, the editor explains the difference between KTEK and TEK, and this explanation may best illustrate the characteristics of KTEK:

> The Korean approach to traditional ecology differs from that of the West in terms of the relationship between a researcher and the research objects. Traditional ecological knowledge, as noted by some Western scholars, is the result of belated attention to the lives of indigenous peoples—lives that had been neglected in the perspectives of the conquerors of these indigenous communities. Some Western scholars of TEK view life, that is, the fundamental center of *saengtae*, not from the perspective of experienced insiders of a society, but from the perspective of outsiders. Western researchers often personally study the native languages of indigenous peoples, or hire interpreters to analyze the resources. In this regard, they may be able to conduct an objective observation; however, the cultures and languages of the main agents of TEK can be subtly different from that of the TEK researchers, which can make it challenging to properly understand and describe the reality of indigenous lives.
>
> I spent my childhood in a rural area where traditional lifestyles were common. Thus, in my daily life, I benefited from the wisdom of our Korean ancestors. After I left my childhood rural hometown, began my urban teenage life, and studied ecology with Western textbooks, I admit I had to create some distance from our traditions. Nevertheless, my early experience of rural lifestyle and language—although not representative of all the different rural regions of Korea—enables me to overcome the difficulties I may encounter in interpreting materials on Korean traditional ecology. Because many other Korean authors have benefited from similar experiences in their lives, their research in TEK is distinct from that conducted in the West (Lee 2004: 10-11).

Based on his description on KTEK, it is plausible to assume that a number of Korean researchers, mainly those who are in their 50s and 60s, share some experiences in rural areas during their childhoods, the time when the influences of industrialization and urbanization were not so great in Korea. In other words, the pioneers in KTEK function as knowledge carriers, interpreters, and sometimes inspirers in the SEM context. Therefore, the pioneering work is valuable and meaningful in that it not only provides contemporary (perhaps western theory-driven) explanations on the existing historical records, cultural landscapes, and rural lifestyles in Korea, but also reflects the researchers' memories in relation to their research interests in the light of sustainability. Although I, as native Korean, also have some experience in rural areas from my childhood, I spent most of time in urban settings for the sake of better education. Likewise, it seems extremely difficult to expect younger generations with experiences and memories in rural areas in Korea. In this regard, it is of significance to understand the approaches of the KTEK pioneers and to further expand them in today's context, matching with the current global and local concerns such as climate change.

Shifting focus to rural (cultural) landscapes

In the previous sections, I have discussed the importance of people as a potential ecosystem stewards, and of their experiential knowledge gained from local stewardship practice, particularly in relation to their roles in cities. However, there are clear signs of counterurbanization nowadays, albeit small in numbers. Both urbanization and counterurbanization cause issues concerning sustainable development in rural areas. For example, a number of issues with depopulated rural areas exist, as urbanization and industrialization have dramatically changed the character of the rural areas. Additionally, people with no previous experience and memories in a rural area may have difficulty acclimating to the rural lifestyle, accelerating the development of the area or causing conflict between the newcomers and the locals. Thus, both urban and rural areas possess unique issues and challenges that require our attention.

Conservation of rural areas is an important task for the ecosystem services of both central and local governments, including food production, bio- and landscape-diversity, and cultural heritage of national importance. From an SEM perspective,

many people draw their experiences and knowledge from rural areas, making these an essential axis of SEM. Conservation of rural areas is strongly tied to conservation of cultural and agricultural landscapes. On these grounds, my research focuses on landscape perspectives of Korea's rural areas, with a particular emphasis on traditional village landscapes.

What then does "landscape" specifically refer to? A definition of the term seems necessary here. Etymologically, the term is a compound including "land" (meaning "land," from Germanic origins) and "scape," related to the English suffix "-ship," which takes its roots from the Old English "sceppan" or "scyppan," meaning "to shape." This indicates that *landscape* concerns understanding or perception of how a piece of land with different elements or a mosaic of patches is shaped. Borrowing from Heidegger's terminology, the concept of a landscape can be understood as "Sein," (meaning "being" or "existence"), whereas a landscape referred to in general can be regarded as a "Seiendes" (meaning "entity"). That is to say, the understanding of the term "landscape" reflects the interest of the term's user.

In fact, the concept of landscape has different connotations across various disciplines. For example, cultural landscape, geography, landscape ecology, and landscape ethnography each address different aspects of landscape. In the field of landscape ecology, a landscape can be understood as a dynamic mosaic of natural and man-made patches of various sizes, shapes, and arrangements (Lee et al. 1992). Other landscape ecologists, such as Turner et al. (2001), describe a landscape as a spatial area heterogeneous in at least one factor of interest, while Naveh (2005) describes it as a tangible system clearly defined in space and time. In the field of landscape art, a landscape may refer to a natural, semi-natural, or artificial scenery that reflects the real or imaginary world the artist wishes to depict.

Although the meaning of landscape varies by discipline, the landscape ecology field identifies a number of important attributes: (a) the heterogeneity of a landscape (Forman and Godron 1986, Kolasa and Pickett 1991), (b) the interrelationships of humans and natural systems (Naveh 1987, Greider et al. 1994), (c) a tangible boundary (Cadenasso et al. 2003, Strayer et al. 2003), (d) a spatial-temporal scale within which the landscape is embedded, and (e) the implicit cultural or historical contexts within which the landscapes are managed or conserved (Plackter and Rossler 1995). In addition, Carl Sauer, who initiated the notion of interrelated physiographic and cultural perspectives, maintained the prevalent understanding of landscape as a result of human management of nature (Johnson and Hunn 2010). Additionally, in the field of ethnoecology, landscape

knowledge, human practices, and cosmological beliefs are acknowledged as valuable components of a given system (Toledo 1992). Landscape-based ethnographic insights in this vein have consequently precipitated the need for focus on the relationships between land and people (e.g., Johnson and Hunn 2010).

On this basis, my claim is that the perceptions of landscape elements and their arrangements are embedded within a cultural context that thereby influences the landscape. Through the prism of cultural context, a landscape can be seen to have a sensibility of *place* that embodies both the cognition of landscape *space* and the interrelation of the perceivers or individuals within their landscape. In short, landscape perspective serves as a counterbalance to the two extreme viewpoints that regard land as either a spatial unit alone, or a place with significant cognitive implication.

The work of Berkes and other TEK research, as well as many studies concerning social-ecological resilience, tend to focus on the relevance of traditional or local knowledge in natural resources management. However, the scope of knowledge and management can be expanded from natural resources to ecosystems or landscapes, comprising a well-defined social-ecological landscape wherein natural resources are found and managed. In such a process, people establish a sense of place (topophilia, biophilia, or love of place) and enhance their ecoliteracy. According to Johnson and Hunn (2010), a landscape holds biological and adaptive significance because it reflects a feedback loop between the potential of the land and human ways of making a living upon it, including knowledge systems and cosmologies. Furthermore, previous studies have shown that the forms and processes of a landscape reflect its geologic, climatic, and anthropogenic memory (Brierley 2010).

Reference to landscape in this dissertation can indicate a spatial scale of interest, a particular setting in which cultural perception or individual experience is displayed, or both. In particular, the term "landscape" is often used in tandem with Korea's traditional villages so as to indicate (a) a spatial SES where ecological properties, heterogeneous landscape components, and humans interact; and (b) a place where local Koreans still maintain their livelihood and stewardship of their local ecosystems. Also, my understanding of landscape requires both qualitative and quantitative approaches to analyze its functions as place and space, respectively.

KTVL provide a suitable setting for developing measures of resilience for four reasons. First, the villages are geographically bounded and identifiable as integrated systems of humans and nature. Second, in rural areas, many ecological

and social processes, such as hydrology and resource use, still follow annual cycles, providing opportunity for temporal change analysis. Third, Korea's remaining traditional villages are often subject to disturbances and shocks, such as floods, droughts, and social changes driven by urbanization and globalization. Fourth, traditional villages often exhibit a unique landscape configuration adapted to local conditions and include a unique landscape element known as a traditional village grove, which has played an important role in fostering the resilience of the community. Thus, many people in KTVL hold memories including experiences and information on ecosystem (or landscape) management.

NURTURING RESILIENCE IN SOCIAL-ECOLOGICAL SYSTEMS WITH SOCIAL-ECOLOGICAL MEMORY.

According to the discussion and previous literature presented thus far, social-ecological memory that nurtures social-ecological resilience involves (Figure 1.2):

- Memory carriers as the primary agents of SEM (*person*)
- Ecosystem stewardship practices based on local observations and experiential knowledge that has undergone a learning-by-doing process (*practice*)
- Physical sites in which the agents of SEM experience and learn through practice about ecosystem management, complex systems thinking, and the link between nature and humans, which could be as small as a garden or as large as a cultural landscape (*place*)

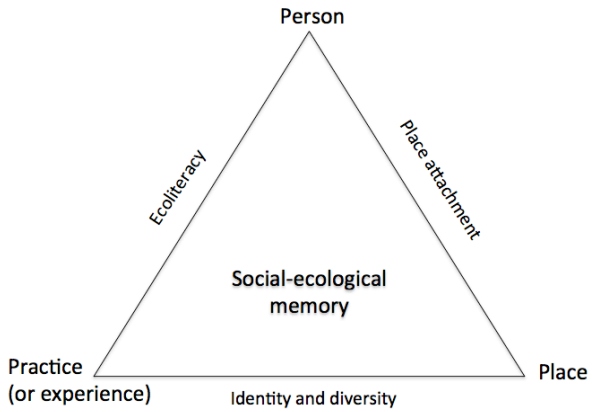


Figure 1.2 A conceptual framework for social-ecological memory as a person-practice-place complex with ecoliteracy, place attachment, and identity and diversity as emergent outcomes of their complex linkages.

A framework is required to discern each axis of SEM and to explore the processes of interaction between person and place, person and practice, and place and practice. Here, I suggest that a person-practice-place complex is appropriate as a framework for SEM to be used for analytical purposes.

Figure 1.2 shows my hypothesis in relation to the consequences of dynamic feedback relationships between person and practice, person and place, and practice and place. In this dissertation, it is assumed that an individual can enhance personal ecoliteracy through practice, and develop an attachment to place (topophilia) through interactions within it. Also, management practices may result in creation of diverse landscape components, as well as increase in biodiversity.

OBJECTIVES

Because SEM is a relatively new concept in SES research, only a few recent studies address it explicitly with a resilience-based approach. Thus, a number of questions and hypotheses remain unanswered in relation to the role of SEM in fostering the resilience of an SES. Based on the discussion so far, the aim of my research is to explore characteristics of SEM's each indicator (person, practice, and place) in relation to KTVL and discuss their implications in the context of social-ecological resilience. In doing so, I explore SEM as a person-practice-place

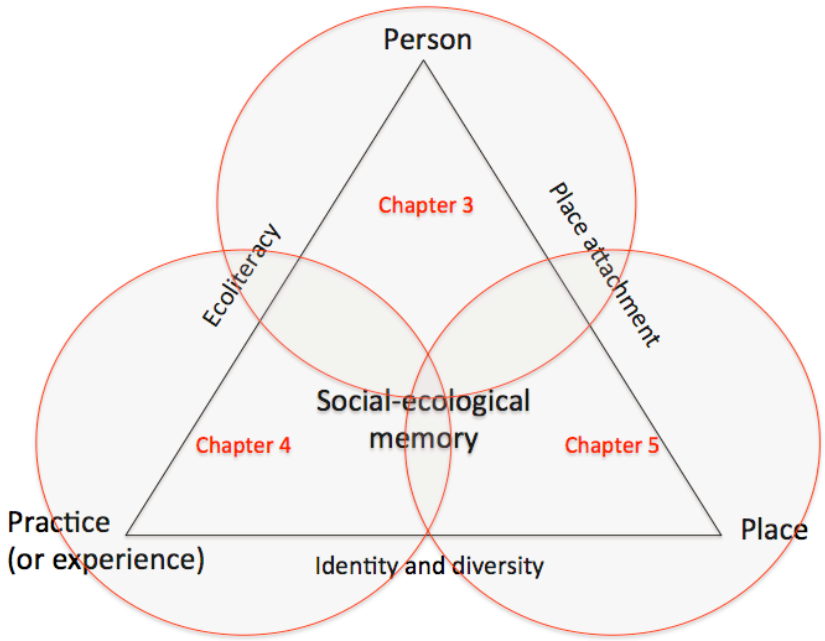


Figure 1.3 Focus of each chapter based on the SEM framework.

complex, with individual cases focusing on person, practice, and place, respectively (Figure 1.3). I will focus on cases of SEM in KTVL, since the research was undertaken in relation to ecological knowledge and practices of traditional village landscapes in Korea. I use a local, community-based, perspective, as my goal is to understand resilience at the local level.

METHODOLOGICAL APPROACH AND OVERVIEW

Researchers of SES espouse integrated approaches and often focus on the structural and functional dynamics of an SES. In examining SEM in KTVL with a focus in individual chapters on person, practice, and place, respectively, I will integrate various approaches to present SEM as (1) autobiographical memory (narratives of identity based on individual experience) and (2) historical memory (knowledge and information stored in institutions, physical forms and places, and documents), based on the work of Halbwachs and Coser (1992).

My research is thus both analytically and methodologically divided into the following components: (1) Literature review to establish the concepts and definitions employed in this chapter and throughout the dissertation (Chapter Two); (2) Evidence of how a *person* manifests ecoliteracy and sense of place in delivering SEM, based on a literary analysis of Park Wan Suh's novel *Who Ate Up All the Shinga* as a case of autobiographical SES memory (Chapter Three); (3) Focus on how TEK-related SEM influences people's *practice*, thereby fostering a community's adaptive capacity, based on qualitative ethnographic analysis (Chapter Four); and (4) Social-ecological identity of KTVL reflected in historical memory, and analysis of spatial identity of *place* as the result of person-practice-place linkages, based on spatial assessment of distribution patterns of existing KTVL (Chapter Five). The final chapter summarizes important findings concerning SEM in relation to KTVL, examines implications of SEM as a person-practice-place complex, discusses potential of the SEM framework to promote future social-ecological resilience research, and concludes with a discussion on limitations and suggestions for further research concerning KTVL.

CHAPTER TWO

Theoretical Emergence

In order to provide a theoretical context for the dissertation and to explain theoretical emergence of social-ecological memory, I begin with a description of complex systems thinking, social-ecological systems framework, and resilience. Also, various concepts and definitions introduced in the Introduction chapter as well as throughout the dissertation are reviewed in this chapter.

COMPLEX SYSTEMS THINKING

The concepts of complexity and complex systems, developed in the 1960s and 1970s, mark the origin of complex systems thinking in the natural and social sciences. The rise of complex systems theory has replaced the modern worldview, which is grounded on a metaphor of the world as a foreseeable machine and on reductionist evaluative mechanisms, with a new paradigm that sees the world as constantly adapting and changing according to environmental feedback (Plummer and Armitage 2007). Environmental feedback includes environmental vagaries resulting from both natural and social processes and patterns. Indeed, scientists worldwide have been able to reach near consensus on the anthropogenic causes and deleterious effects of global environmental change in the Earth system (Rockstrom et al. 2009). This understanding has, in turn, increased the need for a global resolution to the more complex analyses of human-in-nature systems and related understanding of the inter-linkages between ecological and social systems (Berkes and Folke 2000, Folke 2006, Liu et al. 2007, Rockstrom et al. 2009, Folke et al. 2010, Walker and Salt 2012b).

The lesson of complex systems thinking is that because the Earth system is characterized as a non-linear system with inevitable uncertainty and surprise, humans must learn to live with uncertainty and to develop new ways to adapt to changes; furthermore, this new undertaking requires an understanding of both ecological and social systems. In other words, the need for viable solutions to the present global social-ecological challenges necessitates novel perspectives on adaptive social and political processes and the agents of ecosystem stewardship, based on a robust comprehension of the intricate relationships between ecological and social systems (Dietz et al. 2003, Chapin et al. 2010).

Acknowledging this need, a few ecologists and natural scientists have played pioneer roles in broadening the scope of ecology science through interest in sustainable systems, despite the fact that the mainstream fields of ecology and social science are still reluctant to include humans in the study of ecology, or to include the natural environment in the study of society, respectively. Levin (1999), for example, developed eight commandments for environmental management based on understanding of ecosystem and biosphere complexity: (1) reduce uncertainty, (2) expect surprise, (3) maintain heterogeneity, (4) sustain modularity, (5) preserve redundancy, (6) tighten feedback loops, (7) build trust, and (8) do unto others as you would have them do unto you. Furthermore, Berkes and Folke (2000) suggested a new framework—a social-ecological system (SES)—to acknowledge social-ecological linkages by explicitly including the social system within their ecosystem perspective.

Moreover, Chapin and his colleagues (2009) challenged the existing notions of steady-state resource management and ecosystem management and suggested instead a system of resilience-based ecosystem stewardship. These works hypothesize that when changes are a conspicuous feature of the system, it is better to respond to and shape changes in ways that benefit SESs, rather than attempting to manage stability and prevent changes (Chapin et al. 2010).

According to these pioneering studies, an SES is a *framework* by which to understand the world, region, or community as an integrated system, one in which people depend on resources and ecosystem services, and ecosystem dynamics are influenced by human activities and decisions (Berkes and Folke 2000, Turner et al. 2003, Chapin et al. 2009).

SOCIAL-ECOLOGICAL SYSTEM AS A FRAMEWORK

Central to the new framework are three conceptual shifts in the science of ecology: a shift from reductionism to a system view, a shift from excluding to including humans in the ecosystem, and a shift from an expert-based approach to participatory conservation and management (Levin 1999, Berkes 2004). Consequently, there has been a significant transformation from government to governance, as well as increased interest in community-based conservation, which expands the scope of actors and organizations involved (Berkes 2004, Plummer and Armitage 2007). In sum, complex systems thinking has promoted integration of natural and social science systems (Ison et al. 1997), and laid a theoretical foundation for the new conceptual framework, namely the SES (Scoones 1999, Plummer and Armitage 2007).

Although the terms "framework," "theory," and "model" are sometimes used interchangeably, many SES researchers are cautious in distinguishing them (Table 2.1), and emphasize that the SES is a *framework* (Berkes and Folke 2000, McGinnis and Ostrom 2014, Cox et al. 2016). Perhaps the next sentence captures the essence of the difference among the three:

> "…just as different models can be used to represent different aspects of a given theory, different theoretical explanations can be built upon the foundation of a common conceptual framework (McGinnis and Ostrom 2014)."

Table 2.1 Comparisons among model, theory, and framework (adapted from Berkes and Folke 2000: 15, McGinnis and Ostrom 2014)

Model	Theory	Framework
- describes how things work - constitutes detailed manifestation of a general theoretical explanation in terms of the functional relationships among independent and dependent variables important in a particular setting.	- explains phenomena - posits specific causal relationships among core variables. - can be further specified by the development of models - can be investigated systematically using logic and mathematics, as well as simulation and laboratory experiments.	- provides the basic vocabulary of concepts and terms that may be used to construct the kinds of causal explanations expected of a theory. - organizes diagnostic, descriptive, and prescriptive inquiry. - provides a metatheoretical language that can be used to compare theories. - Is used to identify the universal elements that any theory relevant to the same kind of phenomena would need to include.

The SES framework has been designed to identify principal elements and their interrelationships within the system (Figure 2.1), and is needed "to help keep focus, provide direction, and assist in the synthesis" that requires an interdisciplinary, case-study approach (Berkes and Folke 2000). Depending on issues and objectives of study, the size, shape, and boundaries of an SES can be as diverse as needed (Chapin et al. 2009), ranging from a small-scale farming community (Milestad and Hadatsch 2003) to the whole planet Earth (Rockstrom et al. 2009).

According to Berkes and Folke (2000: 20), the SES framework can be used as a guide for the following:

- Identification of social practices based on local ecological knowledge and social mechanisms behind these practices

- Identification of similarities, general patterns, and principles that can be drawn from case studies and lessons to assist in the design of alternative, sustainable resource management systems
- Policy design in the context of sustainable systems

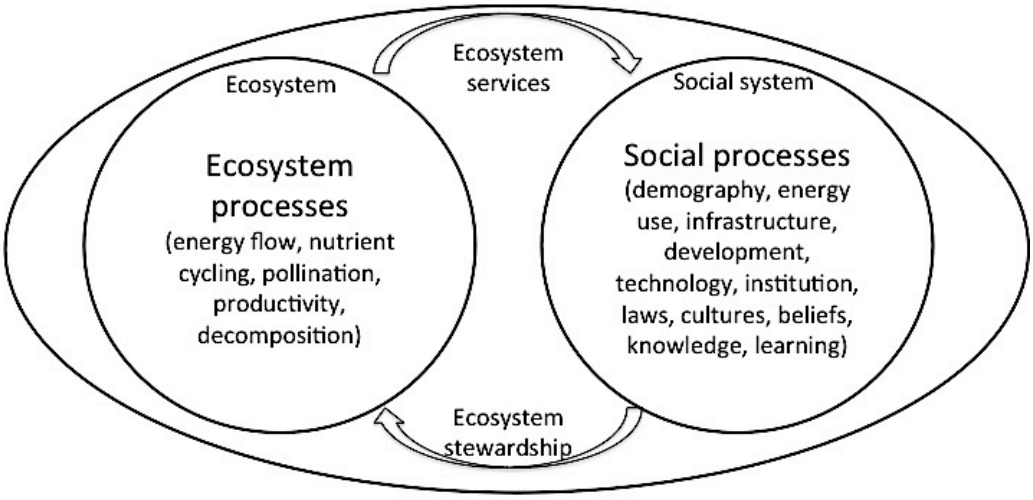


Figure 2.1 Social-ecological systems framework (adapted and modified from Folke 2006; Chapin et al. 2009).

To explain the basic components and processes of a system within an SES framework, researchers select and apply theories and make specific assumptions to address phenomena (i.e., processes and patterns in a system) and predict outcomes (McGinnis and Ostrom 2014). According to a recent study, there are 63 theories examining human-environment interactions from the fields of collective action and the commons, political economy, interdisciplinary study, resilience, environmental and resource economics, conservation biology, geography and land use change, and political ecology (Table 2.2); under the umbrella of the SES framework they tend to relate with one other in some ways (Cox et al. 2016).

Table 2.2 Categories of relevant theories in SES framework

Framework	Categories for relevant theories	Number of theories
Social-ecological systems framework	Collective action and the commons	21
	Political economy	14
	Interdisciplinary	7
	Resilience	7
	Environmental and resource economics	6
	Conservation biology	5
	Geography and land use change	2
	Political ecology	1

THE CONCEPT OF RESILIENCE

The pioneers in SES research, particularly those with a background in ecology, were interested in sustainability, in seeking mechanisms to develop a system's adaptive capacity while regarding multiple potential states and both slow and fast variables as a key to sustainability (Holling 2001). This is where the concept of resilience, one of the key features of a complex system, gained attention. That is, ecologists expanded the concept of resilience, which is rooted in ecology and introduced by Holling (1973), to social-ecological systems (e.g., Gunderson and Holling 2002).

Forty years later, for researchers of SES resilience, sustainability refers to maintaining the functionality of a system when it is disturbed, or to maintaining the essential elements for renewal and reorganization when the system's structure or function is affected by a large perturbation (Walker et al. 2002). In this sense, resilience in the systems approach refers to the SES's capacity to absorb disturbance and reorganize, through self-organization or learning and adaptation, so as to maintain its identity (Carpenter et al. 2001, Cumming 2011a, Walker and Salt 2012a). Although resilience was initially described as a key attribute of an ecological system (Holling 1973), recent studies suggest that it has been developed as a comprehensive concept and theory contributing to natural resource governance by informing a more adaptive form of environmental management (Cox et al. 2016).

According to Cox et al. (2016), seven kinds of resilience theories have been well established to describe the relationship between an outcome and variables, as well as the mechanism by which the relationship manifests. The seven theories include (1) conditions for general resilience, (2) feedbacks and general resilience, (3) gilded traps, (4) metric diversity, biodiversity loss and resilience, (5) social diversity and general resilience, (6) social memory and general resilience, and (7)

technical solutions and shifting the burden (Cox et al. 2016). In these theories, the main independent variables are actors and adaptive capacity (Cox et al. 2016). These two variables may be highly correlated; adaptive capacity refers to the capacity of actors across levels to respond to, create, and shape change and variability in a system (Berkes et al. 2003, Chapin et al. 2009). Thus, resilience theories can be understood as investigation into the components of adaptive capacity that enhances resilience and the social mechanisms behind it.

Also, there is a view that developing resilience as a theory is problematic due to the complexity of an SES (Plummer 2010). Researchers question whether theories and experiments can sufficiently address the extreme degree of complexity and multiple processes of an SES (Anderies et al. 2006). Although Cox et al. (2016) label seven theories as "resilience theories," they are in fact the results of different theoretical focuses on various components of adaptive capacity. Thus, it may feasible to regard the seven theories as seven resilience-based approaches integrated with seven interdisciplinary theories. In my dissertation, resilience is used as a concept or an approach, and theories of memory and community-based conservation are examined and applied.

Disturbance

Disturbance is a key feature associated with the concept of resilience. Depending on a system or an object, disturbance may refer to different types and meanings. In ecology, disturbance is understood as a major cause of long-term variation in the structure and functioning of an ecosystem, occurring in time and space (Chapin et al. 2011). Even within a natural environment, there are different ecosystems and consequently different types of disturbance. For example, in a forest ecosystem, a disturbance may refer to any event that results in significant reduction in biomass such as fire, flood, and earthquake. On the other hand, for birds the sources of disturbance may include human developments and hunting (Hill et al. 1997).

In terms of an SES, i.e., how an SES deals with changes to the system, Walker and Salt (2012a) categorize three different disturbances: characteristic disturbances, large infrequent disturbances, and unknown shocks. Characteristic disturbances are those that characterize the system by how it has evolved under the disturbances. That is, as the types of disturbance are widely known and expected by the system, the system is adapted to them and has certain mechanisms to deal with them (Walker and Salt 2012a).

Although large infrequent disturbances share some similarities with characteristic disturbances, they tend to happen less frequently, resulting in insufficient experience for the system to develop mechanisms for the disturbances. Hurricane Katrina is an example of such disturbance (Walker and Salt 2012a).

Unknown shocks are those that the system has never experienced, such as the outbreak of the Middle East respiratory syndrome (MERS) in 2015 in Korea. With the influence of globalization, however, people, communities, and governments share information and experience across nations and regions, allowing them to prepare for a shock that has occurred in another area. In this sense, disturbances in an SES are not always undesirable. In an SES, opportunities for enhancing resilience emerge from disturbances, with the SES going through the renewal or reorganization phase in the adaptive cycle (Plummer 2010).

Adaptive cycle and panarchy

The concept of adaptive cycle was first proposed by Holling (1986), which led also to the concept of panarchy described by Gunderson and Holling (2002). The adaptive cycle comprises of four stages: growth (r), equilibrium (K), collapse (Ω), and reorganization (α). The origin of the concept of this was based on observations of productive ecosystems in temperate zones. The model of the cycle was developed from the ecological understanding of successive exploitation and conservation of a system (see http://www.resalliance.org/adaptive-cycle and Gunderson and Holling (2002) for details upon which the following description is based). With expanded understanding of complex systems, researchers began to agree upon two additional functions in the cycle—the stages of release and reorganization—to fully describe the dynamics of an ecosystem and an SES. In theory, the adaptive cycle undergoes two major transitions, often referred to as the fore loop and the back loop (Walker and Salt 2012a).

The fore loop (black curved arrow in Figure 2.2) of the adaptive cycle, referring to the transition from the phases of exploitation (or growth) to conservation, is characterized by stability and slow accumulation. On the other hand, the back loop (red curved arrow in Figure 2.2) is the relatively short period of uncertainty and change. Depending on the adaptive capacity of a system, changes can be either destructive or creative, thus requiring novelty and experimentation as fundamental characteristics of the period (Walker and Salt 2012a).

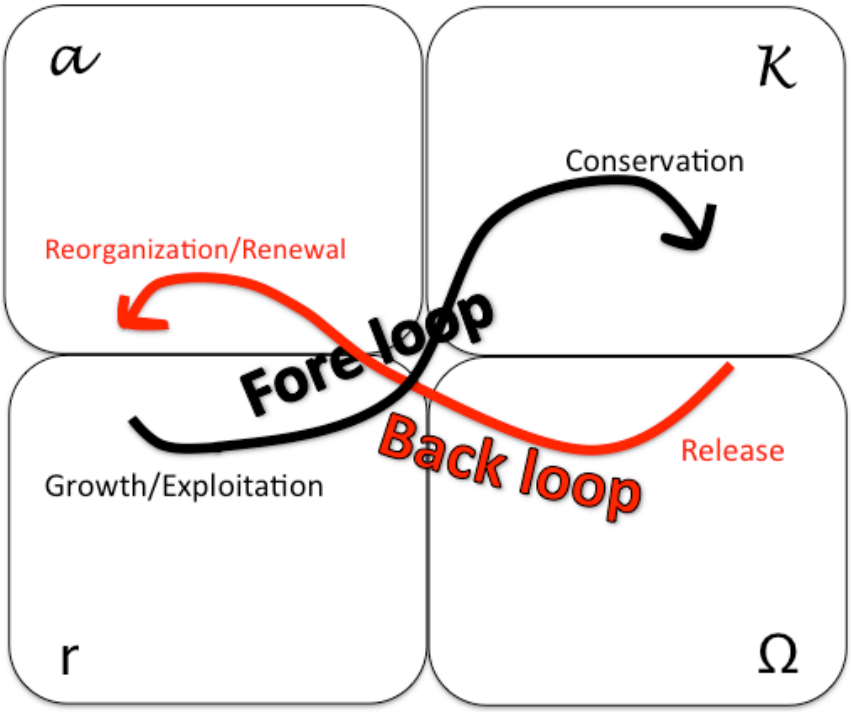


Figure 2.2 The fore and back loops of the adaptive cycle (adapted from Gunderson and Holling 2002; Walker and Salt 2012).

Although the adaptive cycle model is useful in understanding the dynamics of a system at a given time and space, it does not convey the influences of scales across time and space. The concept of panarchy was thus introduced by Gunderson and Holling (2002) to describe the manner in which an adaptive cycle is nested in a spatial-temporal hierarchy. The authors explain the origin of the concept of panarchy as follows:

> The term panarchy was coined as an antithesis to the word hierarchy (literally, sacred rules). Our view is that panarchy is a framework of nature's rules, hinted at by the name of the Greek god of nature, Pan (Gunderson and Holling 2002).

While the two transitions, marked by the fore and back loops, are prominent in the adaptive cycle, the two connections between levels known as "revolt" and "remember" are given particular attention in the model of panarchy. The revolt connection demonstrates how changes can cascade up overwhelming larger and slower events, while the remember connection refers to how changes can move downwards drawing upon accumulated capitals, or memory of the past, which allows the recovery of smaller and faster adaptive cycles (Plummer 2010). Thus,

changes in a lower scale cycle may be interlinked with the scale above (revolt), and higher scale dynamics may lead the direction of changes in the cycle below (remember) (Walker and Salt 2012a). The fundamental lesson of the panarchy model is the importance of considering cross-scale linkages when managing the resilience of a given system.

Adaptive capacity

Diversity, social learning, integration and innovation, and creation of opportunities for self-organization are generally discussed as important components of adaptive capacity (Berkes et al. 2003, Plummer and Armitage 2007, Chapin et al. 2009). Details of each component are summarized in Table 2.3. Although the components are similar in concept and meaning, some scholars refer to them as natural, human, and social capital (Nelson et al. 2007, Chapin et al. 2009), while others describe them as sources of resilience, since Folke et al. (2005a) coined the term in their work. Whether they are termed capital or sources, the important takeaway is that "memory," "learning," "knowledge," and "scale" are common threads often considered in discussion of adaptive capacity in resilience theories (Table 2.6). These components are not independent in influencing the resilience of a system; rather, they are a set of essential, interdependent factors contributing to the resilience of an SES. For instance, Berkes and Seixas (2005) identified strong institutions, cross-scale interactions and communication, political space for experimentation, equity, and use of local ecological knowledge as memory and a source of novelty in their discussion of factors that help build local resilience.

Recent evidence has found that several types of scale issues and challenges in particular are pervasive within SESs, commonly generated and faced by society (Bengtsson et al. 2003, Redman et al. 2004, Berkes 2006, Cash et al. 2006, Cumming et al. 2006, Walker et al. 2006b, Cumming et al. 2013). In fact, cross-scale linkages or interconnectedness are an important attribute of a complex adaptive system, resulting in the dynamics of a complex adaptive system or an SES (Cash et al. 2006). Often, conventional methods of environmental management are challenged by these interconnected, cross-scale and cross-level interactions within an SES. Several studies show that national policies can perpetuate natural resource destruction due to the mismatch of environmental or ecological scales with the intended social-political processes of natural resources management, which results in loss of adaptive capacity within the SES (Hobbs 2003, Cumming et al. 2006, Cumming et al. 2013).

Table 2.3 Principal components and subcomponents of adaptive capacity (adapted from Berkes et al. 2003, Berkes and Seixas 2005, Chapin et al. 2009)

Components	Subcomponents
Foster (biological, economic, and cultural) diversity for reorganization and renewal	Nurture ecological memory Sustain social memory Enhance social-ecological memory Using social memory as a source of innovation and novelty
Foster learning to live with uncertainty, change	Learn how a system works and who and why it is changing Learn from crises Expect the unexpected Evoke disturbance
Experiment and innovation by combining different types of knowledge	Combine experiential and experimental knowledge (or local and scientific knowledge) Integrate knowledge of structure and function Incorporate process knowledge into institution Promote complementarity of knowledge systems
Creating opportunities for self-organization through communications and interactions	Recognize relationship between diversity and disturbance Deal with cross-scale dynamics Match scales of ecosystems and governance Self-organize in response to external drivers Build conflict management mechanisms

The dynamic nature of panarchy and the cycles generated by cross-scale linkages of an SES highlight the social sources of resilience that allow for renewal and reorganization when the system is disturbed (Folke et al. 2005a). Folke et al. (2005a), who first coined the term "social sources of resilience," list social networks and memory as important sources of resilience. Other literature emphasizes various sources of knowledge systems, community-based conservation, social learning, and memory as contributing factors in enhancing adaptive capacity and resilience (Olsson et al. 2004, Cumming et al. 2005, Barthel et al. 2010, Berkes and Ross 2013). In particular, memory and innovation are important in terms of understanding the identity of an SES (Cumming et al. 2005). SESs have both ecological and social memory (Morehouse et al. 2008, Cumming 2011b), and memory, i.e., accumulated/embedded information, legacies, knowledge, and practice, provides key feedback after disruption. As mentioned earlier, the direction renewal takes may be desirable or undesirable, depending on the context in which memory is mobilized (Nykvist and Heland 2014). Therefore, exploring the memory of a given SES is essential in grasping the identity of the SES and thereby managing the resilience of the system.

Memory is important because it functions as insurance for growth points for reorganization and renewal after a disturbance or change (Berkes et al. 2003). Therefore, both ecological and social memory play a key role in ecological and social resilience respectively. According to Adger et al. (2005), ecological memory is bestowed by biological legacies including the remaining species and refugees that survive after a disturbance, while social memory is derived from the reservoirs of practices, knowledge, values, and worldviews (Figure 2.3).

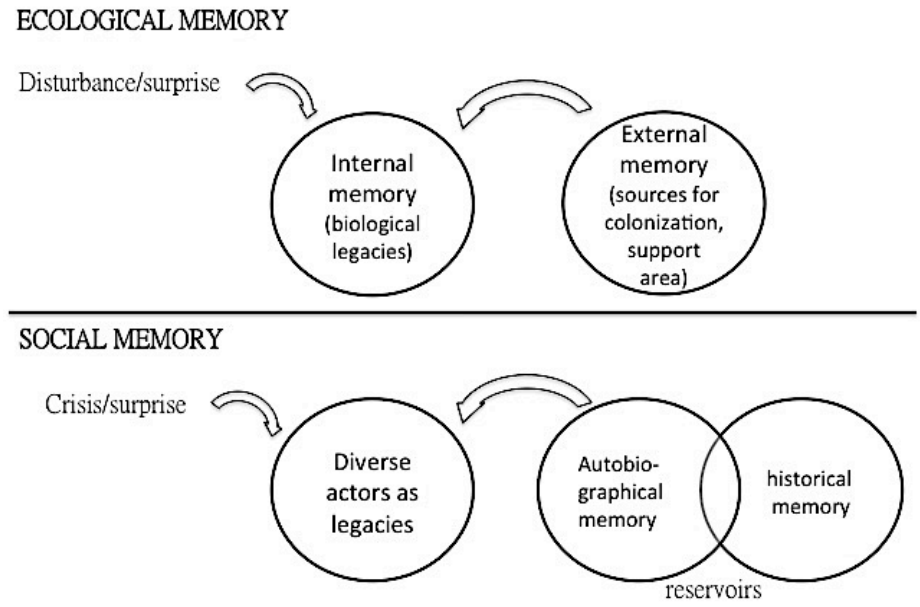


Figure 2.3 Ecological memory and social memory (adapted from Halbwachs and Coser 1992, Folke et al. 2002, and Bengtsson et al. 2003).

Ecological memory

Recent studies on ecological memory criticize the previous literature on "biological legacies," in that they only address the internal components of ecological memory (Bengtsson et al. 2003). External (ecological) memory also plays an important role in providing sources of and supporting areas for colonization (Bengtsson et al. 2003) (Figure 2.3). According to Bengtsson et al. (2003), distinguishing between internal and external memory enables researchers to consider different ecological patterns and processes occurring both within-site and between-site. Within-patch processes include facilitation of regeneration, competition, and trophic interactions that regulate which species survive during a disturbance; and between-patch

processes, mainly acting on the landscape level, provide a patch to reorganize or renew through dispersal agents or structures attracting dispersal agents.

Increased external ecological memory tends to increase the strength and spatial extent of landscape pattern, i.e., landscape resilience (Peterson 2002). Since ecological memory addresses spatial components, the ecosystem's capacity of buffering and renewal from disturbances is referred to as spatial resilience (Nyström and Folke 2001). Researchers often interchangeably use the terms ecological resilience and spatial resilience. However, the concept of spatial resilience in the social-ecological systems framework is further developed by Cumming (2011a) and memory is included as one of the important elements of spatial resilience. For instance, the forms and places in which memory is located are encouraged to consider social-ecological system in a resilience context (Cumming 2011a: 53).

Social memory

Similarly, social memory consists of a variety of different actors as legacies, including individuals, institutions, and organizations with different functions (Folke et al. 2002). According to Folke et al. (2002), the different actors include knowledge carriers and retainers, interpreters and sense makers, stewards and leaders, networkers and facilitators, visionaries and inspirers, innovators and experimenters, entrepreneurs and implementers, and followers and reinforcers. Practices, knowledge, institutions, cultural values, and worldviews are accumulated in reservoirs for social memory and actors draw on such reservoirs during a disturbance (Folke et al. 2002).

As explained, social memory is sometimes referred to as collective memory, and it is useful to distinguish two frameworks of memory: the autobiographical memory, which refers to an individual's narratives based on personal experiences, and the historical memory, which refers to knowledge and information stored in institutions, physical forms, and documents (Halbwachs and Coser 1992). Both memories are regarded as social memory as they are socially shaped and constructed. On the other hand, some researchers distinguish between communicative memory and cultural memory: the former is characterized by its proximity to everyday experience, while the latter is characterized by its distance from it (Assmann and Czaplicka 1995). Although memories are tightly linked with the emotions of actors, memories of everyday experience tend to be distorted, whereas catastrophic memories tend to be preserved in detail (Barthel et al. 2010). From a resilience perspective, a resilient SES has a good chance to have diverse

forms and kinds of memory in its reservoir. In this sense, Folke et al. (2002) emphasize functional social-ecological diversity in relation to memory as a key component to adaptive capacity and resilience.

SOCIAL-ECOLOGICAL MEMORY

Compared to the number of studies that independently address ecological and social memory, fewer studies have attempted to construct a systematic explanation of social-ecological memory (SEM) in the social-ecological system (SES) framework. Berkes et al. (2003) perhaps first discussed the importance of memory in the SES framework in their edited work. In their synthesis chapter, Folke et al. (2002) emphasize diversity, in particular functional diversity, as a key feature of the ability to persist in the face of change. In an SES, diversity is metaphorically understood as insurance benefitting the SES in the reorganization and renewal phase, because the presence of diverse species with overlapping functions and different actors with reservoirs of diverse knowledge and practices are the result of past experience and accumulated information of change (Folke et al. 2002). Cumming (2011a and 2011b) also notes that the SES's capability to deal with a disturbance is influenced by the history of an SES, its exposure to previous disturbances, and its embedded memory of past responses.

The work of Barthel et al. (2010) is the first independent journal article that explores a specific example of SEM. In their work, the authors first summarize the important implications of previous research on social memory and conclude that social memory is considered to be emergent and persistent, functioning as a shared source of community resilience (Barthel et al. 2010). They define SEM as the memory of people who participate in ecosystem management, whether it reflects a traditional ecological knowledge system or a contemporary resource management system (Barthel et al. 2010).

Although their work contributes to the existing literature in that it exclusively addresses the categories of SEM including (1) habits/rituals, (2) oral communication, (3) institutions, (4) physical forms/artifacts, and (5) external sources of support based on the authors' analysis of the data (Barthel et al. 2010), it is limited to household gardening in the Stockholm urban setting. Further, their theoretical examination of memory in an SES context does not address the dynamics of memory, i.e., how the memory interacts with other components of an SES in dealing with unexpected changes. In this regard, Nykvist and Heland (2014) criticize the previous notion of SEM and claim that the social processes of learning and memory may also be linked to maladaptive ecosystem management

practices, making SEM an undesirable source for the system. Through the analysis of two case studies that are researched and discussed in the SES literature, they conclude that using SEM in an SES for specified resilience may possibly affect general resilience (Nykvist and Heland 2014). As managing specified resilience causes trade-offs for other types of resilience (or general resilience) (Walker and Salt 2012a), communities should carefully examine the full extent of SEM and consider its mobilization in the context of general resilience.

Social-ecological memory as a source of resilience

According to Halbwachs (1992), we need to distinguish different frameworks of memory—autobiographical memory and historical memory. Autobiographical memory refers to an individual's narratives of identity based on personal experiences, while historical memory refers to the knowledge and information stored in institutions, physical forms and places, and documents (Halbwachs and Coser 1992, Barthel et al. 2010).

SES researchers often expand the discussion of social memory in the context of resilience by defining SEM as either the combination of both ecological memory and social memory (Morehouse et al. 2008, Cumming 2011b) or the combined knowledge, practices, and experiences relating to ecosystem management (Berkes et al. 2003, Barthel et al. 2010, Nykvist and Heland 2014). For example, Barthel et al. (2010) suggest that green urban areas, such as allotment gardens in Stockholm City, provide important ecosystem services in times of crisis and disturbance; in doing so, they function as a physical form or place of social memory— or *pockets of SEM*. Nykvist and Heland (2014) examine SEM reflected in historical documents in their studies on the role of SEM.

As discussed, SEM can be mobilized in either a desirable or an undesirable direction (Barthel et al. 2010, Nykvist and Heland 2014). It is plausible to assume from the definition of traditional ecological knowledge (TEK)—"a cumulative body of knowledge, practices, and beliefs, evolving by adaptive processes and handed down through generations of cultural transmission" (Berkes 1993)—that TEK encompassing SEM has a greater likelihood of functioning as a desirable source of renewal and reorganization in an SES, rather than as an undesirable source of traps and path dependency; this is because the knowledge system has already undergone the trial-and-error process in the given SES. And it is still evolving in accordance with changes within the SES (Davidson-Hunt and Berkes 2003).

Box 2.1 Social-ecological memory aspects of Korea's Traditional Ecological Knowledge

The two volumes of *Korean Traditional Ecology* (Lee 2004 and Lee et al. 2008) are perhaps the first collaborative efforts by a number of experts in different fields to draw traditional elements of landscape management, social practice, and cultural activities into the scope of environmental management.

Based on my review, among the 36 chapters in the books, 12 chapters address the interconnectedness of forests, mountains, or village groves and people in the past; 13 chapters include geomantic (*pungsu*) elements as background ideology for human settlements; and 21 chapters discuss traditional villages or traditional village landscapes as either research objects or empirical evidences of their academic approaches to find KTEK. Also, except for two chapters that explicitly address ecological aspects of the city Seoul, most chapters focus or rural or agricultural settings as places or landscapes embracing ecological implications in the light of sustainability.

In terms of the resilience and SEM aspects, a number of chapters address issues of perturbations, practices and means of transmission of TEK, places where SEM (TEK) that enables management practices is retained and accumulated, whether in implicit or explicit manners. Based on the qualitative observation, I summarized the relevant contents as shown in the table below.

Table 2A. Social-ecological memory aspects found in the previous literature on KTEK

Disturbance and change	Changes in land tenure Flood Drought
Practices and means of transmission of TEK	Planting vegetative buffer strips and Bibo (landscape complementation) Songgye (institutions) Gut (oral transmission of folk belief) Village rituals (Dangsan-je or Dong-je) Legend telling
Places where SEM (TEK) that enables management practices is retained and accumulated	Traditional villages Folk villages Village groves Traditional gardens
Other forms of SEM	Sijo Landscape paintings Pollen and Archeological Wood Historical records

SUMMARY

The study of the relevant literature shows that SEM can enhance SES resilience by expanding options for renewal and innovation in the face of change and disturbance. However, in certain circumstances SEM can also be maladaptive, resulting in a reluctance to innovate when facing change within an SES (Nykvist and Heland 2014). In this regard, TEK has gained scholarly attention as a knowledge-practice-belief complex that has undergone vigorous trial-and-error over time (Berkes et al. 2000).

In the review of KTEK, it was found that the pioneers of the discipline of KTEK are themselves SEM retainers and carriers, thus facilitating an easy comprehension of traditional elements with social-ecological implications. The work of the pioneers encompasses an understanding of geomantic influences in choosing traditional settlements, the social-ecological relationships of traditional lifestyles with ambient forests and mountains, and the relevance of village scale to local practices and means of ecosystem (landscape) management.

Traditional villages in Korea have retained and transmitted memory in relation to these perturbations and thus developed social mechanisms to deal with them. This implies that SEM and social mechanisms have a propensity to focus on enhancing specified resilience as noted by Nykvist and Heland (2014).

CHAPTER THREE

Autobiographical Social-ecological Memory

"We were part of nature, and because nature is alive, changing,
in motion, not resting a single moment, we had no time to be bored."
– from Who Ate Up All the Shinga? *by Park Wan-suh*

For social-ecological memory studies, every person is considered a potential ecosystem steward, and his or her living past is valued as a potential source of diverse knowledge systems contributing to social-ecological resilience. Everyone has different interests, lifestyles, and vocations, and thus the way individuals employ their social-ecological memory can be diverse. Previous studies focusing on the role of SEM in local social-ecological resilience have drawn attention to people with farming experiences, and their gardening practices in urban settings (Barthel et al. 2010, Krasny and Tidball 2015). This research focuses largely on the *practice* dimension of social-ecological memory, neglecting the important lessons that could be learned from the *people* who perform the ecosystem stewardship.

This chapter examines SEM reflected in a person's memory through analysis of personal narratives and aims to discover elements of ecoliteracy and person-place bonding (attachment) built on a person's accumulated practice experiences, and attachment to place, respectively (Figure 3.1).

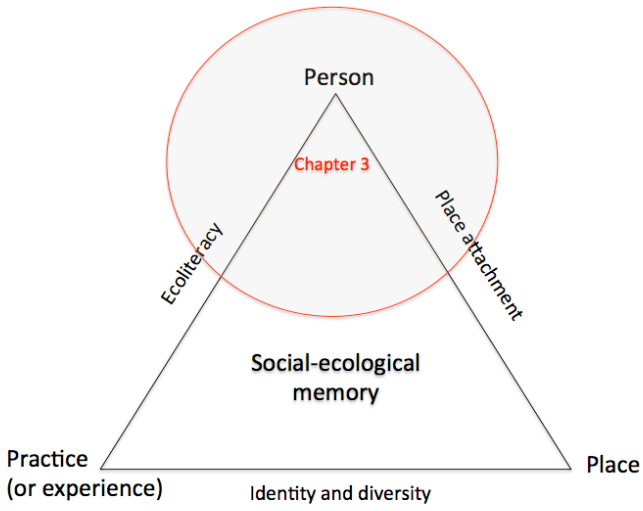


Figure 3.1 Hypothesis and focus of the chapter concerning the *person* dimension of the social-ecological memory framework.

An individual being, as an actor in social-political and social-ecological processes, is the smallest scale or unit in the analysis of SES resilience (Cumming et al. 2015). An individual's knowledge, worldview, social-ecological interactions, and approaches to ecosystem management derive from the individual's experiences; experiences inform perceptions that define the individuals attitudes and behaviors, and depending on the nature of social feedback, the individual's actions can be either reinforced or corrected. Thus, individuals, through their actions and ecoliteracy, can have an inordinately large impact on ecosystem patterns and processes. Although there are various definitions, I establish from Lam (2014) and Pilgrim et al. (2007) that ecoliteracy is the ability to identify names, uses, and related stories of living organisms and natural phenomena within their social-ecological systems, perpetuated by oral transfer of traditional ecological knowledge (TEK).

Tuan (1977), who initiated one of the first modern discussions on the concepts of *space* and *place,* and who explained the scope of individual experiences in differentiating space and place, describes an individual's scope of experience, as the arena in which individuals learn from their encounters. Experiences are influenced by an individual's senses (Tuan 1977). The concept of place is largely related to the individual's perceptions and interactions within the environment, associated feeling of well-being, and cognition or comprehension of sustainability concerning the space. Experience is thus the starting point for recognition of sustainability-related issues and attempts to manage the resilience of the individual's self and place or connected environment, and this chapter draws attention to autobiographical memory that contains such experiences.

In the last few decades, phenomenologists have paid particular attention to place attachment, taking interest in its relation to individual environmental attitudes and behaviors (Tuan 1974, Relph 1976, Buttimer and Seamon 2015). Their analyses of place attachment are rich and varied, and often emphasize subjective experiences within cultural and historical contexts (Low and Altman 1992). Although various terms refer to place attachment or person-place bonding relationships, such as "topophilia" (Tuan 1974), this research uses the term "place attachment" to refer to the broadest concept of the person-place bond. The focus here is on the individual's cognitive function, including knowledge, understanding, beliefs, and cognitions about diverse aspects of the environment, which have been largely neglected in the field of social science in the late twentieth century (Low and Altman 1992).

The objective of this chapter is to present evidence of SEM in personal narrative forms that display aspects of ecoliteracy and place attachment in the context of Korea's traditional village landscape (KTVL). To this end, the implication of autobiographical memory is discussed, and an example case of autobiographical SEM is presented based on an exploratory literary analysis of prominent female Korean writer Wan-suh Park's autobiographical novel *Who Ate Up All The Shinga?*

Autobiographical memory from a social-ecological systems framework

French sociologist Halbwachs distinguishes autobiographical memory from personal memory in that autobiographical memory comprises experiences shaped by group membership (Halbwachs and Coser 1992). Based on his approach, therefore, autobiographical memory should be included in the notion of social memory. The discussion of autobiographical memory in a social context provides valuable insight for SES studies, as it signifies how individuals as actors in SESs function as knowledge carriers and retainers (Folke et al. 2002). Individuals, in their diverse roles and functions in SESs, also enhance and manage the scope of SES resilience in periods of change.

When autobiographical memory is transferred or transformed to cultural memory through communal narratives, it serves an adaptive function (Nelson 1993). Thus, autobiographical memory becomes functional within the society and serves a more expanded role than personal memory alone. Because sustaining social memory is an important component of adaptive capacity (Berkes et al. 2003, Armitage 2005), sustaining autobiographical memory concerning ecosystem management practices and ecological knowledge may contribute to the resilience of an SES.

On the contrary, psychology views autobiographical memory as interchangeable with personal memory. Psychological studies tend to differentiate autobiographical memory from collective memory (e.g., Schuman and Corning 2014) and disregard the social context of autobiographical memory. The focus of psychological research on autobiographical memory is instead on identifying a general period in individual or human development (Nelson 1993, Schuman and Corning 2014). For instance, Schuman and Corning (2014) found that the reminiscence bump for personal memories tends to be located at a younger age, even though the bump extends from as young as five years of age to the late 20s. From the perspective of SES resilience, this signifies that early access to natural

environments in which a child can experience the interconnectedness of humans and nature is important. In addition, meanings of experience at different life stages in relation to environment are important themes in research on place attachment (Low and Altman 1992).

CASE STUDY: AUTOBIOGRAPHICAL SOCIAL-ECOLOGICAL MEMORY IN PARK WAN-SUH'S NOVEL

In the Korean version of her novel *Who Ate Up All the Shinga?*, Wan-suh Park (2009) acknowledges that she wrote her novel by completely relying on her memory. From the first chapter, Park presents a vivid description of her life in a Korean traditional village where she was born and spent her early childhood before moving to Seoul. Park's novel captures the essence of ecological values or ecosystem services of Koreas traditional village landscape (KTVL) that has largely been the social-ecological background for studies of Korea's traditional ecological knowledge (KTEK). Twenty to thirty years ago this village landscape was so common throughout the Korean peninsula that it would attract little scholarly attention as a research topic. Now, however, researchers are showing great concern for the loss of KTVL and its immanent KTEK. The two volumes *Korean Traditional Ecology 1 and 2* (Lee 2004, Lee et al. 2008) present such concern and are poignant examples of multidisciplinary research by Korean experts on various aspects of the KTVL, including Korean traditional social-ecological perspectives and ecological management practices.

Before the impact of wide-scale industrialization and globalization on the Korean peninsula, Korea was primarily a natural resource-dependent society. The KTVL is a representative unit of a natural resource-dependent community that is generally characterized as an agro-forestry based human settlement located within a watershed. At the scale of a watershed, critical slow variables tend to be buffered by stabilizing feedbacks that protect the area from fast variables or sudden changes (Carpenter and Turner 2000, Chapin et al. 2009; p.13). A Korean tradition village was, thus, located strategically within a watershed according to age-old geomantic principles and practices that helped meet important ecological, economic, cultural, and spiritual functions for the community. The villagers also cultivated or nurtured various landscape elements including traditional village groves as intrinsic components of this system, to enhance the community well-being (Koh et al. 2010). It is therefore important to understand the dynamics and stability of the KTVL within an SES framework.

In this chapter, I use literary analysis to describe a KTVL as reflected in SEM. Several authors in *Korean Traditional Ecology 1 and 2* (Lee 2004, Lee et al. 2008) have used similar approaches to provided detailed analyses of Korean traditional poetry, stories, landscape paintings, historical maps, and even photographs to describe KTEK. Many of these analyzed artistic works, however, are either from the Joseon Dynasty or more difficult to access publicly than modern artistic works. Through consultations with Korean ecologists and elderly people who spent their childhoods in traditional villages, I listed several readily accessible articles of modern Korean poetry and prose that potentially offer valuable insights into Korean traditional village societies and their natural resources management knowledge and practices. From this list, I selected Park Wan-suh's novel *Who ate up all the Shinga?,* as it is an autobiographical novel based on the writer's formative childhood experiences in a traditional village near Kaesong (presently in North Korea) and in modern Seoul during the time of the Japanese occupation of Korea and the Korean War.

Approach

Every community has SEM, including a TEK system and a modern community-based resource management system (Barthel et al. 2010). As the focus of this chapter is on finding evidence of ecoliteracy and place attachment in relation to traditional village landscapes, I analyze the social-ecological contents of Park's novel within TEK perspectives.

Several scholars emphasize TEK as a relevant and evolving knowledge system that is informed by the long term feedback relationships of traditional or local communities with their interdependent ecological systems (Berkes 2008, Berkes et al. 2000, Armitage 2003, Folke 2004). There have been few attempts, however, to apprehend and integrate the TEK reflected in historical literature and art. History and culture are veritable means of TEK's transmission (Berkes 2008), and, as such, it is purposeful to include within TEK related studies historical literature and art that contain knowledge and practices of ecosystem management. Indeed, as ecologists increasingly lead and inform multilevel efforts to enhance public ecoliteracy (Jordan et al. 2009, Cardelús and Middendorf 2013), they will find art as an effective and public-friendly means to improve public understanding of TEK or SEM integral to SES.

One's art is the result of one's creativity, experiences, and memory. The composition, context, and medium of an artist's work, such as a landscape painting,

can also offer relevant insights on the artist's comprehension of natural resource knowledge and prevalent management practices shared within a certain group. TEK related studies often reveal the different cultural patterns and natural resource management practices of traditional societies, such as disturbance ecology in Milpa farming systems of the Cree communities, the patterns of utilization and conservation of natural resources in the tropics, and the communal property management in the Pacific Islands and in Caribbean forestry (Martin et al. 2010). Similarly the study of historical literature and art is useful in providing the cultural contexts of SES within which the patterns of formation and application of TEK related SEM can be recognized.

In general, four levels of ecological knowledge are recognized in studies of TEK and ecoliteracy according to Berkes (1999), Berkes et al. (2000): (1) local knowledge of land and animals; (2) land and resource management systems; (3) social institutions; and (4) cosmology or worldview. However, as Berkes (2008) acknowledges, the four levels are not always distinct. In particular, management system and social institution are often coupled so closely that the distinction is sometimes artificial (Berkes 2008). In this regard, Pilgrim et al. (2007) categorizes the four levels as: (1) the names of living and physical components; (2) the functions and uses of each component; (3) the lands and resource management systems and the social institutions that govern them; and (4) the worldview and cosmologies that guide the ethics of people. In their research for ecoliteracy, they only relied on the first two levels of ecological literacy.

As my research is based on landscape perspective, I categorize the four levels as: (1) the names of living and physical components; (2) the resource management system; (3) landscape management systems; and (4) the worldview and cosmologies that are closed related with person-place attachment. By employing four levels of ecological knowledge, I attempt to present aspects of both ecoliteracy (through the first three levels) and place attachment (through the last level of the ecological knowledge). Also, in analyzing Park's novel, I use qualitative content analysis that is defined as "the subjective interpretation of the content of text data though the systematic classification process of coding and identifying themes or patterns (Hsieh and Shannon 2005)." After the analysis, I discuss the relevance of my findings to SES resilience research.

First level of TEK: local knowledge of land, plants, and animals

The title of Park's (2009) novel mentions a plant species—*Aconogonon alpinum* or *shinga* in Korean—and in her first chapter she mentions more than 20 kinds of

local plants, including mulberry, bush clover, peony, chrysanthemum, forsythia, ground cherry, cheery tree, wild apricot, pear, strawberry, pungent scallion, and lily. From her description of food and the kitchen, it can also be assumed that rice, vegetables such as cabbage and radish—the essential ingredients of kimchi, cucumber, and corn were also cultivated in her village. In today's Korean urban societies, it is difficult to expect a child to know so many plants. Some evidence has also shown that the acquisition of knowledge at an early age tend to occur in resource-dependent communities, not in wealthier countries like the UK (Pilgrim et al. 2008). For a child in a small agro-forestry dependent village, however, it seems easy to recognize many plants, as illustrated in an excerpt below from Park's novel:

> Children aren't any different. We ate our three daily meals at home, but we were always spending our time in the mountains and fields. There would be new sprouts galore to pick—sweetgrass, wild rosebuds, mountain berries, arrowroot, bindweed root, chestnuts, acorns, and *shinga*. When we picked them, we could satisfy our creeping hunger and even please the elders, like when we collected mountains herbs and mushrooms. Some of them, like the "jar mushrooms" and "bush clover mushrooms," sprouted so fast that we could even imagine a finger pushing them out of the ground when we turned our backs (p. 16).

Second level of TEK: resource management systems

Park (2009) allocates a large part of her first chapter to humor her readers with descriptions of the village outhouse—the traditional toilet detached from the residential building—from the perspective of a small girl. From the perspective of environmental management, an outhouse has the important function of recycling nutrients. The description of the outhouse illustrates several aspects of KTEK and its application in the KTVL. First, to facilitate collection, transport, and effective use of human excreta, toilets in the KTVL were usually located close to vegetable patches. Park (2009) also describes this location as follows:

> Our outhouse lay at the edge of our vegetable patch. To get to it, you had to climb down three stone ledges, traverse the outer yard, cross under the surrounding mulberry trees, and ford a small stream. (p. 8).

Second, outhouses were built and managed to quickly convert excreta into fertilizer by using ash. Here, by pointing to the misperceptions among urban children nowadays about traditional lavatories, Park (2009) discusses an important aspect of KTEK:

> Children nowadays, with their phobias of countryside outhouses, would be aghast at the notion, but, in fact, the outhouses where I grew up were clean enough to eat porridge in. They were very roomy, sometimes as big as three or four *kan*, with a wooden frame in one corner where adults would take care of their business. Kids just squatted on the dirt floor. This area resembled a shed, and its floor was slanted to allow the feces to roll down, not into a deep pit, but into a section where ash from the kitchen furnace was dumped. In the outhouses, people kept a handy long stick with a rectangular board attached at one end, which children also used to sweep their defecations into the ash.
> Grown-ups, for their part, swept the outhouse floor clean every morning and evening, leaving behind clear broom marks. Back then, the excrement was used, together with compost, as fertilizer. As the village population was small relative to the size of cultivated lands, this night soil was always in short supply. The ash disposed in the outhouses covered the feces and increased its value as a fertilizer by bulking it (pp.13-14).

Third, Park (2009) describes how villagers, even children, routinely participated in the management of the outhouses, which instilled a sense of pride among the villagers:

> The most important thing was to deposit plentiful well-formed feces in the outhouse. We knew there was nothing shameful in shit, because it went back to the earth, helping cucumbers and pumpkins grow in abundance and making watermelons and melons sweet. We got not only to savor the instinctive pleasure of excretion, but also to feel pride in producing something valuable (p. 14).

Third level of TEK: Landscape management systems

(1) A heterogeneous landscape

In *Who ate up all the Shinga?*, Park (2009) vividly describes a small village that represents a typical landscape arrangement of KTVL. The landscape components that she mentions include low and gently sloping hills, vast fields, small streams, many brooks, outhouses, paddy fields, vegetable patches, grasses, kitchen gardens, houses with thatched roofs, gardens, mountains, forests or groves at the entrance of the village, many pools called as "bonus wells," and a well. Although these elements sound common, with apparently no special meaning, they are valuable refuges for various living organisms that enrich the village's biodiversity. Park's description of the bonus well, a unique component of the village landscape, reads:

> When the streams met the paddy fields, they often formed pools. We called these pools "bonus wells" to distinguish them from the ones where we drew water. In retrospect, they were more like small reservoirs (p. 3).

Park's (2009) descriptions of the various landscape elements in her village also provide insights into the biodiversity functions and services of the KTVL system. Aside from the mountains and forests that surround the village, even the undrinkable well named as "bonus well" is recognized as an important refuge of biodiversity in agricultural areas in Korea (Lee 2004). In her another writing titled "The Hill I Lost," Park (1993) elucidates the location, size, and biodiversity of a bonus well as follows:

> There used to be a bonus well within the paddy fields. This bonus well was bigger than the wells dug at the edge of the fields and smaller than a regular pond, and to a child, it was a shaded place of unknown depth.…The bonus well was a messy place with all kinds of water plants and water insects. Tadpoles hatched in the bonus well, and it was probably because of the bonus well that the area swarmed with mosquitoes in the summer. Diving beetles, water striders, giant water bugs, water scorpions, and water scavenger beetles also thrived among the marshy plants (Park, 1993, pp. 557-558; re-quoted from Lee 2004).

It is widely accepted that heterogeneous landscapes enhance local biodiversity, which in turn, enhances the resilience of the landscape (Fischer et al. 2006). Despite a KTVL's small spatial scale in comparison to conventionally discussed spatial scales of SES management, KTVL residents developed their adaptive capacity and livelihoods by cultivating various landscape elements and intricate human-nature relationships within watersheds. As mentioned in Introduction, a watershed is a scale on which critical slow variables are likely buffered by stabilizing feedbacks, thereby protecting the area from fast variables or sudden changes (Carpenter and Turner 2000, Chapin et al. 2009; p.13). "Bonus well" or a village grove can be understood as adaptive landscape management to deal with characteristic disturbance. According to Walker and Salt (2012a), characteristic disturbance are usually known to and expected by the system, so the system has developed adaptive mechanisms to deal with them.

(2) A scale and tangible boundary of the village

Without explicitly describing the spatial scale of the village, Park (2009) mentions that her village had fewer than twenty households. In terms of a village boundary, she explains that the village was nestled "between low, gently sloping hills that

were free of boulders." These boulders may also refer to artificial establishments. The Korean name for her village is introduced as "pakchok-gol," which literally means "a valley of the Park clan." Thus, it is clear that her village landscape was a valley bounded by gentle mountain ridges within a watershed.

The boundary of a KTVL is often defined by the village's surrounding mountain ridges (Koh et al. 2010). Most of the Korean traditional villages are located within watersheds, so many villages resemble each other in their boundaries and landscape arrangements. Such a landscape arrangement—located within a watershed and surrounded on three sides by hills or mountains—has long been considered as an ideal arrangement for settlement in Korea as it allows the residents to adequately access water, fuelwood, and edible plants in the mountains (Kim et al. 2016). This ideal location for a settlement is also described in the *Sangtaekji*, which is a historical Korean reference book with recommendations on choosing settlements. In Table 3.1 I show the comparative similarities between excerpts from Park's (2009) novel and *Sangtaekji,* with regard to descriptions of landscape components and arrangements in a KTVL.

Table 3.1 Comparisons of excerpts from *Who ate up all the Shinga?*(Park 2009) and *Sangtaekji* (Park 2004), showing similarities in descriptions of landscape components and arrangements in a KTVL.

Excerpt from *Who ate up all the Shinga?*(Park 2009)	**Excerpt from *Sangtaekji* (translated into modern Korean by Park (2004))**
Our village was nestled between low, gently sloping hills that were free of boulders and commanded an unobstructed view over vast fields. A small river snaked through the broad plains in the center, and brooks were everywhere. … Even a trip to the outhouse for us meant crossing a little stream (p.3).	There are certain landscape features to be observed when selecting a residential site. With regard to the mountains that surround a residential site, they should not rise steeply, no matter how high they are; while they should also not be concave like a grave, no matter how low they are.
Even when we walked and walked through the fields, we never reached one [village]. Only by climbing over the hill behind us could we reach a neighboring village, and there was nothing especially remarkable to me about it. Houses, flanked by vegetable patches, were nestled at the foot of a hill, and broad fields billowed like a skirt in the front of the village. I assumed everyone lived similarly (p. 4).	These are preferred: hills with gentle slopes closely arranged at one place; expansive fields receiving plenty of sunlight; forests with old trees; and perennially flowing streams. The homes should have vegetable gardens beside them, millets and rice should be cultivated on the fields, and the stream for fishing and irrigation should flow beside the fields. Furthermore, over the stream, there should be mountains, shaped like a writing-brush rack, or a coronet braid, or a rising cloud so as to form an enjoyable scenery.

In the Korean version of her novel, Park (2009) makes reference to *dong-gu* two times which are translated as "the hill (p.6)" and "the village entrance (p.8)" respectively in the English version of her novel. The word *dong-gu* represents the concept of watershed as the term *dong* □, an administrative unit for villages in Korea, means "same water source. (Lee 2004)," while the term *gu* refers to an entrance. The term *dong-gu* is often replaced with another Korean term *su-gu* meaning "water (Lee 2004) entrance," indicating that the village entrance of the KTVL is where water discharges. *Dong-gu* is translated as "the hill" in the English version of the novel presumably because it is related with the Korean traditional landscape management practice of cultivating a grove at the entrance of the village to slow the discharge of water exiting the village. Such a grove is called as *sugu-magi*, or *maeulsoop,* or *bibosoop* and its ecological and social functions have been of much interest various researchers (e.g., Lee et al. 2007, Koh et al. 2010, Joo and Park 2012, Yu et al. 2014, Lee and Krasny 2015).

Fourth level of TEK: cosmology or worldview

(1) "Our village"

Throughout the novel, the writer makes a good use of the pronoun "our." When "I" in the novel speaks of her village, it is always illustrated as "our village" and "our villagers." In the Korean language, it is common to say "our place" instead of "my place" when referring to one's house. Consequently, when one refers to one's village as in the novel, the Korean people often say *woori dongne,* which can be literally translated as "the inner side of our village." Unfortunately, "our village" or the use of pronoun "our" has been not so much survived in the translated version of the novel.

The Korean word *woori dongne* has two implications for the worldview of the language users. First, it may indicate that the village is shared by others, probably including other living organisms within the village. Second, there is a concept of spatial boundary embedded in the word "village" in the Korean language. Traditionally, Koreans prefer to manage their village landscapes in the form of a closed system for several purposes. By implementing trees or a grove at the front of a village or settling in an area with a narrow entrance (this point will be address in the later part of the chapter), they purposely made their village invisible to outside. Having a specific spatial boundary in mind may have helped people come up with practices and strategies for sustainable resource management to the fullest, thereby reducing their ecological footprint. This, in turn, may contribute to

reducing the possibility for scale challenge that is prevalent in today's society, as their social patterns and processes have taken place within the landscape based on their understanding of ecological patterns and processes of the landscape.

(2) Nature as a living entity and human-in-nature system

Although Park's (2009) childhood village was spatially small, the village landscape was a dynamic place replete with fulfilling human-nature interactions. An excerpt from her insightful words reads:

> We were part of nature, because nature is alive, changing in motion, not resting for a single moment. We had no time to be bored. No matter how hard farmers work—scattering seed and tending their crops as they sprout, grow tendrils, bloom, and bear fruit—they can never gain a step. Nature has its own busy rhythms (p. 16).

Based on the findings from the qualitative content analysis of Park's (2009) autobiographical novel, the four levels of KTEK are diagrammatically shown in Figure 3.2.

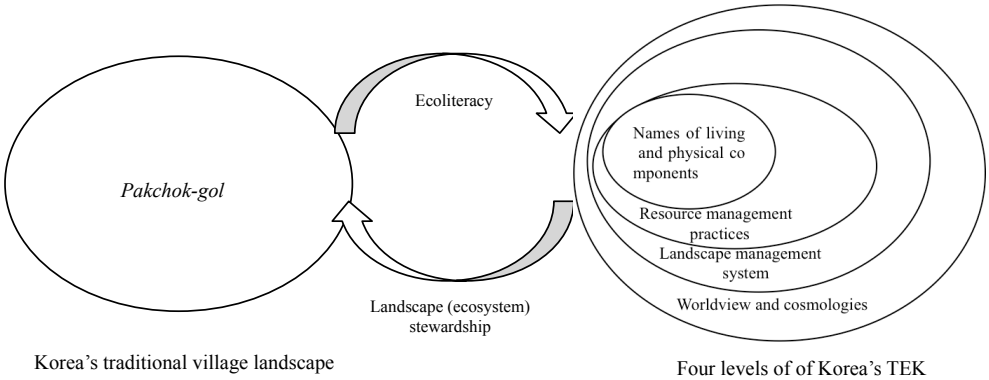


Figure 3.2 Summary of Korea's traditional ecological knowledge (encompassing elements of ecoliteracy and place attachment in four levels of analytical framework and its feedback relationship with the village landscape.

Discussion

The findings reveal that, although Park may not have intended to delve per se into the social-ecological dimensions of her childhood village, she offers valuable descriptions of the TEK related values in her village. Whereas the various living organisms she describes may differ from those of other traditional villages in Korea, the overall configuration of her village landscape and its components are reminiscent of villages for many Koreans. Her vivid descriptions of her village and

her feelings associated with her childhood there are possibly what have kept her novel on the best-seller list throughout the last decade in Korea. By analyzing an artistic work to present the dynamics of a local SES, a researcher can invite readers, and indeed other researchers, to sense making process.

Park's account of the heterogeneous landscape elements and diverse living organisms is evidence of her ecoliteracy, which has significant implications from a SES perspective. Folke et al. (2002) emphasize diversity, in particular functional diversity, as a key feature of the ability of SES to persist in the face of change. In SES, diversity can be understood as an insurance benefitting the SES in the phase of reorganization and renewal, as the presence of diverse species with overlapping functions and memory reservoirs of diverse knowledge and practices are the result of past experience and accumulated information to changes (Folke et al. 2002). Therefore, the loss of the KTVL is the loss of not only the *shinga* (*Aconogonon alpinum*), as the title of Park's novel implies, but also of the diversity, sensibility, and creativity immanent to a KTVL, which informs individuals with a comprehensive understanding of SES.

Humans-in-nature worldviews found in the novel is closely coupled with her attachment to her hometown. Such a worldview where humans are perceived as embedded within ecosystems, are also commonly observed in other TEK studies (Martin et al. 2010). On the other hand, modern research is mostly focused on the scientific quantification of ecosystem services, whereas it should also comprehensively consider the cultural and spiritual values that inform individual worldviews, perceptions of nature, and attachment to place that relate to the direction in which the system adapts when faced with changes. The spiritual, inspirational, and aesthetic aspects of nature are indeed significant motivations for ecological conservation and sustainability (Chapin et al. 2009; p. 47).

The traditional village landscape within a watershed may also be seen as representative of Korean's ecosystem-like concept, similar to evidences of other traditional societies provided by previous literature (Berkes et al. 1995, Berkes et al. 1998). In the findings of this study, excerpts from Park's novel and historical document containing the description of landscape components and arrangements of traditional village are presented. When taking Park's novel as an example of SEM in an autobiographical framework and the historical document as an example of SEM in a historical memory framework, the similarities between two sources show that communal landscape management practices have prevailed for generations in Korea's traditional villages. This has contributed to the conservation of biodiversity in rural areas and to the encapsulation of memory both in

autographical and historical frameworks. Thus landscape practices and relevant knowledge in Korean traditional villages areas are retained and transmitted through narratives of individuals and through the preservation of the physical landscape. Social-ecological memory as carrier of ecological practices and knowledge is particularly important, because memory is a slow moving component in SES that carries experiences from the distant past (Barthel et al. 2010).

Some readers of Park's novel may be curious why, when beginning her account of her childhood experiences in her village, she devotes a large part to describe the village's landscape elements and plants. As her novel continues, however, it becomes clear that her fulfilling ecological interactions in her hometown laid the foundation of her artistic and resilient spirit with which she withstood the difficulties of the Japanese occupation of Korea and the Korean War. In other words, the SEM stored in her hometown is linked to her identity, and the memories in the village can be understood as the memories within the reminiscence bump. The reminiscence bump is not only related with self-identity, but it is also known to be a contributing factor to an individual's life goals, attitudes, and beliefs (Conway et al. 2005). However, autobiographical memory is known to fade with time, unless it is periodically reinforced or brought to awareness through contact with others (Halbwachs and Coser 1992). In this regard, Park's narratives of her childhood memory serve an important role in sustaining the SEM in relation to KTVL.

Some researchers also describe the impacts of storytelling on the development of personal resilience (LeahEast et al. 2010), which can benefit community resilience in the larger sense. For individuals, chances to enhance adaptive capacity are promoted through engagement in various experiences accompanied by reflectivity, and a community with such competent individuals has good chance to have higher adaptive capacity (Fazey et al. 2007). As many Korean agricultural villages exist as clan-based communities, artistic works that depict village landscapes can motivate appreciators of the art, especially those who live in urban areas, to contemplate their rural origins or visit their rural relatives.

Sometimes seemingly unrelated or inconsequential elements may help to address a complex problem of SES. Sustaining the SEM may contribute to the conservation of KTVL and relevant ecological knowledge, while the question about the ways to motivate individuals to foster the adaptive capacity can be addressed from the science of education and cognitive and social psychology (Fazey et al. 2007).

My analysis is limited to the relevant texts in Park's (2009) novel that present elements of ecoliteracy and place attachment in the contexts of KTVL. Nonetheless, Park devotes similar detail to describe how her life and that of her family members was influenced by the Japanese occupation of Korea and the Korean War. The two turbulent periods in the early 20th century caused profound changes in Korean people's lives and in the KTVL system. In this regard, the title of Park's novel may be perceived to allude to the loss of life in the KTVL caused by these big social upheavals. It is useful to understand how these two social events influenced the KTVL system, considering that a community or a society can be capable of self-organizing, learning, and adapting after a perturbation if its individuals possess ecological knowledge gained though generations of learning by trial-and-error (Berkes and Turner 2006).

Last, it is important to employ combinations of various approaches to gain a robust understanding of social-ecological processes and interactions within SES. Art has traditionally been and can be a comprehensive approach that engages the public in an interactive process of scientific research. Arts-based research or "arts for scholarship's sake" (Cahnmann-Taylor and Siegesmund 2013), for example, builds on the evidence that art has the potential to offer pathways to scientific research. In this regard, the approach I have used in my analysis can be considered as a pertinent means of comprehending SES attributes, interactions, and the larger ecosystems within which they are embedded.

CHAPTER FOUR

Social-ecological Memory and Adaptive Capacity

The resilience of social-ecological systems (SESs) is associated with both ecological and social factors. Recent SES studies tend to focus more on social factors, as some of these factors influence the diversity of ecosystem and the survival of keystone species. Often, conventional methods of human management are challenged by the interconnectedness, cross-scale, and cross-level interactions within an SES. Several studies show that national policies can perpetuate natural resource destruction due to the mismatch of environmental or ecological scales with the intended social-political processes of natural resource management: this results in loss of adaptive capacity within the SES (Hobbs 2003, Cumming et al. 2006, Cumming et al. 2013).

Strong local-scale systems have thus been discussed as an alternative approach that may increase the probability for successful implementation of governance at other scales (Dietz et al. 2003). Additionally, local cultures can reveal novel methods for understanding ecological properties and processes at a local level, providing insight on social processes. In particular, the collectively accumulated experience and history of ecosystem management held by a community in an SES—that is, social-ecological memory (SEM)—is known to be a critical source of resilience that provides adaptive capacity for the community (Davidson-Hunt and Berkes 2003, Barthel et al. 2010, Nykvist and Heland 2014). In my research, adaptive capacity is understood to be an emergent outcome created by the attributes of practice-person and practice-place linkages that influence collective action (Figure 4.1). Additionally, adaptive capacity is determined by the manner in which such attributes coalesce in a certain place (Armitage 2005). Consequently, the objective of this chapter is to examine the situation in which SEM is mobilized as a determining factor to foster adaptive capacity, based on a case study conducted in a traditional village in a rural areas of South Korea.

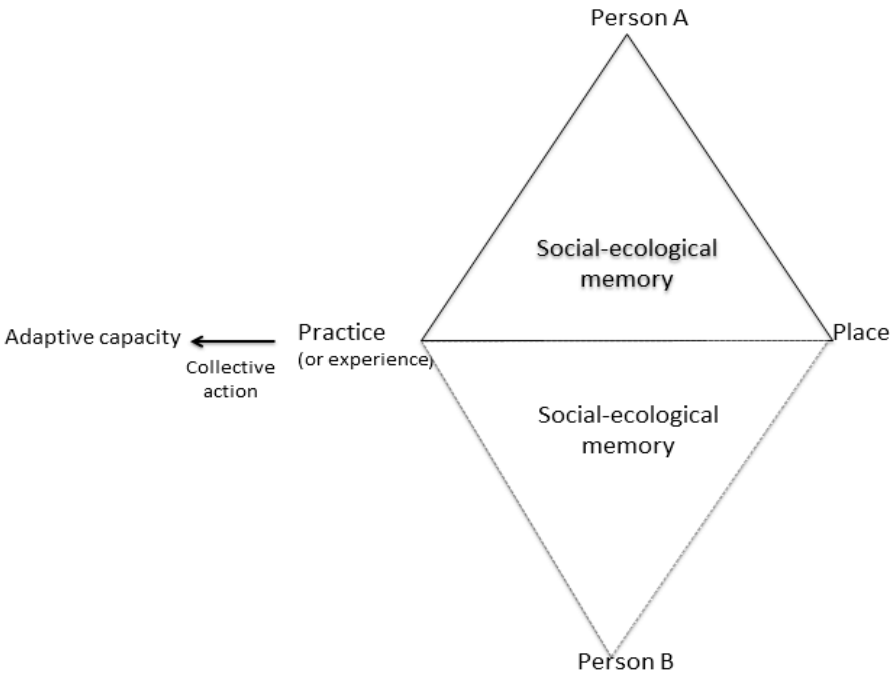


Figure 4.1 Hypothesis and focus of the chapter concerning the *practice* dimension of the social-ecological memory framework and its influence on adaptive capacity.

Conversely, some studies also highlight the possibility that memory may become an undesirable source of resilience, termed alternately as traps, path dependency, inertia, and rigidity, as summarized by Nykvist and Heland (2014). In other words, some SEM may lead to undesirable resilience, such as continuation of maladaptive management strategies or reluctance to innovate in the face of change. Depending on types of disturbance, types of resilience may also vary. For example, Walker and Salt (2012a) demonstrate three different types of disturbance based on frequency and expected occurrence, including characteristic disturbances, large and infrequent disturbances, and unknown shocks. If a community enhances adaptive capacity to deal only with disturbances known to the community, it is said to have developed a specified resilience practice. Researchers often claim that there are trade-offs between specified resilience and general resilience, and it is thus recommended to enhance general resilience, which indicates the system's general capacity to adapt to other kinds of disturbances (Walker and Salt 2012a, Nykvist and Heland 2014). In some cases, specified resilience practice may result in undesirable resilience of an SES.

Therefore, it is important to address the role of SEM as a desirable source of resilience, which provides options to reorganize and renew after both expected and unexpected disturbance. To this end, Ruiz-Mallén and Corbera (2013) emphasize

the need to understand the interconnectedness between ecological knowledge, adaptive capacity, and resilience, thus enabling communities to adaptively manage various stressors and sources of change.

This chapter examines dynamics of ecological knowledge (as an indicator of SEM), social-ecological changes, and other scale related issues to explore how SEM influences people's capacity to adapt to social-ecological change in a desirable way. The findings draw on a three-year ethnographical field study in a traditional village in Boeun County, South Korea. Here, focus is on the *practice* dimension of SEM—that is, the dimension in which social-ecological experiences and traditional ecological knowledge function as a source for resilient conservation of the village landscape.

Study site

The study site is an agricultural village called Gae'an Village, Jang'an-myeon, in Boeun County, North Chungcheong Province, South Korea (Figure 4.2). Boeun has an area of 583.99 km^2, a population of 34,199 (as at May 2016), and 453 natural villages (retrieved from www.boeun.go.kr). Gae'an Village now has a population of 82 residents. In terms of landscape configuration, the village has a traditional village grove at its front, a stream called Samga Stream, an area of 53.7ha of agricultural land, 40 houses—including one magnificent traditional house owned by the Seon Clan designated as the 134th Important Folk Data of Korea—a Korean army battalion camp, and the mountain behind it providing another type of village grove (see Chapter Five). As many tourists visit the village to see the mansion, some residents in the village work within service sectors, while the others are mostly farmers. The main crops produced by the villagers include rice and jujube, while most houses own small vegetable patches to yield vegetables for household use.

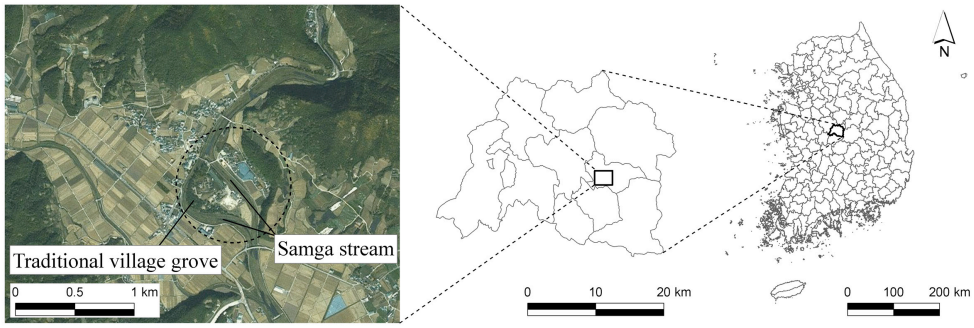


Figure 4.2 Study area.
Left. Satellite picture of Gae'an Village (ESRI World Imagery Basemap Data).
A schematic geological map of the area and site location. *Middle*. The municipal districts of Boeun. *Right*. Map of South Korea with the rectangle indicating Boeun County.

APPROACH

Methodological approach

The methodological approach consists of five sequential parts: (1) pilot field study for learning about social-ecological elements and changes of traditional villages in Boeun and for choosing areas for deeper studies; (2) semi-directive interviews with villagers for collecting information on social-ecological elements and changes of a chosen study site; (3) collecting secondary data to cross-check and verify the interview responses in relation to social-ecological changes; (4) in-depth interviews with key informants about the details of key events to the village and analysis of the interviews; and (5) directive interviews with the key informants to ensure the validity of my interpretation and co-evaluation.

Pilot study and choice of the study site

I began my search for a study site with another study to evaluate a restoration project for traditional village groves in spring and summer 2013. Through this project, I visited over 30 village groves in various regions in Korea; Boeun was a region with three village groves involved in the project. Because the region is subject to less influence from industrialization and urbanization in comparison with other villages with traditional village groves, the villages in Boeun have maintained their village landscape configurations relatively well since the early twentieth century. Of the three villages in Boeun, Gae'an Village was selected as the study site for the following reasons:

1) Gae'an has a landscape configuration typical of Korea's traditional village landscape, including a traditional village grove component.
2) Boeun suffered from two catastrophic floods in 1980 and 1998, respectively; and Gae'an Village was the only village in which the villagers took part in decision-making processes for the restoration project.
3) Most Gae'an villagers were born in the village and have memories of social-ecological changes that have occurred in the village; they demonstrated pride in maintaining their traditional landscape elements during the pilot surveys.

The semi-directive interviews (n=10)

I began the research on the study site with semi-directive interviews. These were conducted the same interviewees in August 2013 and October 2013. The main purpose of the semi-directive interviews was to identify their experiences and

practices in relation to the village landscape management as well as the interviewees' past experiences of disturbances, and to obtain general background information that can be used to facilitate finding relevant documents. In essence, it was an initial process conducted to discover the SEM that has been shared and handed down among villagers regarding the formation of the village and their landscape management practices. Ten villagers were asked a set of questions about the history of the village and the village grove, their past experiences of disasters, and landscape (conservation) practices within their village.

Secondary data collection

Local maps, local newspapers, and relevant documents from the local governmental agencies in relation to landscape management and conservation practices of the village were collected. In most cases, the information in the collected data matched with the responses from the interviewees.

The in-depth interviews (n=6)

On October 25, 2013, July 9, 2014, and May 6, 2016, in-depth interviews with six people—comprising a cultural commentator working in the village, one former county governor, one local person, two villagers, and the owner of the mansion—were conducted, respectively. The interviewees were selected either from among the semi-directive interviewees or based on recommendation by those interviewees.

The interviewees tended to describe 30-40-year time periods, from the time when the Saemaeul Movement (New Village Movement) was conducted by the central government to the present day. The interviews were transcribed and coded according to the methodology of Burnard (1991).

I used MAXQDA (Verbi GmbH) to organize, transcribe, and code the interview data and to compare the interview data with collected materials from the local governments.

Analytical Approach

One possible way to present social-ecological changes in an SES while also acknowledging scale-related issues is to apply adaptive cycle models that comprise the bases of ecosystems and social-ecological systems across scales (Holling 2001). The adaptive cycle is recommended as a heuristic to conceptualize cyclical change in a complex adaptive system, and comprises the four phases of release, reorganization, exploitation, and conservation (Gunderson and Holling 2002,

Walker and Salt 2012a). However, recent evidence shows a high probability that researchers may apply and analyze the adaptive cycle heuristic for their own purposes, ignoring stakeholders' interpretations. For example, Rawluk and Curtis (2016) attempt to address the plurality issues of adaptive cycles generated by multiple and contradictory narratives of landscape change by local stakeholders; they suggest careful use of the adaptive cycle in presenting diverse narratives. While acknowledging the plurality issues, the adaptive cycle model in this chapter is employed to carefully develop a historical narrative of the village landscape system, particularly focusing on changes in landscape configuration and village land use, based on interviews with the villagers.

FINDINGS

Village Landscape System Narrative

I found that SEM concerning village landscape changes is prevalent among the villagers. However, villagers' narratives about the history of the village have been standardized by the influence of ecotourism, because explaining the village's history is a critical part of the tour. To avoid bias and to reconcile contradictory views, I cross-checked secondary data, including a set of local maps, local histories, and governmental documents. The next section provides a summary and description of the village.

Figure 4.3 *Above*. Earlier settlement according to "Back-mountain and front-water" principle. *Down.* A map of the village produced in 1919.

The influence of geomantic theory on the village's formation

The initial settlement dates back to as early as the 16th century (Cultural Heritage Administration 2006). Before the Seon Clan moved into the village and built their mansion on a stream delta in the early 20th century, the village had displayed a typical

"back-mountain and front-water" landscape configuration (Figure 4.3).

In 1903, a high-ranking government official of the Joseon Dynasty, Younghong Seon, moved to the village from Goheung, South Jeolla Province. According to the villagers and documented materials, an old man appeared in his dream and told him to build a house on an island. As the village had a stream delta at its front, Seon decided to build a new house on the site. Such a land formation is called *Yeonhwabusuhyung* in geomantic theory, meaning "a floating lotus" that is known to be a propitious land.

Villagers were familiar with geomantic legends and principles in relation to their village landscape and were found to possess a certain level of geomantic knowledge, particularly about their land formations. They also showed a high level of understanding about the biophysical and geographic conditions of their village landscape, particularly in relation to the hierarchy of surrounding mountains and watersheds. However, while the male interviewees tended to fondly speak about the geomantic principles and the hierarchical mountain systems, the female interviewees exhibited passiveness in explaining the history of the village and talked about some legends using narrative styles.

Ecological use of a village grove

When the Seon Clan decided to build a house, it was necessary to first manage the area as a livable place, as the surface of the land was at the same level as the stream. The Seon Clan decided to create a vegetative buffer strip along the stream, which is now called Gae'an Village Grove. *Pinus densiflora* was selected as the suitable tree species, not only because the pine symbolizes scholarly fidelity but also because it was known to be a favorable species that thrives in the local geographic conditions. All the interviewees showed their understanding of soil moisture conditions and attachment to the Korean Red Pine.

With the village grove created along the stream, the construction of a new house for the Seon Clan began in 1919 (Cultural Heritage Administration 2006). Cultural Heritage Administration (2006) documents that it took five years to complete the mansion, but some villagers explained that it took more than ten years to build the house based on stories passed down to them from their earlier generations.

Military use of a village grove

The eastern part of the delta area is said to have been a base for the Donghak Army during the Donghak Peasant Movement in the late 19th century. Some villagers said that during the Japanese Colonization, the Japanese army occupied this area. It is assumed that the delta surrounded by the village grove was an effective area to conceal the mansion and the army from outside viewing. Under the regime of Park Chung-hee, the Korean army took the area for its reserve forces.

Saemaeul Movement and changes in waterways.

During the military regime of President Park Chung-hee in the 1970s, a governmental project to modernize rural areas was undertaken throughout the nation. At the time, the village was among the sites affected by the project and, consequently, one of the streams that used to enclose the delta was changed into rice paddy fields; another stream channel was straightened (Figure 4.4).

Figure 4.4 A map of the village produced in 1987. Note that there is only one stream in the map.

Although villagers' and local politicians' descriptions of the details of the project were similar, their interpretations and attitudes toward the landscape change were different. Politicians and local people from other districts of the county expressed that the central government project was necessary as most people suffered from hunger at that time; conversely, some villagers, especially those who directly suffered from the two subsequent big floods, described the changes to the waterways as a principal cause of the floods. Villagers remembered the original width of the stream as 120 m, which was narrowed to 30m during the Samaeul Movement project. According to the interviewees, the new rice paddy field was 39,669 m^2 with annual productivity of around 16,000 kg of rice. As the stream was owned and managed by the county government, the county government allocated the new rice paddy field to 30 people who did not previously own rice paddy fields.

Big flood in 1980

Since the artificial changes made to the stream courses during the Saemaeul Movement, the villagers have suffered from two big floods. The first damage of the two flood occurred on July 22, 1980, and the damage was concentrated on the new rice paddy fields and the northern part of the mansion where one of the waterways used to flow. Interviewees said that they were almost in panic and befuddled by the flood damage. Also, because the damage was so big, they had to rely on supplementary living allowance from the government.

Restoration work by the local government

During the restoration work, the villagers stayed in other areas where their relatives reside or in a local public school, which was used as a temporary refugee camp. Also, since the restoration and reconstruction of the damaged parts of the mansion required skilled workers and expensive materials, it took years to fully restore the house.

Designation of the Seon's mansion as Important Folk Data of Korea

When restoration work was done, the Seon clan searched for a more sustainable way to preserve the mansion. With a help of famous scholar Changsoon Lim (1914-1999), in 1984 the mansion was designated an intangible cultural asset with the title of 134th Important Folk Data of Korea. With this designation as its starting point, the village began to build its identity as a place for ecotourism.

Second major flood in 1998

On August 12, 1998, the village experienced another catastrophic flood. When recalling their experiences of the second flood, interviewees often said that the water "remembered" its original course. The study revealed that the occurrence of the second flood made the villagers aware that the flooded area was the course of the original stream, and they thus felt the need to make a change.

On the other hand, the eldest of our interviewees, a politician, said that Boeun is known to have a major flood roughly every 20 years. He remembered another flood in 1959 and said that people from his or older generations have regularly experienced floods around every 20 years. Based on his experiences, the two big floods in 1980 and 1998 were additional cases of natural disaster.

In the case of Gae'an Village, people now regard the two floods as man-made disasters. Villagers expressed agreement that artificial changes to the waterway caused greater damage. Conversely, the county's white paper on flood damage

states that the cause of the flood was an abnormal climate experienced by the region as a result of global climate change.

Samga Stream restoration project in 1999

Although the restoration project included restoration of the mansion and other houses affected and damaged by the flood, this chapter focuses on the waterway restoration work, called the "Samga Stream restoration project." The owner of the mansion took a leadership role, and the villagers decided to ask the local government to restore the stream. The owner gained consensus among all residents of the five villages situated in the watershed and obtained approval from almost 300 people. He presented a petition to the local government to restore the stream to its pre-Saemaeul Movement project dimensions, with a width of 120 m and height of 390 mm. He was informed of the width figure by earlier generations, whereas the height measurement was based on his own monitoring. When the village obtained approval from the local government, some of the villagers, including the owner of the mansion, participated in the process and guided the details of the restoration work based on their knowledge and monitoring.

The interviewees from the local government reported that because the area received national attention, with a visit from the prime minister for both floods, and suffered from the 1980 flood, they were permitted some institutional flexibility in providing funds for the restoration project. This indicates that the scale of the disturbance was an important variable in allowing adaptive governance at various levels. Moreover, regardless of the occupation of the interviewees, all respondents had their own memories and stories of the flood, and all used the phrase "the rain pours as if it's standing up" when describing the event.

By experiencing two destructive events, the villagers were motivated to build adaptive capacity based on their TEK in relation to landscape configuration; it was found that the waterway restoration project initiated by the villagers matched the four categories of engagement with specified resilience summarized by Walker and Salt (2012a), as detailed in Table 4.1 below.

Table 4.1 Summary of Gae'an village's specified resilience practice as per the four categories of engagement of specified resilience by Walker and Salt (2012a)

Known thresholds	Daily precipitation of under 390mm during the rainy season
Thresholds of potential concern	Flood within next 20 years
Conceptual models (functions of a system of interest)	Floating Lotus shape according to geomantic principle
Analytical models: quantitative measurement	Daily precipitation, villager's monitoring and observation

When asked for feedback on the restoration work following both floods, two interviewees from governmental sectors evaluated both flood-control works to have been quite successful. They explained that the flood-control works completed after the 1980 flood resulted in the occurrence of less damage in 1998, despite the fact that daily precipitation was much higher in the latter case (Figure 4.5).

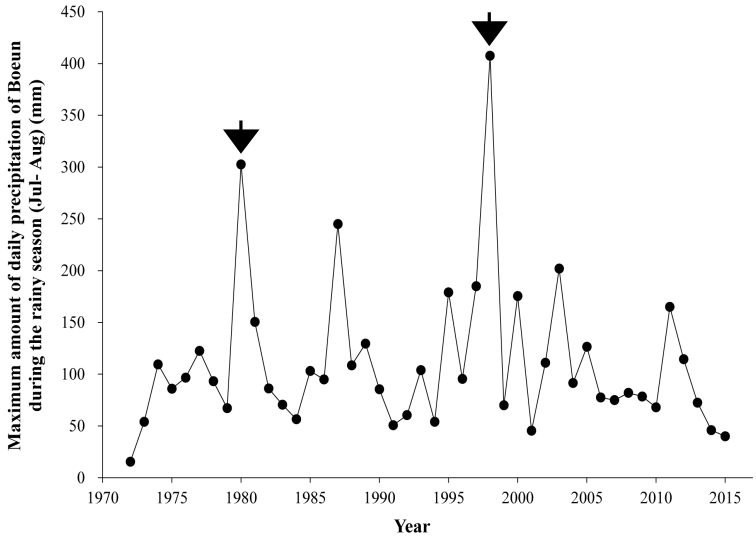


Figure 4.5 Maximum amount of daily precipitation of Boeun during the rainy season from 1972 to 2015. Source: Korea Meteorological Administration, 2015.

Flood-control works completed after the first flood included expansion of the Samga reservoir in the upper section of the Samga Stream, the second biggest reservoir in North Chungcheong Province. Unlike the 1980 flood, after the second flood, a number of small pools (both naturally created and man-made) have remained to function as debris barriers within the watershed. Furthermore, the former county governor was proud to say that representatives of other regions with less flood experience visit Boeun to learn their management strategies, such as widening the distance between the two piers of a bridge. The interviewees all agreed that the region is very sensitive to water-related issues, and two heavy volumes of white papers on the 1980 and 1998 floods support this explanation (Figure 4.6). However, the villagers indicated less satisfaction with the flood-control works undertaken after the 1980 flood, and some even commented that they felt the damage from the second flood was much greater and more serious.

Figure 4.6 County's white papers on the floods in 1980 and 1998, respectively. Note that this type of documents may be regarded as legacies of the society that sets out path dependence.

Synthesis based on the adaptive cycle model

Based on the interviews with the villagers, the description of historical change in relation to the village landscape has been presented so far, and Table 4.2 summarizes the key changes occurred to the village landscape system.

Table 4.2 Timeline of key events causing changes in landscape configuration and land use in Gae'an Village from the early 20th century to present.

Time	**Key events**
Before 20th century	Earlier settlement in the village according to the "back-mountain and front-water" principle.
Late 19th century to early 20th century	The Seon Clan's settlement in the village and the creation of a village grove.
Park's presidency in 1960s and 1970s	Camps for the Korean army troops on the eastern part of the delta. Changes in the waterway as part of the Saemaeul Movement project.
1980 and 1998	Flooding
1999	Restoration project

Using the adaptive cycle model, the historical description of the village landscape can be analyzed as Figure 4.7. Within less than a century, the village has gone through two adaptive cycles, and it is noticeable that conservation phase for each cycle is either very short or absent due to landscape changes made by external forces, i.e., the Saemaeul Movement Project. The K phase (conservation) is a steady-state period in which the system shows a high performance or productivity while the macroscale indicators of the system are stable in terms of their functions (Fath et al. 2015). It is also known that wise stewards or managers of a system often prepares for their release to secure their sustainability phase during this K-phase (Walker and Salt 2012a).

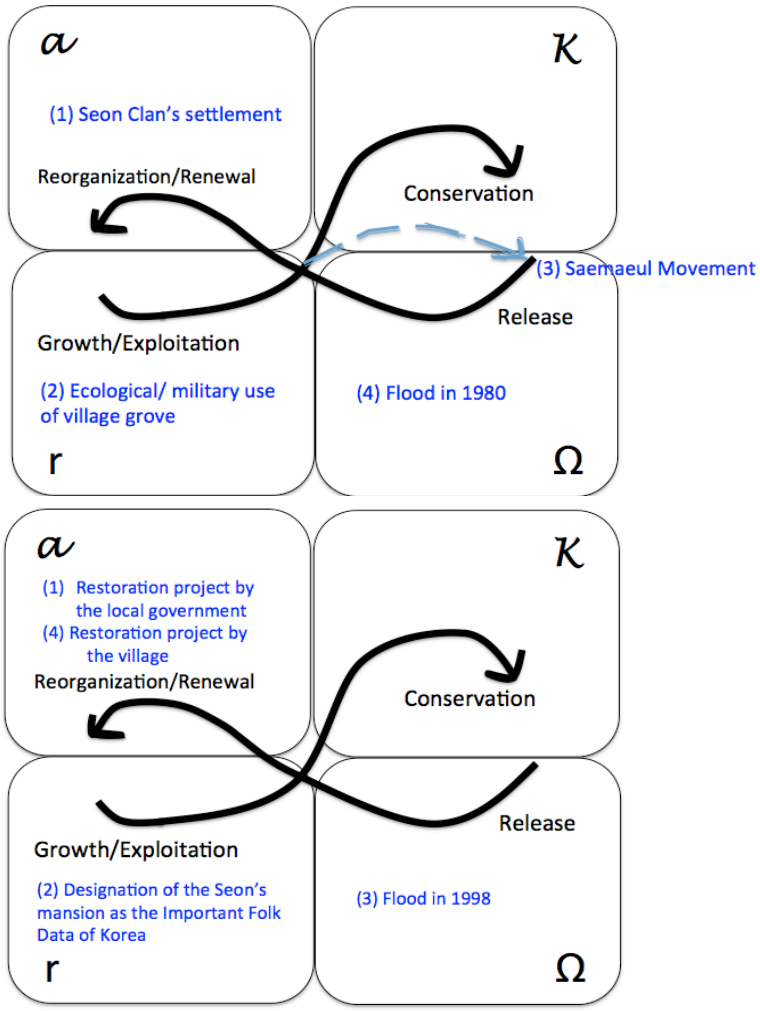


Figure 4.7 Summary of the Gae'an Village landscape changes in the adaptive cycle.

In case of Gae'an Village, the village landscape system has not enjoyed much of its equilibrium state and undergone the flood-and-reconstruction every 20 year, motivating the reinforcement of SEM in relation to their village landscape configuration and thereby leading a collective action after the second flood.

DISCUSSION

The key findings drawn from the ethnographic research are:

1) TEK has influenced the formation of the village and the promotion of one's leadership as well as the villagers' adaptive capacity;
2) Disturbances facilitated the continuation of TEK in relation to landscape configuration, with the influence of SES memory acting as a key variable;
3) The case study evidences that institutions developed by a strong central government can lead to scale-mismatches at the local level, although the interpretation of the government diverged among the interviewees;
4) By undergoing the same type of disturbance a couple of times, i.e., flooding, the villagers' adaptive capacity was operated for a specified resilience scheme, which may lead to trade-offs (Walker and Salt 2012a);
5) The scale of the disturbance, i.e., how big and influential the floods were in terms of spatial scale, is found to be of significance in understanding adaptive governance of the flood-control works; and
6) In continuation of the previous finding, shared social memory among the county residents, in the forms of sayings and storytelling, was found to be the most influential factor interplaying with the SEM of villagers in conducting community-based resilience practice in the case of change.

The primary objective of this chapter is to present a case in which people's landscape management practice motivates collective action, thereby fostering the community's adaptive capacity. One merit of using an SES framework is that cross-scale interactions and spatio-temporal changes are analyzed and discussed as important attributes in the dynamics of an SES. To present the spatial-temporal changes in the village landscape and people's experiences and knowledge of them, I adopted the adaptive cycle model. Analysis found that SEM continues to accumulate and be reinforced and retained during the course of spatial-temporal changes (Table 4.3). Before discussing the role of SEM in fostering the adaptive cycle, however, I will first summarize some important issues concerning cross-scale interactions.

Table 4.3 The dynamics of the changes, social-ecological memory, and scale-related issues found in the study of Gae'an Village

		Social-ecological changes	Related Social-ecological memory	Scale-related issues
1st cycle	**Reorganization**	Seon Clan's settlement	Geomantic principles and formation of the land shape	
	Growth	Ecological/ military use of village grove	Ecological knowledge and practices regarding the establishment of the grove	
	Conservation (or release)	Saemaeul Movement	Village community center and village storage built during the movement	Top-down process and the consequent changes in land cover
	Release	Flood in 1980	Personal and collective experiences of flood and sharing of them in forms of stories and narratives	
2nd cycle	**Reorganization**	Restoration project by the local government		Reconstruction and restoration work by the local government focusing on the maintenance work of large dams
	Growth	Designation of the mansion as the intangible cultural asset	Reinforcement of knowledge about traditional houses and ways of living	
	Release	Flood in 1998	Reinforcement of knowledge about the landscape configuration and traditional worldview	

Scale-related issues

Scale-related issues arose in some cases, primarily owing to institutional changes by the government. Changes in landscape configuration, land tenure, and land use triggered by a strong central government have caused scale mismatch problems at the village level. Therefore, one may conclude that in this case the "natural" disaster presented an opportunity for community-based conservation. The adaptive management at the county level also demonstrates a certain learning outcome. For example, in the case of the first flood, the county government focused on centralization of the flood-control system, for example by expanding the size of reservoirs. However, after the 1998 flood, they began to maintain natural pools and debris barriers in upstream sections across the region.

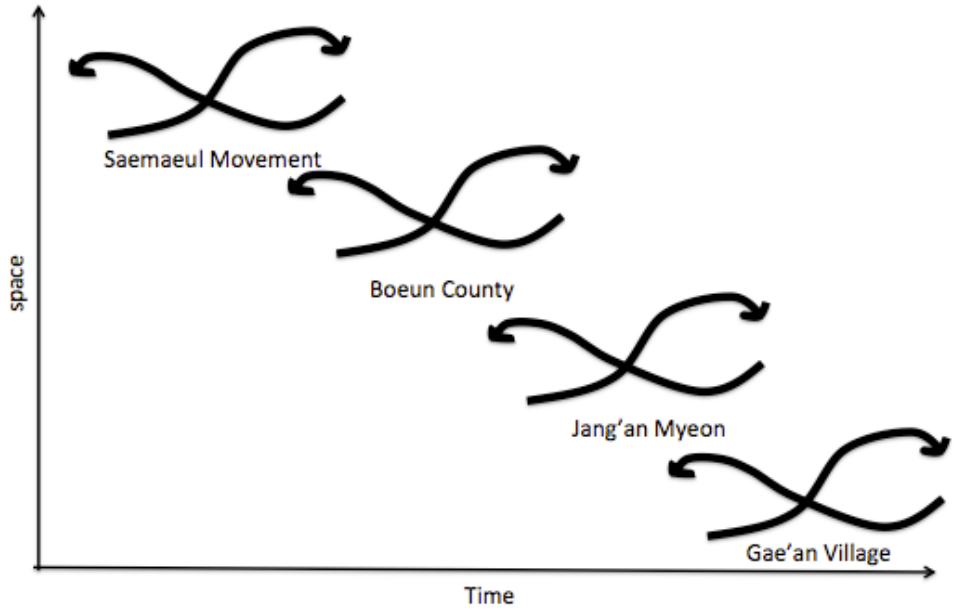


Figure 4. 8 Adaptive cycles within a panarchy framework for Gae'an Village landscape changes

Figure 4.8 illustrates multiple adaptive cycles at the village, township (myeon), county, and the national scales, reflecting the different properties and institutions involved. It shows how human-induced change at the national level with a top-down approach (fast-moving cycles) affects regional, local, and village landscapes (slow-moving cycles) over time. From the Saemaeul Movement to the two flood events, the history of the village populated with events, conflicts, learning, and innovation, triggered by different combinations of cross-scale interactions, and the panarchy concept captures these changes through time and space.

Other minor social-ecological changes not dealt with in the findings were frequently associated with governmental policy, so villagers were well aware of governmental projects and policies regarding rural development and agricultural sectors. Because they possess a traditional mansion designated as an important cultural asset, the villagers also showed interest in preserving the Seon Clan's traditions while simultaneously seeking the opportunity to open their clan traditions to the public, pursuing both preservation of their traditions and the benefits of ecotourism.

Another interesting finding of the study concerns the scale of disturbance. Effects of scale and disturbance to plants and animals have already been discussed in the field of ecology (Glenn and Collins 1992, Bond and Lake 2005). However,

the relevance of disturbance scale in relation to SES resilience and adaptive capacity building has not been addressed in previous literature. Because the disturbance in this study occurred on a spatial-temporal scale much greater than the village scale, the flood damage of village could receive national attention. In addition, most people in Boeun have their own stories about the disasters, and it was clear from the study that shared social memory in the form of narratives and story-telling enabled the flexibility in local government's institutions and promoted community-based conservation practice.

To summarize, in addressing scale- and level-related issues at a community level from a resilience perspective, this study supports community-based conservation or small-scale approaches to scale issues, because the case study proves that a community is capable of building adaptive capacity with social courses including knowledge systems, learning, and memory. In the process, the presence of TEK in relation to KTVL is found to be important at the village (community) level. However, within a hierarchical social system with nested institutions, other variables, such as the disturbance scale and collective memory, should also be examined.

The role of social-ecological memory in nurturing adaptive capacity

Resilience is neither positive nor negative. Rather, people show their desirability in either ecological or social-ecological contexts toward a certain development direction based on their worldview (Walker et al. 2006a). Prior literature reports that learning based on catastrophe may facilitate knowledge creation or promote adaptation of existing knowledge (Berkes and Turner 2006). In the case of Gae'an Village, because of the influence of SEM, villagers tend to show their desirability for maintaining landscape configuration in managing community resilience. One may state that Korea's TEK concerning landscape configuration is heavily influenced by geomantic principles. However, the study found that memories about both landscape configuration and related geomantic legends are transferred mainly among male villagers. When considering both male and female villagers, the ecoliteracy of those taking a leadership role, which places attachment on a village that respects nature and retains its original form, was prevalent and shared among all.

Thanks to the presence of their knowledge system and their strong belief in preserving the original landscape formation handed down over generations, the village community was able to build their adaptive capacity after experiencing

dramatic social and natural changes. The key informant, who managed to collect signatures from all the residents in the five villages, was motivated to take a leadership role, reflecting what he learned from earlier generations and from his own life in the village. The nature of his strategy for collecting signatures from the five villages indicates his ecoliteracy—that he was aware of the scale issues of the stream's potential impact.

Through the interviews, it was apparent that the villagers learned by experience that humans should not "manage" nature, as nature has its own rules and ways. In particular, the villagers were concerned with water-related issues. This finding is parallel to the issues raised by those in governmental sectors. Both the villagers and governmental sector employees showed interest in and concerns over climate-related issues. It thus appears that the worldview of villagers and other people from the Boeun area were influenced by the two major floods. Shared memory concerning the floods, in turn, has motivated the villagers to carry out specified resilience practices.

Figure 4.9 A memorial signboard indicating the flooded area during the second major flood in 1998 (photo taken by G. Kim, May 6, 2016)

Although it is known that specified resilience may result in decrease in adaptive capacity for other disturbances, the learning process and reinforcement of SEM over time has worked to enhance the villager's adaptive capacity. Thus, the villagers may be able to deal with other changes, armed with their experience and knowledge concerning landscape management. However, this study has not examined whether the village is capable of conducting adaptive management in response to other external and internal changes, such as global economic influences

or social institutions. Instead, this chapter describes how shared SEM concerning the village landscape, leadership, mutual trust, and experience of disturbance events have become important attributes allowing villagers to nurture their adaptive capacity.

The potential contribution of TEK in building social capacity to deal with disturbances and to sustain ecosystem services has already been demonstrated in previous literature, particularly in the theoretical context of some case studies (Folke 2004, Berkes and Davidson-Hunt 2006, Berkes and Turner 2006, Gómez-Baggethun et al. 2013). Despite the threat of urbanization, technological development, and globalization, there is a growing body of evidence that TEK still functions as a basis for local communities in maintaining a relationship with their biophysical environments (Gómez-Baggethun et al. 2013). For example, Ruiz-Mallén and Corbera (2013) reported in their review that many studies show evidence of the role of TEK in enhancing local communities' capacity to deal with changes, particularly in rural and indigenous groups. When considering that social institutional causes for scale mismatches within an SES are often derived from inadequacies in the type and amount of information available (Cumming et al. 2006), the experience or ecological knowledge of local groups in rural areas can indeed provide synthetic monitoring bases for decision-making processes in response to change. In addition, because the community level is also vital within the panarchy, it should be given sufficient attention by researchers (Berkes and Ross 2013).

Although I have tried to offer an initial contribution to the literature concerning Korean TEK in SEM and resilience practices concerning adaptive capacity and scale issues, the conclusions await further refinement and correction through further research. Nevertheless, this study suggests that it is important to question the interplay between memory and social-ecological changes in dealing with changes and scale challenges within an SES.

CHAPTER FIVE

Identity of Korea's Traditional Village Landscape

The chapters presented thus far provide evidence that social factors such as social-ecological memory (SEM) are important in resilience of a social-ecological system (SES), particularly in fostering individual's ecoliteracy and place attachment, and in perpetuating local (landscape) management practices. These results are in accordance with previous literature that emphasizes the social processes in managing SES resilience, such as social learning, social memory, and trust building (Olsson et al. 2004, Folke et al. 2005a, Lebel et al. 2006, Armitage et al. 2009).

However, the premise of these approaches is that the social-ecological spaces in which social processes take place should remain intact or resilient to both ecological and social changes. For example, physical sites where people build their relationship with the natural environment, and thus accumulate memories, play a critical role as platforms for ecosystem management practices. Similarly, in the introduction I presented SEM as a person-practice-place complex, and the objective of this chapter is to present how the person-practice-place linkage influences the SES identity and the spatial identity of *place* (Figure 5.1).

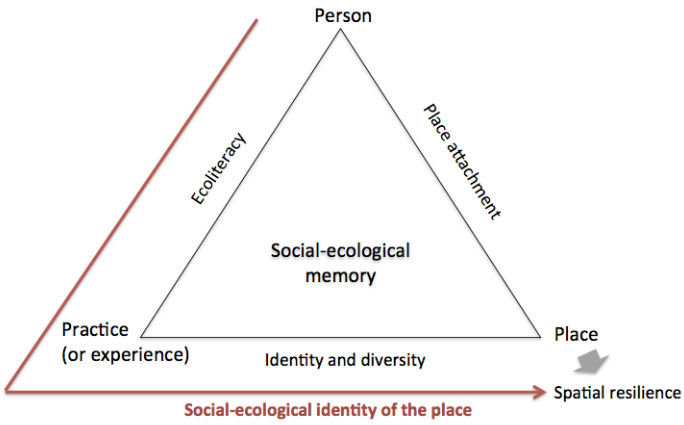


Figure 5.1 Hypothesis and focus of the chapter concerning the *place* dimension of the social-ecological memory framework

Barthel et al. (2010) labeled these types of place in cities "pockets of social-ecological memory" in their studies on SEM, which referred to allotment gardens in Stockholm. The pockets of social-ecological memory contribute to the

generation of ecosystem services and facilitate ecological literacy (Barthel et al. 2010). Furthermore, when considering the fact that autobiographical memory fades easily with time (Halbwachs and Coser 1992), these sites, whether small or large, play an even more important role in reinforcing SEM for people in the vicinity.

Pockets of SEM may vary in size, shape, and history. However, they are spatially important in providing ecosystem services (Barthel et al. 2010), and they have place-based values for those with attachment to them (Davidson-Hunt and Berkes 2003, Kudryavtsev et al. 2012). In this chapter, traditional village groves within KTVLs are examined as pockets of SEM. In addition to the ecological benefits they offer humans; trees, groves, and forests play an important role in providing humans with environments that educe and evoke valued personal and family memories (Henwood and Pidgeon 2001). This significance of trees and forests transcends time and space, and various cultural meanings and management practices concerning trees and forests are commonly found in various places around the globe.

Koreans also developed special meanings and purposes for trees and forests in the past. A distinct practice among Korean traditional societies was the creation and management of village groves or forest commons to compensate the village landscape based on geomantic knowledge and beliefs (Koh et al. 2010). Traditional village groves represent an archetypal cultural landscape of Korea and are commonly called *maeulsoop* (pronounced as má-ùl-soop) or *bibosoop* (pronounced as bee-bo-soop), literally meaning "village-grove".

Traditional village groves as pockets of social-ecological memory

With industrialization and globalization, cultural landscapes in many regions around the globe have undergone rapid changes including the ones in Korea (Koh et al. 2010) and the world is currently at a crossroad between "extinction or evolution" of those landscapes (Naveh 1998).

With increasing awareness of this crisis, a number of researchers have demonstrated the importance of traditional village groves and related management systems. For example, local studies revealed various ecological functions of village groves including their role as a windbreak, a vegetative buffer strip, a corridor for wildlife, and a habitat for birds (Lee 2003, Lee et al. 2007, Joo and Park 2012). Koh et al. (2010) further examined their effects on water conservation in leeward paddy fields during spring, by reducing wind speed and evaporation. Traditionally being an agricultural society, insufficient rainfall during spring and frequent flood during the rainy season may have been a concern for farmers in Korea (Koh et al.

2010), and planting village groves has been a traditional practice to manage the resilience of local SESs at the village scale.

All of these local studies signify the ecosystem services of traditional village groves, and as noted earlier the generation of ecosystem services is an important function of pockets of social-ecological memory. It is also assumed that through cultivating and managing village groves or forest commons, people develop their ecoliteracy, particularly in relation to strategic location of the groves, the selection of tree species, and conservation strategies. Such ecoliteracy is reflected in historical records concerning the village grove and settlement arrangement, which will be analyzed in the following section. In addition, recently, several attempts have been made to apply SES frameworks and highlight the social aspects of traditional village groves and their management systems, exemplifying the reinforcement process of SEM in relation to traditional village groves in the contemporary context (e.g., Yu et al. 2014, Lee and Krasny 2015). Figure 5.2 summarizes the significant functions of traditional village groves as pockets of SEM.

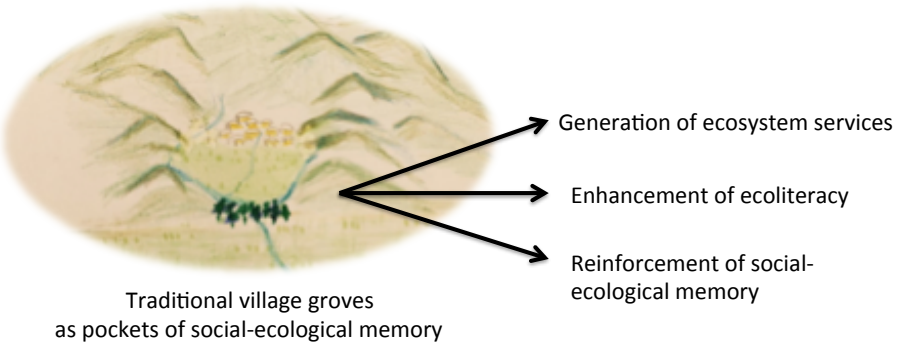


Figure 5.2 Functions of traditional village grove as pockets of social-ecological memory. Note that the village grove illustrated in this figure is the most representative type of artificially created village groves among the six types (see Figure 5.3).

The destruction of cultural landscapes or community-based forest management systems is a worldwide phenomenon (Bhagwat et al. 2005), which requires immediate attention in terms of its management and conservation. However, very little attention is being paid to the analysis of traditional village groves and the landscape embracing the groves at the national scale despite the nation-wide destruction of traditional village groves.

Ecologically speaking, fragmented landscapes and landscape patches are important parts of ecological memory in that they function as habitats for

ecological processes (Bengtsson et al. 2003). Landscape ecological research highlights that maintenance of habitat connectivity and landscape functionality for species that move through landscapes over a range of different scales contributes to ecosystem management (Cumming 2011b). Cumming (2011b) further argues that a more process-oriented view—that is, a systems approach—in the field of landscape ecology will allow researchers to see the interaction between nature and people with spatial components, flows, interactions, and disturbances. His suggestion notes the possibility of defining a systemic identity with a spatial, quantitative approach. Therefore, spatial analysis of physical sites with key social-ecological roles is feasible and necessary for better management plans and schemes.

Nevertheless, an SES often consists of spatial and non-spatial components, even though Cumming (2011b) claims that both ecological systems and social systems can be quantitatively identified with their spatially located components. Social-ecological memory, social learning, leadership, and human perceptions are non-spatial components that are frequently discussed in the discourse of SES resilience research. In this sense, I attempt to analyze both spatial and non-spatial characteristics of traditional village groves in this chapter. First, I define the social-ecological identity of KTVLs that encompass traditional village groves as important landscape elements by examining relevant historical records as a type of historical memory; I then assess the spatial distribution of existing village groves to define its current spatial identity. I believe that this methodological approach is timely and cost-effective for examination of the spatial distribution pattern of village groves and for assessment of spatial resilience of KTVLs at the national scale.

TRADITIONAL VILLAGE LANDSCAPE AND GROVE STORED IN HISTORICAL MEMORY

Defining the identity of traditional village landscapes and groves

Formation of traditional village landscapes and groves

Indigenous people are known to possess ecosystem-like concepts with regard to their land (Berkes et al. 1998). These concepts are usually characterized by a social-ecological unit with a spatially explicit boundary, such as watershed, and interrelationships between humans and the physical environment, as well as living organisms within the SES (Berkes et al. 1998, Boillat et al. 2013). In Korea, water availability was a critical factor in the formation of human settlements, and people usually resided in areas with relatively easy access to water; creating village

landscapes within watersheds in mountain regions is a typical practice in village units (Lee 2003, Koh et al. 2010). In forming a settlement, Koreans often adopted geomantic principles in their belief that certain landforms and locales are auspicious for residences and even for graves (Yoon 1980). Under the geomantic influence, Korea's indigenous ecosystem-like concepts have regarded landscapes as magical, personified, or vulnerable beings (Yoon 1980), and people developed relationships with animals, plants, and physical environments in ways that they could maintain the geomantic image of a village through their landscape management practices, particularly by managing their landscape composition and configuration.

The principles of traditional Korean settlements as well as the practice of planting trees to create groves or forests are well recorded in historical documents including *The Annals of the Joseon Dynasty*, the volume *Sangtaekji* (Record of Selecting Residence) from *Imwongyeongjesibyukji* (Treatises on Management of Forest and Garden) written by Seo Yugu (1764-1845), and in the document *Taengniji* (Book of Choosing Settlements) by Lee Junghwan (1690-1752). With the help of the endeavor made by local researchers, relevant content have been translated and well summarized in the first volume of *Korean Traditional Ecology* (Lee 2004). Historical documents are part of historical memory that has been socially structured and reorganized by the society (Halbwachs and Coser 1992).

Based on the geomantic principles, a salubrious village has the landscape arrangement of back-mountain front-water, and a residential area usually faces south with paddy fields in front. In addition, many traditional village landscapes in Korea induce a sense of snug space because both sides and the front are enclosed within forested areas, hills, or village groves. In terms of topography and climate conditions of Korea, such an arrangement implies cool winds in summer and less harsh cold winds in winter (Shin 2004). Other components of a village include village shrine(s), cairn(s), pole(s), village grove(s), village pond(s), mountain behind a residential area, forested areas on the right and left sides of the residential area, paddy fields, and vegetable gardens (usually located near lavatories or house walls). Park (2004) summarized the conditions and components of a residential site, listed in *Sangtaekji* with the excerpts below:

> "There are certain techniques when selecting a residential site. With regard to the mountains that surround a residential site, they should not rise steeply, no matter how high they are; while they should also not be concave like a grave, no matter how low they are.
> These are preferred: hills with gentle slopes closely arranged at one place; expansive fields receiving plenty of sunlight; forests with old trees; and

> perennially flowing stream. The homes should have vegetable gardens beside which fields should be cultivated for millet and rice, and the stream for fishing and irrigation should flow beside the fields. Furthermore, over the stream, there should be mountains, shaped like a writing-brush rack, or a coronet braid, or a rising cloud so as to form an enjoyable scenery."

In *Taengniji*, Lee Junghwan describes geography, economically comfortable sites, mountain and water, and customs of amiability as important conditions of an ideal living place (Shin 2004). This indicates that people in the early society had already perceived a village as a system with physical, social, and ecological components interacting with each other.

Because ideal locations were limited, people sometimes had to create villages in unfavorable sites such as open fields, resulting in the development of artificial means, such as building village groves, changing the direction of a stream, making cairns, and assigning geomantic names to places and landscape elements, to complement the landscape (Yoon 2011). In addition, people sometimes developed certain social norms and customs such as forbidding the establishment of water wells as part of their indigenous practice (Yoon 2016) and employing local stewardship to protect their forest commons (Yu et al. 2014).

Among landscape management practices, village groves or forest commons are one of the most interesting and significant elements. Based on geomantic principles, the purpose of groves were mainly to reduce wind speed, increase water yield, and complement topographic formations (Jang 2004). Depending on its spatial position within a village landscape, six types of village groves have been identified (Lee et al. 2007), as illustrated in Figure 5.3, with Type 1 village grove being the default setting as "back-mountain" of the village. Thus, Type 1 village grove is the most common type, while Type 2 village grove is the most representative among the artificially created groves. In Korea, this type of village grove is traditionally called *sugu-magi*, which refers to the retention of water at the downstream of a village and the protection of the village from inauspicious energy from outside by the groves at the mouth of the watershed. The name implies that there has been a form of landscape management in order to enhance spatial resilience. In *Taengniji*, Lee Junghwan describes the nature of *sugu-magi* as follows:

> "Generally, when *sugu* (the mouth of water) is loose and wide, fortune is not delivered to the next generation even if they have ten thousand *irang* (ridges or banks, used here as a type of quantifier) of suitable farmland and a thousand *gan* (app. 1.81818 m) of wide housing. They will still scatter and disappear. Therefore, to take a residential site, the *sugu* must be firmly closed and one should carefully examine the fields within it" (from Jang (2004)).

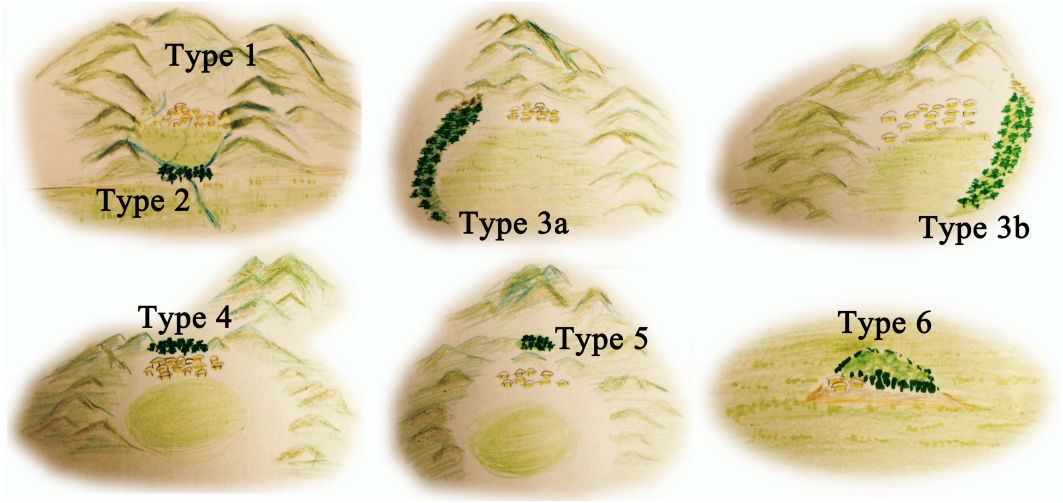


Figure 5.3 Six types of traditional village groves (adapted and modified from Lee et al. 2007).

A number of historical documents also describe the practice of covering the mouths of watersheds by creating the *sugu-magi*. For instance, the following excerpts from *the Annals of the Joseon Dynasty* (1447) also record this:

> "The Silla Dynasty (B.C. 57-935) lasted for approximately one thousand years, owing to complementation practices of vacant places with man-made mounds and forestation. At the time, people made mounds and planted trees to make up for areas which were largely opened in counties and towns. ……..In this country, parts of the national capital wall are weak and the capital's watershed mouth is too open. Thus, those areas should be complemented. "It is difficult to strengthen these areas by building mounds of soil and stones." Instead, planting trees will be an effective way to enhance the areas."

> "For *sugu*, the mountain terrain must be strong and forests dense. Mountains that resemble a gathering of a thousand people are known to be precious lands"…Now, our capital has clearly arranged a perimeter and control over *sugu*; therefore, it is time to complement the perimeter and *sugu*. However, it is difficult to create a mountain structure by heaping soil. Planting trees to create a forest to serve as a block will be more effective, as it requires less effort" (from Jang (2004)).

The excerpts above explain that village groves were created taking the relationship with other mountain terrains proposed by professional geomancers as a guide. This indicates that village groves do not exist solely within a village landscape but coexist in harmony with other forested areas or mountain terrains.

Nevertheless, there is an exception in a region where watersheds with narrow mouths are unlikely to meet the people's demand for water. In such a case, a grove was created on an isolated hill that resembles a dome (illustrated as Type 6 in Figure 5.3). Furthermore, people sometimes artificially developed groves or forests in auspicious shapes including those of phoenixes, floating lotuses, boats, a reclining cow, a winnowing fan, and arcs (Jang 2004). Several geomantic legends on these forests have been handed down, and many are still protected by the local people (Yoon 2006).

Identity of a traditional village landscape as a social-ecological system

Cumming et al. (2005b) and Cumming (2011b) have stated four criteria constituting the identity of a social-ecological system: (1) key components, (2) key relationships between components, (3) elements of continuity through space and time, and (4) elements of innovation that lead to adaption.

In addition to the four criteria, I added key conditions and ideological backgrounds of traditional village landscapes (Table 5.1), because the formation and management of traditional settlements have been heavily dependent on traditional ecological knowledge (TEK) systems that regard land as a live entity full of life forces (Berkes et al. 1998). My minireview of historical documents can be understood as TEK with regard to Korean traditional settlements, and this knowledge is also an important component of SESs (Berkes and Folke 2000, Folke 2004, Berkes and Turner 2006). I summarized six criteria that constitute the social-ecological identity of Korea's traditional village landscapes, as shown in Table 5.1.

Table 5.1 Key elements describing the identity of a traditional village (Yoon 1980, Lee 2004, Yoon 2006, Yu et al. 2014, Yoon 2016)

Criteria	Contents
Key conditions	Back-mountain front-water arrangement
Ideological background	Geomantic principles with knowledge of local geography and climate
Key components of landscape	Village grove(s), stream(s), mountains behind the residential area, forested areas or hills on the right and left sides of residential areas, paddy fields, and vegetable gardens
Relationships	Landscape management practices according to geomantic principles
Elements of continuity	Stewardship of grove/forest commons Social institution Governmental/local restoration projects
Means of enhancing resilience (elements of innovation)	Forbidding well construction Planting trees or forming a grove to complement topographic flaws

Data collection

Remaining traditional village groves in South Korea have been under investigation by the National Institute of Forest Science since 2007 as a part of an urban forest survey project. In the survey, the following features of village groves were recorded: name of village, management authority, address, inspector, survey date, GPS point, main tree species, and type of grove. A total of 1,346 traditional village groves have been recorded. Among these, 350 archetypal type groves, i.e., Type 2, have been selected for our analysis. Type 2 village groves separated by a minimum distance of 1 km were selected to avoid spatial autocorrelation in data (Legendre et al. 2002). Data on remaining village groves prove that the Type 2 village grove is the most common throughout the peninsula (Figure 5.4).

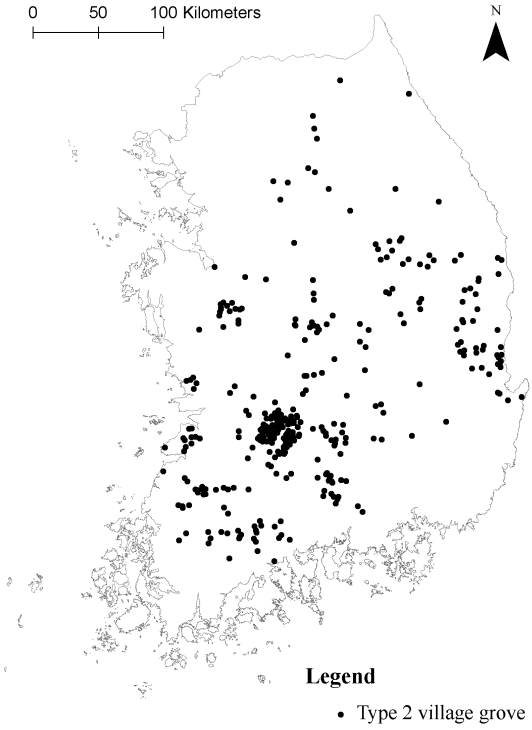


Figure 5.4 Distribution of type 2 village groves.

Identifying relevant variables for spatial analysis

It is highly possible to understand and assess resilience using spatial data by recognizing that the identity of traditional village groves is largely related to the spatial knowledge of local people, that locations of village groves are related to topography and villages, and that they have been maintained over a long period of time. In taking the spatial approach, both social and physical variables should be considered because the traditional village grove is a unit of the SES (i.e., traditional village landscape). In addition, based on the literature review, slow variables of ecosystem properties such as climatic conditions were found to contribute to the development of traditional settlements in Korea. Thus, I summarized and generated a list of 13 variables explicitly available as spatial data, which are classified into two categories: social elements and ecological conditions (Table 5.2).

Table 5. 2 Variables of traditional village grove identity as defined in the text

Category	Variable	Data Source
Social elements	Population within a radius of 300 m	Biz-GIS database (http://www.biz-gis.com/GISDB)
	Road density within a radius of 300 m	National Transport Information Center (http://nodelink.its.go.kr)
Ecological conditions	Forest cover within a radius of 500 m Distance from streams	Land cover classification (at 30 m resolution) provided by the Ministry of Environment in Korea (2009)
	Aspect Slope	DEM (digital elevation model) at 30 m resolution
	Precipitation during the coldest quarter Mean diurnal range Annual mean temperature Precipitation during the warmest quarter	WorldClim database at 1 km resolution (Hijmans et al. 2005) (http://www.worldclim.org/bioclim.htm)
	Annual wind speed Wind direction in summer Wind direction in winter	Wind resource map at 1 km resolution (http://www.greenmap.go.kr/)

(1) Social-economic elements: Many historical documents highlight the importance of humans as an important social driver interplaying with ecological drivers. Thus, population might be a variable concerning the identity threshold of the target SES (Cumming 2011b). In fact, rural communities in Korea have been steadily shrinking because of urbanization and rapid industrialization since the 1960s (Wackernagel et al. 2004). As the number of young adults moving to cities continuously

increases, the population in rural communities is decreasing, causing an aging phenomenon, especially in agricultural communities. Consequently, with less or no people to protect traditional village groves, many are being destroyed for road construction. Also, it order to examine the influence of modern development and infrastructure, road density within a radius of 300 m (km/km^2) is included as another social element. Road construction is one of major causes for the destruction of traditional village groves.

(2) Ecological conditions: The aspect and slope of a residential site, and mountains and streams surrounding a residential site as geographic features are found to be relevant variables through the review of historical documents. As such, four variables were selected considering physical geographic features: (1) forest cover within a radius of 500 m, (2) distance to streams, (3) aspect, and (4) slope. Some village groves are known to have been built to protect the village from strong winds, and some studies have examined its function of microclimatic regulation (Koh et al. 2010). Consequently, it is plausible to conclude that wind and climatic factors could be another set of meaningful variables. Thus, (5) mean diurnal range in temperature (i.e., mean of (max temp – min temp)), (6) annual mean temperature, (7) wind direction in winter and (8) in summer, and (9) annual wind speed were selected as climate-related variables. Furthermore, (10) precipitation during the coldest quarter and (11) the warmest quarter were also added to examine its spatial relationship with climatic factors.

Population was calculated by summing the number of residents within a 300 m buffer around the village groves using the 2011 BIZ-GIS database (biz-gis.com/GISDB). In general, a radius of 300 m from a Type 2 village grove is usually considered a common village scale in rural areas of Korea. I estimated forest cover within a radius of 500 m considering the surrounding mountain terrain of a village. Other sources of spatial data for variables are summarized in Table 2.

Modeling the distribution of Type 2 village groves

All the variables were resampled to a spatial resolution of 100 m. I performed Pearson's cross-correlations among all of the variables to test multicollinearity using ENMtools version 1.3 (Warren et al. 2010, Warren and Seifert 2011). The results showed that the variables were not strongly correlated (i.e., $| r | < 0.6$).

I employed a presence-only machine-learning maximum entropy (MaxEnt) distribution modeling with 350 locations of Type 2 village groves to identify factors associated with their distribution (Phillips et al. 2006). In the MaxEnt modeling, the default settings were applied with 1,000 iterations. Fifty model replicates were processed; 70% of the locations were randomly selected each time to train the model, and the remaining 30% were used to test the model's predictions. I selected the most parsimonious model based on the Akaike's information criterion (AIC) scores (Burnham and Anderson 2002) using ENMtools version 1.3. For the best model, I inspected the percent contribution (i.e., relative importance) of each variable and marginal response curves of the top four variables (Phillips et al., 2006).

Results

The most parsimonious model had a good fit (mean AUC-train = 0.952; mean AUC-test = 0.927). The test omission rate was 16.3% at the 10th percentile training presence (logistic threshold of 0.210). The relative contributions of variables in the model are as follows: (1) population within a radius of 300 m (37.5%); (2) forest cover within a radius of 500 m (17.0%); (3) precipitation during the coldest quarter (14.4); (4) mean diurnal range in temperature (13.0%); (5) annual mean temperature (6.8%); (6) distance to streams (3.4%); (7) road density within a radius of 300m (2.8%); (8) precipitation during the warmest quarter (2.1%); (9) aspect (1.2%); (10) slope (0.8%); (11) wind direction in winter (0.6%); (12) annual wind speed (0.2%); and (13) wind direction in summer (0.1%).

The four variables with highest percentage of contribution were population density within 300 m radius, forest cover within 500 m radius, precipitation during the coldest quarter, and mean diurnal range in temperature (Figure 5.5). Occurrence probability was generally negatively correlated to population (Figure 5.5A), indicating that only few local villagers are able to maintain village groves at the moment. It also indicates that village groves are most likely present in villages with a population of 120 people. Additionally, neighboring forest cover was found to be another important factor contributing to the location of the village grove (Figure 5.5B), implying that village groves were created considering other forests or mountain terrain within a watershed. Considering mean precipitation of the coldest quarter in Korea is approximately 100 mm, Type 2 village groves were frequently identified in regions where precipitation was relatively high in winter and early spring (Figure 5.5C). It is assumed that people can secure more water in well-enclosed watersheds over a long period of time, especially during the dry

season. Also, mean diurnal ranges in temperature was positively correlated with the occurrence probability (Figure 5.5D), indicating that local villagers might have found that village groves stabilize local climate conditions in a watershed area.

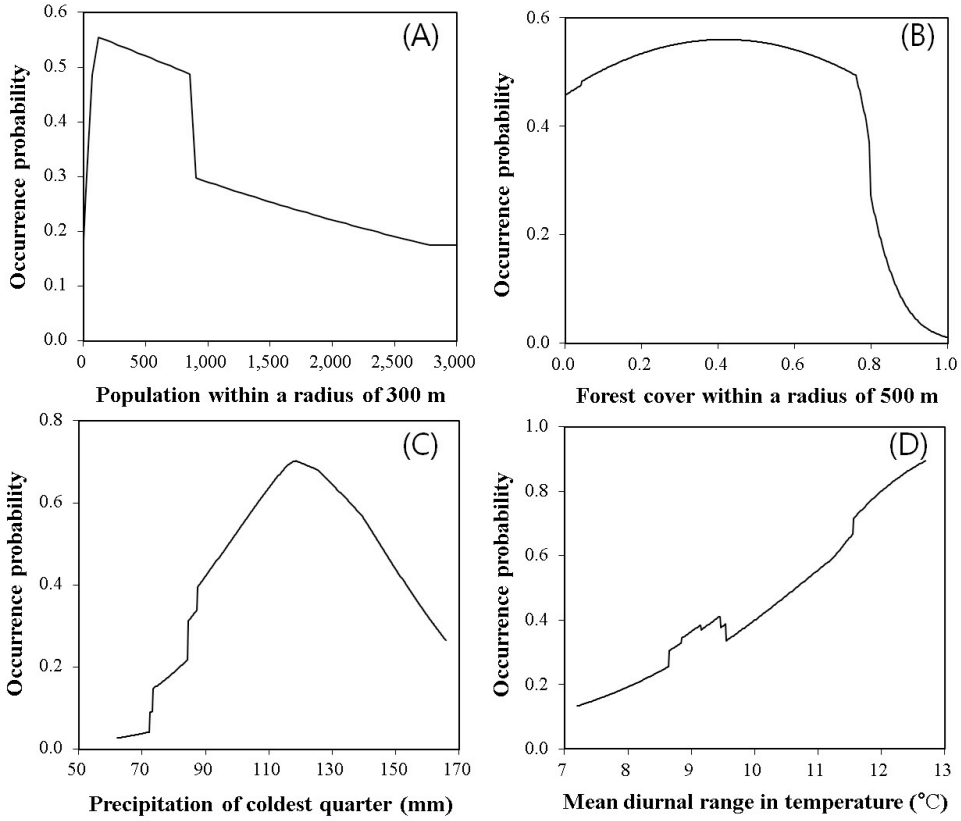


Figure 5.5 MaxEnt response curves showing the predicted probability of village grove occurrence for the top four variables.

Additionally, analysis of the distribution pattern reflects the current identity of traditional village groves in a spatial context. In the introductory chapter and introduction part of this chapter, it was argued that not only place-based values but also spatial characteristics of the place (of SEM) will reflect the information retained and transmitted by the agents and indicators of SEM. In this chapter, the spatial identity of KTVL is assessed, and with the result it is possible to locate other KTVLs with traditional village groves that are not on the list (Figure 5.6), which allows for more strategic planning of conservation management at a national level.

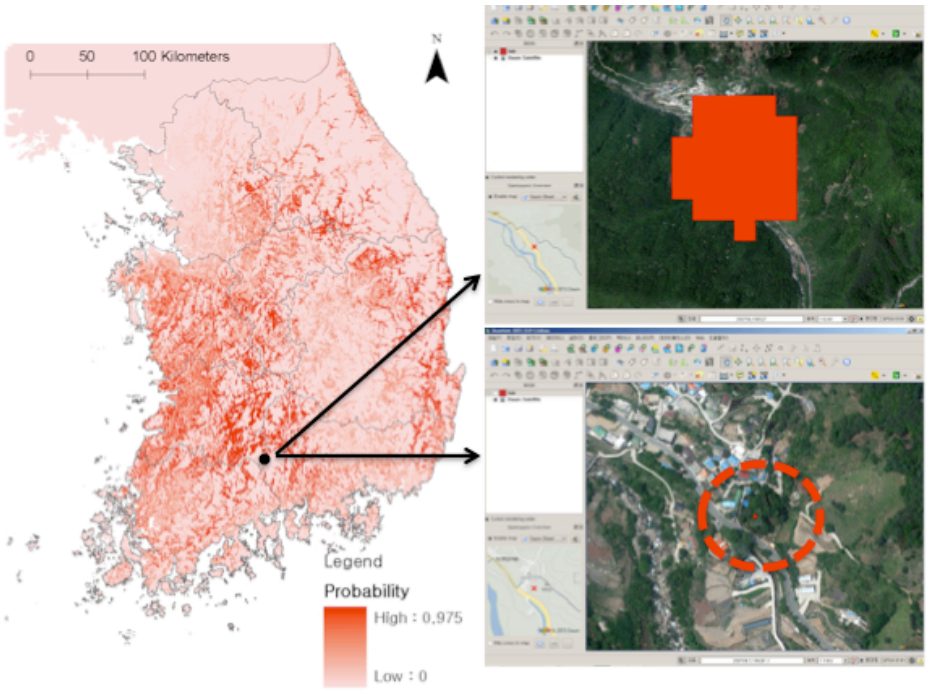


Figure 5.6 Occurrence probability of type 2 traditional village groves (left) and an example site found in a GIS program with occurrence probability > 0.5 (right).

DISCUSSION

One of interesting results of the study is the trend of traditional village groves to distribute in locations where the population is 120 people within a radius of 300 m from the groves. Although the social-economic factors affecting or affected by the certain number of population and the implication of the population of 120 are under investigation, there are many legends suggesting a suitable settlement size for a village based on people's belief in geomancy. For example, people have managed to maintain the same number of their houses within a village where the landscape believed to be a boat according to geomancy:

> "In Yangseon area, there is a sharp decline in prosperity when the number of houses exceeds 40. The number of houses falls shortly afterwards, and after a few years when the hamlet regains its prosperity, the number does not exceed 40 again. Thus, Yangseon at any point in time retains 40 houses. The reason behind this is that Yangseon is shaped in the form of a boat; just as too great a load will capsize and sink a boat, too many houses will bring misfortune to the hamlet (Yoon 2004)."

Yoon (2004) states that this type of management is similar to that of neo-Malthusians, who insist on limits to growth-oriented development. From a resilience-based perspective, however, this might be understood as a carrying

capacity and a threshold of a traditional village landscape system. According to the data, the average number of households for the 350 Type 2 village groves is 45.1, and thus it is plausible to conclude that a certain number of households and population may be regarded as the point beyond which the village landscape system deteriorates or cannot be managed. A large number of people or households are unlikely to exist in a village because villages are often situated within relatively narrow physical boundaries, e.g., surrounding mountain terrain.

In contrast, a number of people below the possible threshold of the village landscape system may refer to the lack of people who can take care of the village groves and carry out landscape management practices. The role of human dimension in SESs is known to be significant because it ultimately shapes the process and dynamics of the ecosystem (Folke et al. 2005a). In particular, man power is essential in agricultural and agroforestry systems. In Korea, with economic growth since the 1960s, many people have abandoned their farmlands in response to changes in economic conditions of rural areas and the demand for formal education. Taking the average number per age group of the 350 Type 2 village groves, the age group of 60 or above is 33.6 within a radius of 300 m from the village groves, while the average for other age groups do not exceed 20. The average number of each group is 17.8 for teenagers, 10.0 for people in their 20s, 12.1 for those in their 30s, 14.8 for those in their 40s, and 16.3 for those in their 50s. With this age distribution, it is plausible to assume that the population in traditional villages will continue decreasing. This shows that the combination of slow and fast variables of social properties including the implementation of social institutions and financial subsidies are required to attract more (younger) people to reside in rural areas. Previous studies also states that migration has both economic and social dimensions (Adger 2000).

In addition, forest cover within a radius of 500 m was found to be another significant variable. This finding highlights the need of expanding a relevant research subject from a single landscape element to landscape as a whole, especially in order to discover human–nature feedback processes within a certain spatial boundary (Bhagwat et al. 2005). Thus, when an SES is studied at a certain spatial level, the landscape ecology approach might provide effective and practical insights (Cumming 2011b). Furthermore, from the SES perspective, I regarded traditional villages as a system with distinct spatial arrangements that interact with other elements. Most studies on traditional village groves have focused on the village groves alone, neglecting its important functional connectivity with other landscape elements. For instance, biodiversity is known to be higher in cultural

landscapes than in remnants of natural landscapes owing to landscape heterogeneity (Naveh 1998, Farina 2000). Therefore, when a traditional village landscape is studied as a system instead of a traditional village grove, more meaningful information about the local ecosystem can be obtained.

Implications for institutional resilience

Adger (2000) distinguishes social resilience from ecological resilience and highlights institutions as central components linking the two types. Additionally, Herrfahrdt-Pahle and Pahl-Wostl (2012) focus on institutional resilience in the face of change to seek methods of renewal and innovation. In this chapter, I follow Adger's broad definition of "institution," as summarized below:

> The question is, then, whether societies dependent on resources and ecosystems are themselves less resilient. In addition, this analysis allows consideration of whether institutions themselves are resilience to change. Institutions in this case are defined in the broadest sense to include habitualized behavior and rules and norms that govern society, as well as the more usual notion of formal institutions with membership, constituencies, and stakeholders.

The continuity or change of institutions is critical, as institutional processes and structures are tightly linked to sustainable or unsustainable ecosystem management (Adger 2000, Bingeman et al. 2004, Herrfahrdt-Pahle and Pahl-Wostl 2012). Sustaining social memory is an important factor that contributes to the continuity of institutions, along with other elements such as transparency of reform processes; conversely, flexible legislation, regular reviews, and adaptation of legislation are elements of institutional change. SEM-related studies should thus be able to address the relationship between social-ecological memory and institutions in the context of resilience.

It is not surprising that population was one of the most contributing variables for the village landscape system. Nevertheless, it provides the current society with an important lesson—the key to conserving traditional village groves, or traditional village landscape in a broader sense, lies in our understanding of its characteristics, i.e., quasi-natural elements. In other words, the human society, which has built a relationship with village groves and landscapes, is and should be the main force and principal agent managing and conserving them. Unfortunately, the current strategies for management, conservation, and restoration employ a top-down approach in most cases.

Through a governmental research project with the Korea Forest Service (No: 0434-20130015), I examined 59 village groves that underwent restoration projects. I found that most restoration projects did not include community members in the decision-making process, and in many cases, villagers were not satisfied with the changes to their groves. Some groves were subjected to natural succession, but during the restoration projects, many deciduous trees were cut down and replaced by *Pinus densiflora* to restore their original structure. In general, the governmental approach of changing the elements of a village landscape, such as replacing tree species in village groves or building more artificial constructions inside and near village groves, can be taken as a disturbance.

Farina (2000) reported that such disturbances may affect two important attributes of cultural landscape: fragility and resilience. Thus, in order to restore some village groves and landscapes such that the resilience of the system is enhanced, ecological feedbacks of such approaches should be considered and voices of community members should also be reflected in the process. In addition, the top-down strategy of management practices results in low levels of general resilience as it allows little adaptive capacity (Walker and Salt 2012a). I also witnessed that in some cases, villagers even lost their interest in caring for village groves and village landscapes, after they realized that external forces have intruded their village and that people from outside are taking care of the village groves. Evidence shows that it is essential to address social processes of participation and learning in order to avoid management failures challenged by stakeholders showing deplorable self-interest (Walters 1997).

The TEK of Koreans, i.e., geomancy-based knowledge and practice system, which has survived over a hundred or thousand years, has paved a path for today's traditional village landscape system. The findings with regard to climatic variables, i.e., precipitation during the coldest quarter and mean diurnal range, reveal that landscape management might also have been practiced on the basis of people's understanding of groves in efficiently coping with slow variables of ecosystems including the regional microclimate (Koh et al. 2010). Through the study, it was also found that people less likely build their villages in a region with high precipitation in during the warmest quarter, as flood has been a well-known disturbance from the past.

Although the remaining landscape and relevant SEM still act as the main driving force in the maintenance of the landscape, it will not likely exist if the trend of population decline and age distribution continues. Therefore, more studies on the ecological and cultural functions of village landscape should be conducted in

order to persuade the local and central governments to implement more effective institutions and mechanisms for the conservation. To this end, financial subsidies and educational support might attract people in villages to continue with their landscape management practices. If the villages have been well maintained in the last century, and if villagers still reside in their villages and are attached to certain landscape elements, their SEM in relation to resource management practices and the pockets of SEM should be respected and protected as a key factor for their adaptive capacity. If villagers are faced with difficulties, education on the unsustainability of the present model of management and development can be provided to increase awareness (Farina 2000) and to reinforce their SEM.

Furthermore, the failure to have a system approach may cause a society to be faced with scale challenges. Several studies have recently documented that mismatch between scales of environmental variation, ecological properties, and processes and scales of management within SESs often result in the loss of adaptive capacity in resources management. (Hobbs 2003, Cumming et al. 2006, Cumming et al. 2013). Thus, when considering institutional continuity as a strategy to conserve traditional village groves and its SEM, a system approach is required. If some parts of the surrounding mountain terrain or village groves are destroyed due to developments such as road expansion, not only the ecological functions of the village landscape system but cultural activities within village groves may also be affected. Such developments in cultural landscape regions imply that the resilience of cultural landscape as well as human stewardship may also be closely related to large-scale processes, such as governance of the central government or processes derived under the influence of globalization and urbanization (Yu et al. 2014).

In conclusion, the historical records and folk legends studied by KTEK researchers provide ample empirical evidence to identify the social-ecological identity of the KTVL. Largely depending on factors contributing to the social-ecological identity of KTVLs, I analyzed the distribution pattern, and the spatial analysis results represent the current spatial identity of traditional village groves. According to the analysis, demographic change is likely the most important factor in resilience of traditional village groves. This signifies that institutions must reflect migration and demographic patterns to enhance institutional resilience. Additionally, because spatial identity comprises social, climatic, and geographic elements, a systems approach to addressing conservation issues is recommended. The conservation of traditional village groves is important, because these physical elements of SEM have their own roles in the complex dynamics of SES.

CHAPTER SIX

Toward Better Landscape Stewardship

SUMMARY OF CASES PRESENTED IN THE DISSERTATION

Analysis of the resilience of social-ecological systems (SESs) shows a continuing global concern about uncertainty of global and local environmental issues and the change in the Earth System (Chapin et al. 2009; p. 6). At the same time, it reflects the vulnerability of both social systems and ecosystems confronted by global environmental problems and catastrophic disasters (Walker and Salt 2012a).

With the growing acceptance of the concept of resilience—one that challenges the previous notion of stable equilibrium (Folke 2006)—SES researchers have delved into the factors that enhance the resilience and adaptive capacity of an SES in the face of change and perturbations (e.g., Olsson et al. 2004, Berkes and Seixas 2005, Folke et al. 2005a, Folke 2006, Ahern 2013, Ruiz-Mallén and Corbera 2013). Recent scholarly investigations show that social memory or social-ecological memory is an important source of resilience, in its ability to be a resource for renewal, reorganization, and innovation when an SES is faced with a disturbance or crisis (Folke et al. 2002, Davidson-Hunt and Berkes 2003, Folke et al. 2005a, Barthel et al. 2010, Nykvist and Heland 2014).

With emphasis on small and localized efforts in enhancing social-ecological resilience, experiential knowledge as a valuable source of local ecosystem stewardship, and landscape perspectives in considering social-ecosystem resilience, my dissertation posits that social-ecological memory (SEM) comprises three indicators—person, practice, and place—and analyzes each dimension of SEM in different cases in individual chapters, based on the analysis of autobiographical and historical memory. Consequently, the aim of my dissertation is to explore the characteristics of SEM's dimensions (person, practice, and place) in relation to Korea's traditional village landscapes (KTVL) and discuss their implications in the context of social-ecological resilience, with specific objectives for each case study as follows:

> Chapter Three (Person): To determine the aspects of ecoliteracy and place attachment in the autobiographical memory conveyed through Wansuh Park's novel;
> Chapter Four (Practice): To examine the role of SEM-based practice in nurturing adaptive capacity through ethnographic study in Gae'an Village, Boeun; and

Chapter Five (Place): To define the social-ecological identity of traditional village landscapes and traditional village groves based on the analysis of historical memory and, with factors derived from the analysis of historical memory, to assess the spatial distribution of the existing village landscapes to understand the current spatial identity of the landscape.

Table 6.1 summarizes the focal dimension of SEM, type of memory framework studied, sources of extracting SEM in relation to KTVL, methodological approach, focal level analyzed, and finally important findings concerning SES resilience.

Table 6.1 Summary of individual case studies in the dissertation.

	Chapter Three	Chapter Four	Chapter Five
Dimension of sem highlighted	Person	Practice	Place
Type of memory framework	Autobiographical memory	Autobiographical memory and historical memory	Historical memory
Source of memory	A modern novel	Interviews, maps, and governmental documents	Historical documents, scholarly work
Methodological approach	Qualitative content analysis	Ethnographic approach	Content analysis and spatial analysis
Level of analysis	Individual	Village	National
Significant findings in relation to resilience	Ecoliteracy and place attachment through four levels of ecological knowledge →personal resilience	The role of SEM in leading to villagers' specified resilience practice → adaptive capacity → community resilience	Spatial identity of KTVL →spatial resilience

In Chapter Three, I examined how an individual (the narrator) displays ecoliteracy in relation to KTVL as well as attachment to place through a literary analysis of Park Wansuh's autobiographical novel *Who Ate Up All the Shinga?* by regarding the novel as a reflection of autobiographical memory. In attempting to analyze the ecoliteracy and place attachment-related contents, I modified the four levels of TEK suggested by Berkes (1999) into (1) the names of living and physical components; (2) the resource management system; (3) landscape management systems; and (4) the worldview and cosmologies that are closely related to person-place attachment. The findings signifying the characteristics of SEM in relation to KTVL involve much knowledge and practice of landscape management within a watershed. In particular, the description of heterogeneous landscape configurations and of the scale and boundary of the village implies the role of village landscape practice in enhancing the biodiversity within the village landscape. As a result,

much content reflecting the local knowledge of plants and land is manifested in the narratives. Additionally, the resource management system is found to be largely related to the cycle of material within the village environment, contributing to a less pronounced ecological footprint of the SES. Further, attachment to the village was found to be tightly linked with the narrator's worldview cultivated through intricate human-nature relationships within the watershed (village landscape). Overall, this chapter highlights the importance of cultural and ecological contexts of *place* for humans to build ecoliteracy and place attachment. The approach of the chapter also draws attention to the new functions of autobiographies in delivering and reinforcing SEM and thus calls for interdisciplinary study of SEM across the humanities, social sciences, and other natural resources management fields.

In Chapter Four, I presented case-based evidence of the role of SEM in motivating people's landscape management practice along with a description of social-ecological changes and scale-related issues of the study site. Understanding the dynamics of social-ecological changes and mobilization of SEM is important to comprehend the case in which adaptive capacity is nurtured within an SES. Adopting an ethnographical, qualitative approach, I interviewed the villagers in Gae'an Village in Boeun and other locals in Boeun and presented the results in relation to changes in landscape configuration and land use based on the four stages of the adaptive cycle. The results revealed that the villagers' SEM, particularly their TEK in relation to landscape configuration was reinforced when they faced disasters and scale-related issues. With the reinforced SEM, promoting belief in their human-in-nature worldview, and a leading role taken by one individual, the villagers were able to enhance their adaptive capacity after a disturbance (i.e., the second flood) and lead co-adaptive management in the reorganization phase. Although it may be seen as an example of a particular SEM—in that the villagers carried out specified resilience practice, which has the potential to cause trade-offs, including falling into rigidity traps (Walker and Salt 2012a, Nykvist and Heland 2014)—their SEM played a significant role in allowing the villagers to participate in the governance of their land use for the first time since the Saemaeul Movement.

In Chapter Five, by examining historical memory, which conveys information on KTVL and traditional village groves, in the form of historical records, I was able to establish the social-ecological identity of the traditional village landscape in the context of resilience. Defining important attributes of an SES and thereby establishing the identity of the SES is a prerequisite highlighted in extant literature (Cumming et al. 2005, Cumming 2011b, Cumming 2011a, Walker and Salt 2012a).

I then introduced traditional village groves as pockets of SEM and highlighted the importance of conserving the physical sites for their three important functions in SESs: generating ecosystem services, fostering ecoliteracy, and reinforcing SEM. Based on the understanding of their physical existence, I conducted a spatial analysis to determine the current distribution pattern of the most representative type of traditional village groves: *sugu-magi*. I found that demographic issues are likely the most important factors in determining the current spatial identity of KTVLs followed by surrounding forest cover and climatic factors. Moreover, with the analytical approach, I was able to locate potential KTVL sites in traditional village groves that are not in the current governmental data. By focusing on a spatial pattern-oriented origin, the concept of operationalized (spatial) resilience provides researchers with certain advantages, particularly by viewing the resilience of an SES as a maintained identity in space and time against a perturbation, assessed using spatially explicit data (Cumming et al. 2005, Cumming 2011b, De Vos et al. 2016).

SYNTHESIS

As discussed in the introductory chapter, the current ecological problems of SESs are often called "wicked problems," that are intertwined with issues of values, equity, and social justice, and require scientists to engage with the public to gain their trust and seek their active and informed participation in social-ecological decision-making processes (Ludwig 2001). This is particularly important in SESs, so as to "match the scale of management to the scale of the system to be managed and implement solutions at the local level first" (Berkes 2004). The significance of SEM is much larger than merely scientific—it is commensurately relevant to social justice, sovereignty, autonomy, and identity of traditional or indigenous peoples (Bohensky and Maru 2011). Further, much literature demonstrates the potential of TEK to build resilience in the contexts of community-based conservation (Berkes 2004, Drew 2005, Berkes 2009a, Ruiz-Mallén and Corbera 2013). Berkes (2004) states that community-based conservation reflects three significant conceptual shifts:

- from reductionism to a system thinking;
- to a human-in-nature paradigm; and
- to participatory conservation and management.

These shifts also require the ability to combine knowledge and information from difference sources (probably from different actors and levels) to adapt to change in a synthetic way (Armitage et al. 2011).

My research shows an effort to collect KTVL-related knowledge and memories by suggesting SEM as a person-practice-place complex. By examining SEM from person-, practice-, and place-based evidence in individual chapters, the dissertation has shown that analysis of SEM reflects the dynamics of person-practice-place linkages in the forms of ecoliteracy, place attachment, and even diversity of a landscape. These linkages are, in turn, manifested through spatial characteristics of the place. In other words, both *place* and *space* aspects of KTVL are addressed in the research through adopting ethnographic and spatial approaches, respectively. In accordance with previous studies (Brierley 2010), the findings exemplify how the patterns and processes of a landscape reflect its geologic, climatic, and anthropogenic memory. Thus, the research provides a framework for exploration of the link between spatial and non-spatial characteristics of SES attributes.

Furthermore, my research illustrates how the discussion on different scopes of resilience such as personal, community, and spatial resilience can be examined within the SES resilience field (Figure 6.1). Also, this dissertation addressed both historical and autobiographical memory as components of SEM and presented case-based evidence of the dynamics of SEM and other SES resilience attributes, and showed how KTVL as a result of nature-human interaction displays spatial identity as an SES.

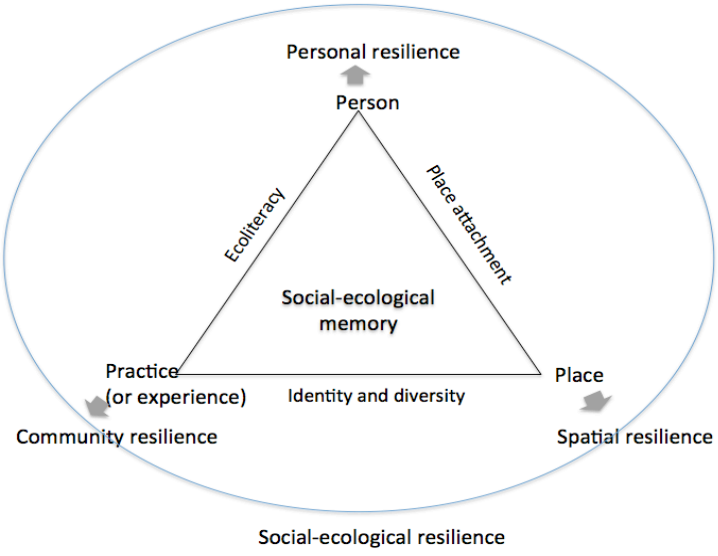


Figure 6. 1 Implications of each indicator of social-ecological memory within a social-ecological resilience perspective.

Based on the SEM framework suggested in my research, civic ecology stewardship introduced in the introductory chapter (Krasny and Tidball 2015) can be understood as the manifestation of the person-practice linkage (i.e., ecoliteracy) in another place (Figure 6.2). Figure 6.2 shows how actors of an SES and their ecoliteracy established from their local SESs can function as a basis of ecosystem stewardship in different places. In this sense, leaders and policy makers of a community are recommended to find methods to motivate more individuals to perform ecosystem and landscape stewardship practices by utilizing their SEM.

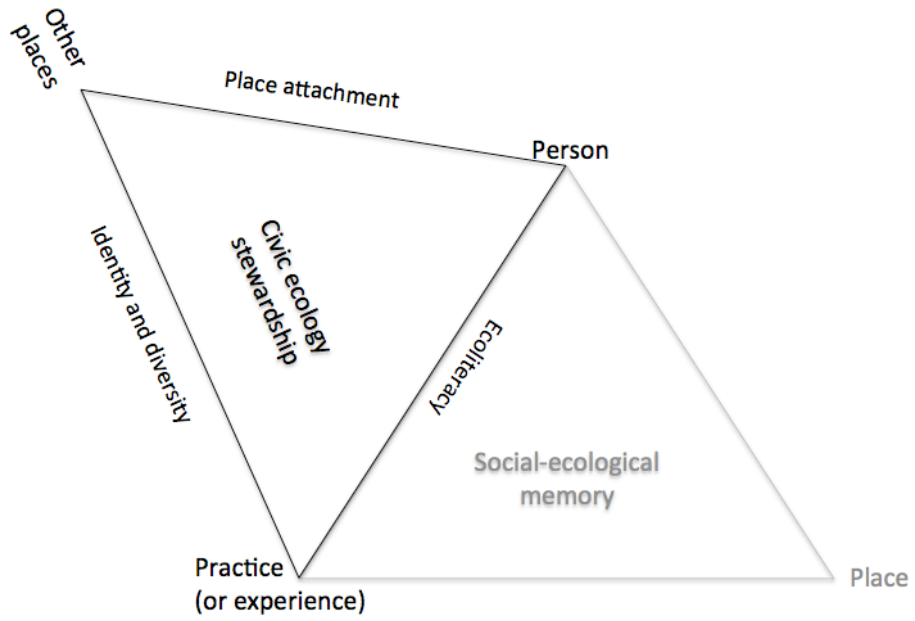


Figure 6.2 Illustration of civic ecology stewardship based on the concept of social-ecological memory as a person-practice-place complex.

LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

Traditional village landscapes with groves have existed for at least 100 years in Korea. While a number of internal and external variables that influence the resilience of these landscapes might exist in addition to the ones discussed in my research (Figure 6.2), my study suggests that SEM and TEK are important social-ecological assets for the sustainability of the Korean SES. From the perspective of resilience, diversity in memory and knowledge systems is beneficial in an SES when managing and adapting to complexity and uncertainty (Folke et al. 2005b). In comparison to modern scientific approaches for analyzing and managing SES

resilience, SEM approaches intrinsically rely on the individual's or group's experiences and practice and sense of place in comprehending and managing their SES and human-nature interactions. The result of such human-nature interactions is manifested through spatial characteristics as shown in the spatial analysis in Chapter Five.

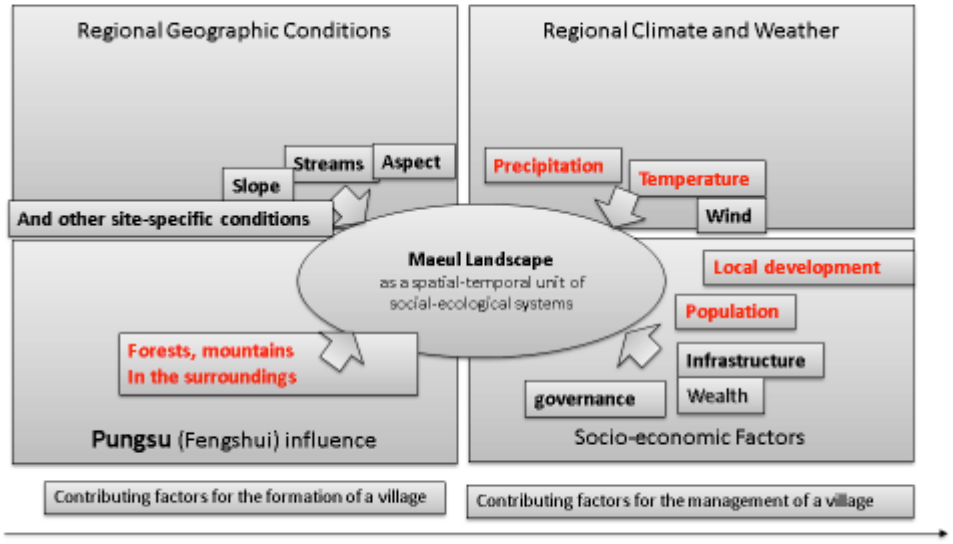
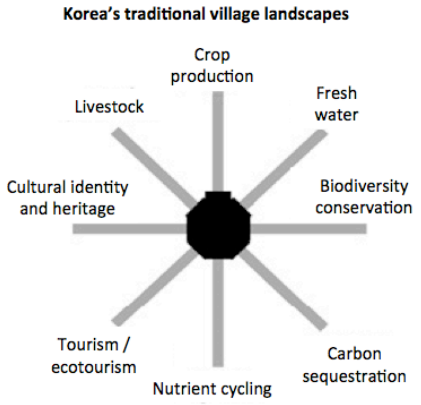


Figure 6.3 Social-ecological context of Korea's traditional village landscape.

However, the approach taken in the research was an exploratory one that examined KTEK embracing SEM from a resilience perspective. It is unfortunate that the parameters of the study did not allow for the inclusion of other critical aspects of KTEK and SEM. For example, the ecosystem services of KTVL (e.g., Figure 6.3), the learning aspects of KTVL from a resilience perspective, and the loss of traditional lifestyles in KTVL are important subjects that need further investigation in the near future. I am conducting research on the biodiversity of KTVL and on learning aspects of KTVL in enhancing ecoliteracy, and I hope to find meaningful and interesting outcomes so that my research can motivate young researchers to become interested in conserving the web of human-and-nature relationships in the traditional context and in applying the lessons in the current society. In this regard, case studies with place-based models and spatial approaches that take into account the local rules and informal institutions of resource use, allocation, and conflict management specific to the scale and patterns of communities may also be useful for a comprehensive understanding of SES dynamics (Kates et al. 2001, Berkes 2004).



Ecosystem services	Data source
Provisioning	
Crop	2014 statistics
Livestock	2014 statistics
Fresh water	Regional water database
Regulating	
Carbon sequestration	Remote sensing data
Soil organic matter	Field research/soil database
Cultural	
Cultural identity and heritage	Survey and /or interview
Tourism	Tourism database(tourist attraction/km^2)
Biodiversity conservation	Field research/previous research/ GIS

Adapted and modified from Foley et al. (2005) & Walker and Salt (2012)

Figure 6.4 Ecosystem services bundle of traditional village landscape.

CONCLUDING REMARKS

According to Halbwachs and Coser (1992), social groups tend to choose different memories to explain current issues and concerns, and leaders in the society reconstruct a past through rationalization, selecting events to be remembered or eliminated, and rearranging the remembered events to conform to social narratives. Facing the uncertainty of a globalized economy and climate change, the world is currently at a crossroads between collapse and evolution. According to the previous work in the SES field, resilience concerns not only the capacity to absorb shocks while maintaining function and structure but also the capacity for renewal, innovation, and development (Folke 2006). Nonetheless, some government policies still perpetuate resource destruction (Ostrom 2009), and evidence shows a failure to develop regional strategies for adaptive governance owing to a lack of interest among stakeholders (Walters 1997). It is thus our society's and leaders' responsibility to choose a diverse set of memories to describe the current challenges, and to motivate people to act in their communities as knowledge carriers and retainers, interpreters and sense-makers, stewards and leaders, networkers and facilitators, visionaries and inspirations, innovators and experimenters, entrepreneurs and implementers, and followers and enforcers (Folke et al. 2002). Ultimately, I hope my research contributes to nurturing social-ecological resilience in Korea's rural and agricultural landscape while maintaining its fundamental functional identity.

요약(국문초록)

한국전통마을경관의 사회-생태기억:
민속학적, 공간적 접근방법을 바탕으로

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김고운

오늘날 기후변화로 인한 생태계와 사회 문제의 심각성이 고조되면서 자연과 인간 사회의 관계에 대한 새로운 이해를 바탕으로 하는 융합 연구가 많이 진행되고 있다. 이 중 사회-생태 시스템(social-ecological systems)의 이론틀(framework)은 생태계와 인간 사회가 피드백 관계에 있으며, 두 시스템의 과정과 상호작용이 서로의 기능과 과정에 영향을 준다는 이해를 바탕으로 발전하고 있다. 또한, 적응주기(adaptive cycle) 모델을 통해 사회-생태 시스템이 성장-보전-해체-재조직화의 과정을 거치는 순환성을 지니고 있으며, 특히 오늘날의 지속가능성의 핵심은 해체-재조직화 과정에서 시스템이 스스로 재조직화 할 수 있는 능력에 있다는 이해를 전제로 한다. 재조직화 단계에서 시스템은 학습과정과 다양성을 바탕으로 시스템의 주요한 요소와 정체성을 유지할 수 있는데, 이러한 능력을 회복탄력성(resilience)라 일컫고 회복탄력성의 자원이 되는 다양한 요소에 대한 관심이 점차 확대되고 있다.

사회-생태기억(social-ecological memory)은 이러한 회복탄력성의 사회-생태적 자원 중 하나로, 재조직화 단계에서 사회-생태 시스템의 구성원 혹은 구성요소가 활용할 수 있는 생태계 돌봄정신(stewardship)과 관련된 기억이라 할 수 있다. 이 연구는 사회-생태기억을 사람-실천-장소의 세 가지 요소로 이루어진 복합체로 정의하고, 사회-생태기억의 각 구성요소 간의 역동적 관계의 결과로서 생태소양(ecoliteracy)과 장소애, 그리고 (장소의) 정체성과 다양성이 회복탄력성에 어떻게 기여하는지 살펴보는 것을 목표로 한다. 사회-생태 시스템에 교란이 일어났을 때 사회-생태기억은 때로는 바람직한 방향으로 때로는 바람직하지 않은 방향으로 활용될 수 있다. 전통생태지식(traditional ecological knowledge)은 사회-생태기억의 한 종류이자 오랜 기간 시행 착오를 거친 지역의 토착 지식체계로서, 바람직한 방향으로 사회-생태 시스템이 적응해가는데 기여한다고 알려져 있다. 따라서 이 연구는 한국의 전통마을경관과 관련된 전통생태지식을 대상으로 세 가지의 사례 연구를 진행했다.

사례 연구에 앞서 2 장에서는 사회-생태기억이 사회-생태 시스템의 회복탄력성 연구 영역에서 다루어지기 시작한 학문적 맥락과 이론적 바탕을 논의한다. 기존 연구를 토대로 사회-생태기억이 자전적 기억과 역사적 기억의 모습으로 전달되고 보유되고 있음에 주목한다. 이를 바탕으로 3 장에서는 박완서 작가의 『그 많던

싱아는 누가 다 먹었을까』를 자전적 사회-생태기억의 사례로 분석하고, 작가의 자전적 기억을 통해 구현되는 생태소양과 장소애를 생태지식체계의 네 가지 수준으로 발전시켜 분석하고 있다. 분석을 통해 제안된 한국의 전통마을경관의 생태지식체계의 네 가지 수준은 마을 경관 내 생물과 비생물의 이름과 이들에 관련된 이야기, 경관 내의 자원관리방법, 경관관리시스템, 그리고 세계관과 우주관이다. 4 장은 사회-생태기억이 마을공동체의 적응능력(adaptive capacity)을 향상하는데 어떻게 기여하는지에 대한 사례 연구로서, 기존의 사회-생태 시스템 연구에서 강조되고 있는 규모간 상호작용과 단위간 상호작용이 야기하는 시스템의 역동성 안에서 마을 주민들의 사회-생태기억이 어떠한 과정을 거쳐 회복탄력성 실천에 기여하는지를 문화기술적 접근 방법으로 정리한다. 연구를 통해 첫째로, 전통마을경관과 관련된 전통생태지식과 사회-생태기억은 마을 경관의 변화를 야기한 국가 정책과 두 번의 큰 홍수를 거치며 강화가 되는 것으로 나타났다. 또한, 이는 곧 리더십과 상호 신뢰 등의 다른 사회적 회복탄력성 자원과 맞물려 주민들이 스스로 의사결정과정에 참여하고 특정화된 회복탄력성(specified resilience)을 관리하는데 결정적인 역할을 했음을 밝히고 있다. 마지막으로 5 장에서는 역사적 기록이 기억하는 마을경관과 전통마을숲의 사회-생태 정체성을 분석하고, 이를 토대로 현재의 수구막이형 전통마을숲을 포함하는 마을경관이 어떠한 공간적 정체성을 지니고 있는지 분석한다. 기존의 인문지리학 혹은 전통생태지식 연구에서는 장소-사람에 대한 관계성에 초점을 맞추는 경향을 보여왔는데, 이 연구에서는 이러한 관계성이 결국에는 오랜 시간에 거쳐 장소의 공간적 특성과 정체성을 만들어낸다고 주장한다. 예컨대, 이 연구에서는 전통마을경관의 사회-생태적 분포 특성을 분석하고, 이를 바탕으로 아직 보고되지 않은 전통마을숲을 포함한 전통마을을 찾아내는 방법을 사례로 제시한다. 이러한 공간적 특성은 사회-생태 시스템의 공간적 회복탄력성(spatial resilience)에 중요한 역할을 하기 때문에, 사람-실천-장소의 복합체로서 사회-생태기억과 공간적 회복탄력성의 피드백 관계에 대한 연구의 필요성을 강조한다고 할 수 있다.

이 연구는 지구 생태계가 지니고 있는 한정된 공간의 수용력을 현실적으로 관리하기 위해서는 장소 기반의 접근 방법뿐만 아니라, 공간적 접근 방법도 필요함을 지적한다. 또한, 도시화 혹은 역도시화 현상이 지속적으로 나타나고 있는 오늘날, 더욱 많은 구성원들이 자신이 위치한 곳에서 스스로의 사회-생태기억을 바탕으로 생태계 돌봄정신을 실천할 수 있는 가능성을 제시한다. 이러한 생태계 돌봄정신의 실천을 바탕으로 지역의 회복탄력성이 관리될 수 있도록 격려하는 혁신적인 정책과 아이디어가 필요한 바이다. 한국의 농촌경관, 특히 전통마을숲을 포함한 마을경관은 우리 고유의 문화유산이자 사회-생태기억의 중요한 장소이다. 이러한 우리나라의 농촌경관에 대해서 더욱 많은 학제적 연구가 진행되어서, 우리 고유의 사회-생태적 회복탄력성 자원에 대한 통합적인 이해를 발전시켜야한다. 또한, 지역의 회복탄력성 기능을 향상하고 유지할 수 있도록 시스템적 사고를 바탕으로 한 경관 관리와 보전 계획이 요구되는 바이다.

주요어: 사회-생태기억, 회복탄력성, 사회-생태 시스템, 경관 관리, 한국의 전통마을경관, 전통생태지식
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