Community Resilience of the Korean New Village Movement, 1970-1979: Historical Interpretation and Resilience Assessment

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Abstract

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This dissertation investigates the Korean New Village Movement (Saemaul Undong, New Rural Community Movement, or the KNVM) driven by the strong top-down leadership of President Park, Chung-hee in the 1970s. As a reaction to rapid Korean urbanization, the KNVM supported rural villages, transformed long-standing human settlements rapidly, and created social-ecological sudden changes of population and resource management. In this context, I investigate community resilience of rural villages supported by the KNVM in the 1970s to rapid urbanization through a framework of social-ecological resilience.

This dissertation is structured in five parts with corresponding objectives: 1) to present a comprehensive research framework to interpret and assess the KNVM's community resilience to rapid urbanization; 2) to identify the KNVM's rationale, historical progress, and transformation of built environments, by comparing and contrasting the KNVM's national-scale plans with village-scale projects based on sample villages; 3) to interpret the KNVM's transformation in terms of human settlements, contextualizing it with Korean traditional houses and villages; 4) and 5) to assess the community resilience of rural villages supported by the KNVM to rapid urbanization in

two dimensions of demography and ecology, addressing the cross-scale and cross-sectoral interaction of the KNVM to population change and resource management change.

In conclusion, I discuss the following main findings: 1) The KNVM was an urban development in the rural sector rather than a rural development. The KNVM's rapid and large-scale transformation created functional change of rural villages in terms of human settlements, which was to value service and infrastructure of rural villages rather than shelter. As a result, the KNVM caused rural villages to fall into high urban dependence and lose existing self-sufficiency. 2) The KNVM's social-ecological resilience assessments show inconsistent results depending on temporal and spatial dimensions. More specifically, the KNVM was responsible for the short-term population mitigation of rapid urbanization, but the long-term urban-rural population polarization in terms of demographic resilience. Meanwhile, the KNVM contributed to the national-scale and local-scale reforestation, but the global-scale consequence of high foreign dependence of resource and energy in terms of ecological resilience.

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This study started from my personal inquiry on the fundamental transition of Korea from traditional to modern society: when and how it happened, and what impact it had. The inquiry led me to discuss Korean rural development in the 1970s with three different histories (built environments, demography, and ecology). It was an intriguing, but challenging task to me because of the interdisciplinary approach beyond my long-term commitment to architecture and urban design. In addition, it was arduous to delve into Korean human settlements and planning history in the United States due to the difficulty of access and the English translation. Honestly, I would not have completed this dissertation without many academic and financial supports over the five and a half years. I would like to express my deep gratitude and acknowledgements for them.

I owe the greatest debt to Professor Dan Abramson in Urban Design and Planning, who gave me a doctoral admission and served as Chair of my dissertation committee. His personal integrity, cultural understanding, and academic creativity always promoted me to focus on my research and teaching. I also owe an immeasurable debt to Professor Stevan Harrell in Anthropology, who opened my eyes of social-ecological resilience theory and methods. As a prominent anthropologist, his deep and wide work of scholarship and dedication to students are imprinted on my mind. Without his sharp comments and continuous encouragements for me, I would not have finished this study. Professor Clark Sorensen in Korean Studies was an active committee member even though he served as Graduate School Representative (GSR). He provided substantive literature and essential advices for my field research in Korea. Professor Ken Yocom in Landscape Architecture expanded my intellectual horizon to landscape architecture beyond architecture and

urban planning. Through his questions and comments, my theoretical framework and employed methods became more balanced and scientific.

My doctoral study was funded by the Korean Government Study Abroad Scholarship and the Korean Honor Scholarship. I also got continuous financial supports of teaching and research positions from my department and PhD program. I would like to thank department chairs (Qing Shen and Christopher Campbell), professors (Christine Bae, Branden Born, Manish Chalana, and Rachel Berney), and program staffs (Jean Rogers, Larissa Maziak, and Diana Siembor). In addition, I should acknowledge my friends and colleagues in our PhD program for their intellectual exchanges and mutual supports even though I cannot call their names here.

I studied demographic methods as a UW-CSDE (Center for Studies in Demography and Ecology) trainee, supported by the National Institute of Child Health and Human Development (NICHD). During my field research in Korea, I received thankful helps from scholars, public officials, archivists, residents, and villagers for literature, pictures, data, and interviews, which were cited in the dissertation. In addition, my conference papers were supported with travel awards or conference grants from the UW, the International Association for China Planning (IACP), and the Association of Collegiate Schools of Planning (ACSP), and the University of Alberta.

I believe that my current academic interests and careers have been continuously developed since I started to study architecture at Seoul National University in 1999. During the intellectual journey in architecture and urbanism, I am really thankful to Emeritus Professor Jinkyoon Kim who has been an influential role model in my life for almost 20 years. Finally, I am most grateful to my family, especially my mom, my wife Jiyeon, and my two daughters Yeonseo and Julie Yeonji. Without their endless prayers and unconditional love, I would never write this page.

DEDICATION

To all people who have shaped me so far and will shape me from now on

"Man Makes Himself"

- Vere Gordon Childe, 1936

Chapter 1. INTRODUCTION

This chapter introduces this dissertation's research background, integrating my interests in existing scholarship on human settlements and sustainability. Secondly, it introduces the Korean New Village Movement in the 1970s. Finally, it identifies a research goal and briefly introduces the dissertation's whole organization.

1.1 RESEARCH BACKGROUND

This dissertation started from my fundamental curiosity on the transition from traditional society (agricultural + rural) to modern society (industrial + urban). First of all, urban is a complex concept to define. It is usually based on demographics of a land area including population number and population density. According to United Nations (2014), there is no common global definition on urban. Since the definition depends on national statistical offices, it varies widely across countries. In addition, different disciplines define it differently. For example, the divide between urban and rural in Korea is based on administrative divisions of lower-level local municipalities called *Eup-Myeon-Dong* (읍-면-동, 邑-面-洞): *Dong* (동, 洞) is urban while *Eup* (읍, 邑) and *Myeon* (면, 面) are rural.

The use of the word urban dates back to the prehistoric times. Legendary archaeologist V. Gordon Childe coined the term urban revolution in order to refer to the Bronze Age and the Iron Age in prehistory (Childe, 1936). However, I am interested in the urban society driven by

industrialization during the modern period. Thus, urban society in this dissertation refers to a society in which the urbanization ratio is more than 50%, which means that more people live in urban areas than in rural.

In this dissertation, traditional society refers to a society that utilizes agriculture as major production and rural areas as main dwelling sites. On the other hand, modern society means a society based on industry and urban areas as major production and main dwelling sites, respectively. With regard to this transition from traditional to modern society, I have one speculative conjecture on society's sustainability: Modern society has a much shorter adaptation period than traditional society had, which implies that the explosive increase in resource use that comes with industry could exceed the carrying capacity of any system, including the earth. More specifically, agrarian society was initiated around 6,000 to 10,000 B.C. in the Fertile Crescent region of the Middle East (Johnson, 2000), while industrial society is considered to have begun due to the Industrial Revolution in the mid-18th century of England (Hudson, 1992). The short adaptation period of industrial society, less than 300 years, leads to the thoughts that today's society is in a relatively new and unstable stage in terms of sustainability. As a result, it is likely that humankind does not yet comprehend the full encompassment of the benefits, challenges, vulnerabilities, and threats that the transition from traditional to modern society creates.

In addition, modern society keep remaking and redefining itself (Berman, 1982). As a result, we may never fully embrace the transition from traditional to modern even though we have more time or adaptive changes. In this sense, a single disciplinary understanding of the transition might miss important and subtle connections between seemingly irrelevant scales, sectors, and systems. Thus, this dissertation aims at the interdisciplinary understanding in order to capture cross-scale and cross-sectoral relationships in the transition. More specifically, my understanding of cross-

scale and cross-sectoral relationships is based on resilience theory, which will be later specified in Chapter 2. To be brief, a cross-scale relationship refers to an interactive relationship ranging from small and short-term to large and long-term levels in spatiotemporal scales. A cross-sectoral relationship means an interactive relationship among different sectors such as politics, economy, society, and culture.

Figure 1-1 Traditional Society vs. Modern Society

For this, I focus on urbanization phenomena that have occurred during the transitional period from a rural to urban society. Theoretically, this dissertation is rooted in three main existing scholarships: human settlements as a subject matter of high-modernist developmentalism, social-ecological sustainability and resilience as an analytical framework, and Korea as a geographical boundary including historical and cultural context. Through this lens, I address the importance and meaning of long-term, regionalized, and contextualized sustainability.

Human Settlements as Subject Matter of High-Modernist Developmentalism

First, I draw the study of human settlements as a subject matter of high-modernist developmentalism in order to ask the following fundamental questions on urbanization as today's dominant dwelling mode in a broad historical context: *How have human settlements changed in the transition from a rural to urban society? How different are human settlements in an urban*

society from those of a rural society? and *What opportunities and threats does an urban society have in comparison to a rural society in terms of human settlements?*

Generally, the term human settlements is often used in disciplines including geography, demography, and anthropology in order to describe human dwellings or populated areas – no matter how they are nucleated, dispersed, clustered, or agglomerated - in relation to natural environments. Thus, they can include isolated dwellings, hamlets, villages, towns, cities, metropolises, and conurbations according to the hierarchical order based on their populations. In addition, the concept of human settlements allows for investigation of coupled human-natural environments in a comprehensive way to focus on their inter-relationship, rather than separating the notions from each other for analysis.

The KNVM in the 1970s, which is this dissertation's research focus, strongly exhibits the approach of high-modernist developmentalism to human settlements. According to James Scott (1998), high modernism is strongly confident in scientific and technological progress, seeks to master nature in order to satisfy human needs, and ignores existing historical, social, cultural context in development. As a result, high modernism grants excessive power and authority to people who have expertise in science, technology, planning, and administration. In this respect, it is easily acceptable that the KNVM's ideology and leaders were highly associated with high modernism. The KNVM took a radical approach to transforming human settlements into new patterns that were quite distinct from existing traditional houses and villages. In addition, President Park as the primary proponent of the KNVM in the 1970s strongly believed in a deterministic and progressive development ideology based on social evolution. For example, President Park invited and listened to Walt Rostow, American economist and political theorist with a powerful governmental role as Special Assistant for National Security Affairs to U.S. President Lyndon B.

Johnson in 1966–69, proposed the use of his five-stage model of economic development, ranging from traditional society to high mass consumption society (Rostow, 1960). According to Nemeth (2008), Rostow's ideas played a significant role in the architecture of the KNVM, which led to the intentional eradication of traditional villages in Korea. Further, President Park and his planners' unfaltering confidence towards modern society and strong social transformation must have been connected to the approach of high-modernist developmentalism.

When the KNVM was implemented in the 1970s, there were other numerous global cases to show physical approaches of high-modernist developmentalism to human settlements. As a conspicuous planner of human settlements, C. A. Doxiadis (1914-1975), coined the term Ekistics as a science of human settlements in 1942, presented radical physical ideas in the 1960s and 1970s, and conducted actual planning projects in the Global South including Pakistan, Iraq, and Iran (Bromley, 2003). He strongly believed that he could resolve problems caused by rapid population growth, urbanization, and environmental destruction through physical and social planning (Doxiadis, 1966). He and his colleagues argued that our system of life should be organized into a fifteen-level hierarchical human settlement plan ranging from Anthropos (1 person) to Ecumenopolis (50 billion people) (Doxiadis, 1977). In addition, they presented an urban form preferring hexagonal urban patterns to rectilinear ones in the development of human settlements (Doxiadis, 1968). Although the discussion on Ekistics gained worldwide popularity in the 1960s and 1970s, Doxiadis' radical ideas based on schematic models and urban form-driven physical approaches did not attract people's attention for a long time due to continuous suspicion and criticism (Bromley, 2003; Madanipour, 2010). Doxiadis' ideas never came to fruition since his death in 1975 and the journal Ekistics (1957-2006) as the main arena of the discussion on Ekistics is no longer being published. Nevertheless, the discussion on Ekistics had positive aspects in that

it aimed to understand a variety of human settlements in an integrated way, creating a hierarchical-scale hybrid system and bringing in a variety of disciplines such as urban planning, social and natural sciences. In addition, some scholars argued that Doxiadis' built projects need to be reevaluated not to condemn him. For example, Pyla (2008) addressed that Doxiadis' plan for Bagdad was abandoned due to Iraq's political regime shift even though the plan had clear future visions with comprehensive claims. Similarly, Daechsel (2013) argued that Islamabad's misplacement resulted from Pakistan government's wrong intervention that used Doxiadis' plans as propaganda materials in the context of post-colonial urbanism and the politics of modernization.

The United Nations Human Settlements Programme (UN-Habitat) can be understood as a serious reflection of high-modernist developmentalism, which is another frequent use of human settlements. The United Nations held its first conference on human settlements in 1976 in Vancouver, Canada (UN General Assembly, 1976). The conference led to the UN-Habitat in 1978 with the goal of improving the quality of life for urban populations, especially for slum dwellers in less developed countries. More specifically, the UN-Habitat paid attention to the scale and vulnerability of rapid urbanization and emphasized human settlements as an instrument and object of development. Unlike the discussion on urban form-focused physical intervention of human settlements, the discussion on human settlements led by the UN-Habitat provided a series of recommendations and plans for national action and international cooperation including titles such as "Settlement Policies and Strategies;" "Settlement Planning;" "Shelter, Infrastructure, and Service;" "Land;" "Public Participation;" and "Institutions and Management."

Social-Ecological Sustainability and Resilience as an Analytical Framework

Second, I introduce the scholarship of social-ecological sustainability as an analytical framework in order to examine urbanization as a driving force and process of transforming traditional human settlements. In this dissertation, I broadly explore the following questions: *How sustainable is urbanization? Which type of society is more sustainable, urban or rural?* and *How can an urban society be more sustainable, admitting urbanization as a dominant worldwide trend of transforming human settlements?* In addition, I revisit today's limited perspectives on urban and rural societies, such as the notion of a mutually exclusive dichotomy, a census-based divide, and an overlooked interrelationship between them in order to explore better understandings of urban and rural living.

The term sustainability [1] has conceptually gained a lot of attention since the Brundtland Report in 1987. Despite the term's popularity from many different disciplines, the well-known definition [2] of sustainable development was more or less ambiguous and normative as academic terminology. This is because it did not clearly specify what the needs of the present and the future may refer to and which ability of future generations should not be compromised. Meanwhile, it is often mentioned that sustainability has the triple-bottom-line dimensions of economy, environment, and society. Recently, culture is also considered as sustainability's possible fourth dimension (United Cities and Local Governments, 2010).

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1 Sustainability is derived from the Latin *sustinere* (*tenere*, to hold; *sus*, up). Dictionaries provide more than ten meanings for sustain, the main ones being to maintain, support, or endure. However, since the 1980s, sustainability has been used more in the sense of human sustainability on planet Earth.

2 "Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (World Commission on Environment and Development, 1987).

The discussion on sustainable development initiated by the Brundtland Report in 1978 tended to be anthropocentric because it mainly concerned humanity's continuous well-being and survival rather than a comprehensive approach to the entire ecosystem. However, there was another important strand of sustainability that recognized the complex ecological interrelationship between human society and the natural world on Earth. For example, Næss, Norwegian philosopher, invented the term deep ecology in 1973 and argued for awareness of the deep ecological relationship between human society and the natural world beyond the shallow approach of viewing environmental problems according to human needs (Næss, 1973). In a similar vein, James Lovelock and Lynne Margulis theorized the Gaia hypothesis, understanding Earth as an adaptive living system with emergent property (Lovelock & Margulis, 1974; Lovelock, 1979). They were predecessors to the social-ecological sustainability discourse, which coincided with numerous scholars of social-ecological resilience in the next paragraph. In addition, they shows the historical reaction to then simplistic and high-modernist applications of technology to development that the KNVM was ideologically based on.

Sustainability has evolved with the emergence of the idea of social-ecological resilience, which engages the integrated relationships of social and ecological systems at the same time. This has created substantive discussion that recognizes ecological systems beyond deep-rooted traditional divides between researchers (i.e., ecologists, social scientists) and practitioners (i.e., managers, planners) (Barash, 2005). More specifically, resilience refers to "the capacity of a social-ecological system to absorb or withstand perturbations and other stressors such that the system remains within the same regime, essentially maintaining its structure and functions" (Holling, 1973, p.21; Holling, Gunderson, and Ludwig, 2002a, p.27-28; Walker and Salt, 2006, p.3). Since the definition of resilience is based on complex systems theory, the discussion on

resilience has been more scientific and comprehensive than the existing sustainability discussion because it has examined a variety of empirical cases with the framework of coupled human and natural systems. The detailed literature review on social-ecological resilience is discussed in Chapter 2 in order to develop this dissertation's theoretical framework.

Meanwhile, in analytically evaluating the sustainability and resilience of urbanization, this dissertation examines both urban and rural ideas at the same time, focusing on the dynamic interaction relationship between them. In this dissertation, I propose that urban and rural are, inevitably, two sides of the same coin. In other words, the rural-urban relation is quite complementary to the worldwide urbanization flow. Rural areas that are emptied and abandoned need to be investigated in connection with urban areas that are agglomerated and congested. As I address urbanization, I focus on its rural impact, with the awareness that rural problems and contradictions have something to do with urban sustainability and resilience.

1.2 RESEARCH PROBLEM

This dissertation investigates the Korean New Village Movement (Saemaul Undong, New Rural Community Movement, or the KNVM) in the 1970s. The official name in Korean is 새마을 운동, romanized as Saemaul Undong. The acronym KNVM is an abbreviation of the English translation according to the Korean meaning of Saemaul Undong. The word by word translation into English or Chinese is as follows:

Table 1-1 Official Name and Translations of Korean New Village Movement

Korean (Pronunciation)	English Translation	Chinese Translation
새 (Sae)	New	新
마을 (Maul)	Village or Rural Community	村
운동 (Undong)	Movement	运动(運動)
새마을운동 (Saemaul Undong)	New Village Movement	新村运动(運動)

The KNVM was a strong political initiative to rapidly modernize the rural economy and change the mentality of peasants, implemented under the powerful top-down leadership of President Park, Chung-hee (1917-1979). Although the KNVM's initiatives and organizations still exists, the KNVM has never regained its strong drive and momentum since President Park was assassinated on October 26, 1979 by Kim, Jae-gyu, his long faithful servant and the director of the Korean Central Intelligence Agency.

Park's 18-year tenure as president (1961-1979) is still relevant in highly controversial debates even though Park, Geun-hye, his eldest daughter, was democratically elected to be the first

female president in the history of the Republic of Korea in 2012. For example, some people praise the first President Park as a national hero who successfully led Korean modernization and industrialization (Cho, 1998). Others disparage President Park as an assassinated dictator who suppressed Korean democracy and human rights (Chin, 2013). In fact, the controversy surrounding President Park reveals a deep-rooted conflict to seize today's political hegemony between two strong groups which formed in the history of modernization of South Korea: One is so-called industrialization group (산업화세력, 産業化勢力) who contributed to economic development since the 1960s. The other is so-called democratization group (민주화세력, 民主化勢力) who fought against military dictatorship in the 1970s and 1980s, and led to democracy. In such contrary evaluations on President Park, the KNVM is regarded as one of the two legs supporting Park's Yushin regime [3] in the 1970s along with Heavy and Chemical Industrialization (Sorensen, 2011).

Historical reviews of the KNVM are generally positive despite the conflicting evaluations of President Park and the strong political aspects of the KNVM. It has been regarded as one of the most positively influential governmental policies and contributions to the national development of the Republic of Korea (Burmeister, 1987; Moore, 1985; Park, 2009). It has also been a popular modernization model for China and the Global South (Dore et al, 1981; Lo et al., 1979; Looney,

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3 President Park staged a self-coup in October 1972. He dissolved the National Assembly and revised the 1962 constitution established after his military coup's success in 1961. The new constitution allowed him to take authoritarian and lifetime power without any check. The Yushin Regime (유신체제, 維新體制) was named after Japan's Meiji Restoration in 1868 (명치유신, 明治維新). Since Park was a loyal former officer of the Japanese Imperial Army and appreciated the Meiji Restoration as an important revolution positively affecting the Japanese history, he called his self-coup event the Yushin (유신, 維新).

2012; Kim, 2015). In addition, Korean people's general perceptions of the KNVM also correspond to the literature. According to the Korea Gallup survey in the year of 2008 [4], the KNVM was selected as the greatest national accomplishment in the history of the Republic of Korea (40.2%), topping the Seoul Olympics (30.1%), the Five-year Economic Development Plans (29.9%), and the Gyeongbu (Seoul-Busan) Expressway (18.8%) (Hong, 2008, March 5). In contrast, the KNVM has often been blamed for the limitation and failure of central government-driven decision making (Boyer et al, 1991; Hale, 2013).

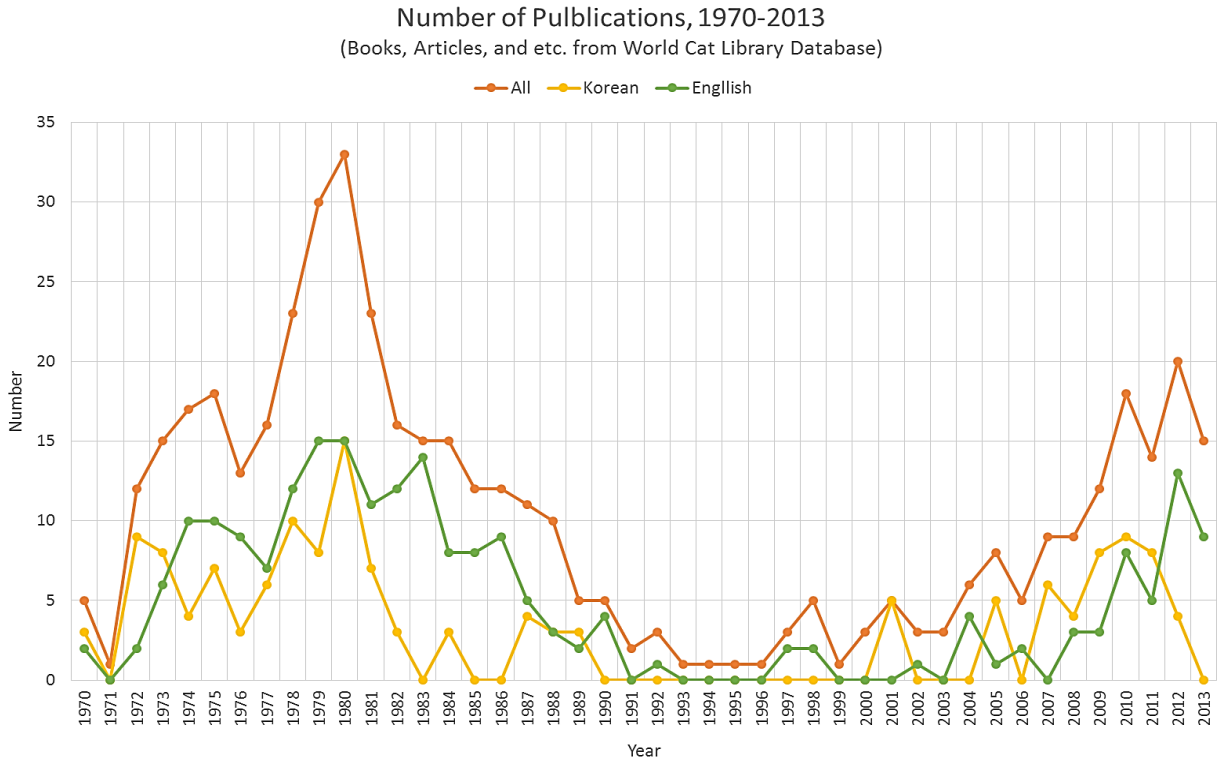


Figure 1-2 Historical Change of Publications relevant to KNVM, 1970-2013

Note: This figure shows the historical trend of all relevant publications including books, articles, and so on which dealt with the KNVM. More specifically, the annual number of publications from

4 This survey allowed for duplicate answers.

1970 to 2013 reached its peak around 1980. After that, those of 1980s and 1990s were almost at the bottom. (Search Keyword: Korean New Village Movement and Saemaul Undong)

The KNVM in the 1970s had the following distinctive aspects: First, the KNVM was implemented during the rapid urbanization period in South Korea. Korean urbanization has showed rapid and distinct trends over the past 50 years in terms of the speed and scale. According to the Korean Government statistics, the Korean urbanization rate increased from 39.1% in 1960 to 91.8% in 2015. In addition, the population of the Seoul Metropolitan Area amounts to more than 25 million peoples, which is almost the same as half of the total population of South Korea and makes Seoul one of the most populated metropolitan areas in the world along with Tokyo, Shanghai, Jakarta, and Guangzhou (Lee, 2016, August 25). It is an important inquiry to reveal the KNVM's rationale, meaning, role, and effect under the rapid and concentrated urbanization in South Korea.

Second, the KNVM's implementation shows the unprecedented scale and speed of an authoritarian government's strong top-down approach to transformation of built environments. The KNVM can be a testable sample to examine the impact and interaction of large-scale and rapid implementation and transformation of built environments. The KNVM transformed approximately 40,000 rural villages in Korea at the same time, which amounted to almost all of the villages in the nation. As a result, the KNVM created a large-scale and rapid conversion of traditional villages into new modern villages in terms of built environments (e.g., building shapes, floor plans, and village layouts) and resource management (e.g., building materials, fuels, light, and water & waste treatment). In addition, the KNVM provided a platform and organization for implementations of other strong demographic and ecological programs such as the Korean Family Plan and the Korean Reforestation. For these reasons, not only the direct impact of the KNVM, but also the cross-scale

and cross-sectoral interaction need to be investigated. Thus, I focus on the interactive relationships among the following sectors or systems: built environments transformation, population change, and resource management change.

Finally, the KNVM is a historical topic for comparative development research in East Asia or for the Global South. East Asia has been experiencing a transition from an agrarian to urban society since the early 20th century, which is a recent, large-scale, and rapid conversion in the history of worldwide urbanization. In addition, the urbanization of East Asian countries including Japan, South Korea, Taiwan, and China has been based on expansive labor migration from the rural sector to the urban sector even though there are distinct time gaps among the three countries in their historical urbanization trends as shown in Figure 1-3.

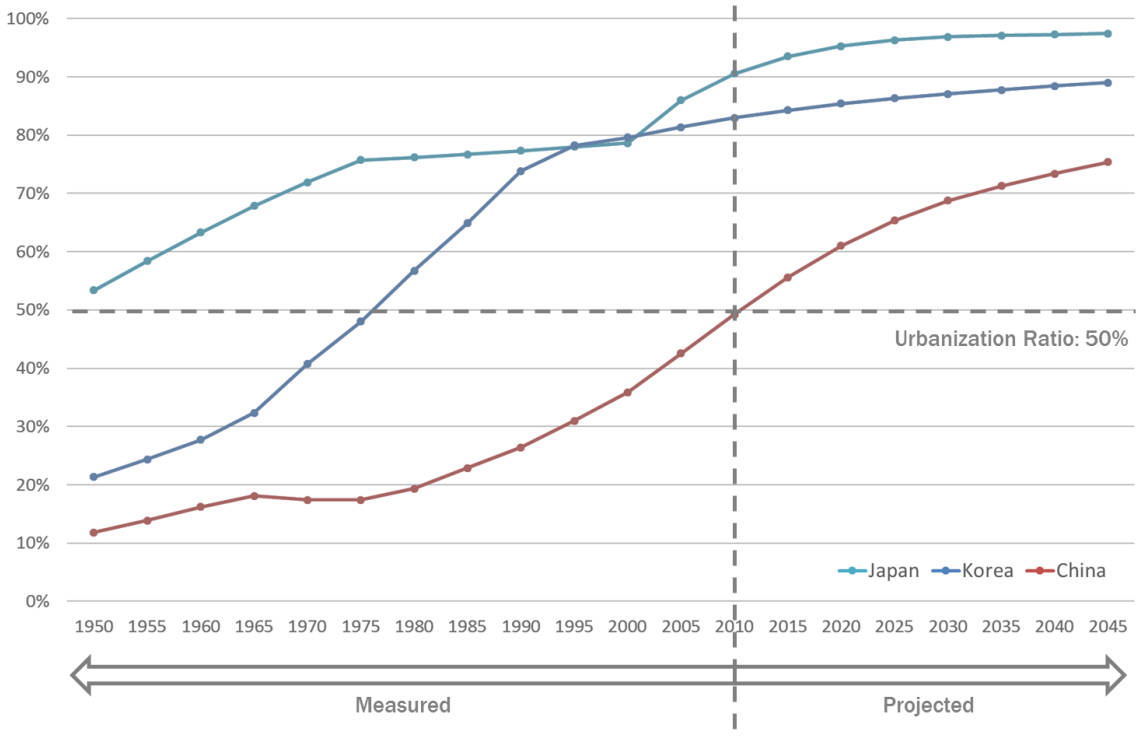


Figure 1-3 Comparison of Urbanization Ratio Trends: Japan - South Korea - China (Source: United Nations, Department of Economic and Social Affairs, Population Division, World Urbanization Prospects: The 2011 Revision)

Under the historical context of urbanization in East Asia, East Asian rural development has taken on complementary characteristics of urban facilitation as well as rural maintenance. As a result, the late movers in urbanization and rural development have benchmarked the early movers. For example, China's New Socialist Countryside Construction, established in 2006, tried to draw lessons and insights from the KNVM in the 1970s (Perry, 2011; Looney, 2012). Moreover, the KNVM's experiences are still widely disseminated to less developed Asian and African countries through educational or governmental institutes such as the Park Chung Hee School of Policy and Saemaul at Yeongnam University, the Korea Saemaul Undong Center Training Institute, and the Korea International Cooperation Agency (KOICA) (Chun et al., 2010).

1.3 RESEARCH GOAL

This dissertation investigates the KNVM's implementation and the accompanying community resilience of rural villages to Korean rapid urbanization, which is more specifically devised and presented in Chapter 2. The basic dissertation approach is as shown in Figure 1-4. I identify the KNVM's strong top-down implementation, addressing a transformation of built environments in the historical context of Korea. I then conduct the KNVM's demographic and ecological assessments of community resilience of rural villages, analyzing the cross-sectoral and cross-scale interaction.

More specifically, I address the following main questions:

1. *When and how were Korean traditional rural villages transformed into new modern villages?*

2. *What was the KNVM's rationale and what historical progress and built environments transformation did it accomplish in the 1970s?*
3. *How has the KNVM's built environment transformation affected population change and resource management change in rural villages in terms of cross-scale and cross-sectoral interaction?*
4. *How has the KNVM contributed to community resilience of rural villages to rapid urbanization in terms of demography and ecology?*

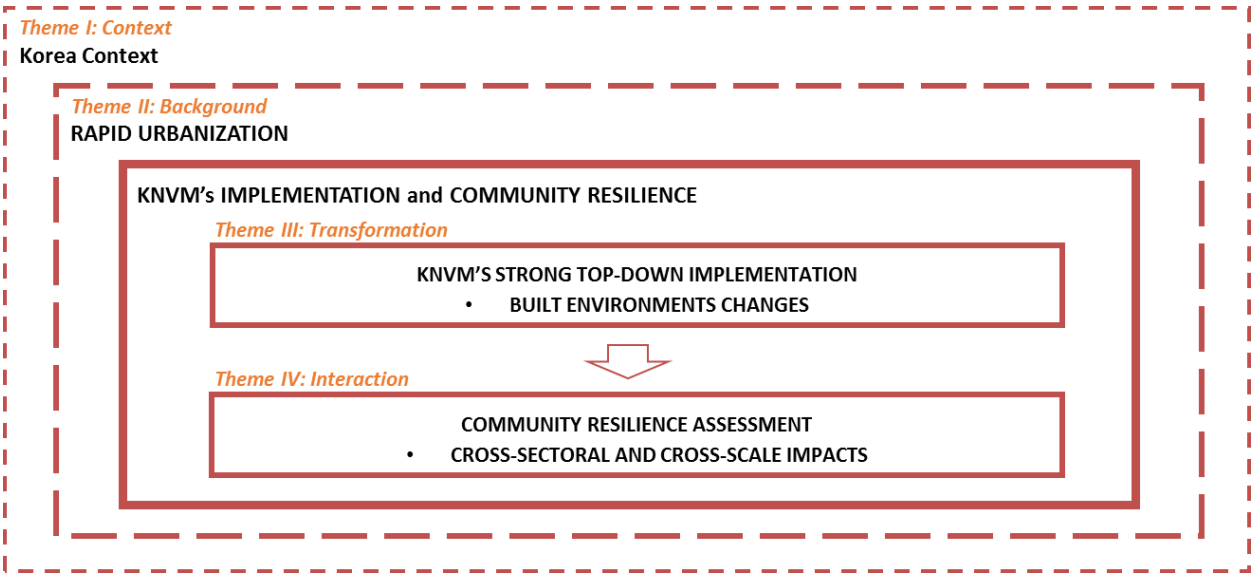


Figure 1-4 Dissertation Approach

In order to respond to the above questions, I take the following five steps: 1) develop and present a comprehensive research framework to interpret and assess the KNVM's community resilience to rapid urbanization, 2) identify the KNVM's rationale, historical progress, and built environments transformation, comparing and contrasting the KNVM's national-scale plans with village-scale projects based on sample villages, 3) interpret the KNVM's transformation in terms of human settlements, contextualizing it with Korean traditional houses and villages, 4) and 5) assess the community resilience of rural villages supported by the KNVM to rapid urbanization in

two dimensions (demography and ecology), addressing the cross-scale and cross-sectoral interaction of the KNVM to population change and resource management change.

Finally, I provide fresh insights to both urbanization and the KNVM as follows: First, urbanization as a phenomenon has been primarily investigated with the concept of migration from the rural sector to the urban sector, often focusing more on the urban sector. However, this dissertation covers urbanization or urban development inside the rural sector through strong top-down implementations drive by built environments. In this sense, the KNVM may be defined as the political campaign for internalized urbanization of rural villages that dictated urban or pseudo-urban life in rural villages through models of high-modern or pseudo-western built environments. Second, distinct from various existing publications and recent discussions on KNVM, I use a theoretical framework of community resilience to interpret the cross-scale and cross-sectoral interaction in order to better understand the potential impact of rapid, top-down implementation of a national program. Third, although I delve into the KNVM itself, the three main changes such as built environments transformation, population change, and resource management change are common features which almost all countries are faced with during their urbanization periods. In other words, the KNVM can provide a general understanding to urbanization beyond the specific details. Fourth, since this dissertation explores the historical implementation in the 1970s, it can draw more substantive and influential lessons, capturing both the short-term and long-term impacts of the KNVM. Further, the lessons and implications may become essential resources to address long-term, regionalized, and contextualized sustainability.

1.4 DISSERTATION ORGANIZATION

This dissertation includes this introduction, theoretical framework and research methodology, three closely-related empirical chapters, and conclusion. In the next chapter, I present a theoretical framework on community resilience, defines demographic resilience and ecological resilience, and describe an interdisciplinary methodology of historical interpretation and resilience assessments. The following empirical chapters discuss a historical interpretation of the KNVM as a transformation of built environments, examine cross-sectoral changes caused by the KNVM, and assess the KNVM's cross-scale impacts in two dimensions of demography and ecology. The specific details and table of contents are as below.

Table 1-2 Dissertation Organization

Dissertation Chapters
Ch. 1. Introduction
Ch. 2. Theoretical Framework and Research Methodology
Ch. 3. Historical Interpretation: KNVM as Built Environments Transformation
Ch. 4. Resilience Assessment 1: KNVM and Population Change
Ch. 5. Resilience Assessment 2: KNVM and Resource Management Change
Ch. 6. Conclusion

1.4.1 *KNVM as Built Environments Transformation*

I conduct a historical analysis based on literature, interviews, and fieldwork, focusing on three temporal periods (before / during / after the KNVM). For the first period, I elaborate Korean traditional settlement logics and patterns such as Fengshui, lineage village, and hanok established

during the Joseon Dynasty. I then specify the KNVM's two strategies: national-scale plans and village-scale projects for the second period. Next, I address the 40-year adaptations of residents and villagers who have lived in the First Saemaul House and the First Saemaul Village. In conclusion, I show that the KNVM was an urban development in the rural sector rather than a rural development, which placed importance on service and infrastructure to shelter.

1.4.2 *KNVM and Population Change*

I first identify the basic mechanism of the KNVM and the Korean Family Plan for population change in the 1970s. Second, I display a variety of demographic patterns using national-scale statistical data, a cross-scale analysis based on multi-scale spatiotemporal data, and a micro survey based on village-scale sample data. Next, I conduct a demographic assessment of community resilience based on three main variables such as total population, age structure, and fertility. In conclusion, I reveal the KNVM's short-term mitigation of rapid urbanization and long-term consequence of spatial polarization between urban and rural populations.

1.4.3 *KNVM and Resource Management Change*

I first identify the mechanism of the KNVM and the Korean Reforestation with regard to resource management change in 1970s. Second, I display a variety of ecological patterns of a macro overview based on national-scale statistical data, a cross-scale analysis based on multi-scale spatiotemporal data, and micro survey based on village-scale sample data. Next, I conduct an ecological assessment of community resilience based on three main variables of forest growing stock, primary energy type, and foreign energy dependence. In conclusion, I display the KNVM's contribution to the national-scale and local-scale reforestation, but the global-scale consequence of high foreign dependence of resource and energy.

Chapter 2. THEORETICAL FRAMEWORK AND RESEARCH METHODOLOGY

This chapter presents this dissertation's research framework and then elaborates research methodology combining historical interpretation with resilience assessment.

2.1 THEORETICAL FRAMEWORK: COMMUNITY RESILIENCE

2.1.1 *Literature Review: Flows and Directions of Resilience Research*

Theoretical Base and Development of Resilience Theory

This chapter explores resilience theory in order to present a theoretical framework on community resilience. First of all, it is no exaggeration to say that resilience theory started from a pioneering article written by C. S. Holling (1973), entitled Resilience and Stability of Ecological Systems (Folke et al., 2010). Since then, the theory has been extensively developed in the fields of ecology and psychology. The term of resilience is currently a trending buzzword that is frequently used in many academic fields ranging from natural sciences (e.g., forest science, atmospheric science, and oceanography), through social sciences (e.g., anthropology, geography, economics, and political science), to applied disciplines (e.g., planning, public administration, business administration, and engineering).

Resilience theory is theoretically based on complexity in systems theory. Complex systems are fundamentally different from simple systems. The latter are composed of a small number of elements which do not have much interaction and feedback. The behaviors of simple systems are thus predictable and understandable with well-defined laws. On the other hand, complex systems consist of many elements that possess dynamic interaction and feedback between them. For such reasons, a common relevant phrase reads, 'The whole is more than the sum of its parts.' In other

words, it is not enough to understand parts alone in predicting the whole system's behavior. This is because complex systems exemplify such features as self-organization, emergent property, non-linearity, uncertainty, and unpredictability. Since complex systems have a capacity to self-organize, they possess emergent property, which refers to unexpected phenomena that are not necessarily noticed at lower levels but are apparent at upper levels. Therefore, it is required to carefully capture and analyze dynamic interaction and positive feedback between actors, elements, or components in complex systems (Meadow and Wright. 2008).

Resilience theory investigates "the capacity of a system to successfully absorb disturbances and reorganize while undergoing change in terms of its function, structure, identity, and feedback" (Walker et al., 2004, p.2). However, the resilience refers to not engineering resilience, but ecological resilience (Holling, 1996). The former is interested in efficiency, constancy, and predictability and assumes that there is one stable state or equilibrium. The latter assumes multiple stable states and focuses on persistence, variability, and unpredictability in terms of the system's evolution. Thus, it is important to clearly identify the "resilience of what system(s) to what disturbance(s)" (Carpenter et al., 2001, p.779) when applying resilience theory to empirical cases and theoretical quests. Then, the system's dynamic behavior needs to be carefully observed including adaptive cycle, regime shift, transformation, and resilience. The concepts and principles of resilience theory have continuously been developed for the past 40 years. Folke et al. (2010) clearly identified the main terminology of resilience theory as shown in Table 2-1. The relevant terms are later used in this dissertation's analyses.

Table 2-1 Main Terminology of Resilience Theory

Term	Definition
Adaptability (adaptive capacity)	The capacity of actors in a system to influence resilience.
Adaptive cycle	A heuristic model that portrays an endogenously driven four-phase cycle of social-ecological systems and other complex adaptive systems. The common trajectory is from a phase of rapid growth where resources are freely available and there is high resilience (r phase), through capital accumulation into a gradually rigidifying phase where most resources are locked up and there is little flexibility or novelty, and low resilience (K phase), thence via a sudden collapse into a release phase of chaotic dynamics in which relationships and structures are undone (Ω), into a phase of re-organization where novelty can prevail (α). The r-K dynamics reflect a more or less predictable, relatively slow "foreloop" and the Ω-α dynamics represent a chaotic, fast "backloop" that strongly influences the nature of the next foreloop. External or higher-scale influences can cause a move from any phase to any other phase.
General resilience	The resilience of any and all parts of a system to all kinds of shocks, including novel ones.
Panarchy	The interactive dynamics of a nested set of adaptive cycles.
Regime	The set of system states within a stability landscape
Regime shift	A change in a system state from one regime or stability domain to another
Resilience	The capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure and feedbacks, and therefore identity, that is, the capacity to change in order to maintain the same identity.
Social–ecological system	Integrated system of ecosystems and human society with reciprocal feedback and interdependence. The concept emphasizes the humans-in-nature perspective
Specified resilience	The resilience "of what, to what"; resilience of some particular part of a system, related to a particular control variable, to one or more identified kinds of shocks.
Threshold (critical transition)	A level or amount of a controlling, often slowly changing variable in which a change occurs in a critical feedback causing the system to self-organize along a different trajectory, that is, towards a different attractor.
Transformability	The capacity to transform the stability landscape itself in order to become a different kind of system, to create a fundamentally new system when ecological, economic, or social structures make the existing system untenable.

(Source: adopted from Glossary of Resilience Terms, Folke et al., 2010, p.3)

Resilience Research in Planning Field

In the planning field, resilience theory has been developed and applied on the premise of social-ecological systems or coupled human-natural systems, which are complex adaptive systems in which humans are part of nature among many other species (Berkes & Folke, 1998; Alberti, 2008; Beatley, 2009; Campanella & Godschalk, 2012). More specifically, there have been two major fields in planning and design: urban ecology and hazard mitigation.

The field of urban ecology is the most vibrant in applying resilience theory. C. S. Holling, Canadia ecologist, initiated resilience theory in 1973. Other leading scholars in resilience theory are also ecologists, including Lance Gunderson, Brian Walker, and Stephen R. Carpenter. As a result, urban ecology has focused on scientifically investigating resilience in social-ecological systems. In addition, urban ecology has tended to explore the resilience of ecological systems to social systems, namely social-ecological disturbance driven by humans' actions such as urbanization, the use of fossil fuels, and large-scale agriculture. The main interests of urban ecology are distinct features of social-ecological systems such as feedback, non-linearity, unpredictability, scale, renewal cycles, drivers, system memory, disturbance events, and windows of opportunity (Berkes & Ross, 2012).

Meanwhile, the field of hazard mitigation including emergency preparedness and disaster recovery has tended to investigate the resilience of the social system to the ecological system, in other words, social-ecological disturbance caused by natural disasters such as volcanoes, earthquakes, landslides, typhoons, and tsunamis. In fact, the concept of disasters is a human-centered notion for the reason that humans judge whether certain natural phenomena are disasters or not. So-called disasters are merely natural phenomena caused by flows of resources and energies in the ecological system. Relatively speaking, resilience in the field of hazard mitigation is a

positive and value-laden concept, while resilience in urban ecology is a neutral and scientific concept. More specifically, much hazard mitigation literature that utilizes resilience theory is based on developmental psychology and mental health. In other words, they are interested in how to build social capacity to natural hazards in order to reduce, prepare for, or recover from them. The main interests are people-place connections, values and beliefs, knowledge and learning, social networks, collaborative governance, economic diversification, infrastructure, leadership, and outlook (Berkes & Ross, 2012). Despite the above divide between urban ecology and hazard mitigation, the two fields overlap each other. For example, urban ecology provides an important scientific information to hazard mitigation. Conversely, hazard mitigation asks urban ecology to solve fundamental inquiry and urgent agenda such as upcoming issues and problems caused by climate change.

In addition, resilience theory is also broadly used in the field of planning and design in areas other than urban ecology and hazard mitigation. While both urban ecology and hazard mitigation focus on the resilient capacity of ecological systems or social systems to disturbances, the cases broadly using resilience theory apply concepts and principles drawn from resilience theory of social-ecological systems to urban, regional issues and problems that have basic characteristics of complex adaptive systems. In other words, the issues and problems are not only multidisciplinary (incl., physical, social, economic, cultural, and ecological aspects), but also interdisciplinary or often tightly interwoven. Therefore, resilience theory may provide useful guidance to understand and interpret complex, interdisciplinary issues and problems. For example, the Rockefeller Foundation has explicitly applied resilience theory into their support program named 100 Resilient Cities since 2013. They have helped numerous cities to become more resilient to ecological

disturbances (e.g., earthquakes, fires, and floods) as well as social stresses (e.g., high unemployment, endemic violence, chronic food, and water shortage).

Interestingly, the broad use of resilience theory shows conflicting value-laden perspectives on the concept of resilience itself. While some researchers regard resilience as a positive concept, others treat it negatively. For example, Newman et al. (2009) and the United Nations (2011) use resilient city as a desirable city responding to climate change or resource depletion. However, MacKinnon & Derickson (2012) regard it as a helpless city that loses urban vitality and new change. In this same vein, the concept of resilience is often stigmatized as politically conservative, as economically maintaining the status quo, and as a fixed-class social system (Hornborg, 2009). Nevertheless, I point out that the concept of resilience itself is ethically neutral because it can be applied to any complex systems, whether they are desirable or undesirable. For example, brown fields or eutrophic lakes can be quite resilient ecosystems even though they are not desirable. Therefore, it is important to be keenly aware of how the concept of resilience is used and identify what aspects of resilience theory are emphasized while reading relevant literature.

2.1.2 *Research Framework: Definition and Scope of Community Resilience*

Research Premise: KNVM and Urbanization

This dissertation notices that the KNVM was an inseparable relation with Korean rapid urbanization. Without the rapid urbanization, the KNVM would have never been implemented in the 1970s. Both KNVM and urbanization were external, sudden, and influential drivers to rural villages in South Korea. However, it is questionable whether the KNVM was a reaction for rural development or a sub-action for urban development as shown in Figure 2-1. In addition, the answer

regarding the KNVM's historical substance may be various depending on what rural villages, what periods, and what aspects (e.g., physical, social, economic, environmental, and ecological) we focus on. In this dissertation, I examine and identify the KNVM through the following conflicting hypotheses: 1) the KNVM was rural development to retain the rural sector against the rapid urbanization, 2) the KNVM was urban development to urbanize the rural sector and mitigated rapid urbanization in the 1970s, and 3) the KNVM was urban development to urbanize the rural sector and accelerated rapid urbanization from the onset.

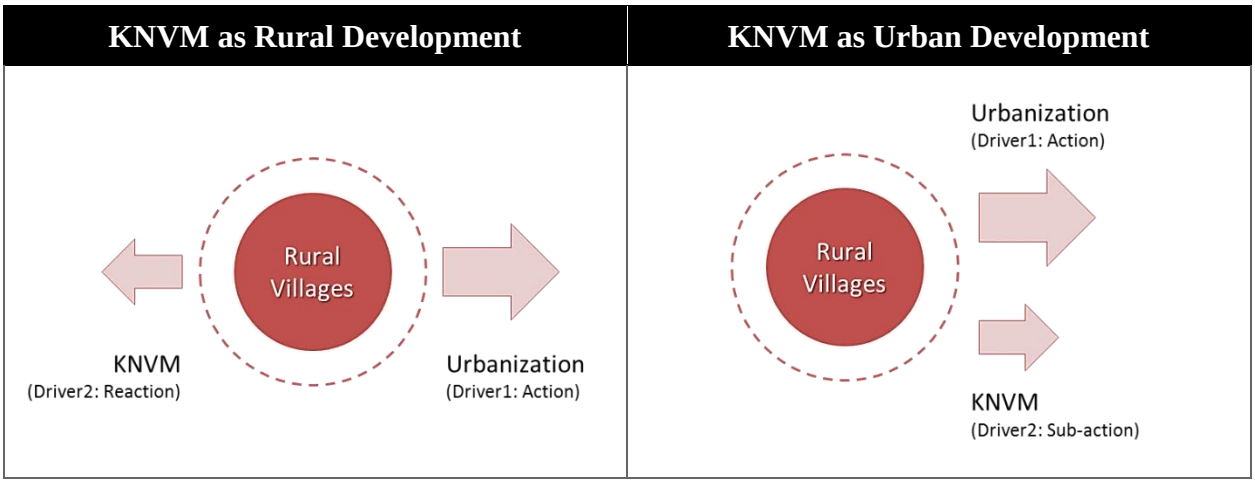


Figure 2-1 KNVM as Rural Development vs. KNVM as Urban Development

Concept Definition and Research Scope: Specified Community Resilience

I define the concept of community resilience according to resilience theory specified above in order to examine whether the KNVM was rural development or urban development in larger and longer perspective. As Berkes and Ross (2012) pointed out in the extensive literature review, the literature of community resilience could be summarized with two important aspects: First, the literature was mainly interested in the community-level resilience, rather than the larger level resilience. Second, the literature had two major strands in terms of academic scholarship: one was

based on resilience in social-ecological systems (Holling, 1973; Chapin et al., 2009). The other originated in developmental psychology and mental health (Norris et al., 2008; Chaskin, 2008). In this context, my definition of community resilience follows the literature based on resilience in social-ecological system because this dissertation aims to discuss the KNVM in terms of systems theory.

There are two additional reasons why I use the term community resilience rather than village resilience. First, the KNVM in the 1970s transformed various aspects of rural villages (e.g., physical, economic, social, and ecological) along with other government-led plans including the Korean Family Plan and the Korean Reforestation, which was beyond physical and spatial transformation of rural villages. Second, the KNVM's impact was not limited to rural villages in the 1970s, but reached to other spatiotemporal scales, which could be explained through the concept of panarchy of resilience theory. According to the main terminology of resilience theory specified in Table 2-1, I define the following concepts relevant to community resilience using Figure 2-2.

- Community Resilience: It is the capacity of a whole community system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identify, and feedback.
- Transformation: It means to create a fundamentally new system when ecological, economic, or social structures makes the existing system untenable. In this dissertation, the KNVM is assumed as the existing system's transformation because rural villages as a community system were moved to a new system state by the KNVM.
- Disturbance: It refers to a sudden and external change that affects a community system. In this dissertation, Korean rapid urbanization is regarded as a disturbance. Meanwhile, the KNVM

could also be assumed as a disturbance to rural villages. However, since the dissertation is mainly interested in the community resilience of rural villages supported by the KNVM, I take the rapid urbanization as a single disturbance.

- Community Resilience Assessment: It means to assess the resilience of a whole community system to disturbance. In the interpretation of the assessment, high community resilience of rural villages supported by the KNVM means the KNVM contributed to the maintenance of the rural sector. Conversely, low community resilience means that the KNVM contributed to the urban sector more than the rural sector. The specific methodology of community resilience assessment in this dissertation is introduced in the next section.

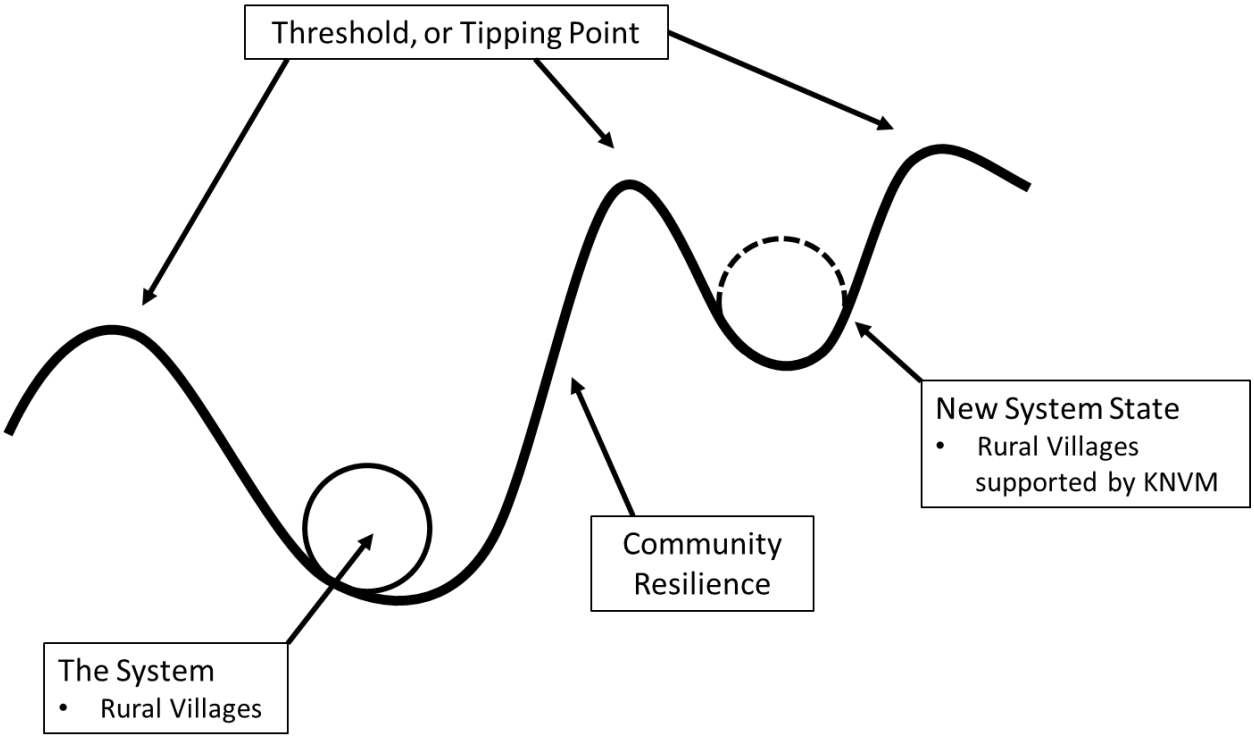


Figure 2-2 Conceptual Diagram of Community Resilience

I define two specified resilience (demographic resilience and ecological resilience) as shown in Table 2-3 and investigate them in this dissertation. The demographic resilience is more based

on social system while the ecological resilience on ecological system. Both are important to reveal the community resilience. However, I do not argue that they are proxies of community resilience because the community resilience could include many different resilience (e.g., physical, economic, social, and environmental resilience) beyond demographic and ecological resilience. In addition, even systems revealing demographic or ecological resilience may change over time in terms of the importance and validity (Berkes et al., 2005; Carpenter et al, 2005).

- Demographic Resilience: It is a capacity of rural population structure supported by the KNVM and the Korean Family Plan in the 1970s to Korean rapid urbanization including huge migration from the rural sector to the urban sector and demographic transition from high birth and high death rates to low birth and low death rates.
- Ecological Resilience: It is a capacity of rural forest system supported by the KNVM and the Korean Reforestation in the 1970s to Korean rapid urbanization including urban development pressure and resource management transition from natural materials and local biomass to industrial products and imported fossil fuels.

Table 2-2 Specified Resilience of Community Resilience

Resilience of	What Systems to	What Disturbances
Community Resilience	Rural Villages supported by KNVM (Korean Family Plan and Korean Reforestation)	Rapid Urbanization
• **Demographic Resilience**	• Rural Population	• Migration to Urban • Demographic Transition
• **Ecological Resilience**	• Rural Forest	• Development Pressure • Resource Management Transition

Research Focus: Cross-scale and Cross-sectoral Interaction

In investigating the above specified community resilience, I focus on cross-scale and cross-sectoral interaction in this dissertation, which allows me to assess the KNVM's multi-scale impact (e.g., spatial scales: village, local, provincial, national, and global; temporal periods: 1970-1980, 1980-1990, 1990-2000, and 2000-2010) in Chapters 4 and 5. The multi-scale impact assessment is theoretically useful and relevant in capturing emergent phenomena that the community system as a complex system could have.

First, the cross-scale interaction refers to the interconnectedness between different spatiotemporal scales, namely the connection from lower-level scales (small and fast cycles) to upper level scales (large and slow cycles) in the single sector. More specifically, Figure 2-3 shows diagrams of adaptive cycle and panarchy as a set of adaptive cycles. The adaptive cycle in the left diagram is a heuristic model that displays a four-phase cycle (i.e., exploitation (r), conservation (K), release (Ω), and reorganization (α)) of complex adaptive systems. The stability and change of systems are determined by three properties: potential, connectedness, and resilience (Holling et al., 2002b and 2002c). Aside from this adaptive cycle, there are two traps as pathological states: poverty trap and rigidity trap. Poverty trap has low values of all three properties (potential, connectedness, and resilience), which creates an impoverished system or unsustainable maladaptive state. Meanwhile, rigidity trap has high values for all three properties, which squeezes out diversity and reinforces power, politics, and profit (Allison et al., 2004; Carpenter et al., 2008). Meanwhile, the panarchy in the right diagram reveals the interconnectedness between different spatiotemporal scales through revolt (i.e., the interaction from lower to upper level) or remember (i.e., the interaction from upper to lower level). For example, the KNVM's strong top-down

implementation corresponds to the interaction of remember. In the same way, the KNVM's national-scale or global-scale impact means the interaction pf revolt in the panarchy diagram.

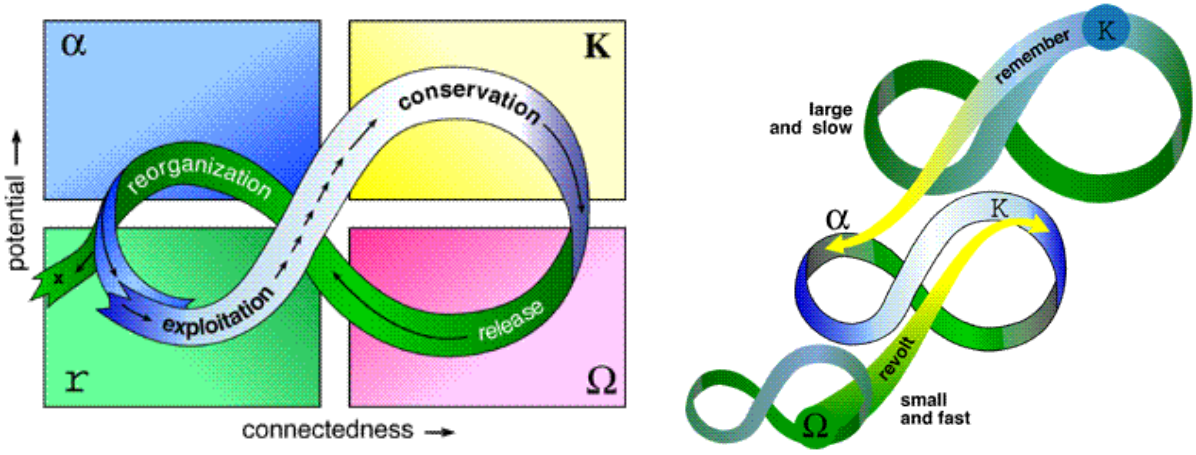


Figure 2-3 Adaptive Cycle, Panarchy, and Cross-scale Interaction
(Source: Holling et al., 2002b and 2002c)

Next, the cross-sectoral interaction refers to the interconnectedness between or among different sectors (e.g., political, economic, social, physical, and ecological). The KNVM's cross-sectoral interaction is based on the rapid and large-scale transformation of the KNVM. The KNVM in the 1970s was a broad and comprehensive implementation vehicle including a variety of government plans, projects, and policies. The KNVM's strong top-down organization from President Park or the central government to individual villages was significant and efficient in disseminating the government's ever-changing agendas and mobilizing all people. As a result, it is possible to explore the KNVM's cross-sectoral interaction from political change through built environments transformation to demographic and ecological impacts as shown in Figure 2-4.

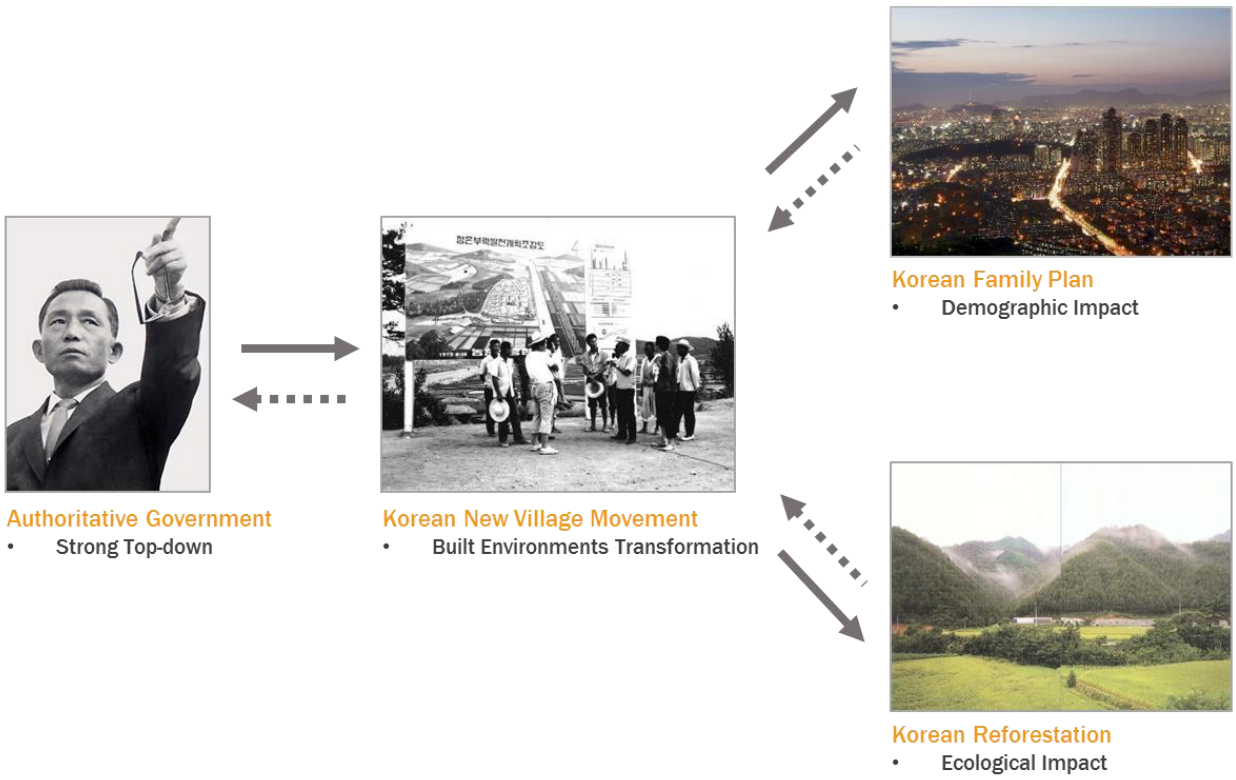
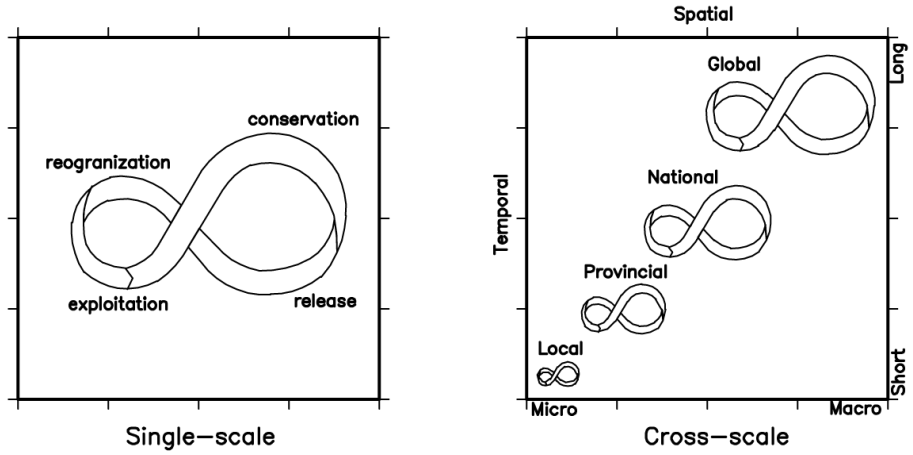


Figure 2-4 KNVM's Historical Development based on Cross-sectoral Interaction

As a synthesis of cross-scale and cross-sectoral interaction above, I present a conceptual diagram of my own creation as shown in Figure 2-5, which is a visual aid to reveal how cross-scale and cross-sectoral interaction could be integrated in the temporal and spatial dimensions. The top two diagrams show a transition from a single-scale to a cross-scale system. The cross-scale diagram is based on a set of dynamics and structure called panarchy in resilience theory. The horizontal axis refers to spatial dimension (micro to macro) while the vertical axis stands for temporal dimension (short to long). According to the two dimensions, a variety of planning scales can be identified as the following order: local – provincial – national – global. Next, the bottom three-dimensional diagram shows a transition from a cross-scale system to multiple cross-scale systems, which imply that they could have cross-sectoral interaction from one another.

Step 1
Panarchy

From Single-scale
To Cross-scale
Interaction



Step 2
Stacked Panarchy

From Cross-scale
To Cross-sectoral
Interaction

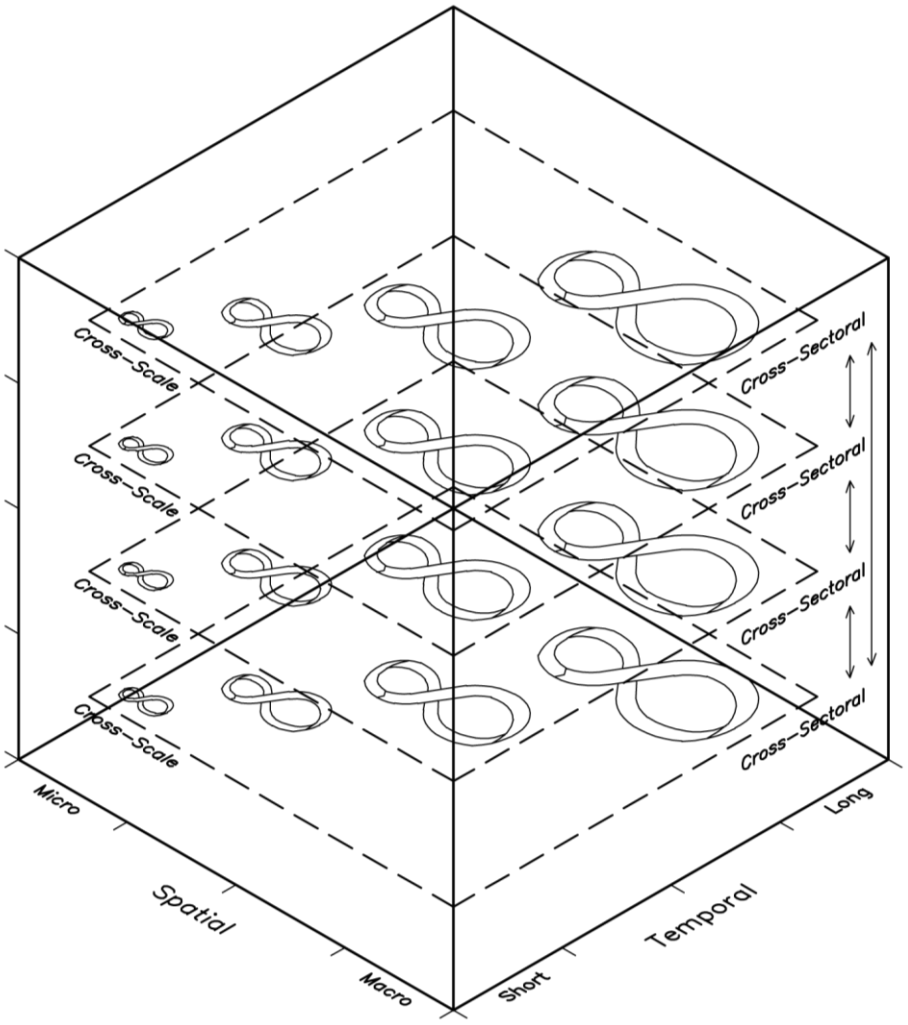


Figure 2-5 Conceptual Diagram of Cross-scale and Cross-sectoral Interaction

(Source: This diagram is drawn by the author.)

2.2 Research Methodology: Historical Interpretation and Resilience Assessment

Under the above theoretical framework, this dissertation takes an interdisciplinary approach ranging from historical interpretation of built environments transformation to resilience assessments of population and resource management changes in spatial (village-scale to global-scale) and temporal (short-term to long-term) scales.

2.2.1 *Basic Approach to KNVM: Implementation and Impact*

I am interested in the relationship between the KNVM's implementation and the historical impact under the assumption that the KNVM was a strong top-down implementation driven by the authoritarian government in the 1970s. Beyond a narrow investigation based on a single analytical method for the KNVM in the 1970s, I employ a variety of exploratory approaches including narrative description & analytical reasoning, quantitative analysis & qualitative interpretation, historical awareness, and comparative understanding. This is because the KNVM was an integrated and complex framework of government plans and projects, and thus affected larger spatial scales and longer temporal periods beyond rural villages in the 1970s.

I followed the research methodology as shown in Figure 2-2. The methodology is mainly composed of historical interpretation and resilience assessment. More specifically, I interpret the KNVM's transformation in the historical context of Korean human settlements. Then, I do demographic and ecological assessments of community resilience to rapid urbanization, focusing on the cross-sectoral and cross-scale impact of the KNVM on population and resource management changes. The abbreviations of CH3, CH4, and CH5, which are encompassed in dotted lines in Figure 2-6, refer to research scopes of three main chapters in this dissertation.

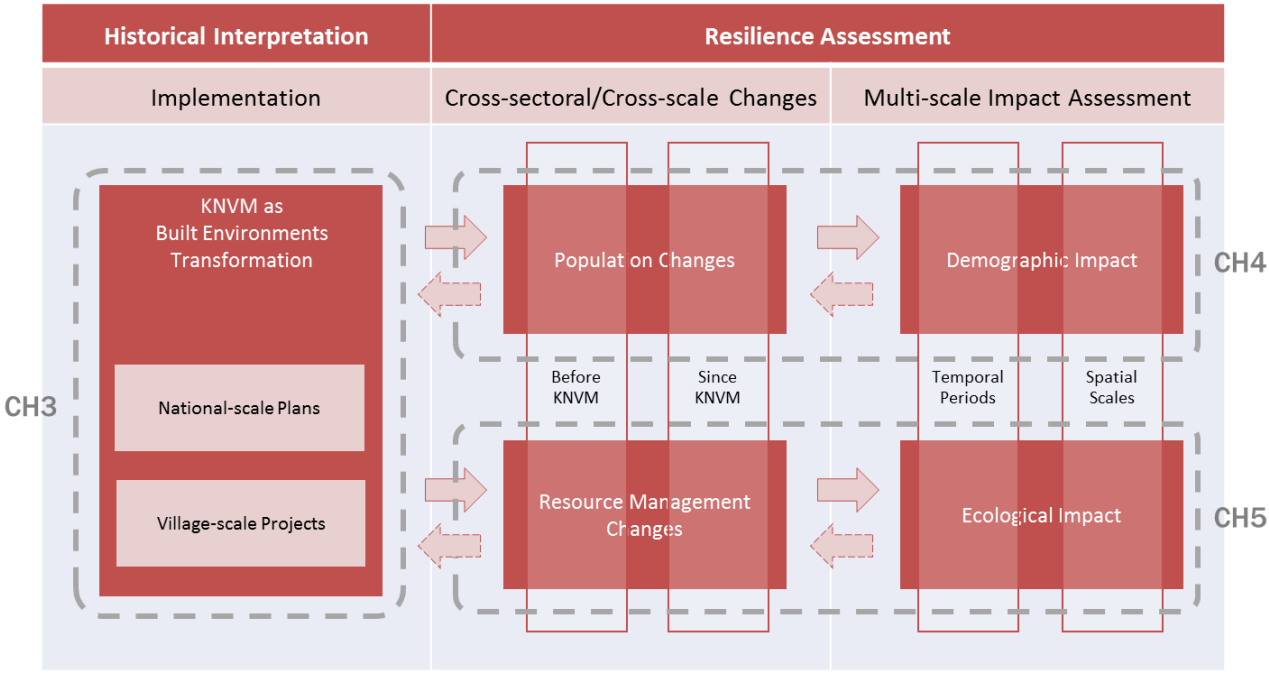


Figure 2-6 Dissertation Methodology

2.2.1.1 KNVM's Implementation: Historical Interpretation

The KNVM was a strong political initiative in which substantial capacities of Korea in the 1970s were mobilized, along with heavy and chemical industry-driven economic developments (Sorensen, 2011). The KNVM thus had fundamentally multifaceted aspects ranging from national-scale plans to village-scale projects. In addition, the Park government focused on a transformation of built environments through the KNVM by providing many physical models, such as the KNVM House and the KNVM Village, which has still continued in Korea as a construction state (McCormack, 1996). In this historical context, I define the KNVM as a series of strong top-down implementations that transformed built environments and contributed to social-ecological changes. I describe, according to three temporal periods (before / during / after the KNVM), how different the KNVM houses and villages were from traditional houses and villages in Korea and how the KNVM's difference caused cross-sectoral changes of population and resource management.

2.2.1.2 KNVM's Impact: Resilience Assessment

Existing literatures showed the following features in doing resilience assessments. First, they explicitly used the following terms of resilience theory in understanding social-ecological phenomena: social-ecological systems, resilience, disturbance, adaptive cycle, panarchy, regime shift, and vulnerability. Second, they frequently used the concept and diagram of adaptive cycle as an assessment tool (Holling et al., 2002b; Scheffer and Carpenter, 2003; Urgenson et al, 2010). Third, they often introduced the concept and diagram of panarchy to reveal emergent phenomena of complex social-ecological systems (Holling, 2001; Chapin et al., 2006). Fourth, they conducted the in-depth social analysis on roles of stakeholders for adaptive governance or management (Gunderson et al., 1995; Olsson and Galaz, 2009).

In this dissertation, I add new exploratory approaches to existing methodology of resilience assessments. I present a resilience matrix based on the concept of panarchy and expand cross-scale interaction to cross-sectoral interaction. In addition, I attempt to include built environments as an important variable that could lead to social-ecological changes. I use mixed methods in order to describe a transformation of built environments and assess its multi-scale social-ecological impact. More specifically, I employ demographic and ecological assessments of community resilience to rapid urbanization, based on the cross-sectoral change caused by a transformation of built environments. The KNVM's physical models had different degrees of rigidity or flexibility, which led to different degrees of success or failure in community resilience. It is thought that the community resilience assessments might be significantly varied according to spatial (village-scale to global-scale) and temporal (short-term to long-term) scales (Ernstson et al., 2010; Chelleri et al., 2015). For example, although the community assessment is resilient at the national-scale and short-term period, it could turn out to be not resilient any more at the village-scale and long-term

period. Thus, I assess community resilience comprehensively using a mixed methodology combining descriptive quantitative analysis and historical qualitative interpretation, which includes a resilience matrix and context-based narratives. Finally, the matrix and context-based narratives of the KNVM may offer meaningful insights into other cases such as developed countries, less-developed countries, or other East Asian countries including Japan, China, and Taiwan. Such comparative works can lead to deeper understanding of urbanization and rural development and provide more appropriate policy implications. I have analyzed the KNVM's impact using the following analyses:

- Morphological analysis was used to compare and contrast traditional rural villages before the KNVM with new modern villages implemented by the KNVM.
- Demographic analysis was applied to understand how the KNVM as rural development affected (accelerated or delayed) Korean rapid urbanization since the 1970s.
- Resource management analysis was employed to identify how the KNVM contributed to resource transitions from natural materials and local biomass to industrial products and imported fossil fuels in the 1970s, for example, from firewood to oil, gas, or electricity.

2.2.2 *Scales of Implementation: Macro Overview and Micro Analysis*

2.2.2.1 Macro Overview: National-scale Statistical Data

The KNVM, as mentioned above, was a multifaceted program ranging from national-scale plans to village-scale projects. In addition, the KNVM's approach had distinct features according to spatial scales, especially between national-scale plans and village-scale projects. In order to elaborate the KNVM's macro overview, national-scale statistical data and existing literature

including government reports were employed. More specifically, the relevant national-scale statistical data were directly collected during my field research visit in 2014 from the following government agencies:

- Statistics Korea / Statistics GIS (통계청): This is a principal agency of national statistical services in Korea, which is officially called the Korea National Statistical Office that can be compared to the Census Bureau in the United States. This agency provides a variety of government data (i.e., numeric spreadsheets, GIS files, and government reports) including demographics, construction, industry, and energy through its own website. However, confidential data including GIS are not allowed to be downloaded from foreign countries and old historic data are not offered through the website. Especially, scholars should get approvals from staff who review research topics and needs for GIS data in order to download them. I clearly described the kind and scope of data that I used in this dissertation whenever I introduced them.

- National Archives of Korea (국가기록원, 새마을운동 기록과 현장): This is a national archival agency in Korea that preserves articles, documents, and records produced by the government and releases them to the general public online as well as offline. In addition, this agency has a special archival collection on the KNVM inscribed on the UNESCO memory of the World International World Register in 2013. The archive is composed of edited compilations in order to facilitate dissemination of the KNVM contents. I consulted them through the website and visited the offline archive as well to look over numerous raw materials. I specified the archival sources in the dissertation whenever I used them.

2.2.2.2 Micro Analysis: Village-scale Sample Survey

The village-scale sample survey was also conducted in order to do the KNVM's micro analysis. More specifically, the relevant village-scale data were directly collected during my field research visit in 2014 through the following sources or methods:

- Lower-level Local Municipalities' Statistical Yearbooks: Each municipality, lower-level local municipalities (city hall or county office) have published a yearbook each year, which include statistical data. They are the most detailed data published by the government in Korea.
- Site Survey / Drawing Documentation / Open-ended Interviews: Actual houses and villages relevant to the KNVM were surveyed after deliberate site selection process, which will be discussed on the next page in detail. In case of need, houses and villages were measured and documented into architectural drawings. In addition, according to the open-ended interview protocol qualified by the University of Washington Human Subjects Division, interviews were conducted with residents who have lived in the same houses and villages as they did during the period of the KNVM in the 1970s. The interviews were transcribed on the spot.

Principles and Rationales of Village Selection

I selected sample villages for micro analysis with the following principles and rationales. First of all, I postulated that the KNVM's villages could be divided into two main categories: (1) model villages that historically shaped the KNVM and (2) all other villages transformed by the KNVM. This divide is later elaborated using the following concepts: the KNVM as village-scale

projects and the KNVM as national-scale plans [5]. The specific principles and rationales of village selection according to each category are as follows:

- Model villages historically shaping the KNVM
    - The KNVM as a strong political initiative created many model villages for propaganda or promotion purposes. These model villages directly or indirectly shaped the KNVM even though they were conducted in the name of the KNVM. Although the KNVM allowed for each village's discretion on actual projects of rural development, the KNVM also tried to have many different model villages to educate village leaders and residents and promote the KNVM to people in domestic and foreign countries. Among them, the following villages were selected and surveyed for the KNVM's historical interpretation:
        - Villages in which the KNVM was initiated for the first time
        - Villages in which President Park was directly involved during the design process
- All other villages transformed by the KNVM
    - Almost all villages in Korea were transformed in the 1970s under the KNVM's national-scale plans even though they had their own discretions for their specific village projects. Therefore, they can be used as good samples to examine how similarly or differently the villages were transformed according to a variety of socio-economic, geographic, or ecological factors. For this, four villages in the watershed of the Han River were specially selected and surveyed for the KNVM's resilience assessments. More detailed logics of village section are as follows:

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5 The specific details regarding the KNVM's implementation are discussed in Chapter 3.3 Two Strategies of the KNVM: Prescription vs. Showcase.

- Villages in the same water basin: Before the development of modern transportation and communication, drainage basins played important roles in forming the same regional systems, acting as physiographic boundaries, facilitating economic relationship between components (urban and rural areas), and being a mode of transportation (Skinner, 1985). Given the facts, I selected the water basin of Han River (한강, 漢江) among four main water basins in South Korea for the dissertation.

- Villages with different locational characteristics: I selected four sample villages in the water basin of Han River, which had different locational characteristics such as location of basin, height above sea level, and distance from the city of Seoul. The sample villages could be examined as to how similar or different they have been according to villages' locations since the KNVM had happened in the 1970s.

- Villages that minimize compounding factors: I sought to select sample villages that could minimize possible compounding factors including the year when the KNVM was started, physical characteristics, socio-economic characteristics, and accessibility to modern resources. In doing so, I considered the village's distance from the city of Seoul as the most important factor.

- Villages far from other governmental implementations except the KNVM: In order to investigate community resilience affected by the KNVM's implementation, I selected sample villages in which the impact of other governmental plans or policies was minor or the least. Other governmental implementations in the 1970s include the Five-year Economic Plan (경제개발 5 개년계획, 經濟開發五個年計劃) and the Comprehensive National Territorial Development Plan (국토종합개발계획, 國土綜

合開發計劃). The Youngseo Region (영서지방, 嶺西地方) in the upper or mid-stream of North Han River (북한강, 北漢江) was relatively less affected by the government's strong implementations in the 1970s.

Administrative Divisions for Village-scale Sample Survey

I carefully considered the administrative divisions of South Korea in collecting village-scale data. As shown in Figure 2-7, the administrative divisions are hierarchically structured in South Korea. Practically, neighborhood *Dong* (동, 洞) and township *Myeon* (면, 面) [6] are the lowest level where local governments provide statistical data. As for the administrative divisions under neighborhoods and townships, individual researchers should collect village-scale data. Meanwhile, the data at the level of neighborhood and township can be collected from lower-level local municipalities' statistical yearbooks.

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6 Neighborhood called *Dong* (동, 洞): It is the primary division of districts called *Gu* and those cities called *Si* which are not divided into districts. The neighborhood is the smallest level of urban government to have its own office and staff. In some cases, a single legal neighborhood is divided into several administrative neighborhoods. Each administrative neighborhood has its own office and staff.

Township called *Myeon* (면, 面): It is one of the divisions of a county called *Gun* and some cities called *Si* of fewer than 500,000 populations. The townships have smaller populations than a town called *Eup* and represent the rural areas of a county or city. Townships are subdivided into villages called *Ri*. The minimum population limit is usually 6,000.

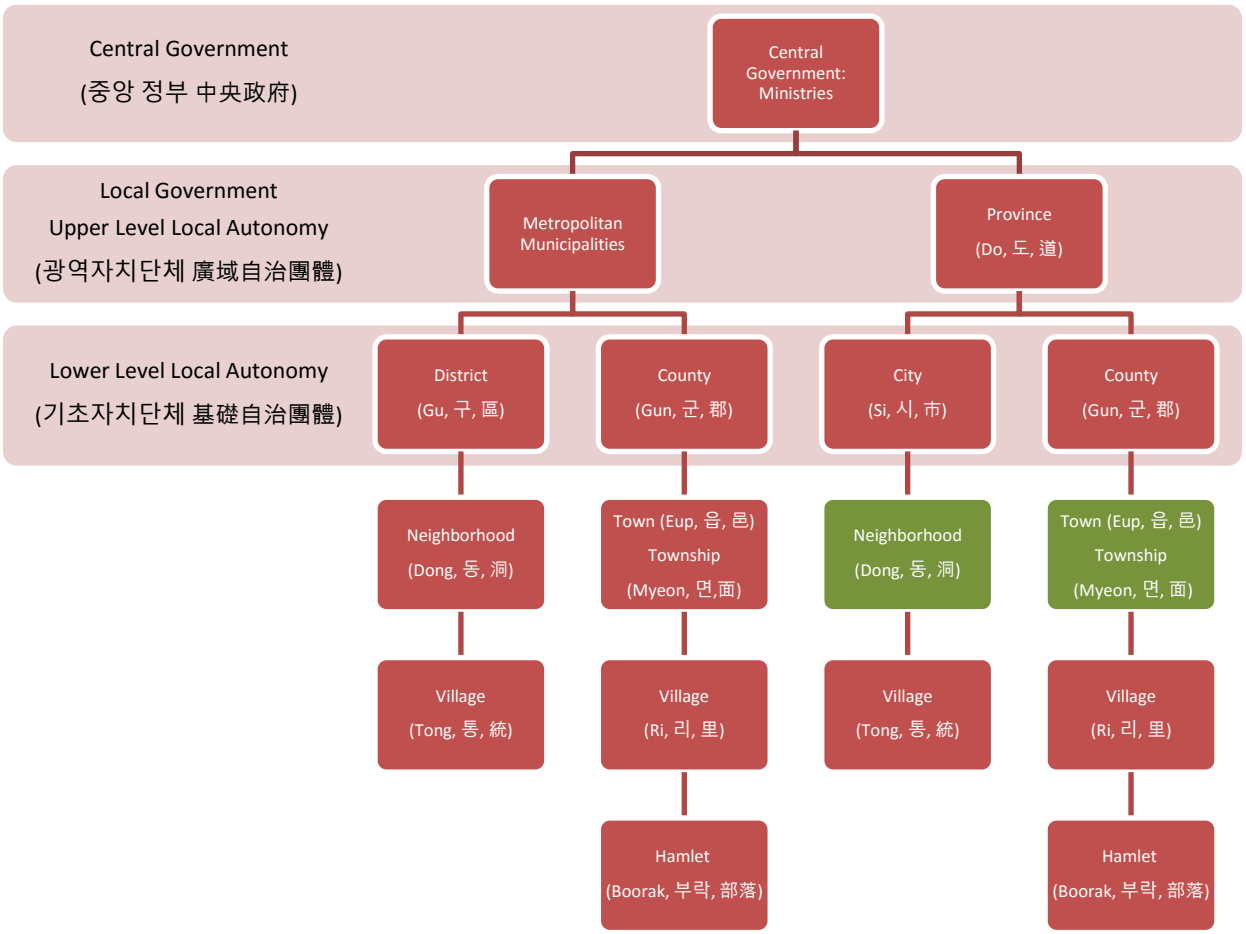

Figure 2-7 Korean Administrative Division Structure

Field Research

The field research was done in Korea in autumn 2014 [7]. During the field research, relevant literature, ArcGIS files, and village-scale statistical data were collected. In addition, open-ended interviews with keepers, residents, villagers, and relevant scholars were conducted according to

7 More specific details regarding the field research is in Appendix B. Fieldwork Summary: Progress, Interview, and Site Survey.

the interview protocols qualified by the University of Washington Human Subjects Division [8]. Further, I carried out actual building and village survey in order to do interviews, document human settlements, and collect relevant information including historical pictures from residents and villagers. The list of visited houses and villages are as follows:

- Model Projects: one house and two villages shaping the KNVM

  ► House and villages surveyed for the KNVM's historical interpretation (Chapter 3)

  - A: Birthplace of Saemaul Undong - Sindo-ri, Cheongdo-eup, Cheongdo-gun, Gyeongsangbuk-do
  - B: First Saemaul House - 650 Dongtangiheung-ro, Giheung-gu, Yongin-si, Gyeonggi-do
  - C: First Saemaul Village - Samgok-ri, Seonggeo-eup, Seobuk-gu, Cheonan-si, Chungcheongnam-do

- Representative Villages: four villages in the watershed of the Han River

  ► Villages surveyed for the KNVM's resilience assessments (Chapter 4 and 5)

  - D: Pungsan-dong, Hanam-si, Gyeonggi-do
  - E: Gangsang-myeon, Yangpyeong-gun, Gyeonggi-do
  - F: Seo-myeon, Hongcheon-gun, Gangwon-do
  - G: Seoseok-myeon, Hongcheon-gun, Gangwon-do

The specific field research locations in Korea are marked with letters A to G on the map as shown in Figure 2-8. In addition, the brief overview of the four selected representative villages, D to G, in the watershed of the Han River are in Table 2-3. The four villages were chosen according

8 The protocols and open-ended interview questions are respectively in Appendix C. Human Subjects Division Report and Appendix D. Asked Open-ended Interview Questions.

to the principles and rationales of village selection discussed above. The enlarged location maps and aerial photos of the four villages are in Figure 2-9.

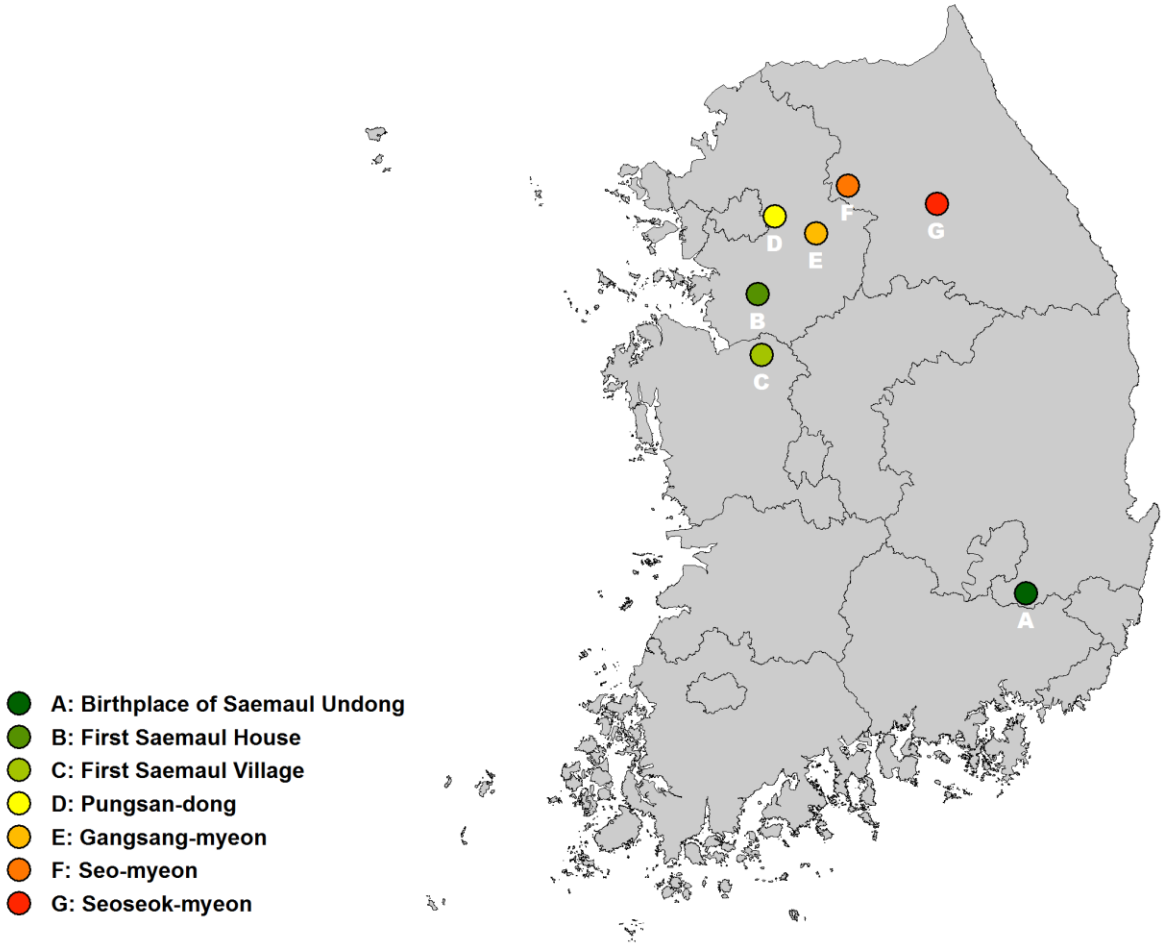

Figure 2-8 Field Research Locations

Table 2-3 Brief Overview of Four Selected Representative Villages (D-G)

Location	D. Pungsan-dong	E. Gangsang-myeon	F. Seo-myeon	G. Seoseok-myeon
1. Administrative Characteristics				
Lower-level Local (City or County)	Hanam-si	Yangpyeong-gun	Hongcheon-gun	Hongcheon-gun
Upper-level Local (Province)	Gyeonggi-do	Gyeonggi-do	Gangwon-do	Gangwon-do
Number of Administrative Villages	3 dong (Pungsan-dong, Misa 1 & 2-dong)	17 ri	17 ri	14 ri
2. Locational Characteristics				
Location of Water basin	Lower stream of Han-gang 漢江下流	Mid-stream of Namhan-gang 南漢江中流	Mid-stream of Bukhan-gang 北漢江中流	Upper stream of Bukhan-gang 北漢江上流
Height above Sea Level	23.16m (76ft)	45.11m (148ft)	107.59m (353ft)	327.66m (1,075ft)
Distance from Seoul City Hall (Direct Dist./ Car-Shortest Dist.)	20.02 / 24.03km	46.7 / 53.29	61.5 / 73.89	108 / 122.78
3. Demographic Characteristics (based on Statistics in December 2012)				
Household	1,781	3,131	1,946	1,720
Population (Incl. Foreigners)	3,486	7,388	3,700	4,073
Male / Female (Sex Ratio)	1,971 / 1,515 (130:100)	3,672 / 3,716 (99:100)	1,965 / 1,735 (113:100)	2,019 / 2,054 (98:100)
Foreigner Pop.	215 (156/59)	93 (42/51)	73 (28/45)	25 (9/16)
+65 Pop.	594 (17.04%)	1,147 (15.53%)	987 (26.68%)	1,010 (24.80%)

D. Pungsan-dong	E. Gangsang-myeon	F. Seo-myeon	G. Seoseok-myeon
Lower stream of Han-gang 漢江下流	Mid-stream of Namhan-gang 南漢江中流	Mid-stream of Bukhan-gang 北漢江中流	Upper stream of Bukhan-gang 北漢江上流

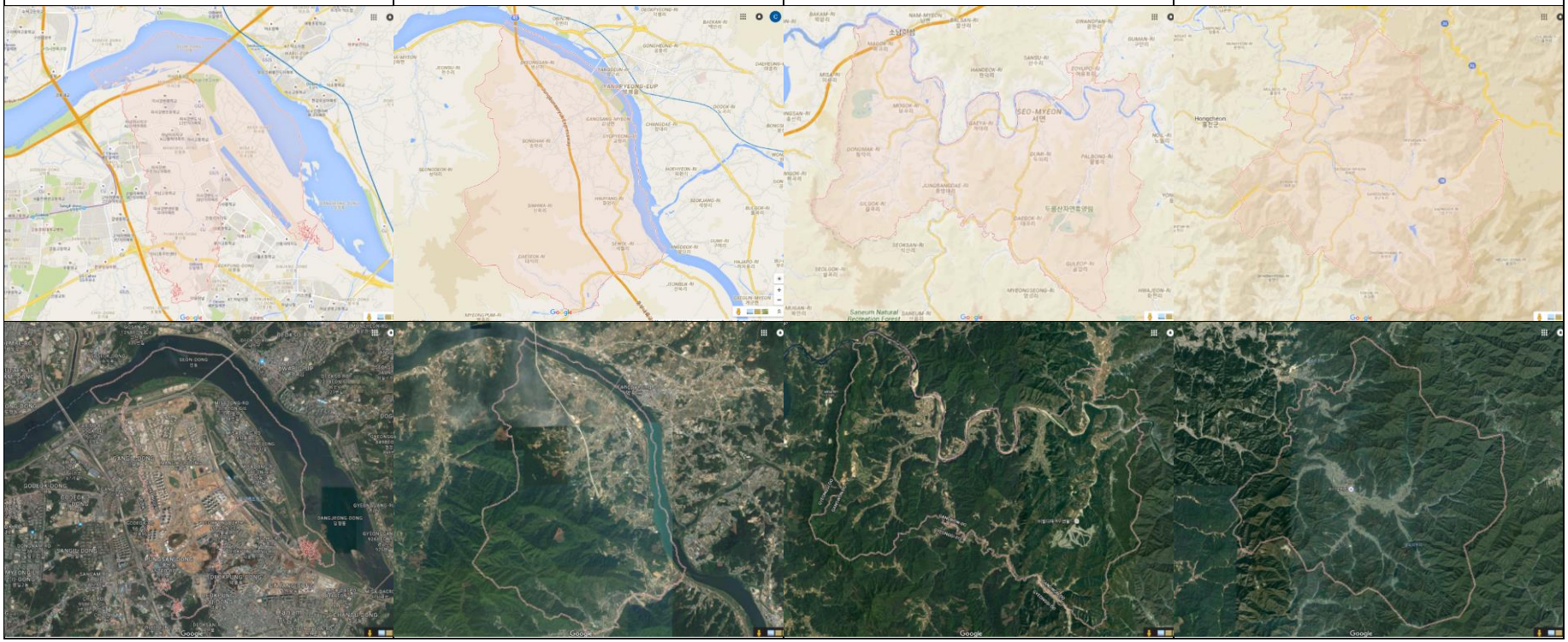

Figure 2-9 Location Maps and Aerial Photos of Four Selected Villages (D-G)

(Source: Google Maps)

2.2.3 *Periods of Impact: Short-term and Long-term*

2.2.3.1 Short-term Impact: 1970-1979

The KNVM is mostly regarded as a 1970s government implementation even though the KNVM's corresponding organizations, such as the National Council of Saemaul Undong (새마을운동 중앙회), the Samaul Undong Central Training Institute (새마을운동 중앙연수원), and the Korean Federation of Community Credit Cooperative (새마을금고중앙회) still exist today. This is because the KNVM was greatly weakened after President Park was assassinated in 1979 and the Korean Government has not taken the KNVM as a core government agenda since 1980. However, there has been an apparent recent shift in the potential for a revival of the KNVM after Park, Geun-hye, President Park's first daughter was elected to be a President of South Korea in 2012. Nevertheless, the revival is mainly related to international development cooperation as a way for official development assistance (ODA) to support less developed countries in Asia and Africa [9].

Therefore, the 1970s was a period when the KNVM had been strongly implemented and the Korean Government had been responding to the KNVM's impact. In addition, the KNVM-related

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9 Yeongnam University (영남대학교), located in Gyeongsan (경산) is a vibrant place that studies the KNVM's ideas and historical experiences. This university had been developed by President Park, Chung-Hee since 1967 after he merged two existing colleges. His hometown was close to the university. President Park, Geun-Hye, his daughter had been a member of the university's board in 1980s. The university has the Park Chung Hee School of Policy and Saemaul (박정희정책새마을대학원) and the Park Chung Hee Saemaul Undong Institute (박정희새마을연구원). The graduate school and the institute cooperated with the World Bank Group in order to disseminate the KNVM's lessons to less-developed countries. Many international students has studied the KNVM there.

implementations such as the Korean Family Plan and the Korean Reforestation were conducted during this period. Thus, I regarded the 1970s as an appropriate time to measure a short-term impact of the KNVM and assess community resilience along with the KNVM's historical implementation.

2.2.3.2 Long-term Impact: Forty Years Later

It is meaningful to revisit the KNVM now because the time gap of approximately 40 years between the KNVM's implementation and the current situation may provide long-term insights and implications for strong top-down governance and the accompanying rapid change. There are many possible advantages in revisiting the KNVM: First, it allows for a more balanced and comprehensive evaluation of the KNVM. Since the KNVM was a main government agenda driven by an authoritarian government in the 1970s, it is easy to find existing literature on the KNVM showing extreme evaluations between high praise and severe criticism. Second, it can provide information regarding how residents and villagers have adapted or responded to the rapid transformation driven by the KNVM's planners. The 40-year dynamic relationship between planners and residents may suggest what should be considered more in the planning process of rural development in general. Researching the KNVM can also trace cross-scale and cross-sectoral interaction caused by the KNVM's implementation. Although the KNVM focused on village-scale physical transformation in the 1970s, the KNVM affected not only the entire country of South Korea beyond a single village, but also other seemingly unrelated systems such as demographic and/or ecological systems. Finally, it can generalize benefits and consequences of strong top-down implementation as well as rapid and large-scale transformation, which may be useful and helpful to currently urbanizing countries in the Global South.

2.2.4 *Resilience Matrix for KNVM: Variables of Interest*

I present a resilience matrix for the KNVM in order to do resilience assessments. This is theoretically based on complexities and uncertainties of resilience theory that could require a variety of spatial scales and temporal periods in doing resilience assessments. In other words, it is risky to do the KNVM's resilience assessments by just focusing on several examples happening at a certain time and in a certain space. Therefore, resilience assessments are required to have robust and flexible enough assessment tools to embrace a variety of times and spaces. Considering the two dimensions of spatial scales and temporal periods discussed in the above sections, this dissertation started from the conceptual model of the resilience matrix as shown in Table 2-4.

Table 2-4 Conceptual Model of Resilience Matrix

		Spatial Scale	
		Micro	Macro
Temporal Periods	Short-term		
	Long-term		

Next, the KNVM Matrix can be developed to include a variety of spatial scales (village, local, provincial, urban/rural, national, and global) and temporal periods (1970-1980, 1970-2010) as shown in Table 2-5. The KNVM Matrix is specified with main assessment criteria for demographic and ecological assessments of community resilience. According to the specified resilience of community resilience in Table 2-3, three variables (i.e., total population, age structure, and fertility) were selected because they could reveal the demographic resilience to the following disturbances (i.e., total population: huge migration from the rural sector to the urban sector; age

structure and fertility: demographic transition from high birth and high death rates to low birth and low death rates).

In the similar way, three variables (i.e., forest growing stock, primary energy source, and foreign energy transportation) were chosen because they could reveal the ecological resilience to the following disturbances (i.e., forest growing stock: urban development pressure; primary energy source and foreign energy dependence: resource management transition from natural materials and local biomass to industrial products and imported fossil fuels). The detailed resilience assessments using the KNVM matrix are discussed in Chapters 4 and 5.

Beyond micro investigation focusing on certain times and places, the KNVM matrix can assist in creating comprehensive assessments for the KNVM's implementation and its impact. In addition, the KNVM matrix can clearly identify possible missing assessment variables due to a lack of data and limitation of references, which can act as an open framework for further study.

Table 2-5 KNVM Matrix on Resilience Assessments

Variables of Interest	Temporal Periods	Spatial Scales					
		Village	Local	Provincial	Urban /Rural	National	Global
Ch. 4. Resilience Assessment 1: KNVM and Population Change							
Total Population	1970-1980						
	1970-2010						
Age Structure	1970-1980						
	1970-2010						
Fertility	1970-1980						
	1970-2010						
Ch. 5. Resilience Assessment 2: KNVM and Resource Management Change							
Forest Growing Stock	1970-1980						
	1970-2010						
Primary Energy Source	1970-1980						
	1970-2010						
Foreign Energy Dependence	1970-1980						
	1970-2010						

Chapter 3. HISTORICAL INTERPRETATION: KNVM AS BUILT ENVIRONMENTS TRANFORMATION

3.1 CHAPTER INTRODUCTION

This chapter discusses the KNVM as a transformation of built environments. To do this, the KNVM is situated in the history of human settlements of Korea and a historical interpretation for the KNVM's rapid and large-scale transformation is discussed. This historical approach reveals that the KNVM in the 1970s transformed rural villages from traditional to modern. Further, it can be interpreted in term of resilience theory that the KNVM created the regime shift of human settlements in Korea. Theoretically, the regime shift refers to "a change in a system from one regime or stability domain to another" (Folke et al., 2010, p.3). More specifically, the KNVM transformed traditional rural houses and villages rapidly. Although the KNVM's transformation varied from village to village, it displayed a clear difference of human settlements before and after the KNVM. The KNVM forced rural houses and villages to use industrialized materials and resources (e.g., concrete, glass, and fossil fuel) and build standardized houses and regular village layouts. Through this chapter, I aim at finding insights and implications from the KNVM for sustainable and resilient rural development during the period of rapid urbanization.

Before delving into the KNVM, I should clearly identify which issues of human settlements the KNVM discussed and how complex the issues were. In addition, it is also notable that the issues had much to do with design and planning of human settlements. More specifically, Figure 3-1 shows Korean traditional rural settlements of Hahoe (하회, 河回) and Yangdong (양동, 良洞), which were designated as the UNESCO World Heritage Sites in 2010.

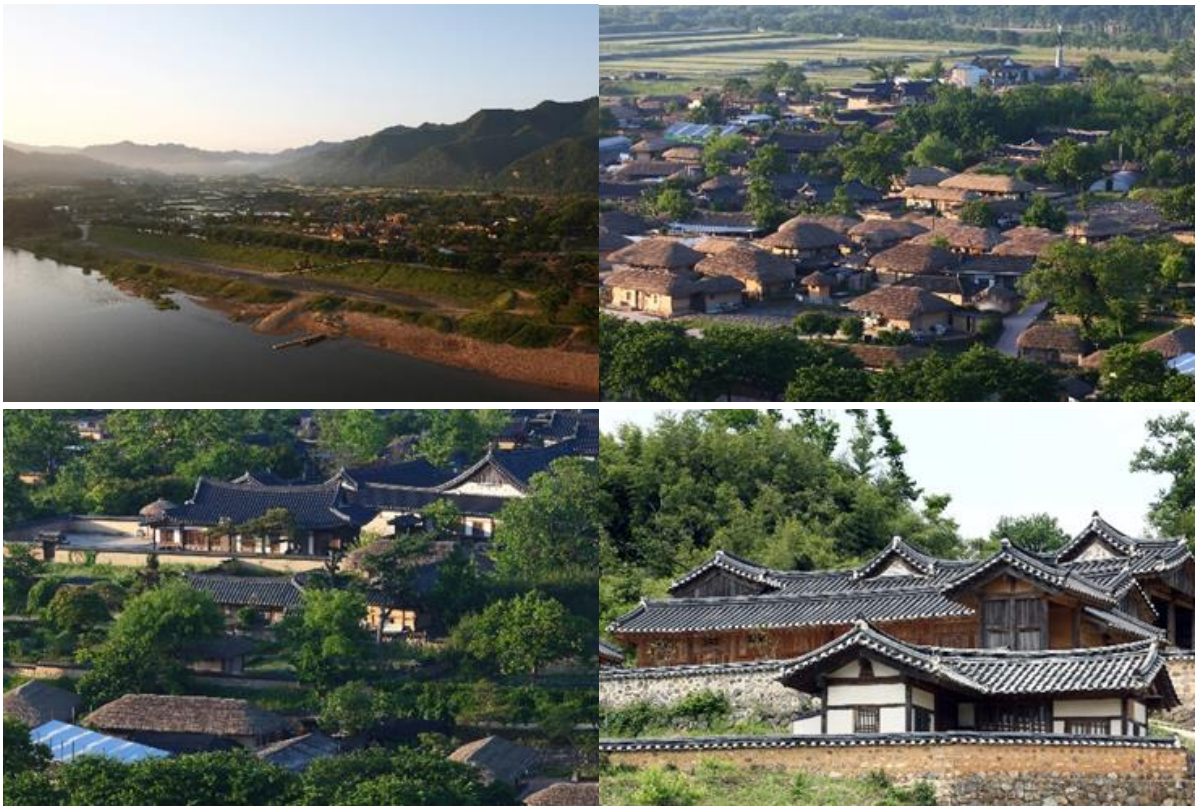

Figure 3-1 Historic Villages of Korea: Hahoe and Yangdong
(Source: Historic Villages of Korea, UNESCO)

However, traditional Korean villages during the period of the KNVM confronted design and planning alternatives specified in Table 3-1: location, settlement patterns, settlement types, building styles, population density, implementation, and basic approach to design and planning. The options marked in red for each category refers to those that the KNVM intended. In this chapter, I address why the KNVM selected these options and how the options transformed Korean traditional villages.

More specifically, this chapter asks the following questions about the KNVM towards sustainable and resilient rural development: Q1) What changed in human settlements of Korean rural villages as a result of the KNVM in the 1970s and what did not change in spite of the KNVM? Q2) What drove these changes to occur and what rational was given for the trend of rapid

urbanization? Q3) How have residents and villagers responded to the KNVM in the past 40 years? Q4) What allows contemporary rural development to be more sustainable and resilient?

Table 3-1 Various Design and Planning Options of Rural Development

Category	Options			
Location	Near Farming	(in between)		Near Service
Settlement Patterns	Isolated	Dispersed	Clustered	Agglomerated
Settlement Types	Isolated Dwellings	Hamlet	Village	Town
Building Styles	Traditional	(in between)		Modern
Population Density	Rural	(in between)		Urban
Implementation	Conservative	Incremental	Transformative	Radical
Basic Approach	Contextualized	(in between)		New

According to the above research questions, this chapter presents a historical analysis based on literature, interviews, and fieldwork, focusing on three temporal periods as shown in Figure 3-2: before the KNVM, during the KNVM in the 1970s, and after the KNVM. The first section regarding the time before the KNVM elaborates Korean traditional settlement logics and patterns: Fengshui, linear villages, and hanoks. The second portion, dedicated to the time during the KNVM in 1970s, specifies the KNVM's two strategies: national-scale plans and village-scale projects. The third section describes the time after the KNVM and summarizes the 40-year adaptations of residents and villagers who have lived in the First Saemaul House and the First Saemaul Village.

Figure 3-2 Historical Interpretation based on Three Temporal Periods

3.2 SETTLEMENT LOGICS AND PATTERNS BEFORE KNVM

It may be challenging and risky to generalize too succinctly the dominant settlement logics and patterns before the KNVM. Nevertheless, three settlement logics in particular, Fengshui, lineage village, and hanok, have been mentioned according to existing literature. Fengshui is regarded as an East Asian traditional ecological knowledge expressing the relation between cultural values and natural environments. Lineage village is thought of as a type of Korean traditional settlements reflecting the neo-Confucian social structure of the Joseon Dynasty (Jeon, 1992). Hanok is a common designation of Korean traditional houses, but I narrowly refer to the houses for local gentry in this chapter that reflected Korean natural environments and neo-Confucian social structure into architectural layouts and styles. However, they were not eternal doctrines, but evolutionary logics shaping Korean settlement patterns over a long period of time.

3.2.1 *Fengshui: Site Selection Logic and Pattern*

Fengshui Theory and Principles as Site Selection Logic

Fengshui [10] originated in ancient China [11]. Literally, Fengshui means of *Feng* (風, wind) and *Shui* (水, water). In addition, the word of Fengshui denotes an abbreviated form of the Korean terms *Changp'ung* [12] (장풍, 藏風, calming the wind) and *Tŏksu* (득수, 得水, acquiring the water). As Fengshui has developed in many different regions and evolved for a long time, it has a variety of regional and historical variations. In applying Fengshui, each region has different natural environments such as climate, topography, and watercourse as well as different cultural backgrounds including regional preference, tradition of planning, and religion. For example,

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10 Fengshui is the term for geomancy used by the Chinese. In fact, Fengshui has been practiced in various parts of China, Vietnam, Singapore, Japan, and Korea. However, Fengshui's pronunciations are slightly different, depending on the country. For example, *Fengshui* is the Mandarin pronunciation. It is called *Fungseui* in Cantonese, *Pungsu* in Korea, *Fusui* in Japan (Yoon, 2006). The theory and principles of Fengshui are often called *p'ungsu chirihak* (풍수지리학, 風水地理學) in Korea.

11 Feuchtwang (1974) describes that no plausible written historical records have been found on the date and place of the beginnings of Fengshui even though some theories have been presented. According to the established theory, the oldest and the most important work of Fengshui is Zangshu (葬書, Book of Burial) written by Guo Pu (郭璞, 276~324) in the Eastern Jin Dynasty (東晉, 317~420), which significantly dealt with theory, method, and practice on landform. Later, Fengshui was developed into two distinct schools: the Jiangxi (江西) school focused on landforms known as the theory of land form (形勢論) and the Fujian (福建) school focused on constellations and cosmological directions known as the theory of land energy (理氣論).

12 The Romanization of Korean language is based on McCune–Reischauer Romanization based on Korean phonetic pronunciation created by George M. McCune and Edwin O. Reischauer in 1937.

Fengshui's general principles on auspicious sites are based on sedentary people like the northern Chinese builders and farmers. Thus, people of nomadic herder origin did not comply with the general principles due to difference of life styles and dwelling places (Yoon, 2006).

Theoretically, Fengshui theory is based on the idea of Qi or *Kiun* (기운, 氣運, life energy) [13] (Lee, 1987). The basic premise of Fengshui theory is that humankind, both the living and the dead are under the control of Qi prevalent in heaven and earth. The Qi on Earth is believed to flow underneath the earth as a conduit and be related to the growth and change of all the phenomena in the world. More specifically, the interaction of two forces, namely *Yin* (陰, dark) and *Yang* (陽, light) exists under the influence of the active cosmic force of Qi. If this Qi is not properly treated, the destiny of man in relation to the site will be affected. In addition, the Chinese have traditionally believed that the currents of Qi and its presence on earth are visibly linked with the geographical features of mountains, watercourses, and vegetation (Smith et al., 2006). Therefore, the starting point of Fengshui theory is that the sites of human dwellings such as graves, houses, villages, and cities must be located at the place where the heavenly Qi and earthly Qi are in constant interaction and in harmony with each other. So to speak, the auspicious site is the place where Qi is primarily accumulated. Selecting an auspicious site is one of the most important roles of Fengshui.

Meanwhile, Fengshui theory has played an important role in site selection logic and settlement patterns in Korea (Yoon, 2006). It is generally recognized that Korean Fengshui started from Doseon (도선, 道詵, 827-898) who was a Korean Buddhist monk in the period of late Shilla

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13 It is difficult to find an equivalent English word for Qi. Qi is frequently translated as life energy, life force, or energy flow. Qi is the central underlying principle in traditional Chinese medicine and marital arts. The literal translation of Qi is breath, air, or gas (Lee et al., 2008).

(신라, 新羅) (Choi, 2016). According to Choi (2006), Doeseon was the progenitor of Korean Fengshui because he had a deep understanding of Korean natural environments through field surveys and applied Fengshui theory to them. In addition, Doseon was especially interested in bibo (비보, 裨補) that is one of the principles of Fengshui theory to restore degraded or unproductive landscapes ecologically through adding new landscape elements (Hong et al., 2006).

According to Fengshui theory and principles, Seoul was selected as a new capital city of the Joseon Dynasty in the late 1300s. Korean Fengshui especially has focused much more on the theory of land form *hyŏngseron* (형세론, 形勢論) rather than the theory of land energy *igiron* (이기론, 理氣論) because about 70% of the land in the Korean Peninsula is mountainous. Conspicuous land forms and terrains have acted as important objects and systems in applying Fengshui theory and principles. Table 3-2 summarizes the dominant theory and principles of Korean Fengshui. The five specific methods deal with mountain systems, site selection, and land shape, ranging from macroscale to microscale.

Table 3-2 Korean Fengshui Theory and Principles

Theory	Method	Goal	Scale
Hyŏngseron (형세론, 形勢論) • Theory of Land Form • Morphology • Water System • Mountain System	Kannyongpŏp (간룡법, 看龍法)	Reading the mountain	Macroscale
	Changp'ungpŏp (장풍법, 藏風法)	Calming the wind	Mesoscale
	Tŭksupŏp (득수법, 得水法)	Acquiring the water	
	Chŏnghyŏlpŏp (정혈법, 定穴法)	Finding the auspicious site	Microscale

	Hyŏngguknon (형국론, 形局論)	Understanding the shape	

(Source: Murayama et al., 1990; Hong et al., 2006)

Fengshui's Settlement Patterns

Unlike Fengshui's symbolic characteristics mentioned previously, Fengshui theory has many spatial diagrams, landform maps, and practice tools representing its general principles. They help Fengshui practitioners to find auspicious sites as well as communicate with each other (Yoon, 2006). Among a variety of graphic representations of Fengshui theory, the auspicious site diagram is the most basic expression of *changp'ung tŭksu* (장풍득수, 藏風得水), which is shown in the left image of Figure 3-3. The drawing's viewpoint is unusual because it consists of partly top views and partly oblique views seen from the center (Lee, 1987). The diagram basically shows spaces surrounded by mountains and watercourses with more open spaces facing the south. The most auspicious site is in the center of the diagram, which is called cave (혈, 穴). In other words, Fengshui assesses geophysical and morphological land attributes such as size, shape, connectivity, pattern, arrangement, and direction of mountain landscapes, and determines the fortunes of dwellers living on the lands *kirhyung hwabok* (길흉화복, 吉凶禍福) (Hong et al., 2006).

Meanwhile, another distinctive pattern called *paesan imsu* (배산임수, 背山臨水) is also commonly observed in the location of Korean traditional villages (Hong et al., 2006). Literally, the pattern means that villages are located with its back to the mountain (背山) and

facing the water (臨水), which is shown in the right image of Figure 3-3. The two patterns of *changp'ung tŭksu* and *paesan imsu* have many ecological characteristics and advantages. First, they are in the proximity of natural resources such as water and mountains. Second, they secure rice paddy or cropping areas by priority because human settlements are located in hilly areas. Third, they are resilient to climate hazards such as flooding, drought, landslides, and cold waves, given the extreme seasonal difference of Korea between summer and winter. Settlement logics and patterns based on Fengshui help villagers and residents to live near local resources, save their energies and labors to survive, and avoid probable natural hazards. Given the limited goods, resources, and technologies before industrialized and modernized society, Fengshui theory reveals that it was a useful ecological knowledge or wisdom in the site selection for human settlements.

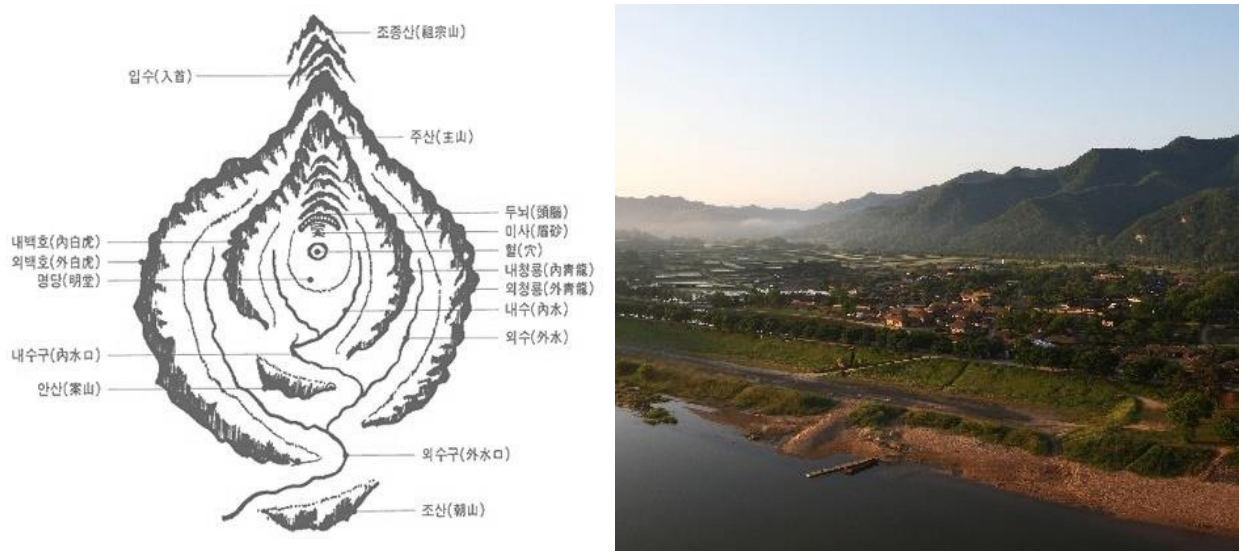

Figure 3-3 Fengshui Settlement Patterns

Note: The left image represents Fengshui's auspicious site diagram called *changp'ung tŭksu* (藏風得水). The right picture shows the auspicious village location called *paesan imsu* (背山臨水).

(Source: Left – Murayama et al., 1990, Right - Historic Villages of Korea, UNESCO)

3.2.2 *Lineage Village: Site Planning Logic and Pattern*

Lineage Village as Site Planning Logic

Following Fengshui theory as a logic for site selection, the idea of lineage village [14] played an important role in site planning logic and patterns of Korean traditional villages. Lineage village refers to traditional villages fundamentally established by ancestors who entered villages *iphyangjo* (입향조, 入鄕祖) during the Joseon Dynasty (조선왕조, 朝鮮王朝, 1392~1897) (Shin et al., 2008). The lineage village was a dominant village type of traditional villages in Korea and has been investigated as an academic subject. According to Zensho Eisuke (善生永助), there were 14,672 lineage villages in 1930 (Zensho, 1933).

The Joseon Dynasty had adopted neo-Confucianism as the state ideology from the dynasty's beginning. Neo-Confucianism is an ethical and philosophical system that emphasized desirable social relationships between people and self-discipline for humanistic persons [15]. In this context, gentry lineage villages *yangban ssijok ch'on* (양반씨족촌, 兩班氏族村) in the Joseon Dynasty were geographical units in realizing neo-Confucianism as strong social norms. Since villagers were related by blood, patrilineal order *chongbŏpchŏk chilsŏ* (종법적질서, 宗法的秩序) or family hierarchy affected all types of relationships between villagers, such as economic, social, and

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14 Lineage village in Korean is as follows: 씨족마을, 씨족부락(氏族部落), 동족부락(同族部落).

15 The principles are well expressed in the Three Bonds and Five Relationships of Confucianism (三綱五倫): 三綱(君爲臣綱, 父爲子綱, 夫爲婦綱), 五倫(君臣有義, 父子有親, 夫婦有別, 長幼有序, 朋友有信) (The specific translations in English are omitted here).

cultural relationships, regardless of the tangible or intangible features. As a result, neo-Confucianism and patrilineal order in the Joseon Dynasty substantially affected architectural characteristics and spatial compositions of the traditional villages (Jeon, 1992).

Lineage Village's Settlement Patterns

In reality, lineage villages reveal patrilineal orders noticeably in their settlement patterns: The first is a spatial hierarchy between ruling class *chaeji sajok* (재지사족, 在地士族) and peasants *nongmin* (농민, 農民). The second is an order among head family *chongga* (종가, 宗家), shrine *sadang* (사당, 祠堂), and branch family *pun'ga* (분가, 分家). According to Jeon (1992), based on four cases of traditional gentry lineage villages in countryside, the patrilineal orders respond with site selection, orientation, mass, and ornament of houses. For example, Yangdong village (양동마을), one of the UNESCO historical villages in Korea, appropriately exhibits the two settlement logics and patterns before the KNVM, namely Fengshui and the lineage village.

First of all, Yangdong faithfully follows Fengshui principles maintaining the functional and scenic integrity of the human settlements (Republic of Korea, 2010). Murayama (村山智順) et al. (1990) described that Yangdong was known as one of the four most auspicious places of the southern region of Korea (삼남의 4 대길지, 三南四大吉地) along with other three villages: Hahoe (하회, 河回), Cheonjeon (천전, 川前), and Yugok (유곡, 酉谷). This selection of auspicious places was based on number of villagers who passed government official examinations

called *Gwageo* (과거, 科擧) as well as site locations and physical conditions of villages according to Fengshui thoery. Second, Yangdong is highly hierarchically organized according to the patrilineal order, even though the village's settlement pattern is seemingly in chaos without spatial hierarchy or orders. As shown in Figure 3-4, the orientation of buildings is controlled not by compass direction along with the preference of southern exposure, but by sightlines from the houses to major landmarks called *Andae* (안대, 案帶), usually peaks of mountains. In other words, the higher the residents' position in the patrilineal order, the better the landmarks visible from their buildings are in terms of the height, prominence, and aesthetic design.

In conclusion, the patrilineal order in the lineage village model played an important role in site planning and architectural design along with Fengshui. In other words, built environments faithfully reflected social structures of neo-Confucianism during the period of the Joseon Dynasty. In the lineage villages, house sites and orientations are not socially interchangeable and equal, but hierarchical and exclusive. The seemingly hidden settlement logics and patterns were influential before the KNVM, which even today shows the continuity and difference. Today's villagers and even urban dwellers have a strong preference for good sightlines to major landmarks or mountains even though the patrilineal order based on neo-Confucianism is no longer influential. It seems that the strong preference of Koreans for mountain views has been psychologically affected by about 70% mountainous land of the Korean Peninsula for a long time.

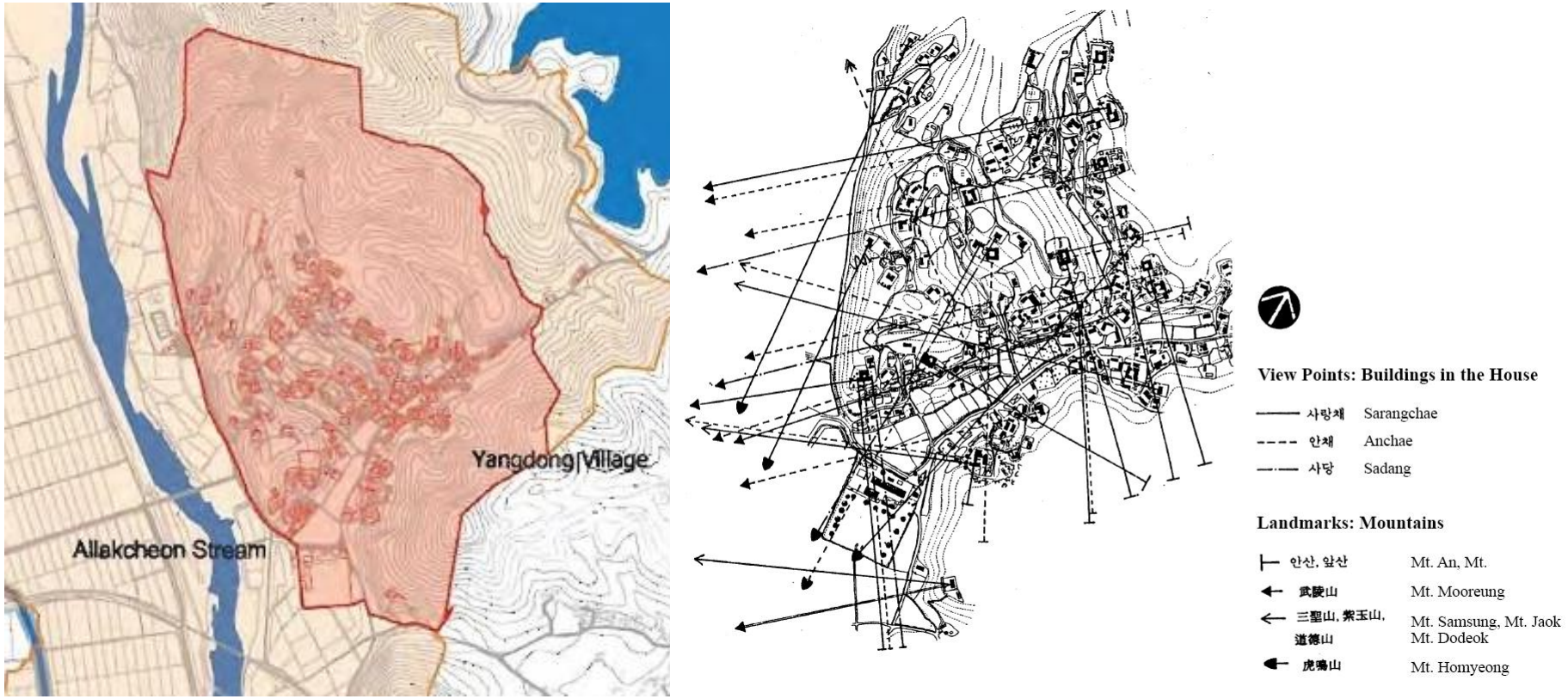

Figure 3-4 Yangdong Village Location and Layout Reflecting Landmarks

(Source: Left - Historic Villages of Korea, UNESCO, Right - Jeon, 1992, added English translation)

3.2.3 *Hanok: House Layout Logic and Pattern*

Hanok as House Layout Logic

Hanok (한옥, 韓屋) refers to Korean traditional houses. There are many different types of hanoks, depending on residents (e.g., king, gentry, common people), regions (e.g., urban, rural) and climates (e.g., north, south, mountain, plain). In this section, I introduce hanoks for local gentry that reflected Korean natural environments and neo-Confucian social structure into architectural layouts and styles. I take Kwangajeong (관가정, 觀稼亭) in Yangdong village as a case. It was a house of Shon, Joong-don (우재 손중돈, 愚齋 孫仲暾, 1463-1529) and famous for its National Treasure designation (국가보물 326 호). The name of Kwangajeong (觀稼亭) means a pavilion for looking to plant grains. Hanoks consist of several or many buildings called *chae* (채), forming a cluster of buildings along with numerous open spaces called *madang* (마당). Hanoks generally have the following buildings (Jeon, 2016, p.122-123):

- *sarangchae* (사랑채): a detached quarters for an upper-class man / men's quarters
- *haengnangchae* (행랑채): servants' quarters
- *anchae* (안채) : a main quarters for the family, main quarters or women's quarters
- *sadang* (사당, 祠堂) : ancestral shrine

According to neo-Confucian social structure, indoor spaces called *bang* (방) are separated each other by sex and social hierarchy. However, semi-indoor or semi-outdoor spaces of hanoks

called *maru* (마루) are connected each other. In addition, men's spaces (i.e., *sarangchae* and *haengnangchae*) are located in the front while women's spaces (i.e., *anchae* including kitchen) at the back. Figure 3-5 shows pictures of Kwangajeong in Yangdong village, which has all of the buildings described above. Kwangajeong is located on the top of the hill, facing south, which signifies higher social hierarchy. In fact, the houses in the location need servants to carry the water from streams or creeks. Meanwhile, since all houses of the village were built in the slope of the land, they have enough sunshine and good views. In the same way, *anchae* of Kwangajeong has also advantages of sunshine and views because of its high elevation. In addition, numerous open spaces called *madang* are so empty that they can accommodate a variety of house activities and provide comfortable openness along with semi-indoor or semi-outdoor spaces called *maru*.

Figure 3-5 Pictures of Kwangajeong

Note: The top picture shows the landscape of Yangdong village. Kwangajeong is located on the top of the hill. The middle pictures show *sarangchae* (men's quarter) and *haengrangchae* (servants' quarter). The bottom pictures show *anchae* (women's quarter) and *sadang* (ancenstral shrine).

(Source: Korean Cultural Heritage Administration)

Hanok's Settlement Patterns

Kwangajeong is composed of combination of same or similar units as shown in Figure 3-6. One unit is formed with four columns. Both indoor spaces called *bang* and semi-indoor spaces called *maru* are structurally the same. The only difference between them is whether it is open or not. As a result, the combination of small units has many advantages in adapting to terrains, building structures, having the unity of design, creating a variety of open spaces called *madang*, and heating individual rooms efficiently. In addition, Kwangajeong clearly shows the fence around the house. The fence is a very important element of hanok. The fence is not for the safety, but for the boundary between the house and natural environments. Since the fence is usually not high, residents can look at surroundings easily. The fence's height varies responding to the contours. Sometimes, the fence has open parts. Through the fence, Kwangajeong separates living spaces

from the ancestral shrine that should be more sacred and quiet. Reflecting natural environments, Kwangajeong keeps its own function and dignity.

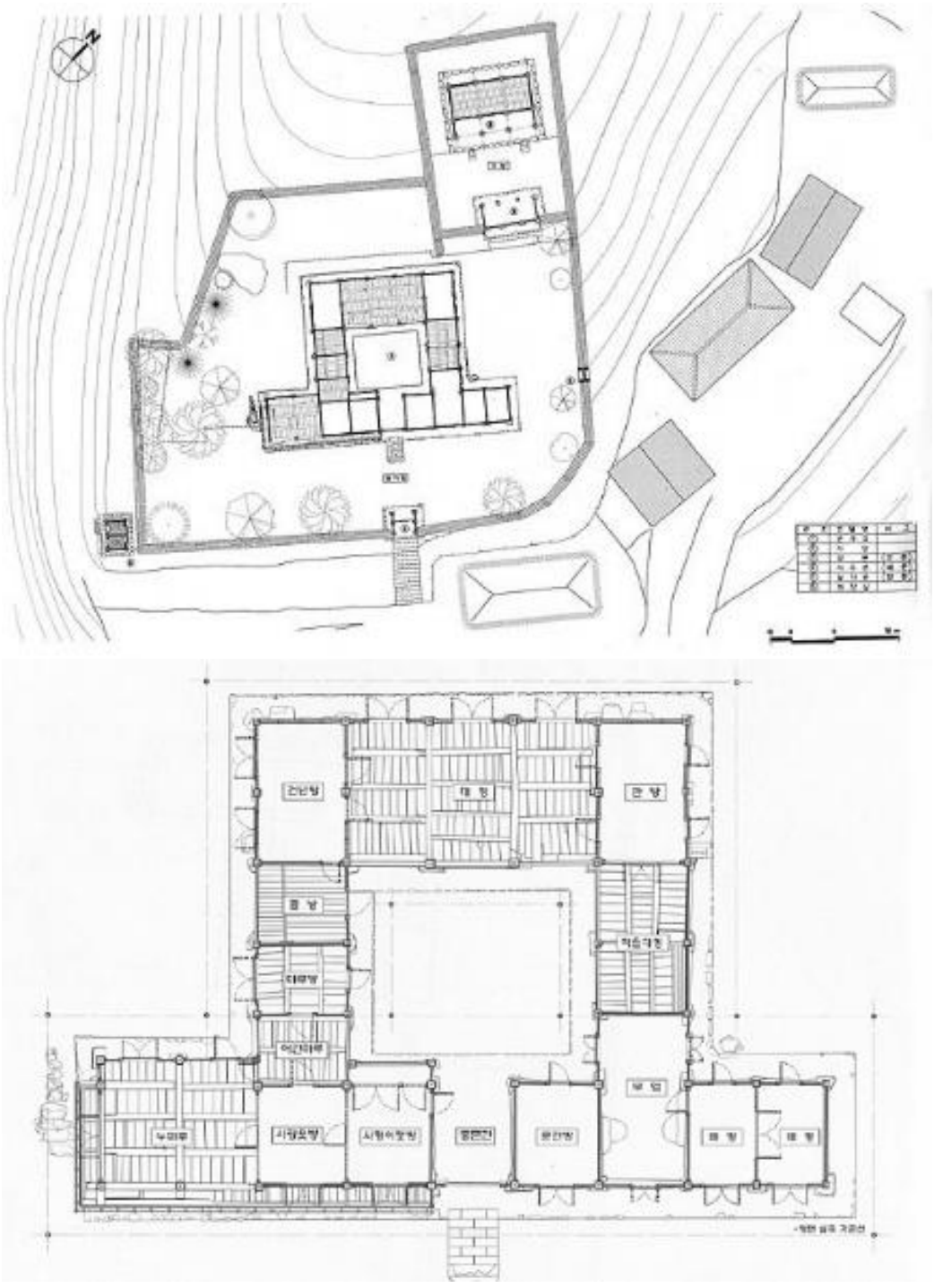

Figure 3-6 Site Plan and Floor Plan of Kwangajeong

(Source: Korean Cultural Heritage Administration)

3.3 TWO STRATEGIES OF KNVM: PRESCRIPTION VS. SHOWCASE

The KNVM has been commonly regarded merely as a strong top-down implementation. However, the KNVM as a transformation of built environments had multi-faceted implementations ranging from strong top-down, to mobilized, and voluntary bottom-up. In order to capture the full picture of the KNVM, this chapter frames the KNVM in two major ways: the KNVM as prescription and the KNVM as showcase, according to the divide between national-scale plans and village-scale projects.

3.3.1 *KNVM as Prescription: National-scale Plans*

3.3.1.1 Background and Rationale

In order to understand the KNVM's national-scale plans, we must also understand the sociopolitical standpoint of South Korea in the early 1970s. Since the Park government assumed absolute power in 1961, local politics in South Korea were under the executive control of the administrative elites of the central government (Boyer et al., 1991). Under these circumstances, Park government led the Five-year Economic Development Plans of 1962-66 and 1967-71, which promoted remarkable economic growth, averaging an annual 9.7% for those years. However, it also exacerbated the economic gap between the rural sector and the urban sector. Boyer et al. (1991) described this point clearly:

> "*Growth in agriculture and rural areas*, however, *lagged far behind that in the industrial sector and urban South Korea*. The average rate of economic growth during *the first five-year plan* was *7.8 percent, but only 5.3 percent for agriculture*. The agricultural sector worsened during *the second five-year plan*, when it grew at an annual rate of *only 2.5 percent, compared to 10.5 percent for industry*. On average a rural household earned

> almost equal income as that of an urban household in 1963, but *only 56 percent of the average urban household income in 1969*." (Boyer et al., 1991, p.32, emphasis added).

However, the rural sector in South Korea was ironically very important to the Park government because it was their political base to strongly support the regime, even though Park and his planners dreamed that the Republic of Korea would become an industrial society (Sorensen, 2011). Park's government knew that the rural sector was very important in order to win the presidential elections. Park was elected to the presidency three times, in 1963, 1967, and 1971, by direct democratic vote from the people. He did, however, amend the constitution to make himself eligible for a third term. Nevertheless, the Park government noticed in the early 1970s that their political popularity was decreasing and they had many political opponents. Thus, Park at last passed the new authoritarian constitution in 1972, which legitimized his dictatorship based on the people's indirect election. The affair was called October *Yusin* (10 월 유신), derived from the *Meiji Ishin* or Restoration, which was an important event that acted as momentum to Japanese modernization in the 19th century. In this context, Sorensen (2011) assessed the rationale of the KNVM as one of Park's *Yusin* regime strategies as shown in the quotation below:

> "The New Village Movement, begun in 1971, was designed in part to shore up *Park's rural support*, and was central to *Yusin developmental strategy*. *The New Village Movement*, in fact, can be paired with *the Heavy and Chemical Industrialization Program* as one of the two legs of Park's Yusin Period development strategy. *Park was personally and deeply involved* in the drafting and implementation of both programs." (Sorensen, p.147, emphasis added).

On top of the economic background and political rationale, it was surprisingly accidental and unintentional to trigger the KNVM in earnest. The KNVM's ideas were actually not initiated

by President Park in the 1970s. When he announced the conception of the KNVM for the first time at the regional ministers' meeting on April 22, 1970 [16], Park introduced Sindo-ri of Chengdo-gun (청도군 신도리) as an excellent example for the KNVM where he had accidentally visited on August 4, 1969 while inspecting flood damage areas in Gyeongsangnam-do (경상남도).

Figure 3-7 Birthplace of the Korean New Village Movement: Sindo-Ri, Cheongdo-Gun (Source: Taken in the Memorial Park for the Birthplace of the Saemual Undong)

16 On this meeting, Park named it as New Village Improvement Program (새마을가꾸기사업) rather than New Village Movement (새마을운동). After the initial success, the official name was changed in 1972.

A history book that Chengdo-gun published in 2012 described an anecdote about how President Park came to visit and know Sindo-ri. According to the history book, Park came across the villagers' active disaster recovery on the train. Park stopped his exclusive train and looked around the village. Park was deeply moved by the villagers' self-sufficiency and cooperation (Chengdo-gun, 2012).

As a result, the KNVM's three main mottos of diligence *kŭnmyŏn* (근면, 勤勉), self-help *chajo* (자조, 自助), and cooperation *hyŏptong* (협동, 協同) were based on his personal experience in Sindo-Ri. Later, the new Sindo-Ri railway station was built right in front of the village in order to propagate his ideas on the KNVM all over the country. Although the village was very small, it had been promoted as a holy village of the KNVM. As shown in Figure 3-7, the railway station was closed and transformed into a memorial park praising the birthplace of the KNVM [17].

3.3.1.2 Historical Progress

The KNVM's energy continued throughout the decade of the 1970s. However, the KNVM's specific implementation had historically shown the distinctive change from New Village Improvement Program *saemaŭl kakkugi saŏp* (새마을가꾸기사업) to New Village Movement *Saemaŭl undong* (새마을운동). Before capturing the distinctive change, it is necessary to point

17 Despite the anecdote of Sindo-ri with President Park, there is an ongoing controversy on the birthplace of the KNVM. Several villages such as Moonsung-ri of Pohang-si and Manwha-ri of Gijang-gun claim to be the real birthplace of the KNVM. Moonsung-ri built its own memorial of the KNVM and filed a lawsuit with their anecdote with President Park against Sindo-ri even though it was dismissed. These happenings reveal that many villages had already been quite passionate about improving and supporting their villages before the KNVM and President Park praised the villages and actively adopted their ideas. (Kim, 2011, June 13).

out President Park's desire and passion for the Republic of Korea as a modern state. As mentioned previously, the KNVM was a political initiative launched in April, 1970. In addition, it has often been said that the KNVM aimed to modernize the rural economy and change the traditional and unscientific mentality of peasants (Sorensen 2011; Oh, 1998). According to Sorensen (1981), the word of peasants in anthropology is compared with two other words of primitive agriculturalists and farmers:

> "*Peasants are distinguished from primitive agriculturalists because they exist within the context of a complex society with state organization and a division of labor by class*. They are not, therefore, mere subsistence agriculturalists; they must produce the provisions not only for themselves but also for those nonagricultural classes that provide administrative services and basic manufactures. In addition, *peasants are distinguished from farmers because they provide directly for most of their own subsistence needs*; they are not primarily entrepreneurs who combine factors of production purchased in a market with the aim of selling their products for cash to purchase their means of subsistence." (Sorensen, 1981, p.83, emphasis added).

However, the KNVM's actual scope and influence were beyond those of so-called rural development or rural support. At the center of the change was President Park's strong top-down leadership. As shown in Figure 3-8, Park often wrote calligraphy in order to clearly present his mottos such as modernization, national regeneration, and development and growth. In other words, President Park tried to emphasize spiritual revolution as well as economic growth. His core mottos of the KNVM were "Let's try to live better" *chal sara pose* (잘 살아 보세), "We can do it" *uri to hal su itta* (우리도 할 수 있다), and "Just do it" *hamyŏn toenda* (하면 된다), which were simple and strong, but more or less vague. The reason why the mottos were strong but vague was that

President Park and his planners wanted to have a loyal and organizational platform like military troops in order to mobilize people and implement national agendas according to changing domestic and international situations such as economic development, industrialization, urbanization, and oil shock. The KNVM was an integrated framework and organization beyond specific goals, plans, and projects, which makes the KNVM distinct from general rural developments. With the name of the KNVM, the government could carry out any plans and projects.

Figure 3-8 Korean New Village Movement

Note: The first calligraphy means modernization of the homeland (조국근대화, 祖國近代化). The second one shows national restoration (민족중흥, 民族中興). Both strongly emphasize patriotism or nationalism. President Park tried to legitimize his strong dictatorship, large-scale mobilization of people, and rapid implementation of government plans and projects with the name of national development.
(Source: Park Chung Hee Presidential Library and Museum)

The KNVM was divided into two major periods according to Boyer et al. (1991): 1970-1972 and 1973-1978. The first period was between 1970 and 1972 for the New Village Improvement Program *saemaŭl kakkugi saŏp* (새마을가꾸기사업). The KNVM started from the pilot projects

of central government distribution of 335 free bags of cement to each of 33,267 villages of South Korea [18]. The villages were expected to use the cement for the ten government-designated village projects comprising the Program for Village Environmental Improvement *maŭl hwan'gyŏng kaesŏn saŏp* (마을환경개선사업) which were mainly for human settlements transformation. More specifically, the Program for Village Environmental Improvement became the initial thrust of the KNVM, expanding from ten first-year target projects to twenty projects thereafter. First-year projects for each village included: (1) reforestation of nearby terrain; (2) broadening village access roads; (3) repairing and improving village dikes; (4) preparing a village compost barn; (5) deepening the village pond; (6) repairing and maintaining the pond; (7) keeping the village, ditches, and gutters clean; (8) constructing a community well; (9) exterminating rats; and (10) establishing a village laundry facility (Boyer et al., p.33).

Although the KNVM provided a lot of discretion to villagers in implementing actual village-scale projects, the KNVM surprisingly achieved huge results which far exceeded initial expectations. For example, according to the government's evaluation in July 1971, the expenditure of the equivalent of U.S. $11 million for the cement had yielded village improvements valued at U.S. $32.6 million, or nearly three times the government's estimate. As a result, the dramatic

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18 Ssangyong Cement Industrial Co. Ltd. (쌍용양회공업, 雙龍洋灰工業) was established in 1962 as a specialized cement production company and known for the first company beginning ready-mixed concrete business in Korea. The company's CEO was Kim, Sung-gon who was a business tycoon and influential politician working as a member of the National Assembly (국회의원, 國會議員) and a chair of the Treasury of the Republican Party (민주공화당, 民主共和黨). He was in charge of political funds. Kim, Jung-ryum, the Secretary General at that time, stated in his memoir that Kim, Sung-gon asked President Park to purchase the overstock of cement in 1970, which was the reason why the KNVM freely distributed the cement in the beginning of the KNVM (Kim, 2006).

success allowed the Park government to pursue a more systematic and planned approach to the KNVM.

The second period was between 1973 and 1979, which became the New Village Movement *Saemaŭl undong* (새마을운동). Since the Park government was much impressed by the unexpectedly huge success based on free labor mobilization, they decided to expand the KNVM to factories from 1974, all villages of urban areas from 1976, schools, and even the military (Saemaul Research Institute, 1980; Jung, 2009). This rapid expansion of the KNVM reveals that the main goal was not for the rural sector alone, but for the whole country's modernization and economic growth. More specifically, the national government classified villages into three categories according to their stages of development: undeveloped or basic *kich'o* (기초, 基礎), developing or self-helping *chajo* (자조, 自助), and developed or self-sufficient *charip* (자립, 自立). The main goal of the classification was for all villages to become developed by 1981 (Integrated Research Institute of Saemaul Movement, 1981). In other words, the KNVM's national-scale plans were mainly based on an awards system for all villages in Korea, which means that the Park government provided more modern resources such as electricity or construction materials to villages deemed superior by actively following the national government's plans and policies.

Table 3-3 indicates how the KNVM was expanded rapidly in the 1970s. It is noticeable that the number of person-days or total hours of work was dramatically increased. Indeed, it is no exaggeration to say that all village-scale projects were implemented by village leaders' devotion and villagers' free labor.

Table 3-3 Historical Progress of Korean New Village Movement

Year	No. of Participant Villages	No. of Person-Days (thousand)	No. of Projects (thousand)	Total Investment (billion won)
1971	33,267	7,200	385	12.8
1972	35,031	106,852	1,099	132.8
1977	36,557	137,193	2,463	463.5
1979	36,271	242,078	1,788	758.2

(Source: Boyer et al., 1991)

3.3.1.3 KNVM and Other Central Government Plans

KNVM's implementation was broad, comprehensive, and adaptive in accordance with the central government's changing agendas. Nevertheless, the KNVM was only one of many related government-led plans implemented during the 1970s that, together, profoundly transformed human settlements and caused changes of population and resource management in Korea (see Table 3-4). It is thus difficult to distinguish the impact of the KNVM alone from those of other programs. In addition, the KNVM acted as an effective and substantive vehicle of labor mobilization to realize President Park's and the central government's goals.

Table 3-4 Central Government-led Plans in 1970s

- Korean New Village Movement (Beginning, 1970-1972) (Expansion, 1973-1979)
- The Third (1972-1976) and Fourth (1977-1981) Five-year Economic Development Plans (경제개발 5 개년계획, 經濟開發五個年計劃)
- The First Comprehensive National Territorial Development Plan, 1972-1981

(1st CNTDP, 제 1 차국토종합개발계획, 第一次 國土綜合開發計劃)

- The Third (1972-1976) and Fourth (1977-1981) Family Plans (가족계획, 家族計劃)
- Long-Term Rural Electrification Project Scheme (1971-1979)
  (농어촌전화사업장기계획, 農漁村電化事業長期計劃)
- The First Reforestation (1973-1981) (제 1 차치산녹화기, 第一次 治山綠化期)

Table 3-5 lists a number of ways in which aspects of the KNVM intersected with other national plans. More specifically, this chapter deals with the Third and Fourth Five-year Economic Development Plans (Economic Wealth) and the First Comprehensive National Territorial Development Plan (Built Environments). Chapter 4.2.2 links the KNVM to the Third and Fourth Family Plans (Fertility). Chapter 5.2.2 connects the KNVM to the Long-Term Rural Electrification Project (Resource Managements) and the First Reforestation (Natural Environments).

Table 3-5 Matrix of KNVM and Other Government-led Plans in 1970s

Category	KNVM's Contribution	Other Relevant Plans
Economic Wealth	Voluntary village-scale implementations were motivated under government's regular evaluation.	The Third and Fourth Five-year Economic Development Plans
Built Environments	Village-scale environmental improvement programs were conducted.	The First Comprehensive National Territorial Development Plan
Fertility	Village-scale women's society monitored and controlled women in childbearing.	The Third and Fourth Family Plans
Resource Management	Electrification was first implemented to outstanding villages for the KNVM.	Long-Term Rural Electrification Project

Natural Environments	The KNVM's organization supported the First Reforestation.	The First Reforestation
Mentality	The KNVM emphasized villagers' mentality such as diligence, self-help, and cooperation to reduce the government's direct support as well as implement the specific plans and projects.	It is not clear to point out specific plans that corresponded to the KNVM in terms of mentality. However, the mentality driven by the KNVM contributed to specific plans and projects.

Five-year Economic Development Plan

The KNVM's contribution to economic wealth of rural villages is regarded as weak or marginal. In addition, the Five-year Economic Development Plans did not affect rural population positively. To be specific, the Third and Fourth Five-year Economic Development Plans put major emphases on the promotion of heavy and chemical industries as well as the KNVM (Song, 1990). Nevertheless, the plans focused much more on economic growth through heavy and chemical industries rather than economic improvement of rural villages. In fact, world economy and Korean economy were very tough and difficult due to the oil crisis of 1973. Park government did not have enough money to support the new heavy and chemical industries even, which resulted in enormous foreign borrowing. As shown in Table 3-6, a few objectives and major policy directions of the Third and Fourth Five-year Economic Development Plans were related to rural population's economic wealth, which are marked in red (directly-related) or orange (indirectly-related). As a result, the KNVM's economic contribution to rural villages was not successful along with Five-year Economic Development Plans.

Table 3-6 Overview of Third and Fourth Five-year Economic Development Plans

Plan	Period	Growth Rate	Objectives
			Major Policy Directions
Third FYP	1972~6	8.6 [a] (10.2)[b]	1. Harmonizing growth, stability, and equity 2. Realizing a self-reliant economy 3. Comprehensive national land development and balanced regional development
			1. Self-sufficiency in food staples 2. Improving the living environments in rural areas 3. Promotion of heavy and chemical industries 4. Improving science, technology, and human resources 5. Development of national land resources and efficient spatial distribution of industries 6. Improving the living environment and national welfare
Fourth FYP	1977-1981	9.2 [a] (5.7) [b]	1. Achievement of self-sustaining economy 2. Promoting equity through social development 3. Promoting technology and improving efficiency
			1. Self-sufficiency in investment capital 2. Achieving balance payments equilibrium 3. Industrial restructuring and promoting international competitiveness 4. Industrial restructuring and enhancing international competitiveness 5. Employment expansion and manpower development 6. Improving living environment 7. Expanding investment for science and technology 8. Improving economic management and institutions

Note: a - planned growth rate, b - achieved growth rate)

(Source: Song, 1990)

Comprehensive National Territorial Development Plan

The KNVM's contribution to built environments of rural villages was amazing. On the other hand, the First Comprehensive National Territorial Development Plan focused much more on growth poles rather than rural villages. More specifically, the First Comprehensive National Territorial Development Plan was led by the central government to pursue the profit and adopted a growth pole development strategy. The government assigned Seoul, Incheon, Busan, and Ulsan as growth poles and heavily invested in those cities in order to obtain maximum profit with limited resources. In addition, the government categorized the entire country into four Great River regions (i.e., Han River, Geum River, Youngsan River, and Nakdong River), eight regional sectors (i.e., Capital region, Taebaek region, Chungcheong region, Jeonju region, Gwangju region, Jeju region, Daegu region, and Busan region), and seventeen sub-regional sectors, and applied different strategies to each region.

Nevertheless, Moon et al. (2013) argues that the First Comprehensive National Territorial Development Plan caused undesirable problems even though it contributed to rapid economic growth and building physical foundations for the development of Korea. Although the government expected that the growth pole strategy would spill over to the other regions, the strategy exacerbated development gaps between cities, especially those that were concentrated on the capital region and the southeast region. As a result, the KNVM's contribution to built environments of rural villages was much more influential and positive than the First Comprehensive National Territorial Development Plan.

3.3.2 *KNVM as Showcase: Village-scale Projects*

3.3.2.1 Park Chung-hee's Experiments

It is difficult to ignore President Park's involvement in elaborating the KNVM's village-scale projects. Despite that President Park was a strong dictator, his actual administration showed an unusual direct involvement in government-led plans and projects, including the KNVM. His life and career reveal why and how he was able to be so deeply involved.

The life of the man Park, Chung-hee shows an ambitious, opportunistic, and desperate personality. He was born as the youngest son of a local collapsed gentry in 1917. He won admission to the Daegu Teacher's Gymnasium, which was a favored high school for prospective primary teachers. After graduating from a five-year study in 1937, he was a primary teacher for three years. Then, he voluntarily joined the Manchukuo Imperial Army Academy, and completed his study with top marks in 1942. Thus, he was able to be selected for officer training at the Army Staff College in Japan, where he graduated third in his class. After World War II, he went on to serve in the military of the Republic of Korea. He became a leader of a military coup on May 16, 1961, which allowed him to have absolute power for 19 years. However, he was shot dead on Friday, October 26, 1979 by Kim, Jae-kyu, the director of the KCIA who was his loyal subordinate for a long time. Director Kim argued in his trial that he shot the heart of Park's *Yushin* regime for democracy in Korea. However, there is still a number of controversy on Director Kim's true intention and whether it was accidental, planned, or instigated. The following conjectures are frequently mentioned: Director Kim's repeated disappointment to Park's *Yushin* regime; internal power rivalry between Director Kim and Cha, Ji-chul, President Park's Chief Bodyguard; conspiracy instigated by the American CIA to prevent President Park's development of a nuclear weapon.

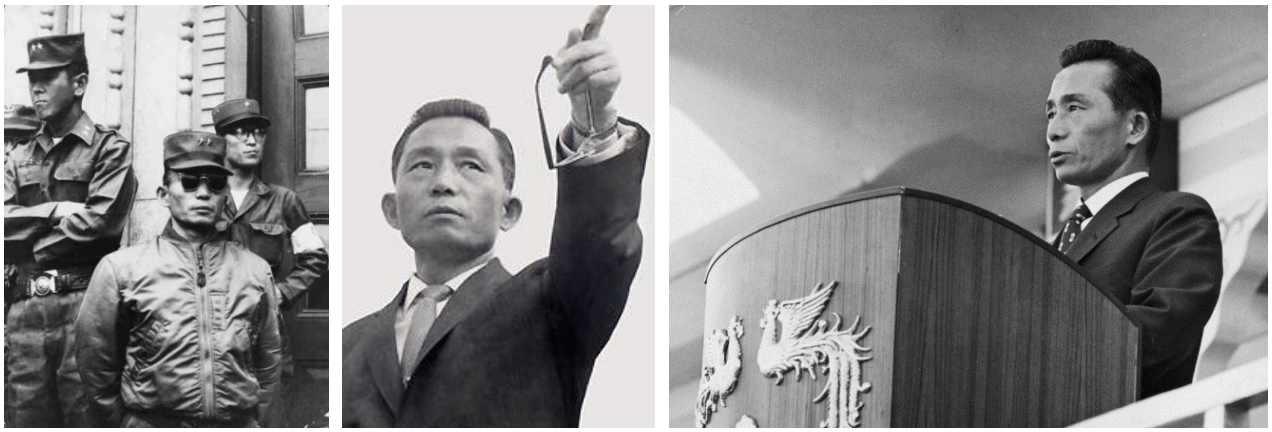


Figure 3-9 President Park, Chung-Hee (1917-1979)

Note: Many historical pictures of President Park show his charismatic appearance. Although he was smaller than 165cm, he imprinted strong and frightening images as a leader of military coup and later an authoritarian president.
(Source: Park Chung Hee Presidential Library and Museum)

President Park was the most influential and experimental actor in the KNVM's conversion towards new built environments, especially in the beginning of the KNVM. He was not someone to preach vague agenda and later receive the progress report. Rather, he deeply engaged in national core projects such as the Gyeongbu (Seoul-Pusan) Expressway, the Saemaul Movement, and the Heavy and Chemical Industrial Complex. For example, he personally drew sketches, calculated necessary resources, composed a song for the KNVM, and designed a model farmhouse and villages for the KNVM including the First Saemaul House, the Saemaul Countryside Construction Plan, and the First Saemaul Village. Since he was trained as an elementary school teacher before becoming a soldier, he had basic skills including calligraphy, painting, music, math, and note-taking. In fact, it would be more accurate to say that his politics was a series of experiments rather than professional-level output leadership.

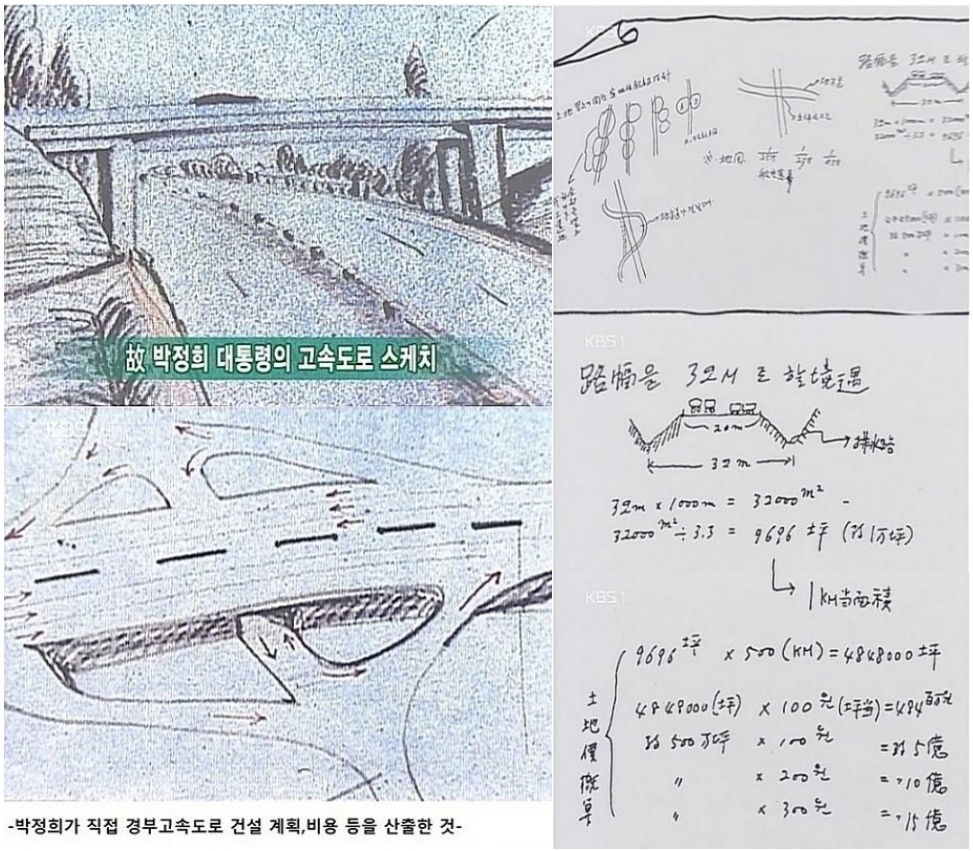
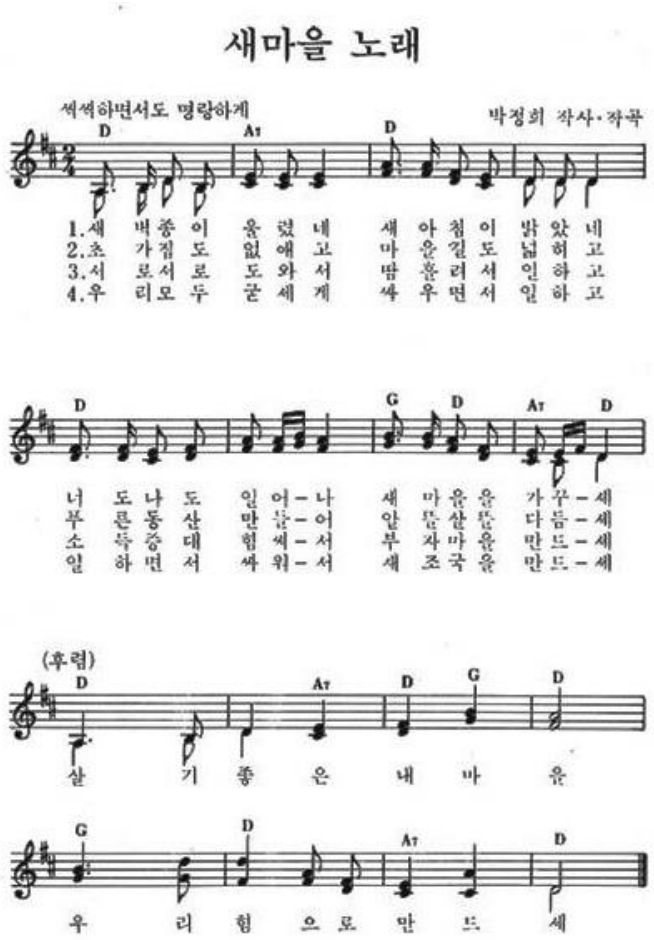


Figure 3-10 President Park's Sketches

Note: The sketches were for the Gyeongbu Expressway. The left sketches show an interchange of expressway as a road junction in the transportation system. The right sketches display placement of reinforcement bars and calculation of estimated costs in building the expressway. (Source: Park Chung Hee Presidential Library and Museum)

Interestingly, President Park's ideas and visions for the KNVM were well condensed into the Saemaul Song (새마을 노래). Park wrote both the words and the music on April 21, 1972. Since then, the song was repeatedly broadcasted every morning and every evening. The song and the green Saemaul Cap (새마을 모자) having the Saemaul Logo (새마을 로고) at the center of the cap came to be the KNVM's symbols, which still strongly represent the KNVM. The song and its translation in English are in Figure 3-11. Overall, the song encourages peasants to work hard

and to build new villages, which are related to modernizing their mentality (*"Let us get up and build a new village"*, *"let us build a new country"* marked in red). Meanwhile, the song also shows specific strategies or tactics in the lyrics. For example, the second verse is related to built environments and resource management (*"Remove thatched roofed, Widen village roads"* marked in red) and natural environments (*"Let us create green hills and tend carefully"* marked in red). On the other hand, third verse is connected to economic wealth (*"for income boost"*, *"let us create a rich village"* marked in red)



Translation of Lyrics

1. Dawn bell ringed, new morning started
Let us get up and build a new village

(Refrain)
My good village for living
Let us build with our hands

2. Remove thatched roofs
Widen village roads
Let us create green hills and tend carefully
(Refrain)

3. Help each other, work in the sweat
Strive for income boost
Let us create a rich village
(Refrain)

4. We all, strongly work while fighting
Fight while working
Let us build a new country
(Refrain)

Figure 3-11 Saemaul Song (1972)

Note: Words and music by President Park, Chung-hee / Translated by the author [19]

[19] The Saemaul song can be played to the following audio source of YouTube, https://www.youtube.com/watch?v=fiafEyklqxU

3.3.2.2 First Saemaul House, Yongin, 1972

President Park's first experiment of village-scale projects was a small house in Yongin, located about 40 km from south of the President's House commonly called Blue House (청와대, 靑瓦臺) in Seoul. The First Saemaul House (새마을주택) was designed by President Park as a weekend farmhouse and built near the Gyeongbu Expressway (Seoul-Pusan Expressway, 경부고속도로) in January 1972 with the help of local carpenters. This house had been a secret safe house (안가, 安家) for a long time. Meanwhile, President Park had routinely used many secret safe houses in order to hide his private life and informal political activities since the late 1960s. Ironically, he was assassinated by his long subordinate at the secret safe house of Gungjeong-dong (궁정동) right in front of the Blue House in 1979. Nevertheless, the succeeding military governments led by President Chun, Doo-hwan and President Roh, Tae-woo had continuously used the secret safe houses until President Kim, Young-sam launched a civilian government in 1993 (Kwon, 2008, November 14).

Although the First Saemaul House is not widely known, it has been reported in the media several times. From previous news articles, I contacted and met the current resident, Director Lee, Byoung Hwa, who was an agricultural secretary for President Park in the past. He is currently running a small farm on this site under the foundation name of the International Agricultural Development Institute (재단법인 국제농업개발원 부속 기흥농장). The house, including a small farm, has been managed and operated by Director Lee since 1972. The organic agricultural products harvested from the farm have been provided to the President's House for about 26 years

ranging from 1972 to 1997 and are currently being provided to the United States Forces in Korea. While interviewing Director Lee, I found him to be very loyal to President Park and still has deep admiration for the former President Park. For these above reasons, the house has been well preserved with its original built form, even though it was partially renovated and expanded in 2006 to make it more livable for Director Lee's family, with additions relating to the kitchen, bathrooms, and additional bedrooms. Director Lee has also used furniture, farming tools, and keepsakes which President Park personally used in the 1970s.

Figure 3-12 First Saemaul House's Current Resident, Director Lee

Note: The left picture shows not only portraits of Park and his wife, but also many medals and plaques which Director Lee has won. Meanwhile, the picture on the right displays a lot of farming tools which President Park had personally used in 1970s.

Figure 3-13 Site Map of First Saemaul House, Yongin

According to Director Lee, President Park wanted to test his idea on new rural houses with this experiment of built environments. As shown in Figure 3-13 and Figure 3-14, the house consists of three different buildings: the main building of 122 m^2 or 37 pyeong (평, 坪), an accessory building of 76 m^2 or 23 pyeong, and a storage building of 59 m^2 or 18 pyeong. On top of that, there is a front yard, which is currently being used as a parking space, and farming areas, including many vinyl greenhouses. The buildings were mainly built using general 6 inch-cement blocks,

with the normal 6” width, 8” height, and 16” length, which were commonly used to build walls and houses at that time.

According to Director Lee, President Park participated in farming here or met village leaders and villagers secretly in order to monitor what was actually happening to rural villages, including the KNVM implementation. For this, President Park often tried to pretend that he was not a president in order to have a conversation with them in a comfortable manner. Director Lee described an interesting anecdote, “President Park usually asked me to let village leaders and villagers get drunken in order not to identify President Park exactly. Once they were more or less drunken, he pretended to be a public officer and had a conversation with them.” I discuss the resident’s 40-year adaptation to the First Saemaul House more specially in Chapter 3.4.2.1 First Saemaul House’s Adaptation.

Figure 3-14 First Saemaul House, Yongin

(Source: Lee, Monthly Joseon, August 2008)

3.3.2.3 Saemaul Countryside Construction Plan, 1972 [20]

While interviewing Director Lee, he introduced an interesting history on President Park's village-scale experiments after the First Saemaul House. As an actual built example, he told me of a village in Cheonan, which is described in the next section. According to his explanation on the village, I consulted old newspapers databases and traced relevant references from the National Archives of Korea (국가기록원) and the library of Seoul National University. As a result, I discovered the Saemaul Countryside Construction Plan published in 1972.

Although the plan was a 46-page-long report, it clearly described what President Park and his planners pursued in the beginning of the KNVM and how they tried to realize their ideas. As shown in Figure 3-15, the plan report included content such as goals, objectives, principles, problems and improvement directions, settlement types, settlement planning elements, basic plans, implementation plans, project implementation strategies, and model house floor plans. In addition, the plan exactly corresponded to the newspaper article by Kyunghyang Shinmun on March 8, 1972. According to the article, the plan was to construct nine model villages near main expressways over the country. However, it did not explicitly mention the KNVM at all because the year of 1972 was quite early in the period of the KNVM. The goal of model villages was to agglomerate and collectivize scattered rural farming houses. For this, each province had its own model village. Nine model villages were selected based on their locations, and were classified as either a mountain or plain type of village. Further, the village in Cheonan was also on the list of model villages, which was a special experiment by President Park, according to Director Lee.

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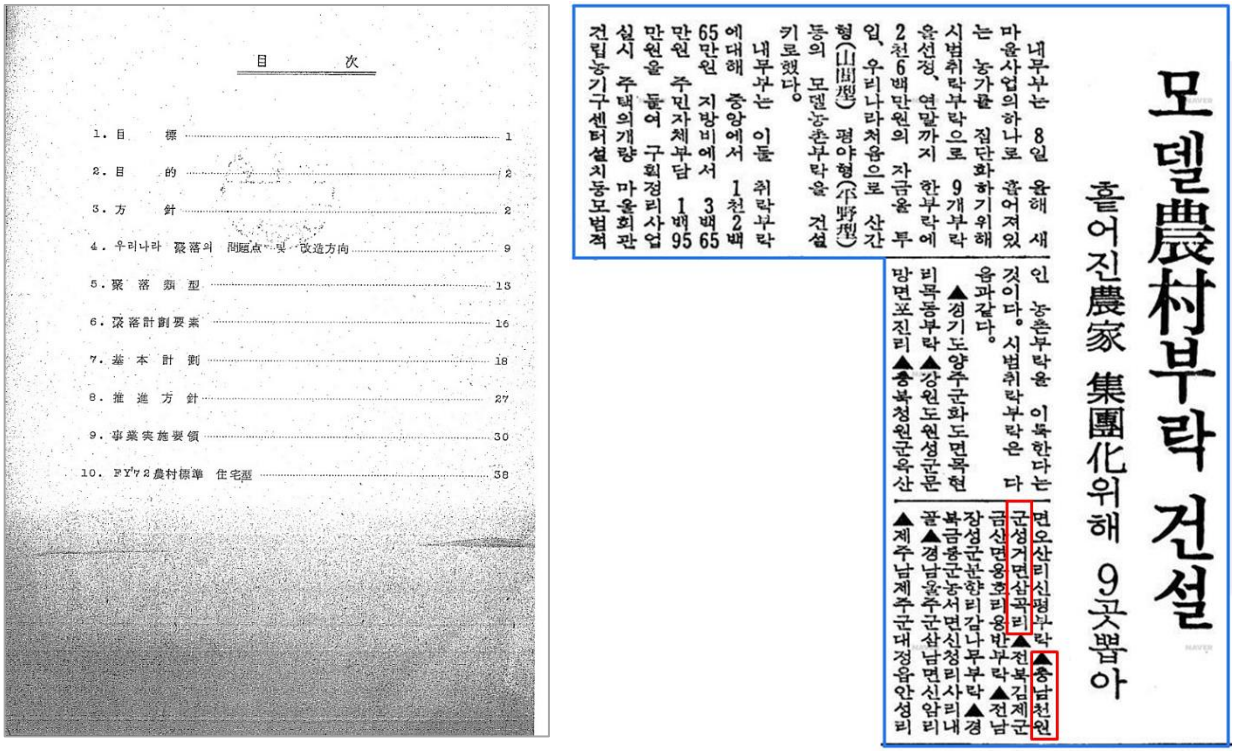
20 This plan report was entitled in Korean with 새마을농촌건설계획: 시범취락건설분산농가집단화계획 (새마을 農村建設計劃 : 示範聚洛建設·分散農家集團化計劃).



目 次

모델農村부락 건설

흩어진農家 集團化위해 9곳뽑아

내부부는 8일 융해 새 마을사업의하나로 흡어져있는 농가를 집단화하기위해 시범취락부락으로 9개부락 을선정、연말까지 한부락에 2천6백만원의 자금을 투입、우리나라처음으로 산간형(山間型) 평야형(平野型) 등의 모델농촌부락을 건설키로했다。

내부부는 이들 취락부락에대해 중앙에서 1천2백 65만원 지방비에서 3백65만원 주민자체부담 1백95만원을 들여 구획정리사업 실시 주택의개량 마을회관 전립농기구센터설치등모범적인 농촌부락을 이룩한다는 것이다。시범취락부락은 다음과같다。

▲경기도양주군화도면목현리목동부락 ▲강원도원성군문막당면포진리 ▲충북청원군옥산면오산리신평부락 ▲충남천원군성거면삼곡리 ▲전북김제군금산면용호리용반부락 ▲전남장성군북하면향리감나무부락 ▲경북금릉군농서면신정리사리내골 ▲경남울주군삼남면신암리내 ▲제주남제주군대정읍안성리

Figure 3-15 Saemaul Countryside Construction Plan and Relevant Newspaper Article
(Source: Left - Ministry of Home Affairs, 1972, Right - Kyunghyang Shinmum, 1972, March 8)

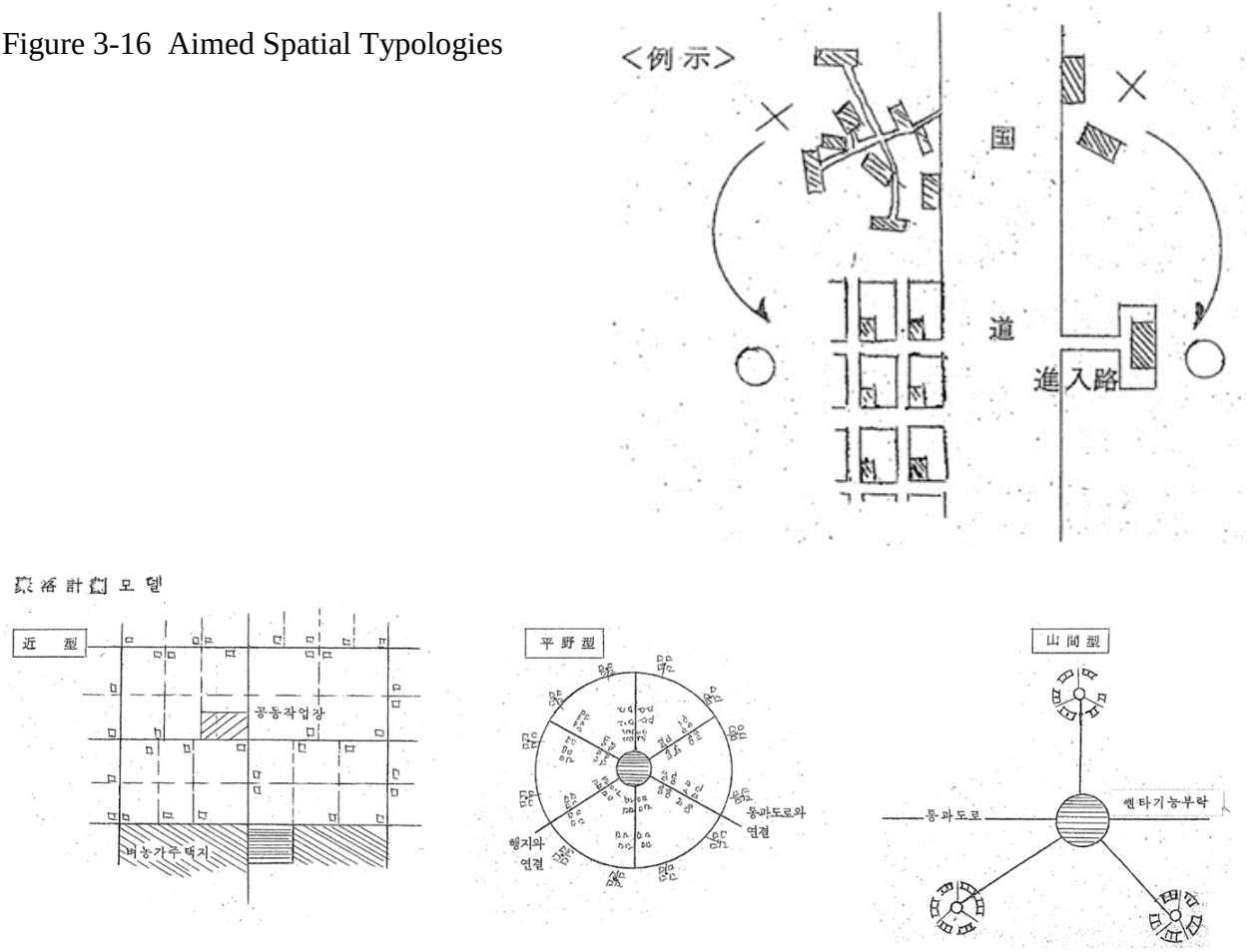
Beyond the above news article, the plan report provided many explicit details on the KNVM. First of all, the plan report clearly identified the goals as follows:

- 農村을 都市化하자 (Urbanize the countryside)
- 農村을 基本的 都市形態로 構成 (Organize the countryside with basic urban forms)
- 農村聚落의 都市性格化 (Transform rural settlements into urban characters)

In other words, the KNVM strongly aimed to radically urbanize rural places through urban forms and urban characters, rather than sustaining or retrofitting rural settlements. According to the plan report, rural settlements were seemingly so irrational and inferior that they required transformation into urban settlements. I captured the KNVM's spatial typologies of human settlements from the plan report as shown in Figure 3-16, which vividly reveals the KNVM's ideas and directions on

human settlements. According to the series of diagrams, the KNVM emphasized regular and functional village layouts rather than organic and contextual ones. In addition, the KNVM valued a space zoning concept consisting of a single village center and surrounding periphery areas no matter what patterns the villages were, for example, grid, circular, or triangular. Fundamentally, the plan report was to require village-scale physical reorganization and human displacement from existing rural settlements to nearby urban or pseudo-urban settlements.

Figure 3-16 Aimed Spatial Typologies



For the target village patterns, the plan report addressed two key diagrams showing plan scopes and strategies for built environments to be transformed as shown in Figure 3-17: village redevelopment and house improvement. More specifically, the village redevelopment emphasized

standardized land division, clear road patterns, functional zoning, and public facilities including village halls and farming tool and equipment centers. Meanwhile, the house improvement ideas pursued house standardization, model house dissemination, compact floor plans, and the use of standardized construction materials. The KNVM regarded traditional rural settlements as poor quality and inefficient environments that needed to be converted into modern urban settlements. For this, the KNVM aimed at regularization of settlement patterns, standardization of houses and construction materials, and zoning of village layouts without acknowledging any cultural and practical values of traditional rural settlements.

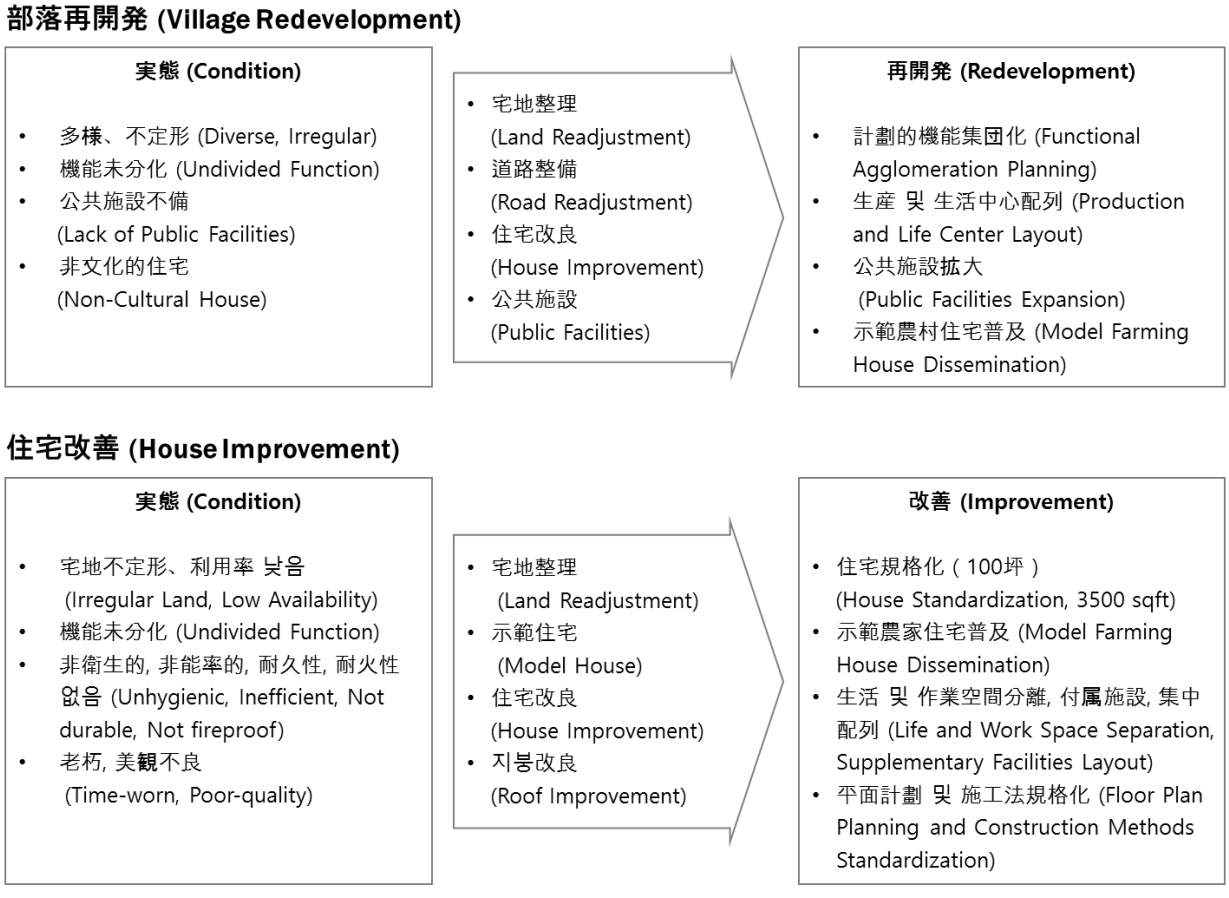


Figure 3-17 Plan Scope and Strategy

The above radical approach to transform built environments culminated with standardized floor plans as shown in Figure 3-18. The plan report suggested three types of floor plans such as minimum, general, and ideal. They were mainly named based on how many living rooms, bedrooms, and kitchen they had, as shown in Table 3-7.

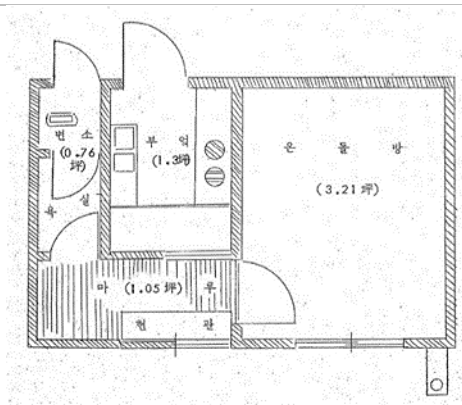
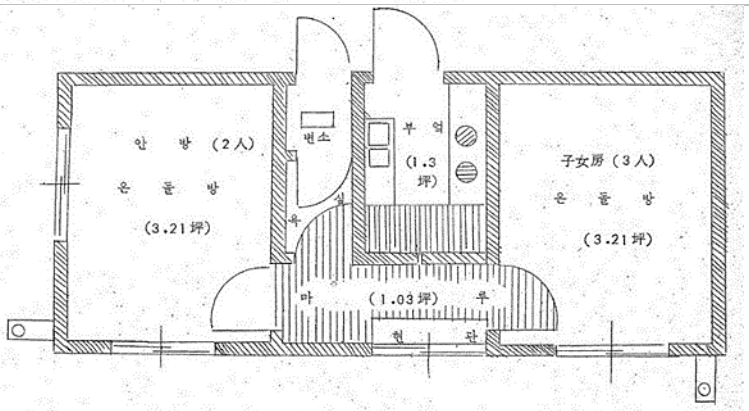
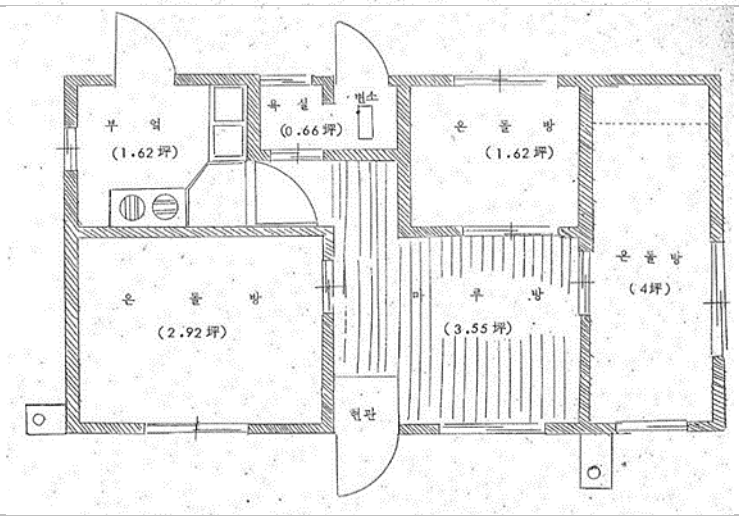
Type 111-2 Minimum (**最小型**)	
Type 121-2 General (**一般型**)	
Type 131-2 Ideal (**理想型**)	

Figure 3-18 Floor Plan Types

The suggested floor plans had relatively small house sizes from 200 to 600 ft^2 even though Type 131 was called an ideal type. As a result, living rooms more closely resembled hallways than livable rooms. In addition, the floor plans followed compact apartment plans far from traditional courtyard houses. Further, toilets and baths were regarded as additional house components that did not need to be located inside of the house, which was similar to traditional rural houses. In this regard, it is questionable that the floor plans could accommodate the lifestyles of the rural population, including farming.

Table 3-7 Floor Plan Variations by Types

Type	Basic			Additional		House Size	Family Size
	Living	Room	Kitchen	Toilet	Bath		
111	1	1	1			6-9 坪 (210-320 ft^2)	3
111-1	1	1	1	1			
111-2	1	1	1	1	1		
121	1	2	1			9-12 坪 (320-430 ft^2)	5
121-1	1	2	1	1			
121-2	1	2	1	1	1		
131	1	3	1			More than 12 坪 (>430 ft^2)	More than 7
131-1	1	3	1	1			
131-2	1	3	1	1	1		

In fact, rural houses are not only living spaces for residents, but also working spaces for farming, which are quite different from compact apartments tailored to urban lifestyles. Korean traditional rural houses have enough outdoor spaces to accommodate farming related-works. For example, the empty front yards and courtyards of traditional rural houses allow for a variety of

farming activities: arranging farming tools and equipment, preparing farming works, planting a seeding, drying rice and red peppers, threshing grain, and even doing small vegetable farms. However, the suggested floor plans above did not show the outdoor farming spaces of rural house. Furthermore, the indoor spaces are too compact to accommodate a variety of farming activities. In conclusion, they do not fit rural lifestyles well.

3.3.2.4 First Saemaul Village, Cheonan, 1974

I conducted the field research for the First Saemaul Village in Cheonan, which was an actual built village project that followed the First Saemaul House and the Saemaul Countryside Construction Plan in 1972. As mentioned above, Director Lee advised me to visit this village as an example of President Park's built environments experiment. The village is located in Samgok-ri, Cheonan-si right near the Gyeongbu (Seoul-Pusan) Expressway as shown in Figure 3-19.

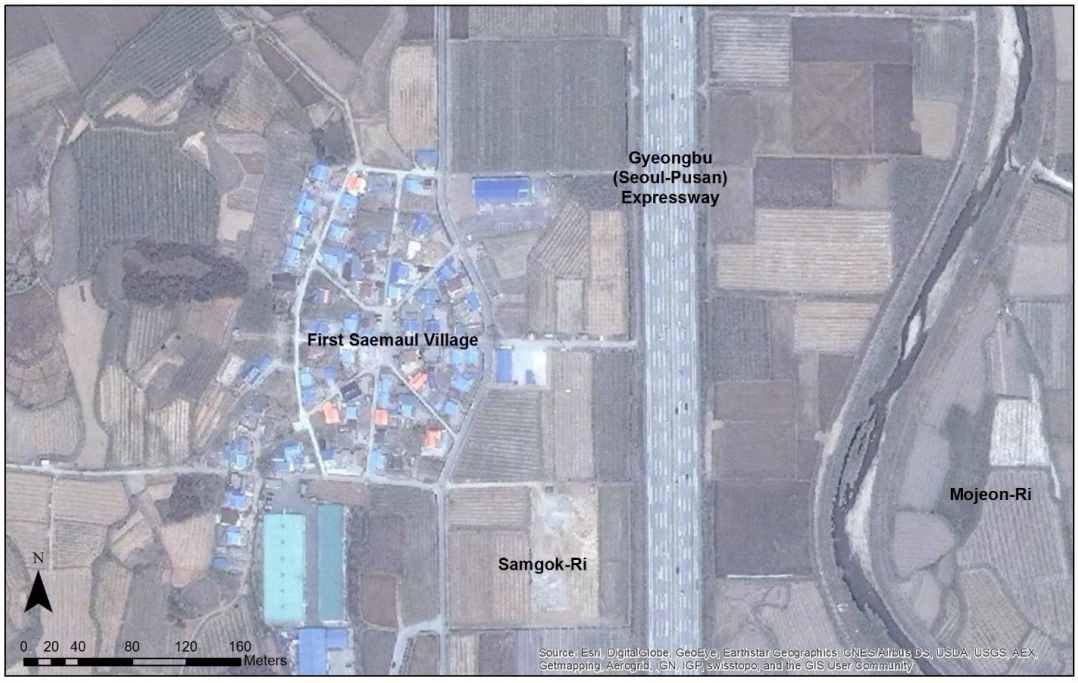


Figure 3-19 Site Map of First Saemaul Village, Cheonan

This village was entirely built in 1974 as a compact village form; its construction required the demolition of existing traditional rural houses and agglomeration of scattered villages. At a glance, I recognized that the village layout had a distinct hexagonal pattern that reminded me of Doxiadis' work described in Chapter 1 even though I could not find no evident connection between them. In addition, the village has a conspicuous central area where eight main roads pass diagonally. In the central area, there are public or common facilities including a village hall, a farming tool and equipment center, and parking lots.

While conducting the field research, I met and interviewed the head of the village, Lim, Kyung Uk. He provided the village's old pictures before the project of the First Saemaul Village. In addition to the pictures, I found relevant pictures from the online archive named 100 years of Modernized Agriculture in Korea (한국농업근현대화 100 년) built by the Rural Development Administration (농촌진흥청). To compare the Samgok-ri landscape before and after the project of the First Saemaul Village in 1974, I organized relevant visual images as shown in Figure 3-20.

The interview with the head of the village Lim revealed that the First Saemaul Village corresponded to the Saemaul Countryside Construction Plan in terms of the project scope, strategies for land and road readjustment, and house improvement through model houses. Lim described that he was born in 1958 and was a middle school student during the construction period of the First Saemaul Village. Since then, he has lived in this village. According to Mr. Lim, the village was completely reconstructed at that time and each house was distributed to each family household according to real estate appraisals for sizes and locations of the previous houses. While building the village and houses, villagers had to live in temporary buildings such as tents near the construction site.

After that, they were relocated to new houses. Mr. Lim remembered that villagers were very happy when they moved there because they had new built environments and convenient resources including water, sewage, and electricity. Although each house came to have smaller yard spaces than before, the village had public facilities at the center of the village. He also mentioned that this project allowed the village to have almost three or four times more houses and villagers than neighboring traditional villages had. Since then, the village has not experienced further radical transformation of built environments, even though it had minor changes or improvements throughout the years.

Figure 3-20 Samgok-Ri Landscape, before 1972 (Top) and 2014 (Bottom)

(Source: Top Left – Rural Development Administration, Top Right Three – Collected from the village head, Bottom Left – Captured from the aerial picture of NAVER, Bottom Right Three – Taken in the village by me)

Mr. Lim described that the project implemented three house types (Type A, B, and C) which had different floor areas, different room arrangements, and different roof shapes as shown in Figure 3-21. Most of the residents have lived in their houses since the village was newly built in 1974. In addition, most of the house has been well preserved or slightly renovated, allowing me to imagine the original built forms.

Type A	
Type B	
Type C	

Figure 3-21 Current Buildings by Types

3.4 FORT-YEAR VILLAGERS' ADAPTATION TO KNVM'S CHALLENGES

3.4.1 *KNVM's Main Challenges*

No matter how positive or negative the KNVM village and housing designs were, residents and villagers have adapted to the new rural settlements over the past 40 years. The KNVM's main challenges have been caused by the difference between traditional and KNVM houses and villages as shown in Table 3-5, which led residents and villagers to transform or adapt to their new built environments. In terms of resilience theory, I interpret the differences summarized in Table 3-5 as representing a regime shift in the physical form of rural settlements in Korea.

Table 3-8 Comparison between Traditional vs. KNVM Houses and Villages

Category	Traditional Houses and Villages	KNVM Houses and Villages
Ideology	Fengshui, Neo-Confucianism, and Architectural Tradition	High-Modern and Pseudo-Western
Driver	Social Norm and Cultural Practice	Strong Top-down Implementation
Rationale	Proximity to Farming	Proximity to Modern Resources
Functional Preference	Shelter	Service and Infrastructure
Formation Process	Long and Incremental	Short and Rapid
Village Pattern	Organic and Contextual	Regular and Centered
Building Layout	Loose and Irregular	Compact and Standardized
Construction Materials	Natural Materials	Industrial Products

This still bears the question of what has and has not changed in rural villages through the KNVM's village-scale projects. For this comparison, I created two sets of diagrams drawn at the

same scale in Figure 3-22: Yangdong village as a traditional village (top diagrams) and the First Saemaul Village as the KNVM village (bottom diagrams). I do not argue that they are samples to represent each village, but they provide detailed information and intuitive insights for each settlement pattern. Comparatively speaking, traditional houses of Yangdong village are scattered in the hilly area and sparsely distributed along the contours. Most of the houses are located in the valleys in order to obtain water. Village roads are tightly related to the terrains. As discussed in Chapter 3.2.2, houses' orientation is mostly a southern exposure and varies according to the patrilineal order of houses and sightlines to major landmarks. On the other hand, the KNVM houses of the First Saemaul Village are located in the plain area near the expressway and highly concentrated near the single center of village. Village roads are not relevant to the terrains and forms a hexagonal geometric pattern. Houses' orientation was an eastern exposure heading to the expressway.

In conclusion, residents and villagers relied on agriculture for their living even though the KNVM provided new houses and villages. The KNVM's rapid transformation of built environments aimed at creating regularity, centrality, zoning, and standardization. However, the KNVM did not embrace traditional rural settlements developed and tested over the past hundreds or thousands of years. Traditional houses and villages had the advantages of accessing agricultural lands and responding to local contexts including water, terrain, and climate. On the other hand, the KNVM houses and villages had the advantage of accessing modern or urban resources such as health, education, and market, and lowering infrastructure costs relating to continuous updates of resource management. Nevertheless, the KNVM houses and villages came to confront the issue of high dependence on modern or urban resources unlike the self-sufficiency of traditional houses and villages.

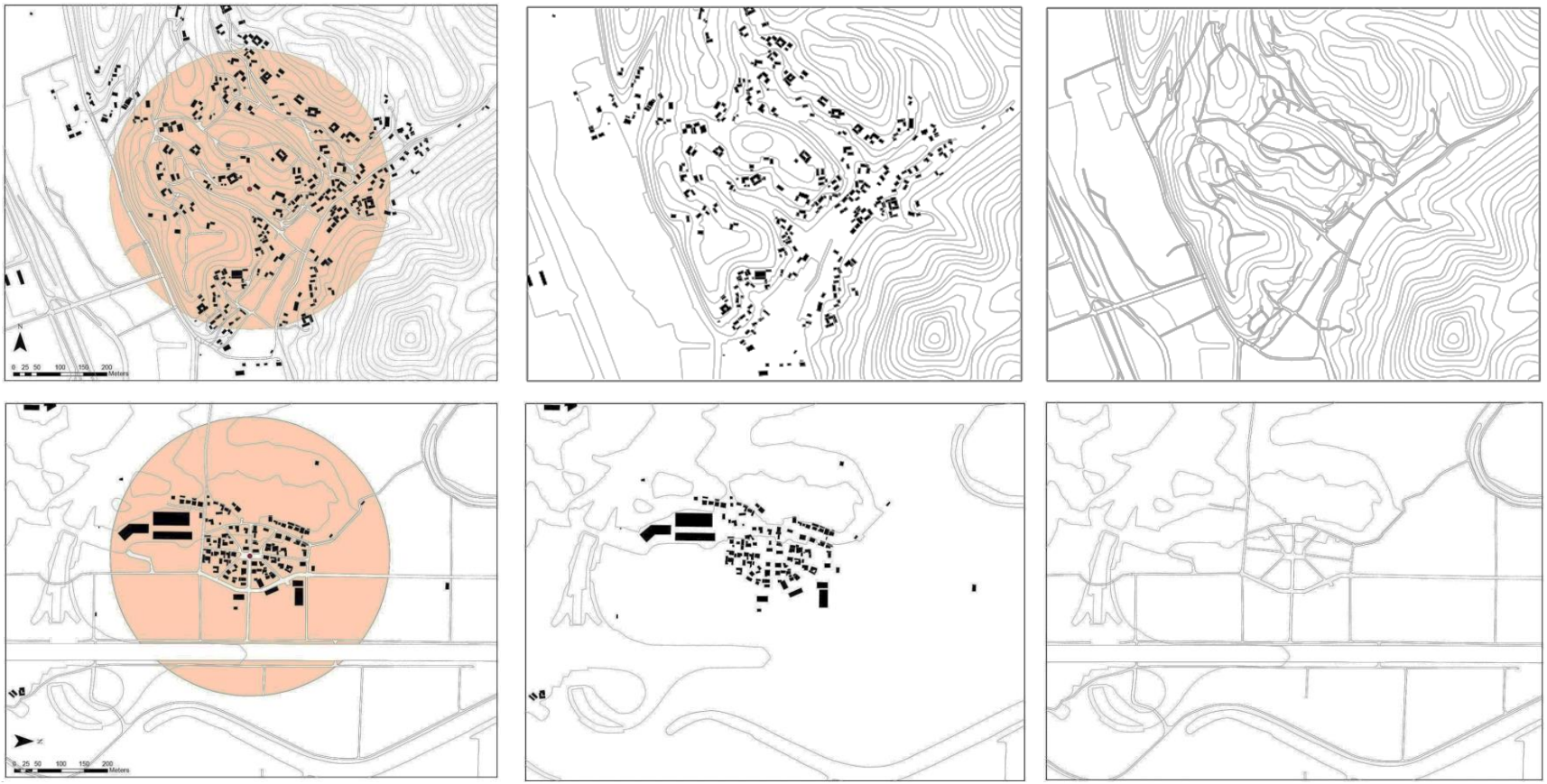


Figure 3-22 Yangdong Village (Top) vs. First Saemaul Village (Bottom)

Note: All of the above diagrams are drawn at the same scale. The yellow circles in the diagrams have the same radius of 300m. The three top diagrams show a settlement pattern of Yangdong Village including buildings, alleys and contours. Likewise, the bottom three diagrams shows that of First Saemaul Village including buildings, roads, and contours. The two settlement patterns display distinctive features in terms of the relationship to contours, compactness, regularity, centrality, zoning, and standardization.

3.4.2 *Residents' Adaptation: First Saemaul House and Village*

3.4.2.1 Adaptation to First Saemaul House

I conducted an interview with Director Lee in order to grasp how he has adapted to living in the First Saemaul House built in 1972. In addition, I measured the First Saemaul House and documented it into architectural drawings. Through this process, I was able to understand his 40-year adaptation to President Park's experiments for built environments. Since Director Lee has been loyal to President Park, he has preserved the original form of the First Saemaul House very well. According to him, he did a major renovation in 2006, which expanded the house horizontally. Besides that, he has made only minor improvements and repairs including adjustments to the boiler, wallpaper, and linoleum replacement, without transforming the original house.

More specifically, the gray area in Figure 3-23 reveals the parts of the house that were expanded in 2006. Interestingly, Director Lee described that the major spatial adaptation and retrofitting happened due to the kitchen and restroom, which were originally too small and old-fashioned to accommodate his family's lifestyle using today's home appliances and furniture. In addition, he also mentioned that the original house was very cold because of a lack of insulation and had a slate roof using asbestos, known to contain fatal carcinogens. He has continuously updated not only the building materials, but also the building equipment related to the water supply and sewage, heating, ventilation, and air conditioning. For example, although the house had originally a raised underfloor heating system using coal briquette furnaces, it is currently using a gas boiler that is supplied by city pipelines.

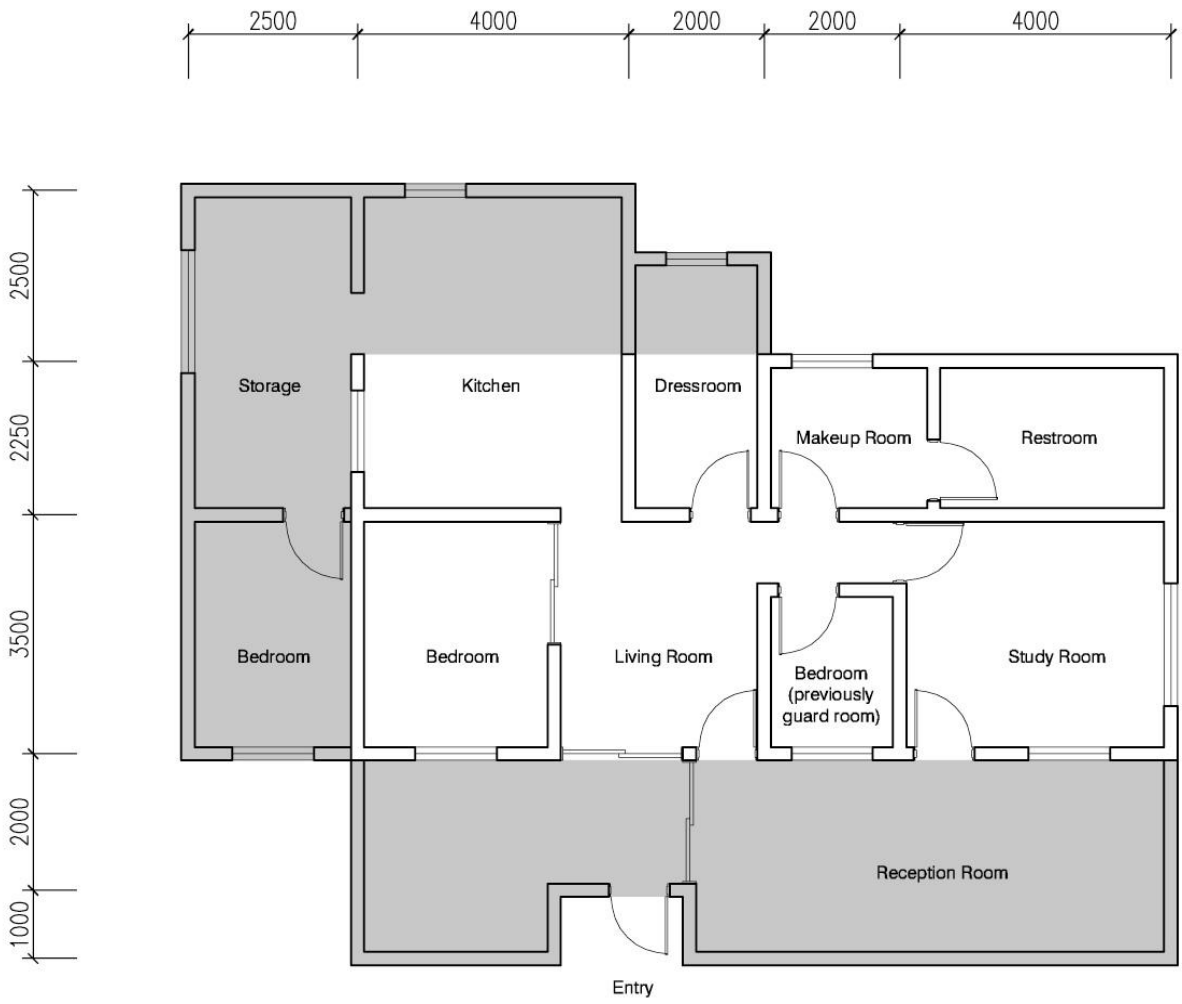


Figure 3-23 Floor Plan of First Saemaul House

3.4.2.2 Adaptation to First Saemaul Village

In the same manner as with the First Saemaul House, I interviewed residents and villagers who have continuously lived in the First Saemaul Village since it was newly built in 1974. I conducted open-ended interviews and measured three building types from the First Saemaul Village and documented them into architectural drawings. Through this process, I was able to compare and contrast the 40-year adaptations of residents and villages in the First Saemaul Village.

Village-scale Adaptation to First Saemaul Village

First of all, the head of the village Lim provided a lot of information for the 40-year village-scale adaptations including the village layout, road patterns, and public and common facilities. Especially, he pointed out the issue of transportation with following impressive comments: *"*Transportation is the most challenging issue. The plaza was changed into parking lots. However, they are not enough. Some roads are just 3 meters in width. Two cars are not passing at the same time." In other words, President Park and his planners in the 1970s did not imagine that there would be much transportation even in the rural villages even in the 2010s, including pick-up trucks, cultivators, and tractors. Since the village's physical structure is related to land ownership, it is clear that the villagers have long been battling transportation issues as Mr. Lim described.

Mr. Lim also described continuous improvement of public and common facilities at the center of the village including the village hall, a farming tool and equipment center, parking lots, and a small exercise area. In addition, he emphasized the village's advantage in updating common resource management relating to water, sewage, electricity, and fuel because the village is agglomerated right near the Gyeongbu (Seoul-Pusan) Expressway. The village is currently using common resource facilities for groundwater and methane gas. On top of that, he explained the change of road pavement material from cement to asphalt.

In addition, I identified current building footprints and uses from the First Saemaul Village as shown in Figure 3-24. According to Mr. Lim, there has been a continuous influx of population and factories because the expressway is so accessible to the village. For example, it takes about 30 minutes to commute by car from the First Saemaul Village to Downtown Cheonan, the nearest urban center around the village. Cheonan-si had a population of about 0.6 million people in 2015. The village's accessible location accounts for the influx trend of population opposite to most rural

villages experiencing population decrease. As a result, the continuous influx has acted as a driver of transforming the village and renovating existing houses. Figure 3-24 clearly reveals that there are many newer or renovated buildings, and industrial factories on the periphery of the village. However, he also pointed out the fact that the new residents and workers have not been fully assimilated with long-term residents and villagers because the newcomers are not farmers in the village, but commuters to urban areas.

House-scale Adaptation to First Saemaul Village

I did interviews with three residents who have lived in Type A, B, and C houses, respectively. They described their 40-year house-scale adaptations including room arrangement, building expansion, and resource management. They left the following interesting comments.

- "I have heard from my grandparents that the house was extended several times in order to have more space, especially for the kitchen." (Type A Resident: Male, Born in 1993)
- "There was a rest room inside the house even though it didn't have a septic tank. So, we had to build another restroom outside the house." (Type B Resident: Female, Born in 1933)
- "The house was so noisy because of the Seoul-Pusan Expressway in the west of village. All houses in the village faced the east expressway, not the south exposure. At that time, there was no soundproof wall." (Type B Resident: Female, Born in 1933)
- "The house was very cold in the beginning. Water was often frozen into ice." (Type C Resident: Female, Born in 1942)

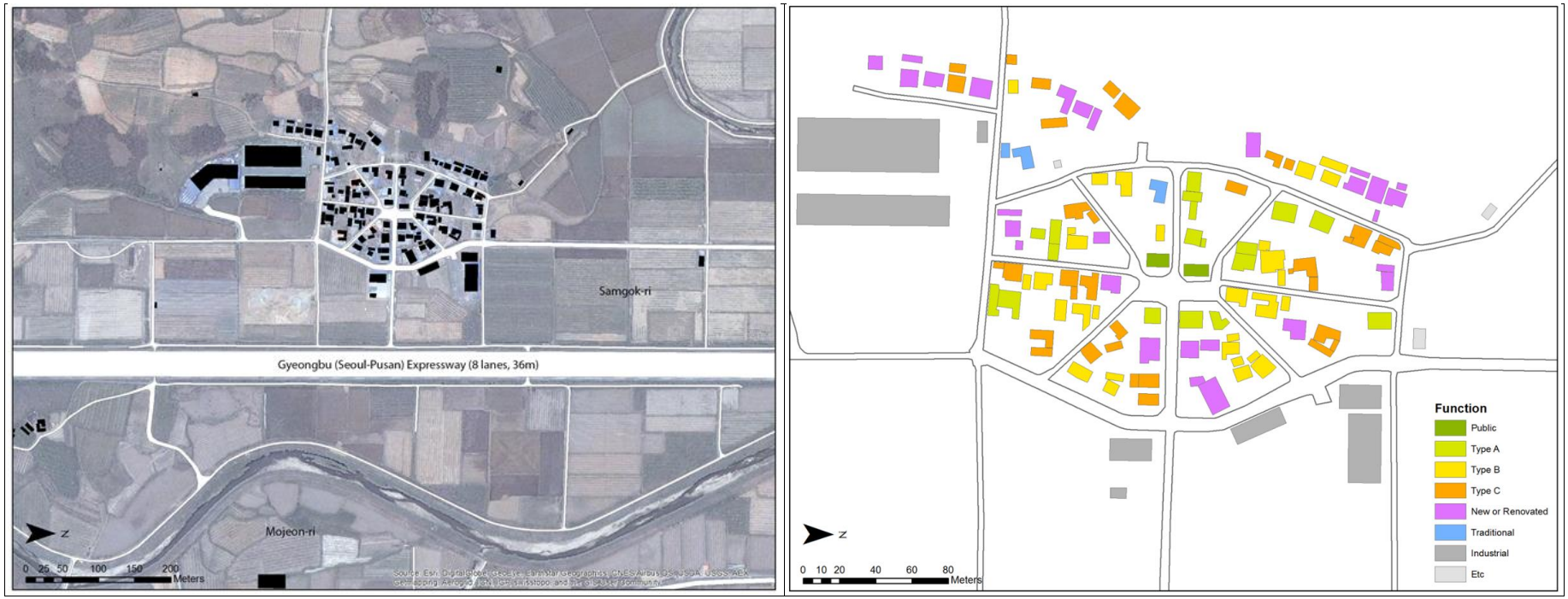
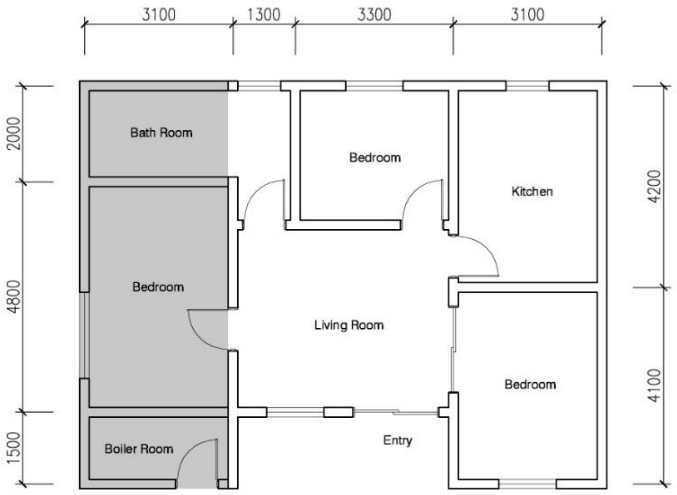


Figure 3-24 Current Building Footprints and Uses of First Saemaul Village

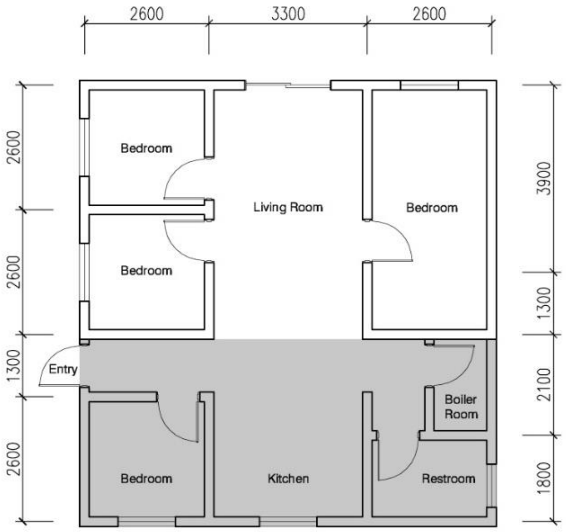
Interestingly, the house-scale adaptions in the First Saemaul Village have many similarities with those in the First Saemaul House. More specifically, the small and compact floorplans led to horizontal building expansion over the past 40 years. I observed that almost all houses in the First Saemaul Village had portions that had been expanded by residents even though they still kept the first story of the building in its original form. I marked them as gray areas in Figure 3-25. Each building type has typically two or three bedrooms, one kitchen, one restroom, and one living room.

The residents in the First Saemaul Village also mentioned that major spatial adaptation and retrofitting were caused by new kitchens and restrooms. The original kitchens and restrooms were too small and old-fashioned to accommodate their lifestyles. In addition, they were not carefully designed from the beginning. Although there were no septic systems at that time, the floor plans had traditional restrooms inside the houses. Due to the smell, the residents had to build restrooms outside the houses. On top of that, the residents described making continuous improvements of building materials and systems including insulation, windows and doors, kitchens, and restrooms. Further, the residents explained the historical changes of heating and cooking fuels from coal, to oil, and finally gas.

Type A



Type B



Type C

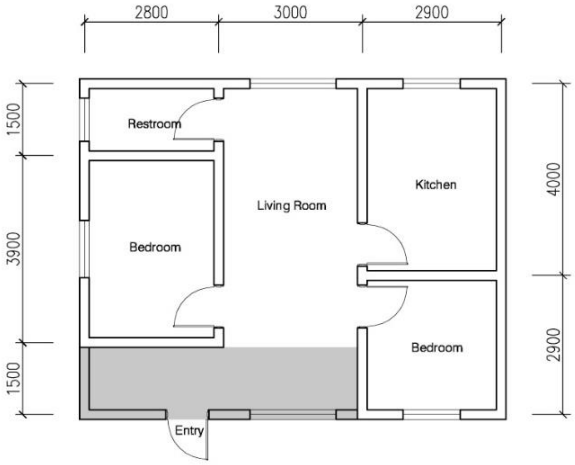


Figure 3-25 Floor Plans of Current Buildings by Types

3.5 CHAPTER CONCLUSION

This chapter focused on the KNVM's conversion of Korean traditional villages into new modern villages and discussed the KNVM as a transformation of built environments. More specifically, this chapter asked the following questions regarding sustainable and resilient rural development within the KNVM: 1) What changed in human settlements of Korean rural villages due to the KNVM in the 1970s and what did not change in spite of the KNVM? 2) What drove these changes to occur and what rational was given for the trend of rapid urbanization? 3) How have residents and villagers responded to the KNVM over the past 40 years? 4) What allows contemporary rural development to be more sustainable and resilient?

With the research questions, I conducted a historical analysis based on literature, interviews, and fieldwork, focusing on three temporal periods: before the KNVM, during the KNVM, and after the KNVM. For the first period, I elaborated Korean traditional settlement logics and patterns such as Fengshui, lineage village, and hanok established during the Joseon Dynasty. I then specified the KNVM's two strategies: national-scale plans and village-scale projects for the second period. Finally, I addressed 40-year adaptations of residents and villagers who have lived in the First Saemaul House and the First Saemaul Village.

In conclusion, this chapter reached the following main findings:

First of all, the KNVM has been commonly regarded as a strong top-down implementation modernizing the rural economy and changing the traditional and unscientific mentality of the peasants. However, the KNVM fundamentally had complex and multi-faceted aspects ranging from national-scale plans to village-scale projects because almost all capacity of top-down and bottom-up implementations in the 1970s was mobilized to succeed in the KNVM. Therefore, the KNVM should be interpreted as an organizational platform for national agendas according to

changing domestic and international situations such as economic development, industrialization, urbanization, and oil shock.

Second, President Park was the most influential and experimental actor for the KNVM's conversion toward new built environments. As Park had been deeply engaged in national core projects such as the Gyeongbu (Seoul-Pusan) Expressway, the Saemaul Movement, and the Heavy and Chemical Industrial Complex, he was similarly involved in the KNVM. He directly drew sketches, calculated necessary resources, composed a song for the KNVM, and designed a model farmhouse and villages for the KNVM.

Third, President Park's experiments towards new built environments were especially focused in the beginning of the KNVM and revealed in the aforementioned village-scale projects. They pursued westernized, industrialized, and urbanized built environments which were a stark contrast to Korean traditional houses and villages.

For the past 40 years since the KNVM, villagers extended their houses horizontally, especially in the storage, kitchen, and restroom areas. They have continuously upgraded their resource management in water, fuel, sewer, and more. Unlike the house-scale adaptation, villagers appreciated the concentrated village layout's advantages because of the village's location accessible to neighboring urban centers and the villager's friendship and solidary, but they also acknowledged limitations due to insufficient infrastructures including aging and narrow village roads and remote public services such as distant markets, schools, and hospitals.

Finally, the KNVM's conversion of traditional villages to modern ones reveals that rural settlements came to emphasize service and infrastructure rather than shelter, which means that the villages have been in the process of losing self-sufficiency and increasing urban dependence. In addition, the KNVM's radical transformation of built environments did not embrace the

advantages and essential needs of traditional settlements, which had been developed through long-term adaptations of rural farming houses and villages.

Chapter 4. RESILIENCE ASSESSMENT 1: KNVM AND POPULATION CHANGE

4.1 CHAPTER INTRODUCTION

This chapter expands the discussion of the KNVM into a demographic assessment of community resilience to rapid urbanization, connecting the KNVM as a transformation of built environments to population change from 1970 to 2010 in Korea. I address the relationship between the KNVM and population change in this chapter.

There are several reasons why the KNVM and population change should be investigated together. First, population change can show the KNVM's cross-sectoral and cross-scale interaction under resilience theory in social-ecological systems. Second, Korea's demographic data have been relatively well accumulated from national to local-level statistics every 5 or 10 years since the population census started in 1925. Third, although a demographic transition from traditional to modern society has been a commonly observed phenomenon in many countries, the Korean demographic transition heavily influenced by the KNVM and the Korean Family Plan may provide a new dimension of universality and particularity to classical demographic transition theory.

More specifically, I raise the following questions on the KNVM and population change towards sustainable and resilient rural development: Q1) How did the KNVM affect population change in the 1970s? Q2) How have Korean demographic patterns changed since the KNVM? Q3) How has the KNVM affected Korean demographic resilience to rapid urbanization in terms of two temporal periods (short-term and long-term)? Q4) What lessons and implications can be drawn from the historical experience of the KNVM and the Korean Family Plan?

To address the above questions, I clearly identify the mechanism of the KNVM and the Korean Family Plan for population change in the 1970s. In order to capture the demographic transition driven by the KNVM's implementation, I introduce the first demographic transition theory which was established for the interpretation of demographic history data (Davis, 1963). I then create a variety of spatiotemporal demographic patterns using a macro overview based on national-scale statistical data, a cross-scale analysis based on multi-scale spatiotemporal data, and a micro survey based on village-scale sample data. These demographic patterns explicitly show Korean population changes before / during / after the KNVM. Third, I conduct a demographic assessment of community resilience based on three main variables such as total population, age structure, and fertility. During the assessment process using demographic resilience matrix, relevant concepts of resilience theory including adaptive cycle, panarchy, and regime shift are applied. Finally, I discuss short-term efficacy and long-term vulnerability of strong top-down implementations by the Korean Government such as the KNVM and the Korean Family Plan., which is associated with a lack of diversity in development strategies including human settlements and population planning.

4.2 KNVM'S IMPLEMENTATION: MECHANISM OF POPULATION CHANGE

4.2.1 *KNVM and Korean Family Plan*

As specified in Chapter 3.3.1.3, the KNVM's implementation was highly associated with many central government-led plans in the 1970s. The detailed explanation of the relationship between the KNVM and government-led plans in the 1970s are summarized in Table 3-4 and Table 3-5. In the context, the KNVM was deeply related to the Korean Family Plan (가족계획, 家族計劃) in the 1970s, which created demographic transition of rapid fertility decline. Thus, the KNVM's mechanism of population change is discussed with the Korean Family Plan.

Korean Family Plan

The Korean Family Plan was initiated by the government in 1962 in tandem with the First Five-year Economic Plan, which started to greatly change the fertility rate from high to low (Kwon et al., 1975). The government thought that rapid fertility decline would lead to an increase in GDP per capita. Meanwhile, the Korean Family Plan may have been a reaction to a baby boom in Korea immediately after the Korean War (1950-1953). Historically, the baby boom generation in Korea refers to people who were born from 1955 to 1963.

The Korean Family Plan focused on women's birth control through contraception during President Park's regime. The achievement of the Korean Family Plan regarding birth control was surprisingly successful enough to surpass the total fertility rate (TFR) gradually reduced by industrialization and women's education. For example, the TFR continuously decreased, from 6.0 children in 1960, through 4.5 children in 1970, to 2.7 children in 1980 (Kwon, 2003). Interestingly, although the government has tried to recover the TFR since the 2000s, the propaganda is not effective any longer. As shown in Figure 4-1, the government's promotion of the Korean Family

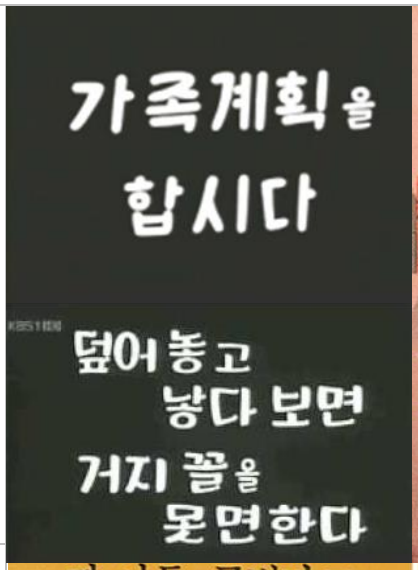
Plan was persistent and intensive enough to be an important item on the national policy agenda. According to Cho (2014), the rapid success of the Korean Family Plan was attributable to the Family Plan Women's Society (가족계획어머니회) from 1968 to 1977, which was later merged into the Saemaul Women's Society (새마을부녀회). The nationwide organization consisted of local women in villages who monitored women's contraception practices and educated them on birth control directly. In other words, the Family Plan Women's Society or Saemaul Women's Society was a substantive implementation agent of the central government to intervene in the private and personal life events of sex, pregnancy, and birth.

Ironically, although the Korean Family Plan was appreciated as a successful implementation at that time in terms of the fertility transition, Korea is currently suffering from the lowest fertility rate among the Organisation for Economic Co-operation and Development (OECD) countries. According to Statistics Korea, the TFR in 2015 was 1.24 children, which is much less than the population replacement rate of 2.1 children. In fact, this trend of low fertility is observed especially in East Asian countries. According to the World Factbook of Central Intelligence Agency (2014), most of the countries in East Asia were in the lowest fertility group: Macau (0.93), Taiwan (1.11), Hong Kong (1.17), South Korea (1.25), Japan (1.4), and China (1.55). Korea's population is currently notorious as one of the slowest growing countries in the world, even though Korea is not experiencing large-scale severe diseases and wars. Dent (2014) warned that South Korea would experience a demographic cliff soon, and noted a productive population decrease and the accompanying economic decline. However, it is also curious how the low fertility could contribute to the planet at the end.

1960s

Left: “Thoughtless childbirth leads to beggars.” (덮어놓고 낳다보면 거지꼴을 못 면한다.)

Right: “Do you know an intrauterine device which is the most efficient, safest, and simplest contraception?” (가장 효과적이며 안전하고 간단한 루우프 장치를 아십니까?)



1970s

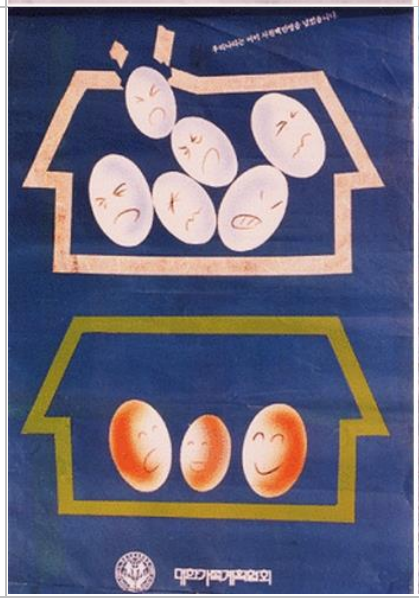
Left: “Let’s stop at two children regardless of sex.” (딸아들 구별말고 둘만 낳아 잘 기르자.)

Right: “Either a son or a daughter are the same human.” (다 같은 인간인데)

1980-90s

Left: “We already exceeded 41 million people” (우리는 이미 사천백만명을 넘었습니다.)

Right: “A well-raised daughter Is better than ten sons.” (잘 키운 딸 하나, 열 아들 부럽지 않다.)



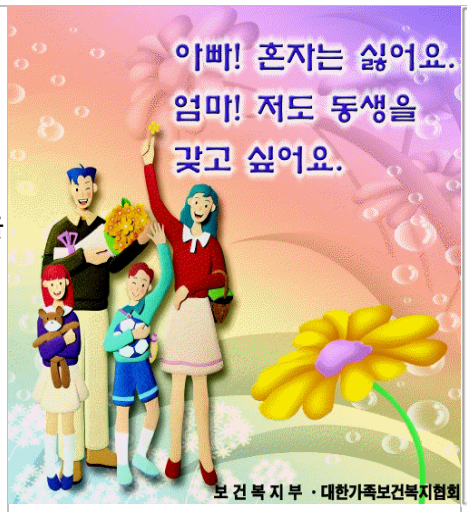
2000s Left: “Dad, I don’t want to be alone. Mom, I want to have my younger brother or sister.”(아빠, 혼자는 싫어요. 엄마, 저도 동생을 갖고 싶어요.) Right: “1-2-3 Movement: Let’s be pregnant within 1 year of the marriage, have 2 children, bear them before 30 years old, and raise them healthily.” (1 -2-3 운동: 결혼 후 1 년 내 임신하고, 2 명의 자녀를, 30 세 이전에 낳아 건강하게 잘 기르자.)		

Figure 4-1 Historical Slogans of Korean Family Plan

(Source: Planned Population Federation of Korea)

4.2.2 *Demographic Transition: Fertility and Mortality Changes*

It is necessary to introduce classical demographic transition theory before delving into the relationship between the KNVM and population change. The theory was suggested by Warren Thompson in 1928 and developed by Frank Notestein in the 1940s and the 1950s in order to interpret demographic history that was occurring during the transition period from agrarian to industrialized society. The theory captured demographic changes, especially transitions of birth and death rates in industrialized societies as shown in Figure 4-2.

The theory formulated a demographic transition from high birth and death rates to low birth and death rates as a country moves from an agrarian to an industrialized society (Notestein, 1944; Davis, 1963; Kirk, 1996). As shown in Figure 4-2, population growth in the first phase is low

because of high fertility and high fluctuating mortality. In the second and third phases, the transition begins with mortality going into decline, followed by fertility decline. During this period, the rapid population growth occurs. Finally, in the fourth phase, the population growth slows down and eventually reaches almost zero because both fertility and mortality are low. Meanwhile, the dominant death reasons shift from infectious diseases to chronic conditions during the transition period (Coale, 1973; Lee, 2002).

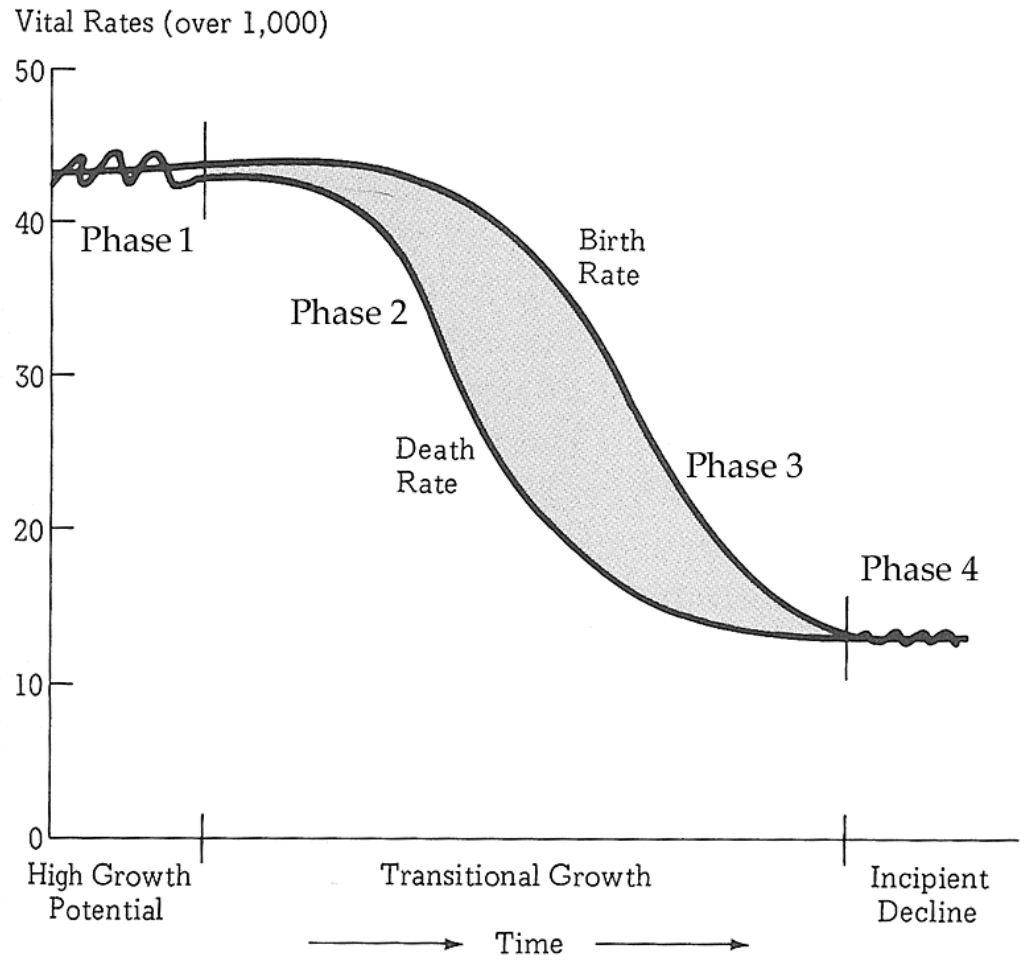


Figure 4-2 Classical Demographical Transition Model

(Source: Weller et al., 1981)

Later, Lesthaeghe and Van de Kaa developed the concept and theory of second demographic transition from 1986, which focused more on the fourth phase in the classical demographic transition model specified above, in order to understand new demographical changes in Europe. Nowadays, the theory is often applied to explain new marriages and family patterns in the world, for example, those in America since 1960. Lesthaeghe (2010) identified the biggest cause of second demographic transition as being the erosion of traditional values for marriage and family. Meanwhile, Caldwell (1976, 2005) explained the transition of fertility decline based on the concept of intergenerational wealth flows: the wealth flow from children to parents is reversed, i.e. from parents to children, as the society moves from a farming mode of production to a capitalist or labor-market mode of production.

More and more people who are at the marriageable age are pursuing self-realization, freedom, and different lifestyles, rather than absolute sacrifice and responsibility for potential babies and family. In other words, they have self-oriented views of family which are different from traditional perspectives. As a result, people are getting married later and later in life, if at all. For those who do choose to marry, bearing babies becomes a problem of choice rather than obligation. In addition, cohabitation without being legal married is accepted as an alternative to marriage. Even child bearing without legal marriage is a relatively much more common occurrence than before. As a result, the fertility rate has started to lower more and more, not exceeding the birth replacement ratio. In addition, females have come to improve their rights and powers in family and males have come to actively engage in parenting and homemaking. Thus, many different family types exist beyond the traditional nuclear family, including single-parent households and remarriages that result in blended families. Consequently, the life-long commitment of marriage is losing power.

In addition to the demographic transition theory specified above, Korean demographic transition from high birth and high death rates to low birth and low death rates needs to be understood in relation to the strong top-down government program implementations such as the KNVM and the Korean Family Plan because they hastened the demographic transition. On top of that, rapid Korean urbanization, namely migration from the rural sector to the urban sector, should also be considered in describing population change since the KNVM.

4.3 KNVM's Demographic Impact

4.3.1 *Population Situation before KNVM*

During the Joseon Dynasty (1392-1910), a population registry system called Hojok (호적, 戶籍) existed for the purpose of taxation, labor mobilization, and conscription of military forces, which is considered to have approximately covered 40 to 50% of the whole population enumeration (Kwon et al., 1975). More specifically, the population in the early Joseon Dynasty increased due to political stability, agricultural development, and territorial expansion, as shown in Table 4-1. The population situation, including the total population, age structure, fertility, and mortality had been almost stationary since the late 17th century, with the exception of several periods of severe invasions from foreign forces, like the Japanese Invasion (임진왜란, 壬辰倭亂, 1592-1598) and Manchu Invasion (병자호란, 丙子胡亂, 1636-1637). The trend of the relatively stable population during the Joseon Dynasty can be attributed to stable socioeconomic conditions, few technological innovations, and little industrial development (Kwon et al., 1977).

Table 4-1 Population Estimates of the Joseon Dynasty, 1392-1910

Year	Population (in 1000)	Population Growth Rate
1392	5,549	-
1400	5,730	-
1500	9,412	0.50
1600	11,722	0.22
1700	14,359	0.20
1800	18,443	0.25
1900	17,082	0.22
1910	17,427	

(Source: Kwon et al, 1977)

Unlike the stable population situation in the mid and late Joseon Dynasty, the Korean population situation has undergone a demographically rapid change since Korea was annexed by the Japanese Empire in 1910. In the meantime, the Korean census was initiated in 1925 for the first time, which allowed a correct measure of the population for the first time. In order to explicitly identify the population change between 1900 and 2010, I complied existing literature showing historical population indicators and recent data from Statistics Korea, as shown in Table 4-2.

The historical change of population indicators in the table clearly reveals the first demographic transition as discussed in the previous section. More specifically, over the past 100 years or so (1900-2010), the total population continuously increased from 17 to 47 million people, especially after the liberation from Japanese Imperial rule in 1945 and following the Korean War (1950-1953). Meanwhile, both birth and death rates have undergone the rapid shift from high to

low. Further, indicators such as fertility rate, life expectancy, and urbanization ratio show remarkable transitions. The fertility rate decreased from 6.0 in 1949 to 1.23 in 2010. The life expectancy increased from 37.5 in 1925 to 81.9 in 2010. The urbanization ratio also increased from 4.8% in 1925 to 81.9% in 2010.

In conclusion, the Korean population situation experienced an important period of transformation in the 1960s and 1970s, which reveals that Korean population change was deeply related to Korean development history. The First and Second Five-year Economic Plans were implemented in the 1960s with the goal to transform built environments of urban areas while the KNVM, in the similar manner, transformed rural areas along with the rapid urbanization in the 1970s.

Table 4-2 Population Indicators, 1900-2010

Year	1900	1925	1940	1944	1945	1949	1955	1960	1970	1980	1990	2000	2010
Population (in 1000)	17,082	19,020	23,547	16,136	20,167	21,502	-	24,989	31,466	37,436	43,411	46,136	47,991
Crude Birth Rate (A, %)	3.5-4.0	4.2	4.4	4.2	-	4.2	4.0	4.2	2.99	2.34	1.56	1.34	0.94
Crude Death Rate (B, %)	3.3-3.8	3.0	2.3	2.3	-	2.3	3.3	1.2	0.94	0.67	0.58	0.52	0.51
Natural Increase Rate (C=A-B, %)	0.2	1.2	2.1	1.9	-	1.9	0.8	3.0	2.04	1.67	0.98	0.82	0.43
Net Migration Rate (D, %)	-	-0.18	-0.89	-0.22	-	4.19	0.66	-	-0.04	-0.10	-0.05	-0.06	0.05
Growth Rate (E=C+D, %)	-	1.02	1.17	1.80	-	6.08	1.45	2.00	2.00	1.57	0.93	0.76	0.48
Total Fertility Rate (%)	-	6.0	6.2	6.1	-	6.0	5.6	6.0	4.5	2.7	1.63	1.47	1.23
Life Expectancy at Birth (Year)	-	37.5	41.5	42.5	-	-	49.7	55.3	63.2	65.8	71.3	76.0	80.8
Urban Proportion of Population (%)	-	4.8	16.0	-	-	17.1	24.4	28.0	41.1	57.3	74.4	79.7	81.9

Note: Whole Korea for 1900-1944, South Korea only since 1945

(Source: Kwon et al, 1975 for 1900-1955; Kwon, 2003 for 1960-2000; Statistics Korea for 2010)

4.3.2 *Demographic Pattern since KNVM*

It is crucial to create a variety of demographic patterns since the KNVM in assessing the KNVM's demographic resilience to rapid urbanization. Thus, I comprehensively revisit a variety of data sources such as national-scale statistical data, multi-scale spatiotemporal data, and village-scale sample survey.

4.3.2.1 Macro Overview: National-scale Statistical Data

The historical progress of Korean urbanization shows a continuous and dominant growth trend. As shown in Figure 4-3, the urbanization ratio has been continuously increasing over the past 60 years from 1950 to 2010. The slope in the graph represents the speed of urbanization, which is expressed in the bottom graph. Through the two graphs, I found the period between 1970 and 2000 shows a remarkable growth trend different from other periods. It has a steep slope in the urbanization ratio graph and prominently high values in the urbanization speed graph.

As a next step to delve into the relationship between the KNVM and Korean urbanization, it is necessary to pinpoint when the shift from a majority rural to a majority urban society took place in Korea. For this, I focus on the number of urban and rural population, which could explain when Korea experienced the transition from rural to urban society. In Korea, the divide of urban and rural areas follows local administrative divisions called *Eup-Myeon-Dong* (읍-면-동, 邑-面-洞): *Dong* (동, 洞) belongs to the urban sector while *Eup* (읍, 邑) and *Myeon* (면, 面) belong to the rural sector. As shown in Figure 4-4, the rural population in Korea was larger than the urban population until around 1980. Since then, the urban population started to exceed the rural

population. Meanwhile, both populations of the rural and urban sectors are currently stagnant, which reveals that Korean urbanization has nearly reached its maximum.

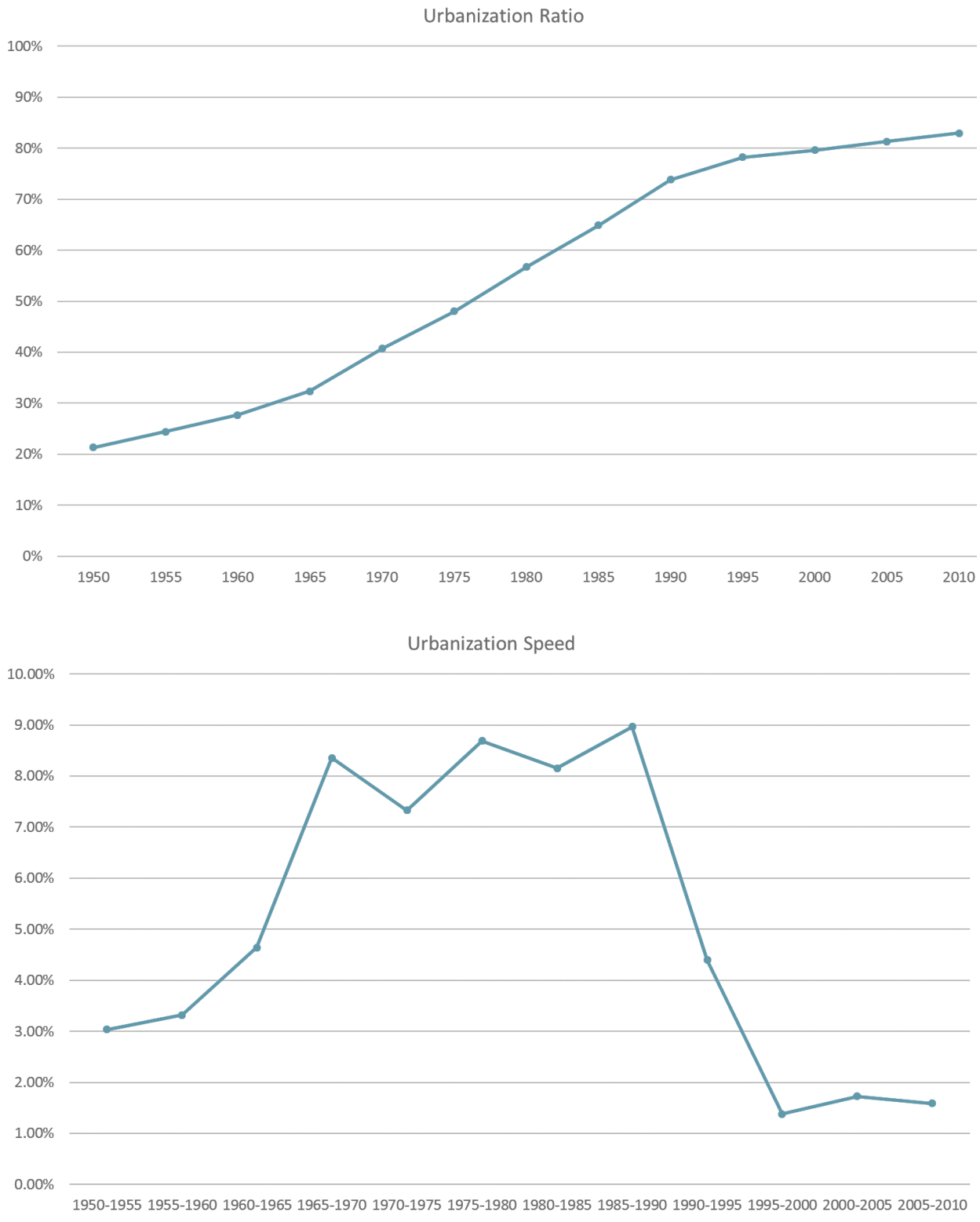


Figure 4-3 Historical Trends of Urbanization Ratio, 1950-2010

(Source: United Nations, 2011)

Interestingly, the year of 1980, when the urban population exceeded the rural population for the first time in the history of Korea, coincided with the time when the KNVM's implementation ended due to President Park's assassination in 1979. This reveals that even an unprecedented 10-year implementation of the KNVM (1970-1979) as means to develop rural areas did not stop the transition from rural to urban society, which makes not only the KNVM but also rural development itself more or less questionable in terms of efficacy. Further, it asks whether the KNVM was even pro-urbanization or anti-urbanization in the 1970s, which are the dissertation's main hypotheses to examine as specified in Chapter 2.1.2.

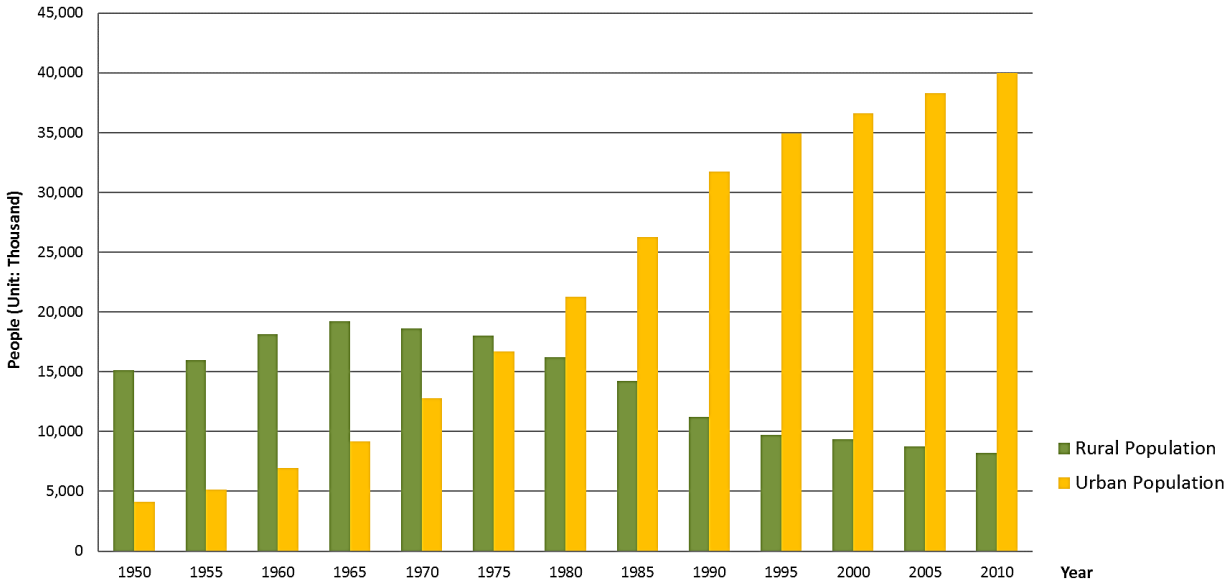


Figure 4-4 Rural Population vs. Urban Population
(Source: United Nations, 2011)

In this historical context of the KNVM and Korea urbanization, I came to confront the following questions: What made Korean rapid urbanization possible during the period between 1970 and 2000? Why did villagers leave their attached hometowns? Were their individual choices voluntary or involuntary during the transition? What explicit or implicit roles did the KNVM play in that transition? Lim (2005) shed light on these questions. According to him, the Korean

Government pursued the Green Revolution in the 1970s for self-sufficiency in terms of food. Koreans of those days suffered from hunger and poverty, especially during the spring hunger season called barley hump (보릿고개). Meanwhile, the new rice *Tong-il* (통일, 統一) was developed by Prof. Hur, Mun-hoe (1927-2010) at Seoul National University and his team of agricultural scientists in 1971, which allowed for a 40% yield increase from the existing types of rice. The new rice was rapidly propagated to rural households because it was one of the KNVM's important tasks to accomplish green revolution at that time. As a result, the national propagation of the new rice led to an unusual increase in rice production in the 1970s. Korea finally achieved rice self-sufficiency in 1976, 1977, and 1978.

However, the increased rice productivity and falling rice prices contributed to migration of rural population to the urban sector. Although the increased rice productivity also increased rural carrying capacity, expected income differentials between rural and urban areas played an important role in the migration decision (Harris and Todaro, 1970). In addition, the government's strong drive of heavy and chemical industry development in the 1970s started to need many laborers from the rural sector. As a result, the urban sector became more advantageous than the rural sector in terms of expected income and job opportunity. Since around the year of 1980, the difference of total population between the urban sector and the rural sector has kept increasing.

4.3.2.2 Cross-scale Analysis: Multi-scale Spatiotemporal Data

In addition to the above macro overview of demographic patterns based on national-scale statistical data, it was also useful to interpret spatiotemporal population data according to three different administrative divisions, namely national, provincial, and local. Further, I created two pairs of time-series GIS maps showing population and population relative change in order to address not only spatial patterns of population, but also temporal patterns of population change, which is used for the demographic assessment of community resilience in the next section.

More specifically, I took the following steps to create the maps: First of all, I collected three different sets (i.e., national, provincial, and local) of spatial-scale population data from 1970 to 2010 from Statistics Korea. Since 1925, Korean census has been collected and released every five years. Second, I created two population datasets to represent population and population change in order to address the spatiotemporal patterns. The population dataset was simply drawn to show corresponding figures for certain temporal periods and certain spatial scales. Additionally, the population change dataset was calculated based on a formula of relative change between two temporal periods. The formula is as follows:

$$Population\ Relative\ Change\ = \frac{P_{present}\ -\ P_{past}}{P_{past}}$$

Next, I matched the two population datasets with geographical boundaries of local-scale administrative divisions collected from Statistics GIS [21]. The local-scale administrative divisions correspond to lower-level local autonomy called *Si-Gun-Gu* (시-군-구, 市-郡-區). As of 2010,

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21 I explained Statistics Korea and Statistics GIS in Chapter 2.2.2.1 Macro Overview: National-scale Statistical Data.

there were 230 administrative divisions in Korea. Meanwhile, the geopolitical boundaries have also been continuously changing over the past 40 years. Thus, I merged or separated relevant population data that experienced changes in the administrative divisions or the geographical boundaries for every 10-year analysis period. Finally, I mapped the matched datasets of population data and the geographical boundaries.

Population Trend

To begin with, I created a series of maps revealing local-scale population patterns from 1970 to 2010, which is as shown in Figure 4-6. The local-scale administrative divisions are below the provincial-scale divisions, which were usually called *Si-Gun-Gu* (시-군-구, 市-郡-區) [22]. Meanwhile, I also added a map showing Korean provincial-scale administrative divisions in order to efficiently explain findings and insights from the maps, which is shown in Figure 4-5.

The dominant trend of population was population concentration over the past 40 years from 1970 to 2010. Although the physical sizes of administrative divisions were more or less changed throughout the years, the map from 1970 shows that most of the units had similar colors, like orange, except several areas such as Seoul, Busan, and Daejeon. However, as time moved on to 2010, the similar colors on the map gradually changed into two distinct groups, shown as yellow and brown. The yellow group was getting paler and paler, which means that the corresponding units were decreasing in population. On the other hand, brown or dark brown groups had a tendency toward continuous growth, which shows that the relevant administrative divisions were

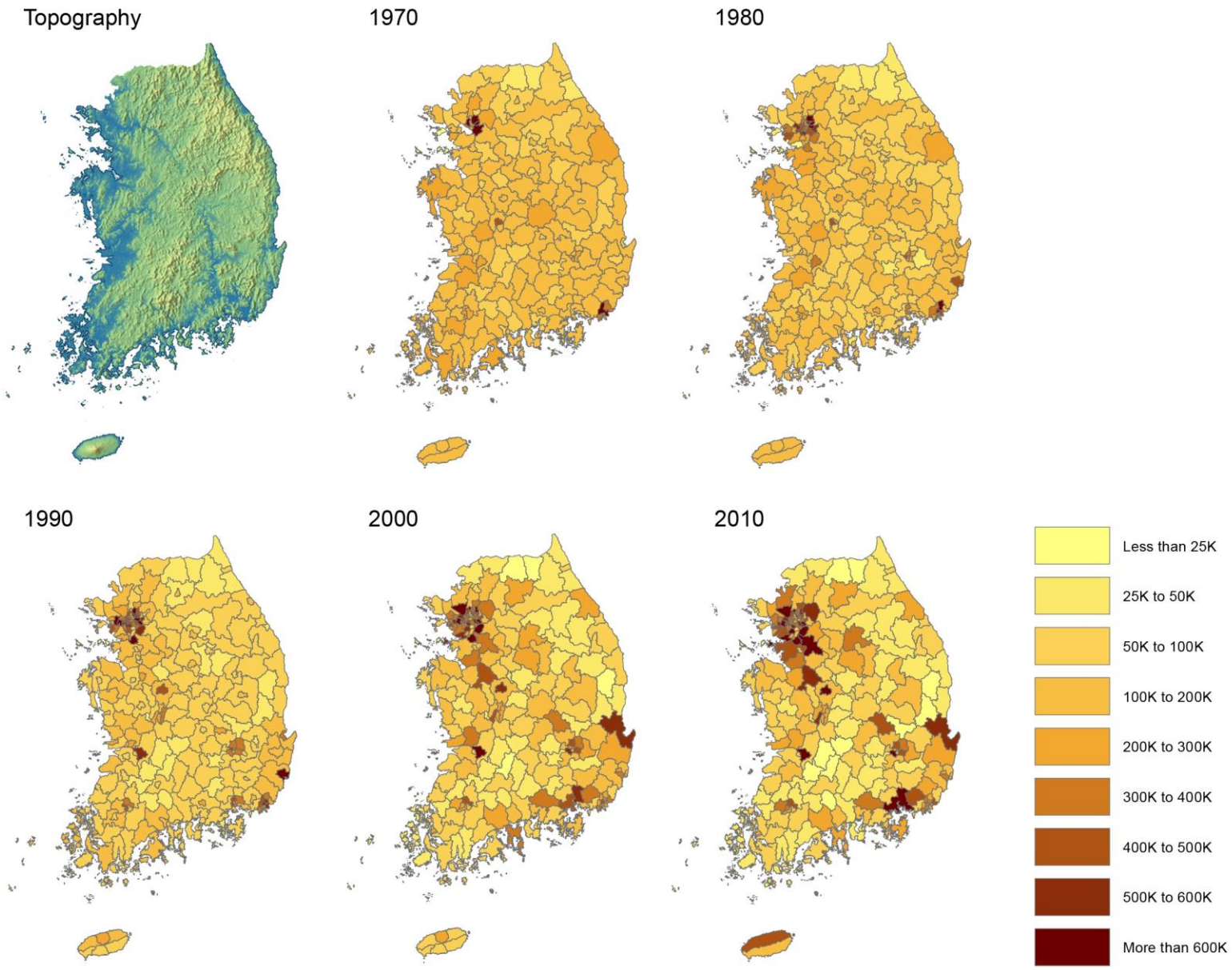
22 I describe Korean administrative division structure in Chapter 2.2.2.2 Micro Analysis: Village-scale Sample Survey.

increasing in population and expanding the geographical boundaries. In other words, there were two distinct population change patterns, growth and decline.

Meanwhile, I came to find that such population changes were related to topography in South Korea. Relatively, administrative divisions near the mountain ranges experienced a population decline much more than those far from the mountain ranges. These population maps are further discussed with the population change maps.

Figure 4-5 Korean Provincial-scale Administrative Divisions

Figure 4-6 Population by Local Administrative Divisions, 1970-2010



Population Relative Change Trend

Similar to the local-scale population patterns described above, I created a series of maps showing three different spatial-scale patterns (i.e., national, provincial, and local) of population relative change from 1970 to 2010, which is shown in Figure 4-7. Meanwhile, the accurate calculation results of population relative change are summarized in Table 4-3. The series of maps allows for comparing and contrasting spatiotemporal population relative changes at the same time.

The dominant trend of population relative change patterns is a polarization of the population between the urban and rural sectors through the years from 1970 to 2010. More specifically, the urban sector is easily identified with red or orange colors on the maps while the rural sector is well observed with green or yellow-green colors. The trend of population polarization has been observed since the period between 1970 and 1980. However, the distinct gap between the urban and rural sectors has been intensified more through continuous spatial expansion of areas for both increasing and decreasing in population.

Between 1970 and 1980, Seoul was the most influential administrative division in terms of population growth. However, from 1980 on, the Seoul Metropolitan Area without the inclusion of the city of Seoul itself (Incheon Metropolitan City and Gyeonggi Province, Seoul Metropolitan Area) took over the lead of population growth even though there was substantial growth in places such as Busan, Daegu, Gwangju, and Daejeon at the provincial level. Further, the local-scale maps of population relative change show a more vivid picture of population growth and decline. The areas where population increased are expressed in red or orange colors are focused around the Seoul or Busan Metropolitan Area. The remaining areas have turned into areas where the population decreased.

As a result, I identified the 40-year population relative change of Korean administrative divisions into four following distinctive groups:

- Group 1: Continuous Growth - Seoul Metropolitan Area minus the city of Seoul itself belongs to this group, which is identified with red or orange colors. The administrative divisions in this group experienced continuous growth over the past 40 years between 1970 and 2010 even though the growth speed was recently reduced.
- Group 2: Decline after Continuous Growth – Seoul is relevant to this group, which is indicated by a color transition from red or orange to yellow-green colors: The administrative divisions in this group continuously grew between 1970 and 1990, but the population started to decrease between 1990 and 2010.
- Group 3: Stagnant – The administrative divisions between metropolitan cities and mountainous areas are applied to this group. They were shown with yellow-green colors during the period between 1970 and 2010 even though the specific values of population relative change fluctuated slightly.
- Group 4: Continuous Decline – For the most part, the administrative divisions in mountainous areas included in this group, which is marked by green colors. As shown in Figure 4-6, most of the mountainous areas are located in the ranges near the east coast or the northeast and the southwest diagonally crossing over the center of South Korea.

Figure 4-7 Population Relative Change by National-Provincial-Local Administrative Divisions, 1970-2010

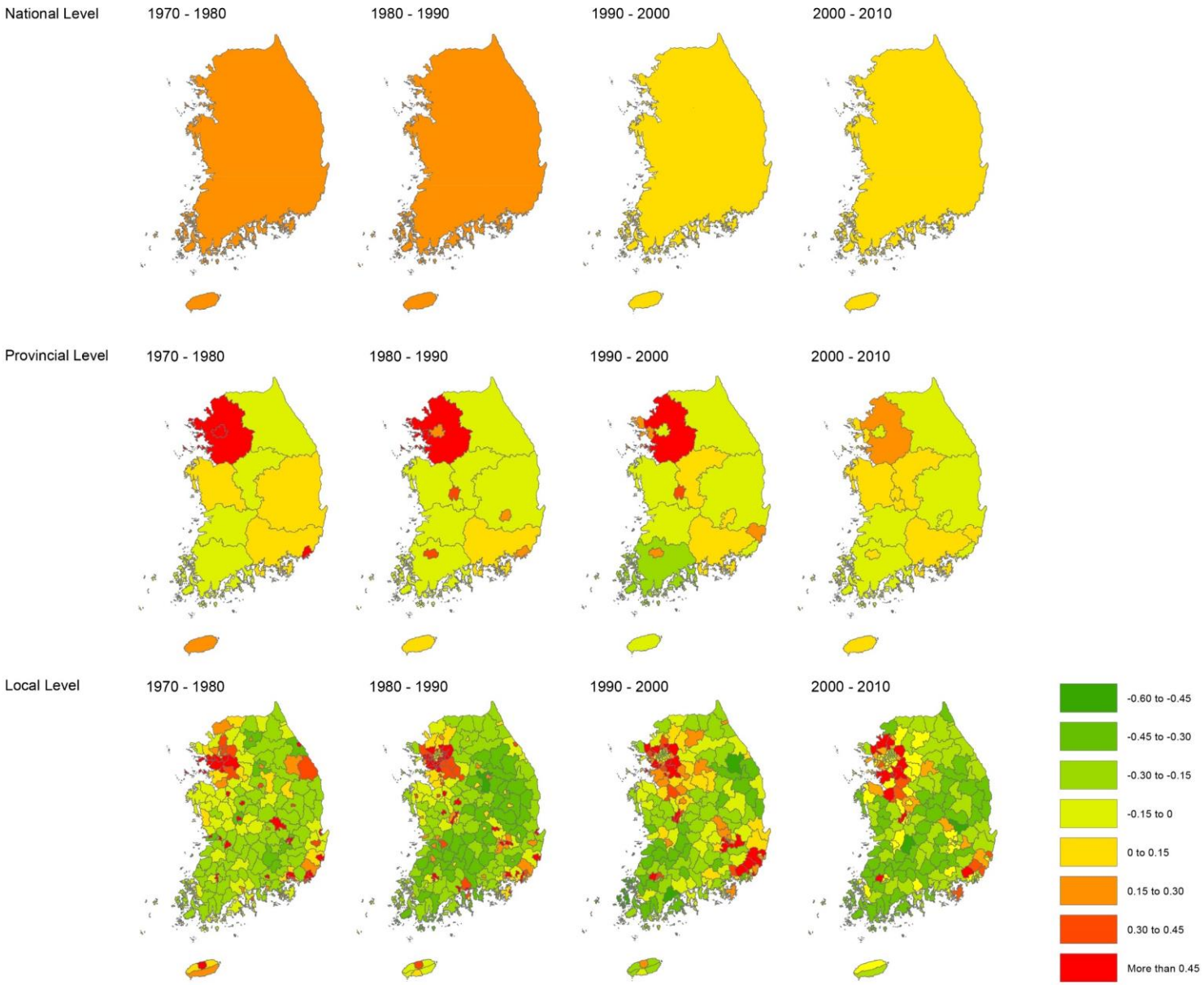


Table 4-3 Population Relative Change by National-Provincial-Local Administrative Divisions, 1970-2010

Temporal Periods	Spatial Scales											
	National	Provincial		Local								
	Relative Change	Name	Relative Change	Relative Change				Number of Local Units			
				Min	Max	Mean	SD	Growth	Decline	All	Growth %
1970 -1980	0.2122	Seoul special city	0.5395	0.0414	1.0823	**0.4761**	0.3956	9	0	9	**100.00%**
		Busan metropolitan city	**0.7261**	-0.1596	1.3840	0.4753	0.6524	4	2	6	66.67%
		Gyeonggi Province	0.4965	-0.1386	**2.4957**	0.4373	**0.7047**	17	8	25	68.00%
		Gangwon Province	-0.0251	**-0.4334**	0.6018	**-0.0582**	0.2707	6	13	19	31.58%
		North Chungcheong Province	-0.0205	-0.2124	0.9084	-0.0254	0.3290	3	9	12	25.00%
		South Chungcheong Province	0.0796	-0.3695	0.9758	0.0028	0.3121	3	14	17	17.65%
		North Jeolla Province	**-0.0414**	-0.3689	0.8390	-0.0380	0.3624	3	13	16	18.75%
		South Jeolla Province	-0.0389	-0.2374	1.4086	-0.0566	0.3397	4	23	27	**14.81%**
		North Gyeongsang Province	0.1069	-0.3773	1.5894	0.0790	0.4810	11	22	33	33.33%
		South Gyeongsang Province	0.0799	-0.3113	1.6630	0.0585	0.4768	9	16	25	36.00%
		Jeju province	0.2928	0.0869	0.6051	0.3059	**0.2682**	3	0	3	**100.00%**
		All	0.1996	-0.4334	2.4957	0.1019	0.4802	72	120	192	37.50%
1980 -1990	0.1596	Seoul special city	0.2688	-0.2245	1.2981	0.3592	0.5013	17	5	22	77.27%
		Busan metropolitan city	0.1944	-0.2148	0.6546	0.1731	0.2959	8	4	12	66.67%
		Daegu metropolitan city	0.2572	-0.3013	2.0042	0.3956	0.7556	6	1	7	85.71%
		Incheon metropolitan city	**0.6421**	-0.2352	3.4772	**0.9880**	1.4092	4	2	6	66.67%
		Gwangju metropolitan city	0.3298	-0.1025	0.6291	0.2619	0.3949	2	2	4	50.00%
		Daejeon metropolitan city	0.3055	0.0376	1.1446	0.4807	0.4779	5	0	5	**100.00%**
		Gyeonggi Province	0.6086	-0.2867	**9.5579**	0.8060	**1.6809**	29	7	36	80.56%
		Gangwon Province	-0.1175	-0.3397	0.3071	**-0.1439**	0.1740	4	18	22	**18.18%**
		North Chungcheong Province	-0.0242	**-0.5044**	0.7746	-0.1411	0.3318	3	10	13	23.08%
		South Chungcheong Province	-0.0643	-0.2606	0.7537	-0.0072	0.2800	6	15	21	28.57%
		North Jeolla Province	-0.0952	-0.4298	0.3338	-0.1631	0.2767	6	13	19	31.58%
		South Jeolla Province	**-0.1422**	-0.3955	3.9589	-0.0029	0.8257	6	21	27	22.22%

		North Gyeongsang Province	-0.1009	-0.4089	0.9563	-0.1083	0.3136	9	25	34	26.47%
		South Gyeongsang Province	0.1122	-0.3719	1.8943	0.0466	0.5144	11	18	29	37.93%
		Jeju province	0.1116	-0.1121	0.3871	0.0767	**0.2391**	2	2	4	50.00%
		All	0.1524	-0.5044	9.5579	-0.0121	0.4808	118	143	261	45.21%
1990 -2000	0.0628	Seoul special city	-0.0676	-0.3009	0.2898	-0.0751	0.1513	4	21	25	16.00%
		Busan metropolitan city	-0.0498	-0.3377	0.5817	-0.0491	0.2758	5	11	16	31.25%
		Daegu metropolitan city	0.0679	-0.4361	0.6303	0.0776	0.4153	4	4	8	50.00%
		Incheon metropolitan city	0.2874	-0.4334	**8.2541**	**0.8956**	**2.6060**	5	5	10	50.00%
		Gwangju metropolitan city	0.1877	-0.3926	1.4350	0.3088	0.7083	3	2	5	60.00%
		Daejeon metropolitan city	0.3036	-0.1738	1.2239	0.4786	0.6506	3	2	5	60.00%
		Ulsan metropolitan city	0.2596	0.0875	0.6494	0.3352	0.2619	5	0	5	**100.00%**
		Gyeonggi Province	**0.4847**	-0.1926	2.1186	0.4636	0.5734	27	4	31	87.10%
		Gangwon Province	-0.0591	-0.4786	0.2506	-0.1365	0.2033	4	14	18	22.22%
		North Chungcheong Province	0.0553	-0.2757	0.2280	-0.0642	0.1996	6	6	12	50.00%
		South Chungcheong Province	-0.0837	-0.3343	1.3213	-0.0597	0.4054	3	13	16	18.75%
		North Jeolla Province	-0.0866	-0.3709	0.1923	-0.2185	0.1725	2	12	14	14.29%
		South Jeolla Province	**-0.2038**	**-0.5477**	0.0305	**-0.2553**	**0.1449**	1	21	22	**4.55%**
		North Gyeongsang Province	-0.0151	-0.3426	0.5730	-0.1047	0.2336	6	17	23	26.09%
		South Gyeongsang Province	0.0599	-0.3591	0.8634	-0.0107	0.3396	6	14	20	30.00%
		Jeju province	-0.0026	-0.2334	0.2035	-0.0778	0.1981	1	3	4	25.00%
		All	0.0711	-0.5477	8.2541	0.0475	0.6719	85	149	234	36.32%
2000 -2010	0.0530	Seoul special city	-0.0102	-0.1075	0.0842	-0.0187	**0.0550**	10	15	25	40.00%
		Busan metropolitan city	-0.0677	-0.2303	0.3772	-0.0621	0.1457	5	11	16	31.25%
		Daegu metropolitan city	-0.0138	-0.2524	0.1392	-0.0349	0.1378	3	5	8	37.50%
		Incheon metropolitan city	0.0757	-0.0619	0.2548	0.0769	0.0943	9	1	10	**90.00%**
		Gwangju metropolitan city	0.0909	-0.1020	0.4942	0.0843	0.2401	3	2	5	60.00%
		Daejeon metropolitan city	0.0977	-0.1232	0.8088	0.1507	0.3741	3	2	5	60.00%
		Ulsan metropolitan city	0.0672	-0.0936	0.4325	0.1051	0.2077	3	2	5	60.00%
		Gyeonggi Province	**0.2666**	-0.1559	**1.5796**	**0.3116**	**0.3938**	27	4	31	87.10%

		Gangwon Province	-0.0104	-0.2192	0.1606	-0.0730	0.0901	2	16	18	11.11%
		North Chungcheong Province	0.0311	-0.2354	0.2380	-0.0486	0.1551	4	8	12	33.33%
		South Chungcheong Province	0.0990	-0.2292	0.5417	0.0155	0.2581	6	10	16	37.50%
		North Jeolla Province	-0.0600	**-0.3247**	0.0540	-0.1442	0.1060	2	12	14	14.29%
		South Jeolla Province	**-0.1277**	-0.2831	0.0980	**-0.1793**	0.1187	2	20	22	**9.09%**
		North Gyeongsang Province	-0.0458	-0.3045	0.1788	-0.1326	0.1323	3	20	23	13.04%
		South Gyeongsang Province	0.0610	-0.1970	0.4896	-0.0169	0.2062	5	13	18	27.78%
		Jeju province	0.0363	-0.1041	0.0921	-0.0060	0.1387	1	1	2	50.00%
		All	0.0306	-0.3247	1.5796	-0.0026	0.2480	88	142	230	38.26%

Note: The maximum values of relative change and growth percentage for each temporal period in national, provincial, and local scales were marked in red. The minimum values were marked in green.

4.3.2.3 Micro Survey: Village-scale Sample Data and Interview

In addition to the above demographic patterns based on macro overview of national-scale statistical data and cross-scale analysis of multi-scale spatiotemporal data, I conducted village-scale micro survey for four villages in the watershed of Han River. Four selected villages were specified in Chapter 2.2.2.2 Micro Analysis: Village-scale Sample Survey.

Population and Population Relative Change

I compiled and analyzed village-scale population data based on the lowest-scale available administrative divisions. As shown in Table 4-4, all villages except for Pungsan-dong most rapidly decreased in population in the period between 1980 and 1990, followed by the period between 1970 and 1980. Meanwhile, although the distance between each village and the Seoul Metropolitan Area was regarded to be important in population relative change, the correlation was not strongly observed. It seems that local development near the villages played a more important role in population growth or decline, which is later discussed with open-ended interviews with villagers.

Table 4-4 Village-scale Population and Population Relative Change, 1970-2010

Year	Pungsan-dong		Gangsang-myeon		Seo-myeon		Seoseok-myeon	
	Pop	Relative Change	Pop	Relative Change	Pop	Relative Change	Pop	Relative Change
1970	18,675*	-	4,985	-	8,883	-	12,882	-
1980	34,121*	0.83	4,482	-0.10	6,777	-0.24	8,790	-0.32
1990	11,426	NA*	3,558	-0.21	3,680	-0.46	5,275	-0.40
2000	7,749	-0.32	3,750	0.05	3,235	-0.12	4,443	-0.16
2010	5,078	-0.34	5,277	0.41	3,265	0.01	3,365	-0.24

Note 1: Strictly speaking, this village-scale population data is based on *Eup-Myeon-Dong* (읍-면-동, 邑-面-洞), which was the lowest-scale administrative division available from lower-level local municipalities' statistical yearbooks [23].

Note 2: Pungsan-dong in 1970 and 1980 belonged to Gwangju-gun, Dongbu-myeon. Thus, I was not able to calculate the population change of Pungsan-dong between 1980 and 1990, which is expressed as "NA" in the table.

(Source: Lower-level Local Municipalities, Statistical Yearbooks)

Open-ended Interviews with Villagers

As a supplementary measure of the above quantitative data, I also conducted open-ended interviews with villagers through the same interview protocol specified in Appendix C. Human Subjects Division Report and Appendix D. Asked Open-ended Interview Questions. The following explanations and quotations are my general observations about them and their answers for my questions on the village's demographical change in the 1970s.

- Pungsan-dong, Hanam-si, Gyeonggi-do
    - Interview with Pungsan-dong Resident (Male, Born in 1936)

      The interview was conducted at the village hall of Pungsan-dong on Oct 9, 2014. He introduced himself as a village head and farmer who lived in the village since 1972 and engaged in small farming such as cucumber and animal husbandry including chicken and cow. His general perception for the KNVM was neutral or indifferent. He mentioned the

23 I describe lower-level local municipalities' statistical yearbooks in 2.2.2.2 Micro Analysis: Village-scale Sample Survey.

policy of greenbelt many times during the interview, pointing out how it prevented the villagers from building new houses and structures in their lands. According to him, the village was in the greenbelt area since 1971, which restricted new development and construction for more than 40 years. Although the greenbelt's regulation was relaxed around 10 years ago, they can only repair or reconstruct their houses and structures within 30 pyeong (평, 坪) or 99.17 m^2.

1) Can you describe how your village's migration was in the 1970s in terms of scale and period? Generally speaking, there were huge migration from rural villages to urban areas in the 1970s. Do you think that the KNVM decreased migration from your village to urban areas in the 1970s?

"There were originally not so many people in the 1970s. As far as I know, almost 80% of Dongbu-myeon was in the green belt area in the 1970s. The new development was prohibited for a long time and villagers lived through subsistence farming and small husbandry. Thus, there were very few migrations in the village for a long time. The KNVM was a government policy helping to expand roads in the village, which was not special to our village."

2) Can you compare how different your village's population structures between the 1970s and nowadays are in terms of age, sex, and so on? Was there any reverse migration from urban areas to your village since the 1970s?

"Most households lived in the village for a long time. However, their children left the village for their schools and jobs. As a result, there are many elderly people in the village. Recently, there was a huge apartment complex development near this village. In fact, this

village is good because it is close to Seoul, the air is clean, and the landscape is beautiful. The new apartment construction is being planned in our village as well. Many people started to leave the village after they got their land compensations."

- Gangsang-myeon, Yangpyeong-gun, Gyeonggi-do
  - Interview: Byungsan-ri Village Head (Male, Born in 1959)

    The interview was conducted in front of the village hall of Byungsan-ri on Oct 10, 2014. He introduced himself as a village head and farmer who mainly engaged in rice farming and beekeeping. His general perception for the KNVM was very positive and still appreciative for President Park. He highly appreciated the KNVM in the 1970s, saying that our country came to survive and live thanks to the KNVM. He told that he was a student of middle school or high school during the KNVM period and participated in many construction projects such as broadening village access roads, repairing and improving village dikes, and reforesting the village after school. He remembered that his village was so enthusiastic about the KNVM that it was selected as one of the superior villages at that time.

    1) "This village continuously lost its population until tourism-related developments started around the year of 2000. I remember that there were more migrations after the KNVM. Especially, many existing villagers migrated to urban areas for their jobs and their children's education in the 1980s. In the mid and late 1970s, we were very poor, but the rice production was gradually increased due to compost and *Tong-il* rice. During the KNVM, the village was in the rapid change and growth even though many villagers at

that time left from the village as well. After the KNVM, there was not so much support from the government as the KNVM."

2) "As you know, this village is located near the Han River. From the 2000s onwards, many leisure pensions, restaurants, and tourism-related shops were built along with the arterial road of Gangnam-ro. As a result, there were many immigrants moving to our township. In addition, the village is close to the town center of Yangpyeong. Several apartment complexes were built near our village around the year of 2010 and new apartment complexes are being built. In other words, the village has new immigrants and many tourists after the long population decline and aging."

- Seo-myeon, Hongcheon-gun, Gangwon-do
  - Interview: Yeoyupo-ri Resident (Male, Born in 1933)

    The interview was conducted at the interviewee's home on Oct 10, 2014. He introduced himself as a long-term resident who lived here since he was born in 1933. In addition, he explained that this village was a clan village of Choi formed by decedents of Choi, Chung (최충, 崔沖, 986-1068) who was a prominent Confucian scholar and educator called Korean Confucius (해동공자, 海東孔子) during the Goryeo period. This village had Nodong memorial hall (노동서원, 魯東書院) to honor and worship Choi, Chung. His general perception for the KNVM and President Park was very positive and appreciative. He described that the village became much better thanks to the KNVM.

1) “Many young villagers left from the village in the 1980s, not the 1970s. I don’t know exactly how the KNVM affected the migration in the village. However, I remember that much more villagers migrated to urban areas after the KNVM. Before the KNVM, we were poor and hungry. During the KNVM, all of us were very diligent and hard working. The village got better and better in the 1970s.”

2) “There are no young people in the village. Most of the houses in the village have two old people. Some houses have only one old person left alone. Meanwhile, there are many immigrants along the main arterial road in front of my house. We don’t get along with them so much. In the early 1990s, Daemyung resort opened in Mt. Palbong near the village, which had accommodations, golf course, ski slope, and so on. After that, Palbong amusement park opened in the 2000s. Since then, many leisure pensions, cafes, restaurants, and tourism-related shops were built near the village. Sometime I am scared with so many traffics in the main arterial road. Before Daemyung resort was built, the village was completely rural and remote. Now there are a lot of tourists all the year round.”

- Seoseok-myeon, Hongcheon-gun, Gangwon-do
    - Interview: Sangok 2-ri Resident (Male, Born in 1945)

      The interview was conducted at the interviewee’s home on Oct 11, 2014. Surprisingly, he was a remarkable village leader who was honored many awards including the Order of Saemaul Service Merit (새마을훈장) from President Chun in 1983 and broadcast on television due to his dedication and leadership. He introduced many episodes of his village projects during and after the KNVM. He was still very loyal to the KNVM and President

Park. In addition, he was very proud of his whole devotion to his village without special compensation. He told me that he still regarded himself as a village leader with the Saemaul spirit even though he became a pastor around 15 years ago. He praised the KNVM as a spiritual revolution allowing all villagers without distinction of sex or age to improve their futures and engage village works actively beyond a long feudalistic convention.

1) "According to my observation so far, villagers usually left from the village for the sake of higher income and better education for their children. I think that almost all social infrastructures such as transportation, education, and culture were provided to people living in urban areas by priority. People in rural villages did not get them easily. I remember that there was more migration from the village in the 1980s rather than the 1970s. However, there were several important reasons to cause migration in the 1970s. First, many slash-and-burn farmers (화전민, 火田民) left from the village after President Park issued a ban of slash-and-burn fields in 1974. Second, many villagers who lived in submerged area left from the village in 1976 when the government built a reservoir in the valley. Most of them moved to Yongin or Yeoju with land compensation. Third, many villagers in the late 1970s left to Seongnam where a large-scale urban development was implemented by the government as a satellite city of Seoul."

2) "Nowadays, rural villages are full of remaining villagers who cannot settle down in urban areas and adapt themselves to urban life style and intense competition for survival. Thus, rural villages got older and older and we are suffering from population aging. For example, villagers in their fifties are completely young guys in the village. There are two people who are still singles in their fifties and two people who got married to women from Philippines in their forties. In the past, old singles used to get married to ethnic Koreans

living in China (조선족, 朝鮮族). However, the women divorced their old husbands or ran away from the village shortly after their marriages. Since they were able to speak Korean, they were easy to earn money at restaurants in urban areas. Since then, old singles in the village came to get married to women from Vietnam, Cambodia, and Philippines. Recently, there are several households who came from urban areas after they retired. As a result, it is becoming more and more difficult to maintain an elementary school near the village. The school which had 700 students in the 1970s has only 35 students now."

4.4 KNVM'S DEMOGRAPHIC RESILIENCE ASSESSMENT

In this section, I synthesize the spatiotemporal analyses and present the KNVM matrix for the demographic assessment of community resilience to rapid urbanization. Finally, I discuss the KNVM's demographic resilience in terms of two temporal periods, short-term and long-term.

4.4.1 *Demographic Resilience Matrix: Implementation and Impact*

Population change related to urbanization has the following fundamental characteristics in describing demographic resilience. First, urbanization as a social-ecological migration is qualitatively different from simple ecological migration. Humans can migrate to other human settlements much easier than plants or animals do. As a result, urbanization can happen rapidly because many humans can escape from bad, dangerous, or unwanted human settlements at the same time. In addition, big cities or whole nations seldom collapse even though small rural villages can collapse due to population decrease. Therefore, the application of resilience theory into human settlements needs to be cautious and different from natural habitats for plants or animals.

Next, urbanization is based on a trade-off relation between the rural and urban sectors in terms of population change. The migration from the rural to urban sector creates not only growth in the urban sector, but also, in turn, a decline in the rural sector. If the urban sector is in the growth ($r \blacktriangleright K$) phase as shown in Figure 4-8, the rural sector comes to be in the release ($K \blacktriangleright \Omega$) phase. Likewise, if the rural sector falls into the poverty trap, the urban sector can be in the rigidity trap or the growth phase. More specifically, the poverty trap refers to a situation of low potential for change, low connectedness, and low resilience, whereas the rigidity trap means that of high potential for change, high connectedness, and high resilience (Holling et al., 2002b; Allison et al., 2004). As a result, urbanization tends to intensify a variety of differences between the rural and

urban sectors in terms of population change, economic benefits, social equities, and environmental resources. In this context, I define community demographic resilience as the capacity of a community's population structure to sustain itself on a basic level, despite the shocks and disturbances caused by urbanization. As this chapter relates, however, the KNVM, as a force for urbanization at a national scale, and in combination with national family planning policies, has ultimately encouraged a migration pattern that has driven rural communities to adopt a fairly radical form of international and cross-cultural bride importation in order to sustain themselves.

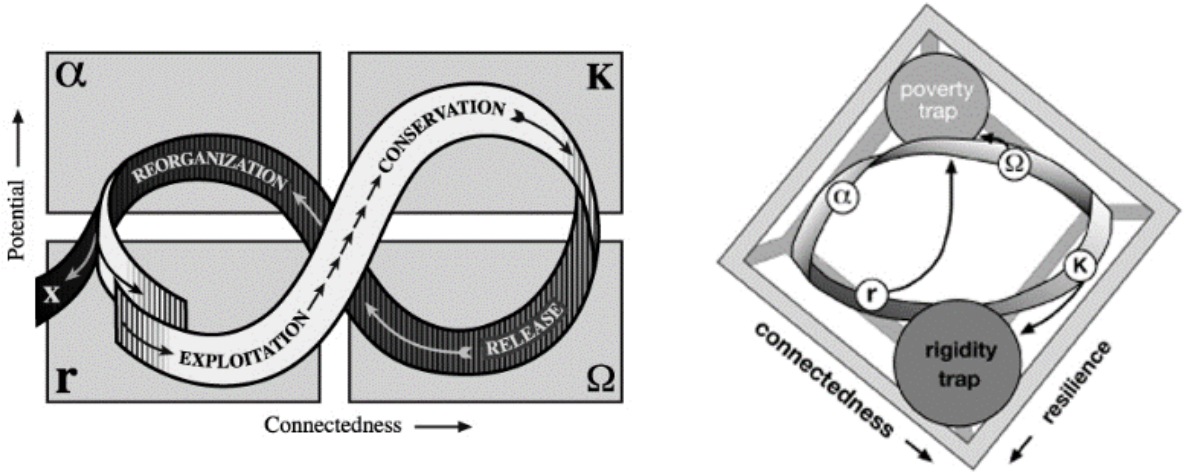


Figure 4-8 Adaptive Cycle, Poverty Trap, and Rigidity Trap
(Source: Left Diagram - Holling et al., 2002b, Right Diagram - Allison et al., 2004)

I synthesized the spatial (i.e., village, local, provincial, and national) and temporal (i.e., 1970 to 2010) analyses addressed in the previous sections as shown in Table 4-5 and Figure 4-9 in order to present the KNVM matrix on demographic assessment of community resilience. The cross-scale analysis provides findings and insights in terms of demographic resilience. First, the upper-scale systems were more uniform than the lower-scale system in the values of mean, range, and standard deviation. For example, as the system moved from local to provincial, the standard deviation was greatly decreased.

Second, the upper-scale systems lost much detail that lower-scale systems retained, which means that the upper-scale systems failed to correctly capture the dynamic change and differences between localities. For example, the Korean population kept increasing over the past 40 years from 1970 to 2010 in terms of the national scale. However, about 60% of the local-scale divisions constantly lost their populations during the same period.

The historical trend of the upper-scale systems change did not often match with that of the lower-scale systems change even though the trends of several provincial-scale systems such as Seoul Metropolitan Area could be similar to that of the national-scale system. The local-scale mean value of population relative change was the smallest in the period between 1980 and 1990 while the provincial-scale mean between 2000 and 2010. Similarly, the local-scale standard deviation was the largest between 1990 and 2000 while the provincial-scale standard deviation between 1970 and 1980. Therefore, it is important to conduct a comprehensive assessment including multi-scale spatiotemporal analysis when assessing and interpreting demographic resilience.

Table 4-5 Cross-scale Analysis on Population Relative Change, 1970-2010

Temporal Periods	**Spatial Scales**			
	Village	Local	Provincial	National
1970-1980	Pungsan: 0.83 Gangsang: -0.10 Seo: -0.24 Seoseok: -0.32	-0.4334 to 2.4957 • M: 0.1019 • SD: 0.4802 • G: 72 • R: 120	-0.0414 to 0.7261 • M: 0.1996 • SD: 0.2722 • G: 7 • R: 4	0.2122
1980-1990	Pungsan: NA Gangsang: -0.21 Seo: -0.46 Seoseok: -0.40	-0.5044 to 9.5579 • M: -0.0121 • SD: 0.4808 • G: 118 • R: 143	-0.1422 to 0.6421 • M: 0.1524 • SD: 0.2529 • G: 9 • R: 6	0.1596

1990-2000	Pungsan: -0.32 Gangsang: 0.05 Seo: -0.12 Seoseok: -0.16	-0.5477 to 8.2541 • M: 0.0475 • SD: 0.6719 • G: 85 • R: 149	0.1623 to 1.2130 • M: 0.0711 • SD: 0.1843 • G: 8 • R: 8	0.0628
2000-2010	Pungsan: -0.34 Gangsang: 0.41 Seo: 0.01 Seoseok: -0.24	-0.3247 to 1.5796 • M: -0.0026 • SD: 0.2480 • G: 88 • R: 142	-0.1277 to 0.2666 • M: 0.0306 • SD: 0.0920 • G: 9 • R: 7	0.0530

Note: M – mean; SD – standard deviation; G – number of administrative divisions in population growth phase; R – number of administrative divisions in population release phase.

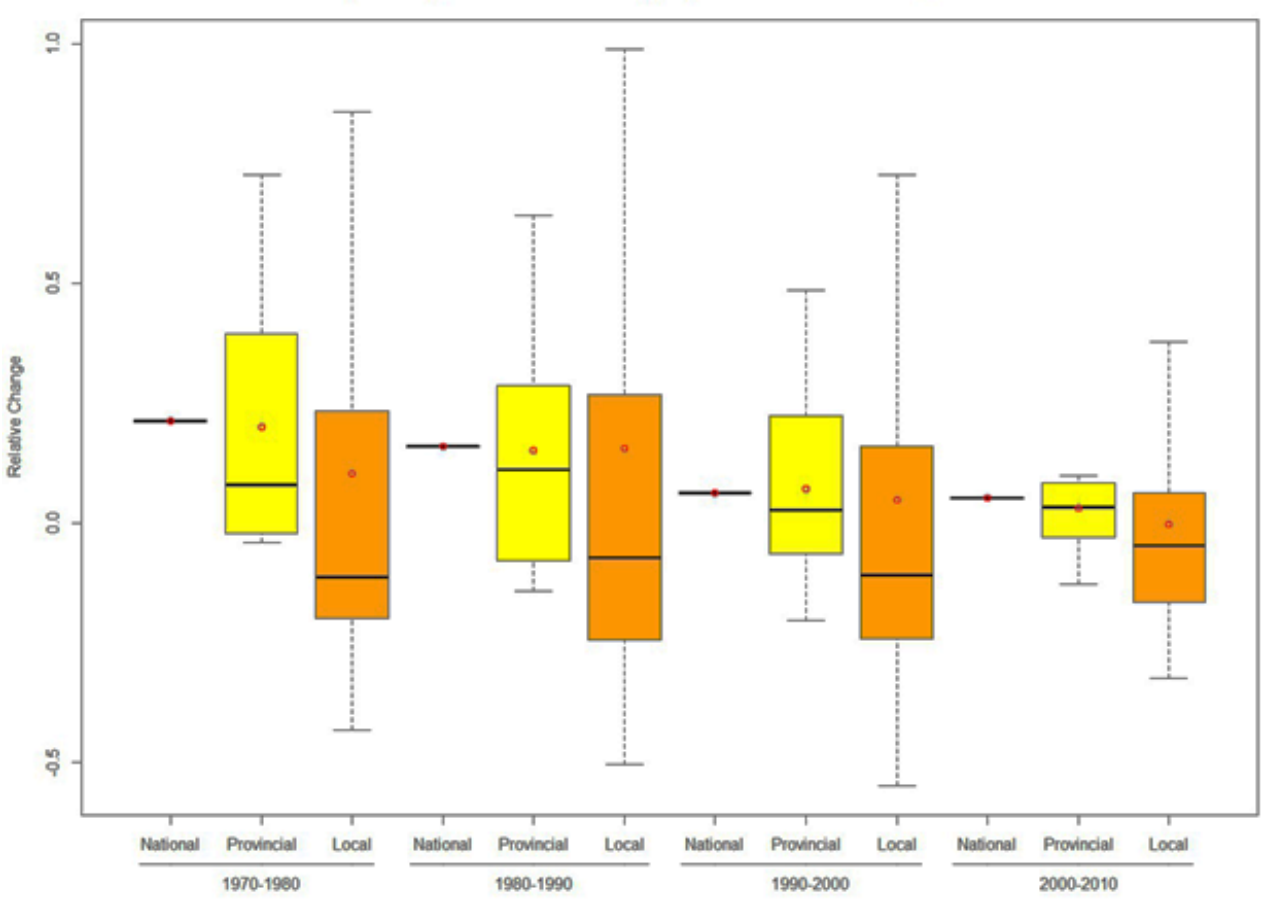


Figure 4-9 Boxplot of Population Relative Change, 1970-2010

Finally, I presented the KNVM matrix on demographic assessment of community resilience to rapid urbanization as shown in Table 4-6, which reflected the above cross-scale analysis and included two additional variables of age structure and fertility. In conclusion, I assessed the KNVM as a short-term success of mitigating rapid urbanization, but a long-term consequence of shifting demographic trends in terms of demographic resilience, which is discussed in detail in the next section. To be brief, rural villages supported by the KNVM between 1970 and 1980 had not completely lost their demographic resilience in total population, age structure, and fertility even though the KNVM may have triggered the rapid demographic transition of rural villages.

However, rural villages after the year of 1980 came to experience the demographic regime shift in total population, age structure, and fertility. The demographic variables of rural villages have not recovered since 1980, which led to unsustainable rural villages. During the period between 1980 and 2010, there was no noticeable rural support or development that may be comparable to the KNVM in the 1970s. South Korea has become a more urban society while ignoring rural villages. The main vulnerability in demographic resilience came from the spatial polarization of population between the urban and rural sectors, which was exacerbated by an aging population and a spatial mismatch of males and females.

Table 4-6 KNVM Matrix on Demographic Assessment of Community Resilience

Variables of Interest	**Temporal Periods**	**Spatial Scales**					
		Village	Local	Provincial	Urban /Rural	National	Global
Total Population	1970-1980	Given the mean population relative changes, all (i.e., national-provincial-local) systems were still in the growth phase even though they had high variances inside the systems. Geographically, many local-scale growth poles were observed on the map along with relatively homogeneous population distribution.					

	1970-2010	As time went on, the speed of population growth decreased. Although upper-scale systems were generally in the growth phase, most of the lower-scale systems were in the release phase. Geographically, the strong divide between urban and rural areas became more evident on the maps since 1980.
Age Structure	1970-1980	The younger generation under 30 years old was still the majority among all age groups despite the rapid fertility decline. Population growth of town centers in the rural sector was similar to that of urban centers even though towns and villages in the rural sector experienced a population decline. As a result, the difference of age structure between the urban and rural sectors was not severe.
	1970-2010	As the baby boom generation, born between 1955 to 1963 grew older, population aging was more severe even though there was an echo baby boom born to the first baby boom generation. Productive age population had continuously been reduced, which led to non-reversible state of age structures over all systems.
Fertility	1970-1980	Although the Korean Family Plan was initiated in 1962, it started to have a strong influence on the fertility decline of the rural sector in the 1970s. Although the KNVM contributed to the Korean Family Plan at that time, fertility was still higher than the fertility replacement ratio of 2.1 by 1980.
	1970-2010	Fertility decreased to much less than the fertility replacement ratio of 2.1. Although there has been a recent promoting of the recovery of fertility since 2000, the trend of fertility decline never changed, which was exacerbated by huge differences between the spatial polarization of the population between the rural and urban sectors.

4.4.2 *Demographic Resilience Assessment: Short-term and Long-term*

4.4.2.1 Short-term Resilience: Urbanization's Soft Landing

As discussed in Chapter 4.3.2, Korean urbanization showed a remarkably rapid increase from 1970 to 2000. Nevertheless, the KNVM is considered to have had a somewhat mitigating impact on rapid urbanization in rural villages between 1970 and 1980 in terms of demographic resilience, including total population, age structure, and fertility. However, it should be noted that the KNVM's contribution to demographic resilience to rapid urbanization was different between the first five years (1970-1975) and the second five years (1976-1980) of its existence. Coincidentally but obviously, the Park government had expanded the KNVM to all of the urbanized areas beyond rural areas since 1976 as specified in Chapter 3 (Saemaul Research Institute, 1980; Jung, 2009). Therefore, the KNVM cannot be fully credited with the sum of the rural movement, especially after 1976. In fact, this is an important issue in identifying whether the KNVM's implementation was truly an act of rural development or not. However, there were no comparison cases to examine the KNVM's efficacy against the rapid urbanization because the KNVM covered all of the rural villages in the 1970s. Instead, it is possible to compare population indicators between the period of KNVM (1970-1980) and the period after the KNVM (1980-2010).

The KNVM's direct or indirect mitigation of rapid urbanization between 1970 and 1980 can be confirmed in Table 4-7 showing the annual population growth of the urban and rural sectors during the period of Korean rapid urbanization. The divide between the urban sector and the rural sector in the table is based on the Korean administrative division structure specified in Chapter 2.2.2. In Korea, there are three administrative divisions having the same local-level hierarchy which are called *Eup-Myeon-Dong* (읍-면-동, 邑-面-洞): *Dong* (동, 洞) is used to refer to

neighborhoods in the urban sector while *Eup* (읍, 邑) and *Myeon* (면, 面) are respectively used to call towns and townships in the rural sector that belong to counties called *Gun* (군, 郡). Generally, each county (군, 郡) consists of one town (읍, 邑) as the most populated area and several or many townships (면, 面). Certainly, the population growth of the urban sector was high enough to be more than 5% between 1970 and 1980.

Table 4-7 Annual Population Growth of Urban and Rural Sector, 1970-2000

Period	Whole Country	Urban Sector	Rural Sector		
		Neighborhood (Dong)	Town (Eup)	Township (Myeon)	Total
1970-1975	2.4	5.7	5.5	- 2.0	- 0.3
1975-1980	1.5	5.0	4.3	- 4.2	- 2.2
1980-1985	1.6	4.3	1.2	- 4.3	- 2.6
1985-1990	1.4	4.1	- 5.6	- 4.0	- 4.5
1990-1995	0.6	1.6	- 0.6	- 4.1	- 2.9
1995-2000	0.7	1.0	1.5	- 1.6	- 0.4

(Source: Kim et al., 1996)

Interestingly, the population growth in urban areas (*Dong*, 동, 洞) was similar to that of towns (*Eup*, 읍, 邑) in the rural sector even though that of townships (*Myeon*, 면, 面) in the rural sector showed quite different results, losing much of its population annually. However, the similar trend between urban and rural sector after 1980 is not observed. In conclusion, the urbanization

within the rural sector (i.e., the growth of towns in the rural sector) was as vibrant in the 1970s as the growth of the urban sector overall was. In other words, the rural sector mostly held its population in towns, especially for the first five years (1970-1975).

Meanwhile, it is impossible to avoid the impact of urbanization on rural villages according to historical precedents that urbanized countries have experienced. The difference among the urbanized countries was mainly in the degree of the impact of urbanization on rural villages. Therefore, it is meaningful to ask how the KNVM made rapid urbanization possible to be mitigated in the 1970s and why it was no longer possible after that. For this answer, I traced historical data showing rural household average incomes and the relative social significance of agriculture.

As shown in Table 4-8, the average income of rural households had been superior or similar to urban household average incomes during the period of the KNVM even though there was a fluctuation of the average income of rural households at that time. However, the percentages of rural to urban household incomes continuously decreased after the year of 1985, and never returned to the state that was in the 1970s. Further, this historical trend matches well with that specified in Table 4-7. In the meantime, the percentages of agricultural employment of total industries also continuously reduced, with 27.1% in 1970, 25% in 1975, 14.8% in 1980, and 4.9% in 2000 (Lim, 2005). In other words, although the rural sector gradually lost not only the vitality of countryside as a space, but also the priority of agriculture as an industry, the historical trend became more serious from the 1980s because the Korean Government did not need to be responsible for the rural sector any longer.

Table 4-8 Rural and Urban Household Average Incomes, 1965-2010

Year	Rural Household Average Income (A)	Urban Household Average Income (B)	Percentage (A/B)
1965	112,201	101,400	110.65%
1970	255,804	338,160	75.65%
1975	872,933	786,480	110.99%
1980	2,693,110	2,809,032	95.87%
1985	5,736,246	5,085,456	112.80%
1990	11,025,781	11,319,264	97.41%
1995	21,802,558	22,932,768	95.07%
2000	23,072,123	28,643,364	80.55%
2005	30,503,000	39,010,044	78.19%
2010	32,121,000	48,092,052	66.79%

Note: The unit of income is Korean won. The incomes refer to average annual incomes of people living in rural or urban sectors. The urban household average incomes were calculated from households who had workers employed in urban sector.
(Source: Statistics Korea)

4.4.2.2 Long-term Resilience: Urban-Rural Spatial Polarization

Unlike the above short-term mitigation of demographic resilience in the 1970s, South Korea is currently suffering from urban-rural spatial polarization, which resulted from the rapid demographic shift. At a glance, the OECD statistics (Organisation for Economic Co-Operation Development, 2012) revealed strong urbanization indicators. The Korean urbanization ratio

reached 85.4% in 2011, which means that 85.4% of the total population in Korea lived in urban areas. In addition, the population of the Seoul Metropolitan Area was 49.5% of the total population of the country in 2011. Although the speed of Korean urbanization has become slower, the spatial polarization between the rural and urban sectors has become more serious and irreversible. This long-term consequence of demographic resilience is currently being worsened with an aging population and a spatial mismatch of males and females.

Population Aging

I drew Korean population pyramids from 1960 to 2010 as shown in Figure 4-10, which clearly shows that there were tremendous changes of population age structure between 1960 and 2000. The population pyramids reveal that the major age group, namely the baby boom generation who was born from 1955 to 1963, continuously moved from younger to older age groups. Along with the rapid fertility decline, population aging has deepened over the past 50 years; it is expected that this phenomenon will perpetuate unless substantial social changes occur, such as the unification of North and South Korea, a large-scale international migration, or a rapid fertility increase. Although population aging has been an unavoidable phenomenon to all urbanized countries including many in Europe, North America, and Japan, Korea's population aging has been discussed much more seriously with the extremely low fertility rate. Coleman (2002) numerically calculated that South Korea could be one of the first countries to be ethnically extinct in the future if the demographic trend continues even though he did not fully consider Korean ethnicity, bloodlines, and nation-statehood beyond the demographic change.

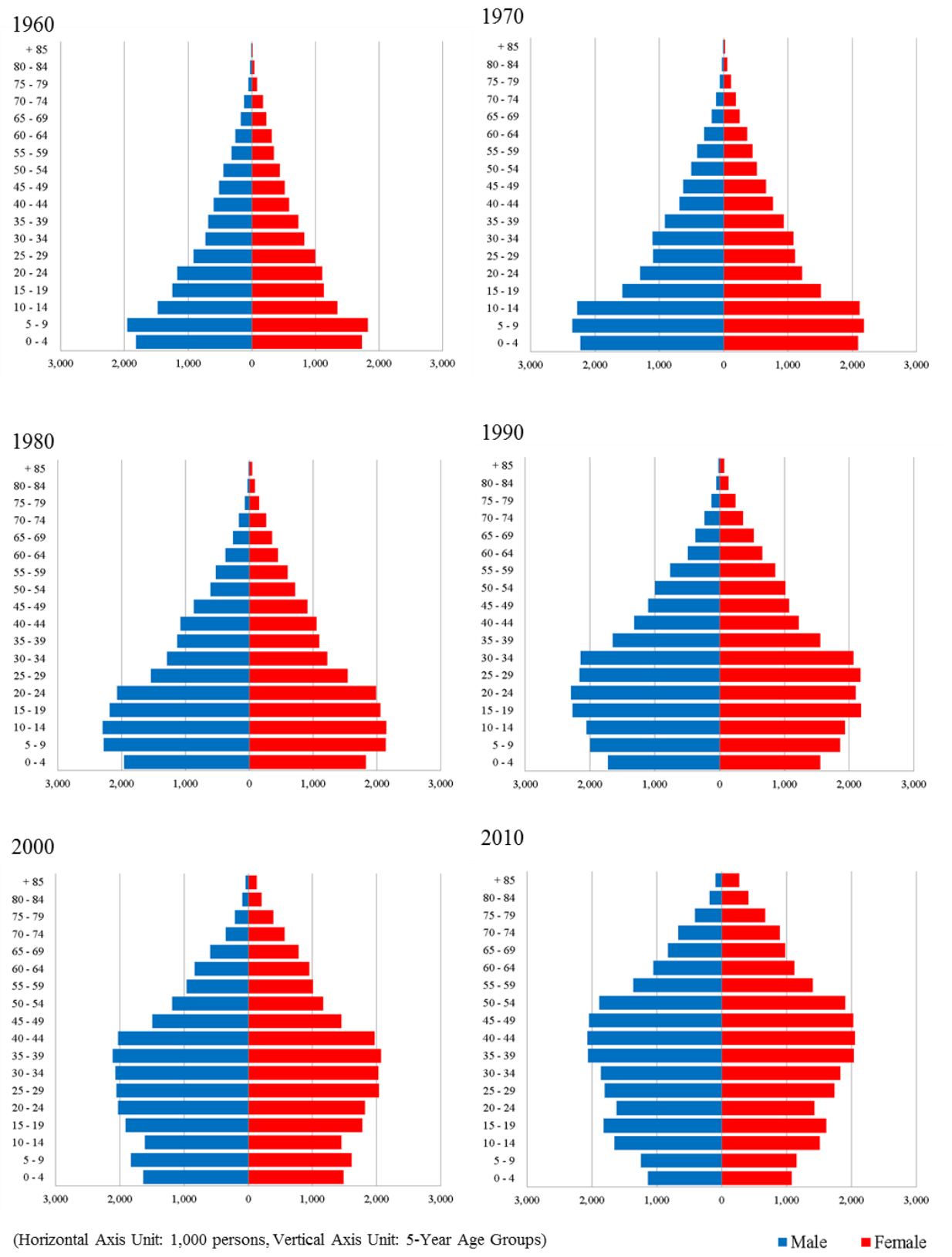


Figure 4-10 Population Pyramids, 1960-2010
(Source: Statistics Korea)

Spatial Mismatch of Male and Female

The spatial polarization between the urban and rural sectors is exacerbated by the spatial mismatch of males and females who are of a marriageable age. The rural sector has continuously suffered from the phenomenon of bride shortage. As shown in Table 4-9, the urban sector has had more women than men of a marriageable age while the rural sector has had many more men than women since 1985. In addition, the difference of the sex ratio between the urban and rural sectors has been very high since 1985. As a result, the shortage of women in the rural sector led to men remaining unmarried, which has made sustainability in the rural sector difficult in terms of demographic resilience.

Table 4-9 Sex Ratio between Males (25-29) to Females (20-24 years old), 1970-1995

Period	Whole Country	Urban Sector (A)	Rural Sector (B)	Difference (A-B)
1970	89.6	84.9	92.9	- 8.0
1975	84.2	79.8	88.3	- 8.5
1980	77.6	75.7	80.1	- 4.4
1985	98.4	93.7	107.3	- 13.6
1990	103.3	100.9	114.3	- 13.4
1995	100.9	99.0	111.5	- 12.5

(Source: Kim, 2007)

Today, Korean women have a tendency to be reluctant toward marrying men in the rural sector, which makes the problem of the spatial mismatch between males and females more serious. This inclination has unintentionally resulted in many immigrant marriages in the rural sector, where women primarily come from other less developed countries such as China, Vietnam,

Thailand, Mongolia, and the Philippines. In addition, international marriages are often driven by artificial business agents. For example, Figure 4-11 shows a common advertisement of a 6-day one-stop wedding service that aimed to facilitate international marriages of Korean men in the rural sector with Vietnamese women. The advertisement that is questionable whether it is really happening implies that Korean urbanization is not a domestic migration from rural to urban sector any more, but an international trend linking poorer and more affluent countries. In addition, the appearance of transnational marriage markets is currently a global phenomenon triggered by the rapid global circulation of capital and labor (Tseng, 2012).

Translation of above diagram

- First Day: Departure with six-day schedule
- Second Day: Four-hour meeting and Bride Selection
  (Meet several or dozens of bride candidates.)
- Third Day: HIV and Mental Disorder Test
- Fourth Day: Wedding Ceremony and First Night
- Fifth Day: Honeymoon in Vietnam
- Sixth Day: Coming back to Korea

Figure 4-11 Wedding Process of International Marriage Agency
(Oh et al., 2006, May 25)

Further, this global phenomenon reveals that the panarchy of demographic resilience of rural villages is scaling up from national-scale urbanization in the late 20th century to global-scale transnational wedding migration in the early 21th century. Although old men of rural villages in Korea have an international capacity or buffer to get married, they also come to confront with foreign cultures and languages that their young wives are rooted in. In other words, the quantitative demographic mismatches between rural and urban areas could lead to the qualitative demographic mismatches between Korean old men and Vietnamese young women. However, the community or rural villages are not prepared to accommodate international marriages in terms of cultural diversity, language education, and child bearing. Therefore, it is required that the community have capacity or buffers such as cultural adaption, social consideration, and economic support to absorb and reorganize the qualitative demographic mismatches.

4.4.3 *Limitation of Analysis: Next Steps*

The demographic assessment of community resilience specified in this chapter is not without its challenges and limitations. First of all, this study utilized exploratory and historical research covering a 40-year temporal period and spatial scales ranging from village to national. However, it is impossible to completely separate the temporal and spatial impacts of the KNVM alone from other government-led plans in the 1970s. Thus, I focused primarily on the KNVM and the Korean Family Plan as important implementations in doing a historical interpretation of demographic resilience. In addition, I created a variety of demographic patterns representing the time since the KNVM was completed, from national-scale statistical data, multi-scale spatiotemporal data, and village-scale sample survey. Nevertheless, it would be great to do the same analysis with the multi-scale spatiotemporal data showing the time before the KNVM took place, especially from 1945 to

1970. Although Korean census started from 1925, I could not find digital datasets showing local-scale census from 1925 to 1970 and relevant GIS digital maps delineating the local-scale geographical boundaries. As a next step, the demographic data of old statistical references and the area maps of old administrative divisions should be first digitalized into spreadsheet files and GIS maps respectively for extended time-series analysis.

I presented the KNVM matrix on demographic assessment of community resilience based on the three variables of total population, age structure, and fertility. My data and reasoning were based on administrative divisions because of the data limitation of the Korean census. However, spatial scales of community resilience may be different from the hierarchical administrative divisions of Korean census. Other spatial scales (e.g., natural boundary, school district, or transportation network) can show cross-scale interaction of community resilience more clearly. In addition, the degree of analyses investigating the three variables depended on the data availability. For example, the variable of total population had the most detailed and available information. If possible, the KNVM matrix can be developed further using possible demographic variables such as migration, mortality, or life expectancy.

The discussion in this chapter can be tested with numerous empirical studies. For example, the growth and decline of local-scale populations from 1970 to 2010 can be answered through the regression of many variables such as local resources (e.g., land, water, tourist attraction), local industry (e.g., agriculture, non-agriculture, tourism), local infrastructure (e.g., access to road / railroad / airport), local public services (e.g., education, culture, transportation), and local development (e.g., project, subsidy). In addition, the rural sector's demographic change should be understood with the urban sector's large-scale development because of push and pull factors of migration. Although rural development supports rural villages, the development's efficacy can be

minor if benefits from the urban sector is much larger than those from the rural sector supported by the rural development.

4.5 CHAPTER CONCLUSION

This chapter investigated the relationship between the KNVM and population change, and conducted a demographic assessment of community resilience to Korean historical rapid urbanization. According to the Korean census, the Korean urbanization rate increased from 28.0% in 1960 to 81.9% in 2010. The population of the Seoul Metropolitan Area reached 49.5% of the total population of the country in 2011. Given the rapid and concentrated urbanization driven by enormous migration from the rural to urban sector, several questions on the KNVM and population change towards sustainable and resilient rural development were relevant: Q1) How did the KNVM affect population change in the 1970s? Q2) How have Korean demographic patterns changed since the completion of the KNVM? Q3) How has the KNVM affected Korean demographic resilience in terms of two short-term and long-term effects? Q4) What lessons and implications can be drawn from the historical experience of the KNVM and the Korean Family Plan?

With the above questions, I took following four steps: First, I clearly identified the mechanism of the KNVM and the Korean Family Plan for population change in the 1970s. Second, I created a variety of spatiotemporal demographic patterns using a macro overview based on national-scale statistical data, a cross-scale analysis based on multi-scale spatiotemporal data, and a micro survey based on village-scale sample data. I then conducted a demographic assessment of community resilience based on three main variables such as total population, age structure, and

fertility. Finally, I discussed short-term efficacy and long-term vulnerability of Korean strong top-down implementations such as the KNVM and the Korean Family Plan.

The KNVM and the Korean Family Plan strongly affected population change in the 1970s. Although the Korean Family Plan had been initiated in 1962 along with the First Five-year Economic Plan, it achieved the rapid success of women's birth control with the KNVM, decreasing the TFR from 4.5 children in 1970 to 2.7 children in 1980, which was attributable to the national organization of village-scale local women called the Family Plan Women's Society or the Saemaul (New Village) Women's Society.

Korean urbanization has shown continuous and dominant growth trend. Korean rapid urbanization was especially prevalent from 1970 to 2000 according to the speed of urbanization ratio. Around the year of 1980, namely right after the KNVM, the urban population started to exceed the rural population through the migration from the rural to the urban sector. Ironically, the migration was greatly accelerated after South Korea achieved self-sufficiency of rice because rice production came to be less important in promoting income increase of agriculture households.

Third, demographic patterns of local-scale administrative divisions since the KNVM are identified with the following four groups: Group 1 had shown continuous population growth over the past 40 years (1970-2010) even though the growth speed was recently reduced. The Seoul Metropolitan Area minus the city of Seoul falls into this group. Group 2 revealed a decline in population between 1990 and 2010 after continuous growth. The city of Seoul belongs in this group. Group 3 displayed stagnant population change. Administrative divisions between metropolitan cities and mountainous areas are applied to this group. Group 4 showed continuous decline. Administrative divisions in mountainous areas are related to this group.

Fourth, the cross-scale (i.e., national, provincial, and local) analysis of demographic patterns since the KNVM provided findings and insights in terms of demographic resilience. The upper-scale systems were more uniform than the lower-scale systems in the values of the mean, range, and standard deviation. In addition, the upper-scale systems lost much detail that the lower-scale retained. The historical trend of the upper-scale systems change did not often match that of the lower-scale systems change. For example, the Korean population increased in the 40 years from 1970 to 2010 in terms of the national scale. However, about 60 to 70% of local-scale divisions consistently lost their populations during the same period.

I assessed the KNVM as a short-term success of mitigating rapid urbanization, but the long-term consequence of shifting demographics in terms of demographic resilience. Rural villages supported by the KNVM between 1970 and 1980 had not completely lost demographic resilience in demographic variables such as total population, age structure, and fertility, even though the KNVM may have triggered the rapid demographic transition of rural villages. However, rural villages after the year of 1980 came to experience the demographic regime shift in the above demographic variables. The variables in rural villages have never recovered since 1980, which led to unsustainable rural villages because they are on a path to extinction or collapse. In addition, rural villages are also not resilient because the current situation has become more and more difficult to reverse or adapt. The desperate migration of replenishing women population cannot overcome the ongoing rural collapse. Overall, Korean demographic resilience was not consistent in two temporal periods such as short-term (1970-1980) and long-term (1970-2010).

Chapter 5. RESILIENCE ASSESSMENT 2: KNVM AND RESOURCE MANAGEMENT CHANGE

5.1 CHAPTER INTRODUCTION

This chapter expands the discussion of the KNVM into an ecological assessment of community resilience to rapid urbanization by connecting the KNVM as a transformation of built environments to resource management change from 1970 to 2010 in Korea. I investigate the relationship between the KNVM and resource management change in this chapter.

There are many reasons why the KNVM and resource management change are important to this dissertation. First, the KNVM created a transition of resource management from traditional to modern resource and energy in the 1970s and accordingly has affected Korean ecological resilience, which is worth investigating the KNVM's cross-sectoral and cross-scale interaction under resilience theory in social-ecological systems. The KNVM and the Korean Reforestation have also been regarded as a successful reforestation implementation in the world because South Korea had been largely deforested before the implementations in the 1970s (Brown, 2008). In Korea, ecological data of forest growing stock have been relatively well accumulated since forestry yearbooks covering from national to local-level statistics was, for the first time, published in 1968. Although resource management transition from traditional to modern society has been a commonly observed occurrence in many countries (Cipolla, 1962; Wilkinson, 1973; Wrigley, 1988; Kander et al., 2014), the rapid and large-scale transition of South Korea was heavily influenced by the KNVM and the Korean Reforestation, and may thus provide insights and implications regarding the feasibility and vulnerability of strong top-down implementations as a measure to enhance social-ecological resilience.

More specifically, I address several questions on the KNVM and resource management change towards sustainable and resilient rural development. Q1) How did the KNVM create resource management change in the 1970s? Q2) How have Korean ecological patterns of forest growing stock changed since the KNVM's completion? Q3) How has the KNVM affected Korean ecological resilience to rapid urbanization on both a national and global scale? Q4) What lessons and implications can be drawn from the historical experience of the KNVM and the Korean Reforestation?

According to the above questions, I clearly identify the mechanism of the KNVM and the Korean Reforestation with regard to resource management change in the 1970s. In order to capture the resource management transition driven by the KNVM's implementation, I identify such a change of resource types from traditional and natural to modern and industrial. I then display a variety of spatiotemporal ecological patterns of forest growing stock using a macro overview based on national-scale statistical data, a cross-scale analysis based on multi-scale spatiotemporal data, and a micro survey based on village-scale sample data. These ecological patterns explicitly show the impact of the KNVM and the Korean Reforestation. Next, I conduct an ecological assessment of community resilience to rapid urbanization based on three main variables: forest growing stock, primary energy type, and foreign energy dependence. During the assessment process using ecological resilience matrix, relevant concepts of resilience theory including adaptive cycle, panarchy, and regime shift are applied. Finally, I discuss national-scale efficacy and global-scale vulnerability of Korean strong top-down implementations, such as the KNVM and the Korean Reforestation, pointing out unavoidable resource limitation in the era of fossil fuel economy, particularly in Korea.

Finally, this chapter raises a fundamental question on the opportunities and limitations of rapid and large-scale transformation of built and natural environments. Although the KNVM and the Korean Reforestation led to a seemingly miraculous success of reforestation, these government programs also resulted in a new dimension of vulnerability. As a result, this chapter may reveal that there is no panacea for sustainable and resilient rural development in complex social-ecological systems because of cross-sectoral and cross-scale interaction (Ostrom and Cox, 2010).

5.2 KNVM'S IMPLEMENTATION: RESOURCE MANAGEMENT CHANGE

5.2.1 *KNVM and Korean Reforestation*

As specified in Chapter 3.3.1.3, the KNVM's implementation had an inseparable relation with many central government-led plans in the 1970s. The detailed explanation of the relationship between the KNVM and government-led plans in the 1970s are summarized in Table 3-4 and Table 3-5. In the same vein, the KNVM was deeply related to the Korean Reforestation (산림녹화, 山林綠化) in the 1970s, which rapidly created resource management change and accordingly enhanced natural environments. The enhancement of natural environments, as an opposite concept of environmental degradation, means that the productivity of natural environments is improved by social process or human interference beyond purely environmental process (Blaikie and Brookfield, 1987). Therefore, the KNVM's mechanism of resource management change is discussed with the Korean Reforestation.

Korean Reforestation

Lester R. Brown (2008) argued in his book, *Plan B 3.0: Mobilizing to Save Civilization* that South Korea's reforestation should be a model for the rest of the world in that South Korea is successfully reforested from the large deforestation of only 50 years ago. Then, he described why Korean reforestation was a successful reforestation as shown in the quotation below, claiming that the earth can be reforested based on the case of Korea's successful rapid reforestation:

> "*South Korea* is in many ways *a reforestation model for the rest of the world*. When the Korean War ended, half a century ago, the mountainous country was largely deforested. Beginning around 1960, under *the dedicated leadership of President Park Chung-Hee*, the South Korean government launched a *national reforestation effort*. Relying on the

formation of *village cooperatives*, hundreds of thousands of people were mobilized to dig trenches and to create terraces for supporting trees on barren mountains. Se-Kyung Chong, researcher at the Korea Forest Research Institute, writes, "The result was a seemingly *miraculous rebirth of forests from barren land*." *Today forests cover 65 percent of the country, an area of roughly 6 million hectares*." (Brown, 2008, p.197, emphasis added).

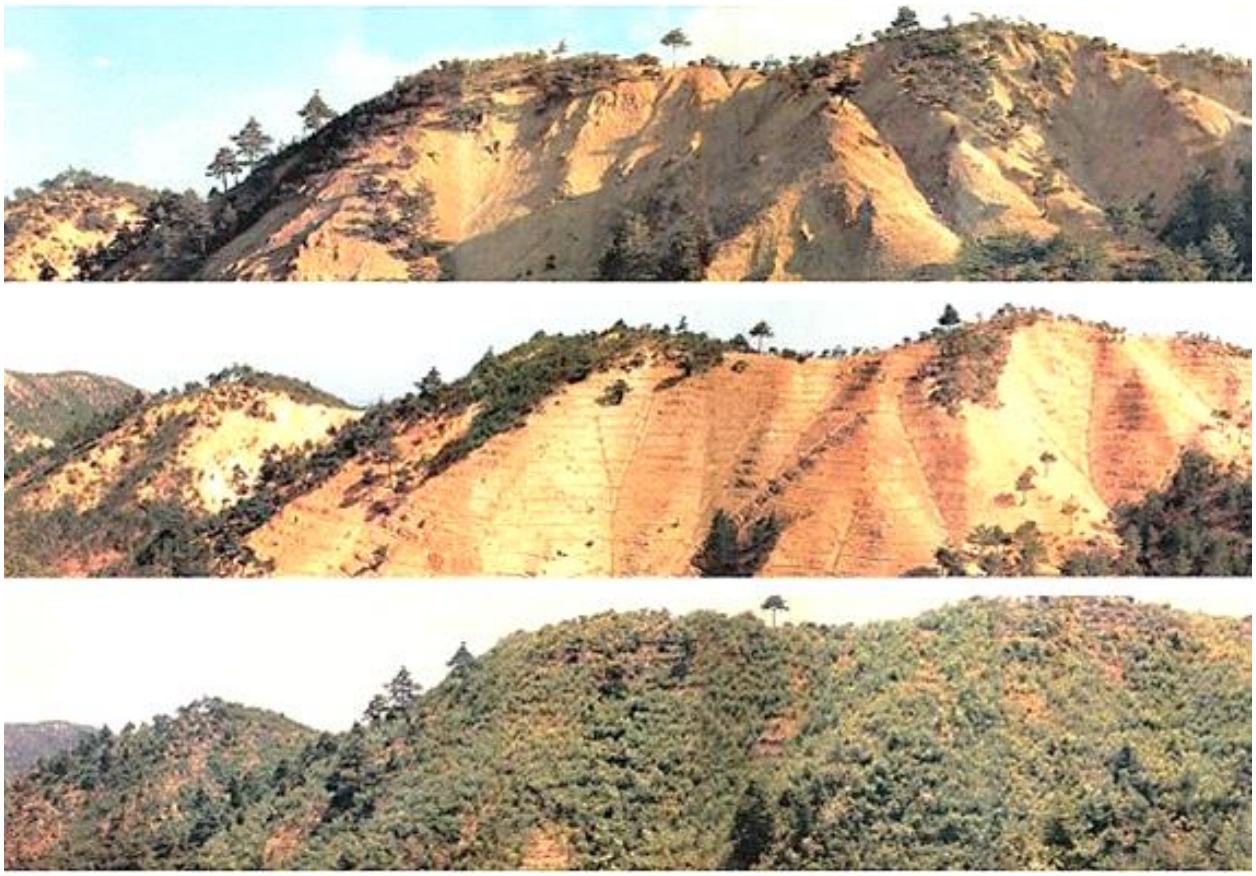


Figure 5-1 Miraculous Rebirth of Forests from Barren Land
(Source: Kim, 2011)

It is necessary to discuss Korean natural environments before delving into the Korean Reforestation in the 1970s, which can allow for a better understanding of Korean forests. South Korea has a high population density and large mountainous areas, which cover about 65% of the whole country. In addition, rainfall is concentrated in the summer months from June through September. Rainfall in July amounts to about 28% of the country's annual precipitation. Thus,

forest issues have been historically very important in Korea because forests provide a variety of ecosystem services including holding water, alleviating droughts, mitigating floods and landslides, providing foundation for biodiversity, and maintaining air quality.

Historically, Korea's reforestation endeavor has continuously been in tact since Korea was completely deforested by Japanese exploitation and the Korean War. The Park government passionately reforested the country regardless of the period. The Park government exerted strong leadership during the Pre-Reforestation (치산녹화기 이전, 治山綠化期以前: 1962-1972) and the First Reforestation (제 1 차 치산녹화기, 第一次 治山綠化期: 1973-1978) periods. As shown in Table 5-1 and Figure 5-2, the period of the Pre-Reforestation had a lot of reforested areas and trees which were similar to those of the First Reforestation in terms of the annual averages of planted forest areas and trees. Nevertheless, the achievement of the Pre-Reforestation was poor due to reckless deforestation for firewood and a lack of policing (Bae et al., 2006).

Meanwhile, the Korean Reforestation started to be effective from the First Reforestation, which had the following distinct features: First, the reforestation was rapid and intense. The 10-year plan of the First Reforestation was actually completed within just six years. Second, the reforestation focused more on timber trees and rapid growth trees rather than fuel trees. Third, the government's forest policing was improved with forestry-related acts and regulations including a ban of slash-and-burn fields in 1974. Fourth, fundamental changes of forest utilization happened during the reforestation period, including the substitution of fossil fuels for firewood in home use. The specific resource management change of rural villages are discussed later with the KNVM's implementation.

Table 5-1 Historical Progress of Korean Reforestation

		Period			
		Pre-Reforest. (1962-1972)	1st Reforest. (1973-1978)	2nd Reforest. (1979-1987)	Whole Reforest. (1962-1987)
A. Planted Forest Area (ha)					
Annual Average Area (1 year)	Timber Tree	63,236	59,626	56,325	60,011
	Rapid Growth Tree	10,607	59,467	47,184	34,544
	Fruit Tree	20,182	25,599	3,146	15,535
	Fuel Tree	55,732	34,638	0	31,572
	Others	145	632	664	437
	Sum Area	149,902	179,962	107,319	142,099
Total Area (whole period)		1,648,918	1,079,773	965,871	3,694,562
B. Planted Trees (million)					
Annual Average Trees (1 year)		420	493	213	365
Total Trees (whole period)		4,617	2,960	1,915	9,492

Note: The types of trees in the above A. Planted Forest Area (ha) were translated from the following terms of Korean Forestry Stats: Timber Tree (장기수/용재림, 長期樹/用材林), Rapid Growth Tree (속성수, 速成樹), Fruit Tree (연료림, 燃料林), and Others (기타, 其他). However, the specific types of planted trees were not explained in the statistical data.

(Source: Forestry Stats, Korea Forest Service)

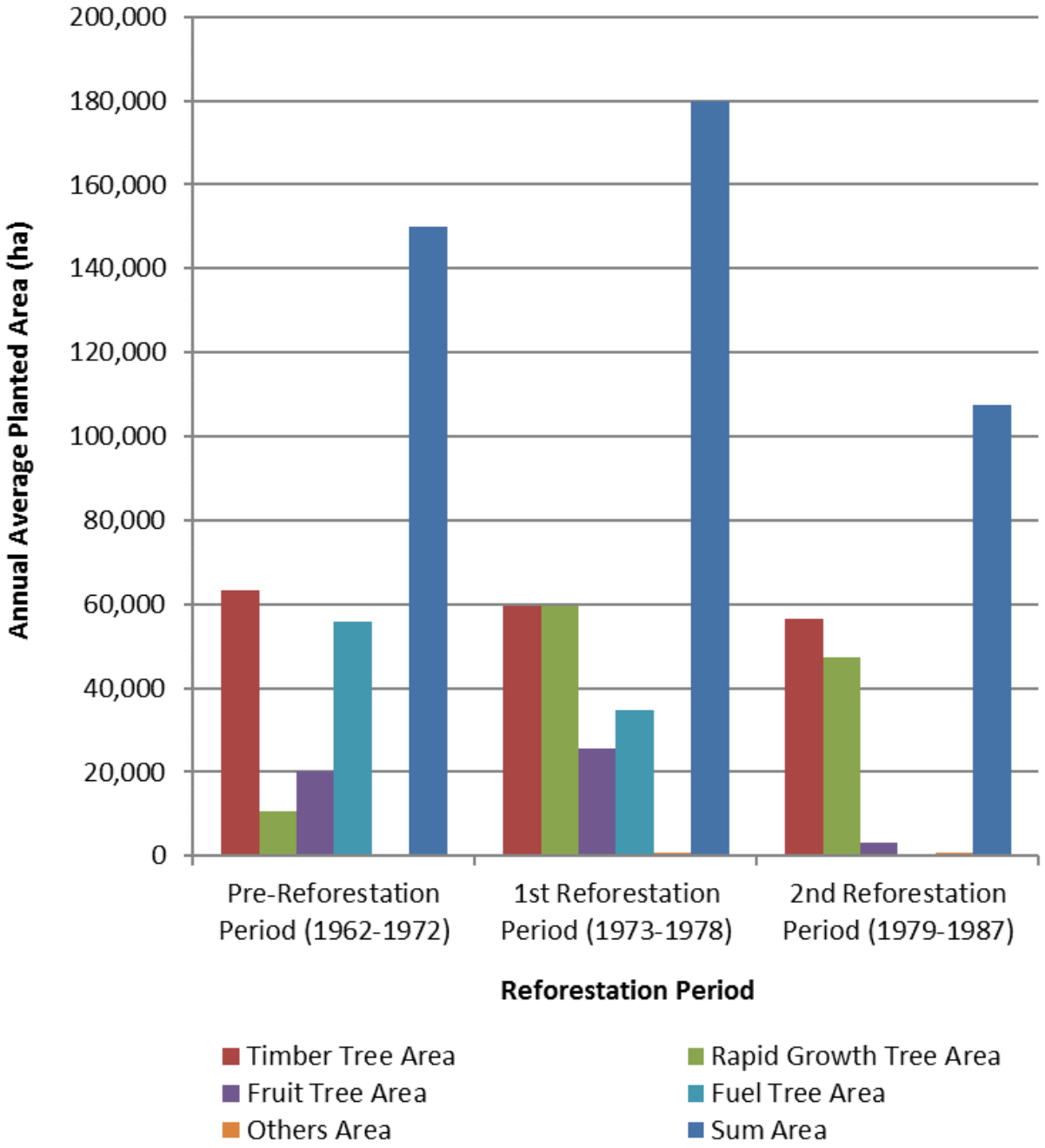


Figure 5-2 Historical Progress of Korean Reforestation

Note: The y-axis in the figure refers to annual averages of planted forest areas which were reforested during each period according to the types of trees.

(Source: Forestry Stats, Korea Forest Service)

5.2.2 *Resource Management Transition: Resource Type Change*

The KNVM created a transition of resource management in the rural sector through change in resource types from natural materials to industrial products, which had an ecological impact in tandem with the period of the Korean Reforestation. To be specific, President Park wanted to rapidly transform traditional villages into modern villages as discussed in Chapter 3. President Park and his planners regarded traditional villages as negative places of passivity, stagnation, disease, and poverty. As a result, the KNVM houses and villages were quite different from traditional houses and villages in term of human settlements. As shown in Figure 5-3, the new built environments were a sharp contrast to the traditional human settlements, especially in terms of used materials and landscapes of built environments.

Figure 5-3 Difference between Traditional and KNVM Human Settlements

The KNVM houses were westernized buildings with gabled roofs and punched windows in load-bearing walls. In addition, the KNVM houses and villages were built with industrial products, replacing existing natural materials in traditional houses and villages. For example, traditional building materials, such as soil, paper, wood, and straw, were replaced by cement, glass, and reinforcing bars. Fuels for heating or cooking were also changed from firewood to fossil fuels such

as coal, oil, and gas. As a result, the KNVM's implementation led to regime change of resource management as shown in Table 5-2.

Table 5-2 Regime Change of Resource Management

Resource		Traditional (Natural Materials)	Modern (Industrial Products)
Building Material	Wall	Soil, Wood, Straw	Cement, Reinforcing Bar
	Window	Traditional Paper	Glass
	Roof	Straw and Grass	Slate
Fuel	Cooking	Firewood	Coal, Oil
	Heating	Firewood	Coal, Oil, Gas
Lighting		Kerosene Lamp	Electricity
Water		Well	Well Pump

Further, the KNVM used resource incentives to promote its rapid implementation. In other words, each village's performance in the KNVM initiatives acted as an important factor in providing new resource and energy to the village. For example, the Long-Term Rural Electrification Project Scheme (농어촌전화사업장기계획, 農漁村電化事業長期計劃, 1971~1979) was implemented in order to mitigate the tremendous gap between agriculture and industry as well as between the urban and rural sectors, which resulted from the government's Five-year Economic Development Plans (Yim et al., 2012). During the actual process of rural electrification, the National Agricultural Cooperatives (농업협동조합, 農業協同組合) selected 150 outstanding KNVM villages in 1972 and loaned approximately 1 million wons (원, ₩) to

each village with medium- or long-term, low-interest loans, totaling 100 million wons for the entire electrification project budget. The annual interest rate was 5% with a two-year grace period and three-year equal payments. In the following year, the project expanded to over 2,100 villages selected by the government. In 1974, special funds of 200 million wons were provided to support the electrification project for outstanding KNVM villages. In 1975, the full-fledged electrification project supported over 305,000 households nationwide with 1.525 billion wons (Yim et al., 2012). As a result, the 1970s' rural electrification used as the KNVM's resource incentives contributed to the rural population's resource management transition.

Meanwhile, the KNVM had a direct ecological impact by supporting the First Reforestation (제 1 차치산녹화기, 第一次 治山綠化期, 1973~1981). More specifically, the KNVM's organization was deeply devoted to the First Reforestation. Since the Park government was very passionate about reforesting the country, a variety of governmental ministries cooperated closely under the management and supervision of the Ministry of Home Affairs (내무부, 內務部). As a result, the government was able to not only encourage villagers to reforest their villages through the KNVM's existing organization, but also to mobilize all public officials including the police, the prosecution, and the military. Through this process, the KNVM was strongly involved in the First Reforestation (Bae et al., 2006).

5.3 KNVM's Ecological Impact

5.3.1 *Forest Situation before KNVM*

In this section, I address the long-term social-ecological impact on Korean forests over thousands of years by describing the forest situation in Korea before the KNVM was implemented. The Korean Peninsula originally had abundant and diverse forests according to geographical change in temperature and precipitation. However, as agriculture started to thrive and the population increased, Korean forests were deeply affected by the traditional underfloor heating system, compost fertilizer using fallen leaves, and forest land ownership (Korea Forest Service, 1997).

Korean traditional houses have used underfloor heating system called *Ondol* (온돌, 溫突) for many years in order to adapt to cold weather in winter. The *Ondol*'s primitive form dates back to the period of Goguryeo (고구려, 高句麗, 37 BC-668 AD). As shown in Figure 5-4, the *Ondol* as a distinctive heat system consists of a stove called *Agungi* (아궁이), a raised masonry floor underlain by horizontal smoke passages called *Goodlejang* (구들장), and a vertical chimney called *Gulttuk* (굴뚝). Firewood had been the main heating fuel for the *Ondol* system until fossil fuels replaced firewood, which had threatened the continuous growth and conservation of Korean forests (Kim, 2009).

Meanwhile, coniferous trees, especially pine, make up for the dominant part of forests in Korea. For example, South Korea's forests as of 2007 were composed of coniferous forests (43%), broadleaf deciduous forests (26%), mixed forests (29%), and others (2%) even though South Korea

is in a temperate climate region (Kim et al., 2008). According to Kim (2009), Korean forests made up of coniferous trees have historically been formed due to the use in agriculture of compost fertilizer made from fallen leaves on broadleaf deciduous forests and ashes collected from the *Ondol*'s stoves. In other words, the fallen leaves were not fully used to contribute to the fertility of forest soils.

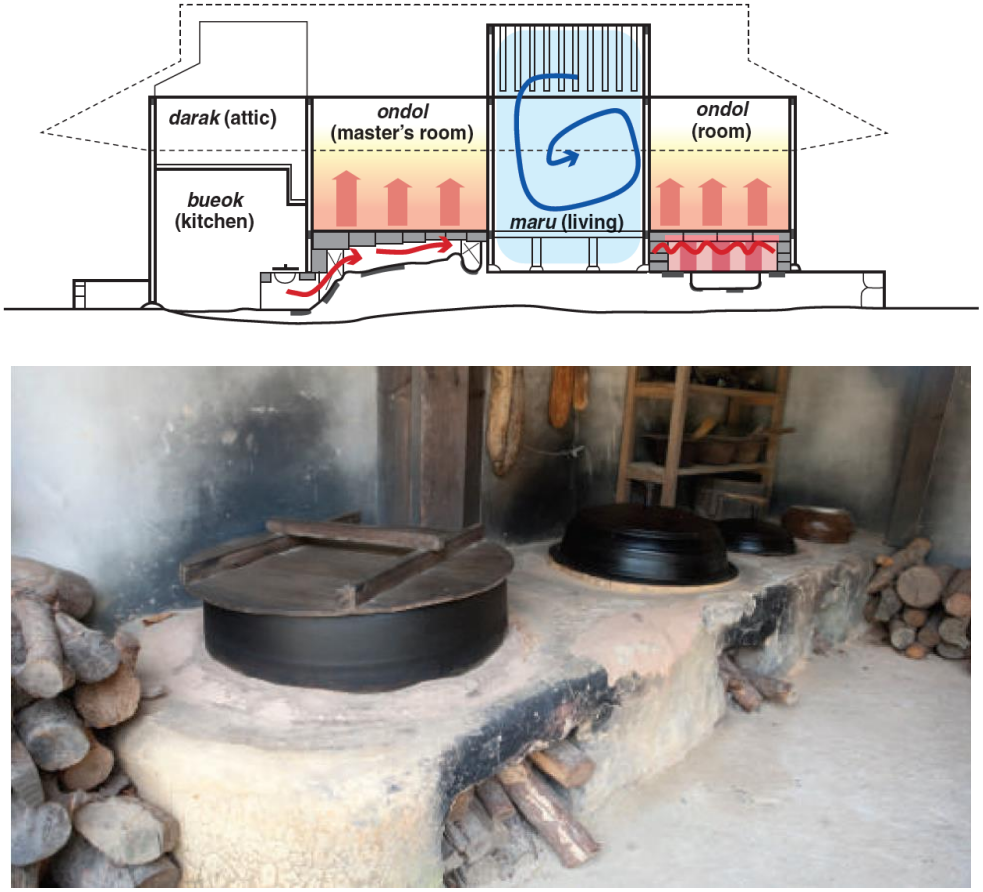


Figure 5-4 Ondol System of Korean Traditional House
(Source: Jeon, 2016)

In addition, Korean forests had been affected by forest land ownership. The Kingdom of Goryeo (고려, 高麗, 918-1392) operated a stipend system of government officers called *Junsikwa*

(전시과, 田柴科). The Goryeo government gave the officers land for grain (전지, 田地) and land for firewood (시지, 柴地). According to the *Junsikwa*, forest lands were privately owned and utilized without the government's control. However, the Joseon Dynasty (1392-1910) did not allow for the private ownership of forest lands. The Joseon government advocated that all forest lands were common lands (山林川澤與民共之). Under the public ownership of forest lands, the Joseon government prohibited people from entering certain forest lands (금산, 禁山) and cutting pine trees (금송, 禁松) for the purpose of Fengshui, shipbuilding, military use, firewood, or horse grazing. Furthermore, the Joseon government also promoted private and public joint cooperation of forest management and use (봉산, 封山) (Kim, 2009). As a result, although Joseon's forest management and land ownership policies were more progressive than Goryeo's, they still had the fundamental challenge of firewood use in the *Ondol* heating system.

Korean forestry statistics from the Japanese colonial period (1910-1945) reveal how devastated Korean forests were at that time. For example, the average forest growing stock per hectare in 1927 was 16.7 m^3/Jungbo **24** even though it was at its peak during this period, which was far less than that of 2010 or 125.62 m^3/ha, as shown in Table 5-3. According to Bae (2005), 14 to 17 million m^3 of lumbers were annually produced during the colonial period, which means

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24 Jungbo (정보, 町步) is an aerial unit used to measure the size of land and buildings in East Asia including Korea, Japan, and Taiwan. 1 Jungbo is the same as 3,000 Pyeong (평, 坪), which is about 9,917.4m^2 or 0.9917 ha. Therefore, two units of 1 Jungbo and 1 ha can be interchangeably used as they are approximately equivalent.

that Korean forests were annually depleted by 5-6% even though they were annually increased at 3-4% in terms of the growing stock. As a result, Korean forests had continuously been deforested due to firewood use and industrial timber production for Manchuria development, industrialization, and wars during the colonial period. After that, the Korean War (1950-1953) devastated Korean forests much more severely than before. According to Korean Forestry Stats as shown in Table 5-3, the average forest growing stock per hectare sharply dropped from 13.15 m^3/ha in 1943 to 5.66 m^3/ha in 1953, which shows almost 57% decrease over the 10 years. This fearsome devastation and damage had something to do with the strategic mode, including the United States' saturation bombing and the United Nations' scorched-earth policy. The United States Air Force estimated that American planes dropped 635,000 tons of bombs on Korea, which were greater than 503,300 tons of bomb dropped in the entire Pacific theater of World War II (Armstrong, 2010).

5.3.2 *Ecological Pattern since KNVM*

It is crucial to create a variety of ecological patterns since the end of the KNVM's major implementation in assessing the program's ecological resilience. For this, I comprehensively revisit a variety of data sources from national-scale statistical data, multi-scale spatiotemporal data, and village-scale sample survey.

5.3.2.1 Macro Overview: National-scale Statistical Data

As a continuous discussion of the situation of Korean forests before the KNVM, I drew four graphs showing historical trends of forest indicators since the KNVM as shown in Table 5-3. More specifically, the two left graphs show the historical changes of forest area and proportion of forest

area from 1952 to 2010. Although the graphs show a continuous decline since 1961, the degree of this decrease is gradual. Meanwhile, the two right graphs reveal the increases of forest growing stock and forest growing stock per hectare, which were not only rapid, but also accelerative. As a result, these four graphs indicate that the Korean forest situation has become more stable and mature. As of 2010, the proportion of forest land to entire country's land was 63.67% and the growing stock per hectare of the total land area was 125.62 (m^3/ha).

Table 5-3 Forest Indicators, 1934-2010

Year	Forest Land Area (ha)	Forest Growing Stock (m^3)	Forest Area Ratio of Total Land Area (%)	Forest Growing Stock per ha (m^3/ha)
1934	16,210,984	224,469,976	-	13.85
1940	16,138,233	226,337,971	-	14.02
1943	16,139,798	212,185,969		13.15
1944	-	56,437,087	-	-
1949	-	35,553,994	-	-
1951	-	30,820,850	-	-
1952	6,415,419	36,314,543	64.64	5.66
1960	6,700,915	63,995,014	68.08	9.55
1970	6,611,474	68,772,956	67.14	10.40
1980	6,567,772	145,694,050	66.35	22.18
1990	6,476,030	248,426,292	65.23	38.36
2000	6,422,128	407,575,822	64.57	63.46
2010	6,368,843	800,025,299	63.67	125.62

Note: Whole Korea for 1934-1943, South Korea only since 1944

(Source: Forestry Stats, Korea Forest Service)

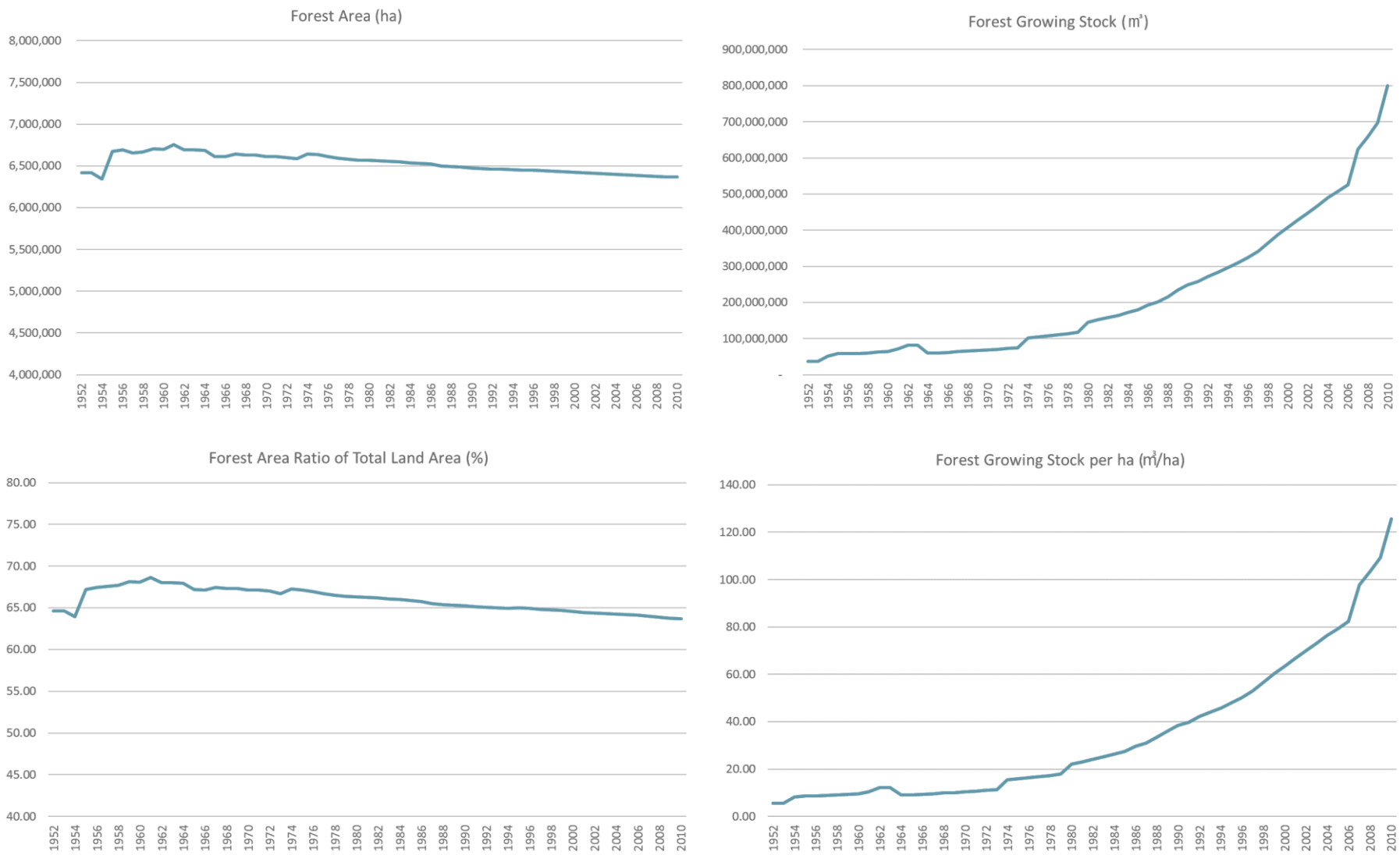

Figure 5-5 Historical Trends of Forest Indicators, 1952-2010

(Source: Forestry Stats, Korea Forest Service)

5.3.2.2 Cross-scale Analysis: Multi-scale Spatiotemporal Data

I followed a similar approach as in Chapter 4 to delve into spatiotemporal forestry data according to three different administrative divisions, namely national, provincial, and local. During the process, I was especially interested in forest growing stock per hectare (m^3/ha) among possible forest indicators (e.g., forest land area, proportion of forest land area) because it has dramatically changed and can be used as a representative variable showing Korean forests. In the same manner as with the population analysis, I created two pairs of time-series GIS maps showing forest growing stock and forest growing stock relative change in order to address not only spatial patterns of forest growing stock, but also temporal patterns of forest growing stock change, which is used to do the ecological assessment of community resilience in the next section.

More specifically, in creating the maps, I first collected forestry data about three different spatial scales (i.e., national, provincial, and local) from 1970 to 2010 from Statistics Korea. Korean forestry statistics have been relatively well collected and have been released according to the local-scale administrative divisions since 1968. I then created two forestry datasets, forest growing stock and forest growing stock change, in order to address the spatiotemporal patterns. The forestry dataset was simply drawn to show corresponding figures for certain temporal period and certain spatial scale. On top of that, the forest growing stock change dataset was calculated based on a formula of relative change between two temporal periods. The formula is as follows:

$$Forest\ Growing\ Stock\ (m^3/ha)\ Relative\ Change\ =\ \frac{F_{present}\ -\ F_{past}}{F_{past}}$$

Next, I matched the two forestry datasets with geographical boundaries of administrative divisions collected from Statistics GIS [25]. The local-scale administrative divisions correspond to lower-level local autonomy called *Si-Gun-Gu* (시-군-구, 市-郡-區). As of 2010, there were 230 administrative divisions in Korea. Meanwhile, the geopolitical boundaries have also been continuously changing over the past 40 years. In addition, not all geographical boundaries of forestry data matched with the local-scale administrative boundaries. Thus, I merged or separated relevant forestry data which did not match with the GIS geographical boundaries during every 10-year analysis period. Finally, I did mapping for the matched datasets of forestry data and geographical boundaries.

Forest Growing Stock Trend

I created a series of maps revealing local-scale forest patterns from 1970 to 2010, which are shown in Figure 5-5. Meanwhile, the local-scale administrative divisions are called *Si-Gun-Gu* (시-군-구, 市-郡-區)[26], which is the same as in Chapter 4. The specific details of forest patterns are as follows: To begin with, the dominant trend was continuous growth over the 40-year period from 1970 to 2010. Although the physical size of administrative divisions was more or less changed, the map of 1970 shows that most of the units had yellow colors except several areas near the mountain ranges. However, as time moved on toward the year of 2010, the yellow colors on the map gradually changed to orange and then to brown or dark brown, regardless of urban or rural

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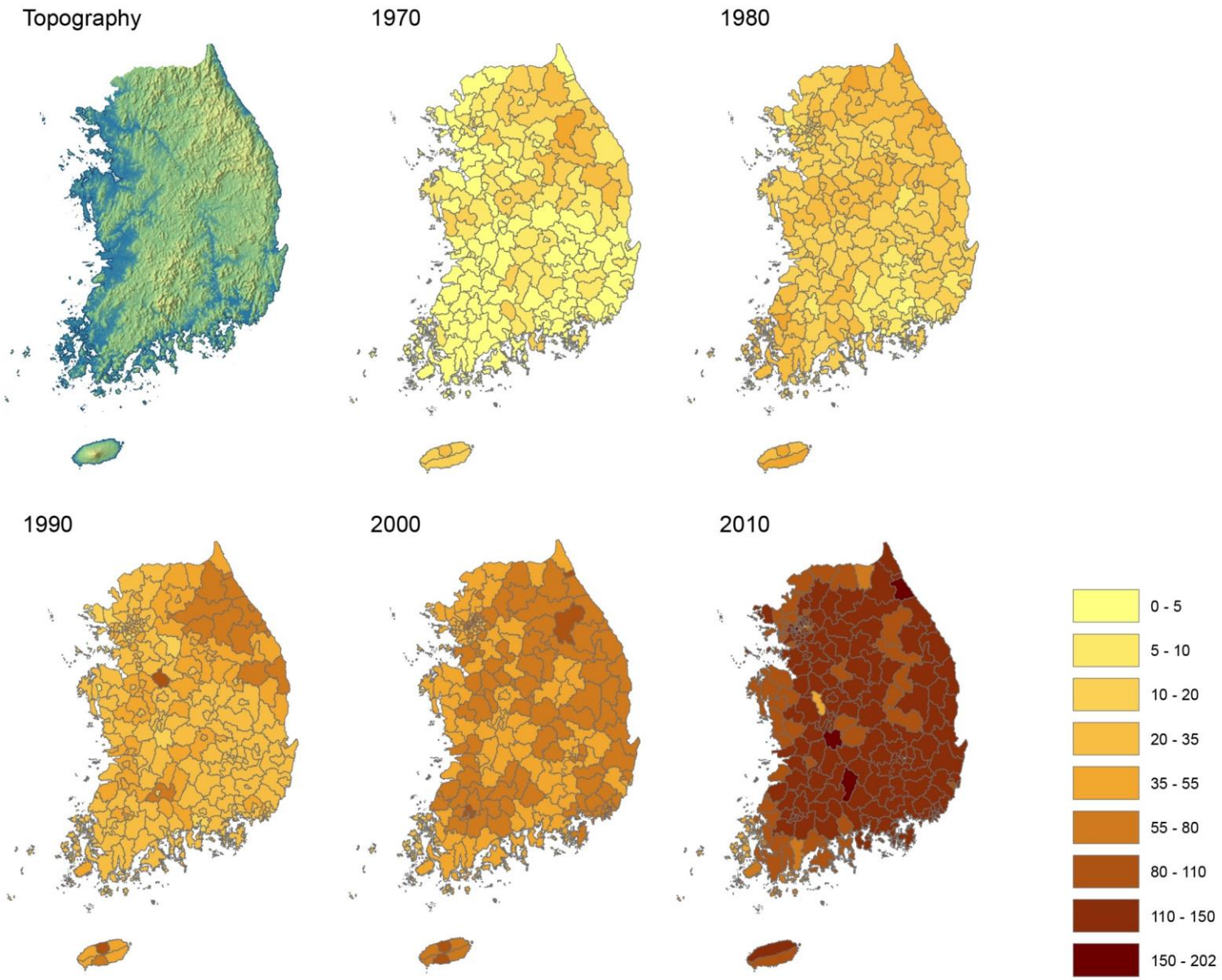
25 I explained Statistics Korea and Statistics GIS in Chapter 2.2.2.1 Macro Overview: National-scale Statistical Data.

26 I described Korean administrative division structure in Chapter 2.2.2.2 Micro Analysis: Village-scale Sample Survey.

areas. Very few administrative divisions experienced a decrease of forest growing stock during its 10-year analysis period. As a result, administrative divisions near the west or south coasts had relatively low forest growing stock in comparison to those which were inland or near the east coast. In other words, there was a similar forest growing stock change pattern, namely continuous growth. Meanwhile, I discovered that such a forest growing stock change had a mostly low correlation with topography in South Korea. Relatively, administrative divisions near the mountain ranges had forest growing stock larger than those far from the mountain ranges. These forest growing stock maps are further discussed along with the forest growing stock relative change maps.

Figure 5-6 Forest Growing Stock by Local Administrative Divisions, 1970-2010



Forest Growing Stock Relative Change Trend

As discussed with the local-scale forest patterns above, I also created a series of maps showing three different spatial-scale (i.e., national, provincial, and local) patterns of forest growing stock relative change from 1970 to 2010, which is shown in Figure 5-7. The accurate calculation results of forest growing stock relative change are summarized in Table 5-4. As in Chapter 4, the series of maps allows for a comparison of spatiotemporal forest growing stock relative changes.

The dominant trend of forest growing stock relative change patterns was continuous growth from 1970 to 2010 regardless of the administrative scale and geographical location, which is expressed in yellow, orange, or red colors on the maps in Figure 5-6. More specifically, the national-scale growing stock increased most rapidly during the period between 1980 and 1990. However, the provincial-scale or local-scale growing stock relative change varied depending on the periods and locations. For example, the growing stock change of the western half of South Korea was active during the period between 1970 and 1980 while that of the eastern half was vibrant between 1980 and 1990. After that, the growing stock change was relatively slow between 1990 and 2000. Finally, the growing stock change between 2000 and 2010 was more prominent in the region of the northwest and southeast diagonally crossing over South Korea.

As a result, it is almost impossible to divide the 40-year forest growing stock relative change of Korean administrative divisions into several distinctive groups because nearly the entire country showed continuous growth. Instead, it is possible and meaningful to discuss the period that the forest growing stock increased more rapidly than the others. Between 1970 and 1980, there was huge growth in the growing stock, followed by the next largest growth in the period between 1980 and 1990, then between 2000 and 2010, and finally between 1990 and 2000.

Figure 5-7 Forest Growing Stock Relative Change by National-Provincial-Local Administrative Divisions, 1970-2010

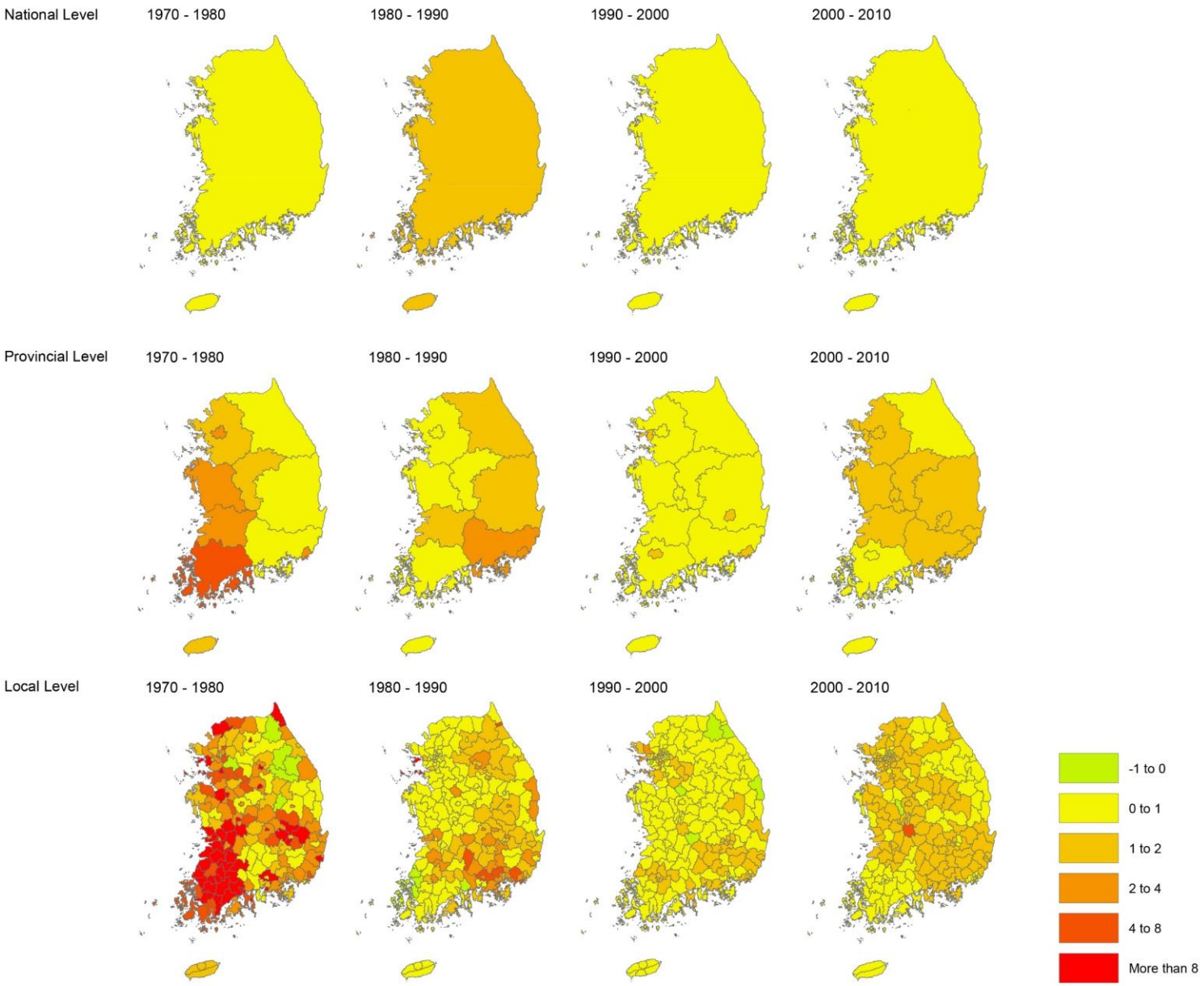


Table 5-4 Forest Growing Stock Relative Change by National-Provincial-Local Administrative Divisions, 1970-2010

Temporal Periods	Spatial Scales										
	National	Provincial		Local							
	Relative Change	Name	Relative Change	Relative Change				Number of Local Units			
				Min	Max	Mean	SD	Growth	Decline	All	Growth %
1970 -1980	0.7160	Seoul special city	2.8807	-0.2621	7.8385	3.1907	2.4872	8	1	9	88.89%
		Busan metropolitan city	2.3837	-0.4346	58.9519	11.1300	23.5018	5	1	6	83.33%
		Gyeonggi Province	1.2940	-0.1003	21.3625	4.5698	5.1077	21	1	22	95.45%
		Gangwon Province	**0.0159**	-0.4894	25.2079	5.6814	8.6808	15	4	19	**78.95%**
		North Chungcheong Province	1.1235	0.3148	14.1658	3.3828	3.7800	12	0	12	**100.00%**
		South Chungcheong Province	2.6346	0.7853	**104.3665**	12.7503	24.6524	17	0	17	**100.00%**
		North Jeolla Province	2.5350	0.7683	45.9388	11.3592	11.6414	16	0	16	**100.00%**
		South Jeolla Province	**6.0017**	0.0040	96.0686	**21.3453**	**25.8040**	26	0	26	**100.00%**
		North Gyeongsang Province	0.6589	-0.3219	53.3543	5.4375	10.3217	28	1	29	96.55%
		South Gyeongsang Province	0.6642	**-0.6398**	11.5330	2.4409	2.9241	24	1	25	96.00%
		Jeju province	1.1784	1.0880	1.6466	**1.3217**	**0.2903**	3	0	3	**100.00%**
		All	1.9428	-0.6398	104.3665	8.2648	15.4400	175	9	184	95.11%
1980 -1990	**1.1058**	Seoul special city	0.6459	0.4016	0.8358	0.6346	0.1276	17	0	17	**100.00%**
		Busan metropolitan city	**2.2736**	1.7361	5.0229	**2.8492**	1.1760	10	0	10	**100.00%**
		Gyeonggi Province	0.7275	**-0.6733**	**11.2996**	1.0251	**2.0056**	28	1	29	96.55%
		Gangwon Province	1.2893	0.3137	5.4087	1.4322	1.1421	20	0	20	**100.00%**
		North Chungcheong Province	0.5294	0.4796	3.1720	0.7774	0.7327	13	0	13	**100.00%**
		South Chungcheong Province	0.6351	0.5692	0.7146	0.6347	**0.0376**	17	0	17	**100.00%**
		North Jeolla Province	1.2947	0.6294	2.2825	1.4105	0.6273	16	0	16	**100.00%**
		South Jeolla Province	**0.5078**	-0.1632	2.3054	0.7095	0.7240	21	6	27	**77.78%**
		North Gyeongsang Province	1.2613	0.0000	3.8962	1.4776	0.9828	35	0	36	97.22%
		South Gyeongsang Province	2.0028	0.0688	4.3637	2.2903	1.1524	26	0	26	**100.00%**

		Jeju province	0.5180	0.3217	0.7539	**0.5643**	0.2209	3	0	3	**100.00%**
		All	1.0623	-0.6733	11.2996	1.1492	1.1945	206	7	214	96.26%
1990 -2000	**0.6544**	Seoul special city	0.3378	-0.3325	3.1140	0.7052	0.8241	20	2	22	90.91%
		Busan metropolitan city	1.0467	0.8292	1.9194	1.1508	0.3068	12	0	12	**100.00%**
		Daegu metropolitan city	1.1501	0.0000	1.8788	**1.2008**	0.6325	7	0	8	**87.50%**
		Incheon metropolitan city	1.0755	-0.0799	3.5771	1.1511	**1.4067**	7	1	8	**87.50%**
		Gwangju metropolitan city	**1.2130**	1.0097	1.3318	1.1604	0.1491	4	0	4	**100.00%**
		Daejeon metropolitan city	0.6367	0.5913	0.6997	0.6541	0.0465	5	0	5	**100.00%**
		Gyeonggi Province	0.9781	0.1767	**3.9136**	1.1502	0.8665	31	0	31	**100.00%**
		Gangwon Province	**0.1623**	-0.1009	0.5953	**0.2308**	0.2041	16	2	18	88.89%
		North Chungcheong Province	0.4034	**-0.4212**	0.7237	0.3961	0.3333	10	1	11	90.91%
		South Chungcheong Province	0.6215	0.3911	1.0158	0.6483	0.1777	15	0	15	**100.00%**
		North Jeolla Province	0.4536	-0.0152	0.8181	0.5154	0.1843	13	1	14	92.86%
		South Jeolla Province	0.8334	0.2133	1.5305	0.8425	0.3593	22	0	22	**100.00%**
		North Gyeongsang Province	0.5821	-0.0328	1.1337	0.7471	0.3235	22	1	23	95.65%
		South Gyeongsang Province	0.9779	0.5088	1.9223	1.0447	0.3320	22	0	22	**100.00%**
		Jeju province	0.3464	0.1740	0.4996	0.3442	**0.1339**	4	0	4	**100.00%**
		All	0.7212	-0.4212	3.9136	0.8093	0.6220	210	8	219	95.89%
2000 -2010	0.9793	Seoul special city	1.1142	0.6351	2.2602	1.1574	0.3112	25	0	25	**100.00%**
		Busan metropolitan city	1.0006	0.5930	1.2183	0.8588	0.1462	16	0	16	**100.00%**
		Daegu metropolitan city	1.2153	0.0000	1.4154	1.0348	0.4625	7	0	8	**87.50%**
		Incheon metropolitan city	1.4132	0.8367	1.6832	1.3469	0.2505	10	0	10	**100.00%**
		Gwangju metropolitan city	0.4738	0.3886	0.5805	0.4778	0.0765	5	0	5	**100.00%**
		Daejeon metropolitan city	1.4758	1.3939	1.5155	**1.4677**	**0.0459**	5	0	5	**100.00%**
		Ulsan metropolitan city	**1.4838**	1.0814	1.5926	1.3416	0.2285	5	0	5	**100.00%**
		Gyeonggi Province	1.2151	0.8168	1.7597	1.2470	0.2334	31	0	31	**100.00%**
		Gangwon Province	0.8469	0.1279	1.6182	0.8744	0.3545	18	0	18	**100.00%**

		North Chungcheong Province	1.2603	0.9778	1.6052	1.2682	0.2086	12	0	12	**100.00%**
		South Chungcheong Province	1.1243	**-0.0480**	**4.6750**	1.2630	**0.9726**	15	1	16	93.75%
		North Jeolla Province	1.2184	0.8398	1.7711	1.1941	0.2920	14	0	14	**100.00%**
		South Jeolla Province	0.8305	0.7073	0.9310	0.8185	0.0645	22	0	22	**100.00%**
		North Gyeongsang Province	1.0659	0.5973	1.4301	1.0925	0.2518	23	0	23	**100.00%**
		South Gyeongsang Province	1.3857	1.1025	1.7947	1.4066	0.1982	18	0	18	**100.00%**
		Jeju province	**0.4370**	0.3063	0.5459	**0.4261**	0.1694	2	0	2	**100.00%**
		All	1.0976	-0.0480	4.6750	1.1161	0.4073	228	1	230	99.13%

Note: The maximum values of relative change and growth percentage for each temporal period in national, provincial, and local scales are marked in red. The minimum values are marked in green.

5.3.2.3 Micro Survey: Village-scale Sample Data and Interview

As in Chapter 4, I conducted village-scale micro survey for four villages in the watershed of Han River in addition to the above ecological patterns based on macro overview of national-scale statistical data and cross-scale analysis of multi-scale spatiotemporal data. Four selected villages were specified in Chapter 2.2.2.2 Micro Analysis: Village-scale Sample Survey.

Forest Growing Stock and Forest Growing Stock Relative Change

I compiled and analyzed forest growing stock data of selected villages based on the lowest available scale of administrative divisions. As shown in Table 5-5, all villages except Hanam-si increased their forest growing stocks most rapidly in the period between 1980 and 1990, followed by the period between 2000 and 2010. Meanwhile, although the distance between each village and the Seoul Metropolitan Area was regarded to be important in forest growing stock relative change, the correlation was not strongly observed. It seems that local forest conditions near the villages played more important role in forest increase or decrease, which is later discussed with open-ended interviews with villagers.

Table 5-5 Village-scale Forest Growing Stock and Relative Change, 1970-2010

Year	Hanam-si		Yangpyeong-gun		Hongcheon-gun	
	Stock (m^3/ha)	Relative Change	Stock (m^3/ha)	Relative Change	Stock (m^3/ha)	Relative Change
1970	19.97*	-	9.79	-	11.98	-
1980	15.79*	-0.21	14.23	0.45	22.63	0.89
1990	28.29	NA*	35.27	1.48	55.43	1.45
2000	63.19	1.23	54.43	0.54	60.36	0.09

2010	136.06	1.15	132.26	1.43	140.20	1.32

Note 1: Strictly speaking, the village-scale population data is based on *Si-Gun-Gu* (시-군-구, 市-郡-區), which was the lowest-scale administrative divisions available from Lower-level Local Municipalities' Statistical Yearbooks **27**.

Note 2: Hanam-si in 1970 and 1980 belonged to Gwangju-gun, Dongbu-myeon. Thus, I was not able to calculate the relative change of Hanam-si between 1980 and 1990, which is expressed as "NA" in the table.

(Source: Lower-level Local Municipalities, Statistical Yearbooks)

Open-ended Interviews with Villagers

As a supplementary measure of the above quantitative data, I also conducted open-ended interviews with villagers by using the same interview protocol specified in Appendix C. Human Subjects Division Report and Appendix D. Asked Open-ended Interview Questions. The interviewees are the same persons as I introduced in Chapter 4. The following quotations are their answers for my questions on the village's resource management change in the 1970s.

- Pungsan-dong, Hanam-si, Gyeonggi-do
    - Interview with Pungsan-dong Resident (Male, Born in 1936)

    1) Can you describe what time you or your neighbors stared to change your resources? For example, water system (from well to tap water), building materials (from soil and straw

27 I described Lower-level Local Municipalities' Statistical Yearbooks in 2.2.2.2 Micro Analysis: Village-scale Sample Survey.

to cements, concrete blocks, slate roof, and so on), fuel (from firewood to coal, oil, and gas), lighting (from kerosene lamp to electricity), and so on.

"I remember that we used briquette stoves or furnaces called *Yeontan Agungi* (연탄 아궁이) for heating and cooking and nine-holed briquettes called *Gugongtan* (구공탄, 九孔炭) as fuels in the 1970s. It seems that firewood was used in the 1960s. I don't think that we used firewood as fuels during the KNVM period. Meanwhile, the house renovation and new development were quite limited due to the greenbelt regulation at that time. We could change building materials, preserving existing houses and not building new structures. I remember that straw-thatched roofs were replaced into slate roofs (슬레이트 지붕) at that time."

2) Can you describe what happened in your village during the Korean Reforestation period in the 1970s? Was it successful or not in your village? Can you explain what the relationship between the KNVM and the Korean Reforestation was at that time? Do you think how much the resource management change contributed to the Korean Reforestation's success?

"I do not remember that we were mobilized to reforest the village through the KNVM. As you see, our village is located in the plain area next to the river. Forests and mountains are far from the village. We were not enthusiastic about the reforestation. In addition, we were not asked to reforest it. There were originally not so many trees in the village. The village had rice paddy and dry fields at that time."

- Gangsang-myeon, Yangpyeong-gun, Gyeonggi-do
    - Interview: Byungsan-ri Village Head (Male, Born in 1959)

1) "I remember that there was only one well in the village for drinking water in 1973. During the KNVM, villagers laid PVC (polyvinyl chloride) pipes and brought in water 5 km away from here. We still use the piped water partially even though we're currently drinking water from local public water supply. Meanwhile, village roads were too narrow for vehicles to pass before the KNVM. Villagers teared down their walls and donated their lands for free in order to build wide roads. All of the village roads were made at that time. Without the KNVM, we could not have the roads now. Imagine how we can solve this issue today. It's impossible to build the roads today without any compensation. During the KNVM, the government provided only cements. Thus, we collected sand and gravels in a stream and carried them using handcarts. There were no excavators to dig in the ground, villagers did it with pickaxes and made concrete for ourselves."

2) "In the mid and late 1970s, there was a reforestation in the village. We planted a lot of trees. These trees which you see now were planted at that time. In the same period as the reforestation, there was a house improvement or renovation in the village. Straw-thatched roofs were replaced into slate roofs. Later, the slate roofs were also changed because they were known as carcinogens or cancer-causing agents. In addition, traditional firewood stoves were replaced into briquette stoves or furnaces for heating and cooking. I think that the KNVM strongly contributed to the unity and cooperation of villagers. With the village asset, we can still solve many issues and problems in the village."

- Seo-myeon, Hongcheon-gun, Gangwon-do
  - Interview: Yeoyupo-ri Resident (Male, Born in 1933)

1) "During the KNVM, villagers expanded village roads, dug waterway for drainage and built several small bridges over streams. Villagers were organized into groups at that time. Everyday each group took turns in working on village projects with cements and iron bars which the government provided. In addition, straw-thatched roofs were replaced into tin roofs (함석지붕) and later slate roofs. In the mid and late 1970s, there was a house improvement and renovation. The village had several Saemaul houses which were one-single-story buildings with tiled roofs (기와 지붕). I don't correctly remember when the village had electricity for the first time. However, it was quite late. Meanwhile, we drank groundwater through well buckets. Later, we came to drink pumped water from the wells. Now, we are drinking water from local public water supply."

2) "There was an intensive reforestation in the village. We planted a lot of trees, especially, larch (낙엽송, 落葉松), silver poplar (은사시나무, 銀白楊), and pine (잣나무, 五葉松). Now they become huge trees. Before the KNVM, there were not so many trees in the village. Along with the reforestation, traditional firewood stoves were replaced into briquette stoves or furnaces for heating and cooking. After that, villagers did not have to gather a lot of firewood any longer. Later, the briquette stoves and furnaces were again changed into oil furnaces. Currently, we're using off-peak electric furnaces."

- Seoseok-myeon, Hongcheon-gun, Gangwon-do
    - Interview: Sangok 2-ri Resident (Male, Born in 1945)

1) "After I came back to the village in 1972, I was selected as the village's Saemaul leader. Each village had one Saemaul leader at that time. I stared to organize young people into 4H Club (4H 구락부) and women into Saemaul Women's Society (부녀자회) in the village. They played an important role in transforming the village. Although the government provided about 300 cement bags and one-ton iron bars for free, villagers did not have skills to make concrete with the resources and build structures such as village roads, small bridges, and a village hall. We did a lot of trials-and-errors in the KNVM's beginning. Fortunately, my father learned architecture and civil engineering during the Japanese colonial period. Thus, he could teach many people in and beyond the village. When we built a village hall, each household had its obligation that was assigned to work for 30 days. Villagers gathered sand and gravels in the village, dug the ground, and built a village hall for ourselves. From the 1974, there was a house improvement and renovation. Straw-thatched roofs were replaced with tin roofs, and then slate roofs. Meanwhile, villagers originally drank groundwater through well buckets. From the mid-1970s villagers could drink piped water drawn from mountain valleys. However, the water system was later broken due to readjustment of arable land. Nowadays we are drinking pumped water from the wells. The village's houses are located near the water now and then. Relatively late, we got the electricity in 1978 because the village was in the remote mountainous area. The Korea Electric Power Corporation (KEPCO) used to be arrogant and ignore us. We kept presenting petitions for quick supply of electricity. Even, we dug

the ground and put up electric poles for ourselves which were later replaced into new electric poles by KEPCO."

2) "This village had about 150 households doing slash-and-burn farming at that time. They occupied national lands without permission and did slash-and-burn farming. About 40 out of 150 households did only slash-and-burn farming for their living. The remaining households had their small lands and did both dry-field farming and slash-and-burn farming. In the meantime, President Park issued a ban of slash-and-burn fields in 1974. In addition, there was a huge reforestation for completely deforested lands in the village. Villagers were allowed to collect branches and leaves naturally fallen from trees. After we dried and stored them in fall, we used them for heating and cooking all year around. From the late 1970s, traditional firewood stoves started be replaced into briquette stoves or furnaces. Later, the briquette stoves and furnaces were changed into oil furnaces from the late 1980s. We're currently using oil furnaces."

5.4 KNVM's Ecological Resilience Assessment

Now I synthesize all of the spatiotemporal analyses done thus far, and then present the KNVM matrix for the ecological assessment of community resilience to rapid urbanization. Finally, I discuss the KNVM's ecological resilience in terms of two spatial scales, namely national and global.

5.4.1 *Ecological Resilience Matrix: Implementation and Impact*

As in Chapter 4, I synthesized all of the spatial (i.e., village, local, provincial, and national) and temporal (1970 to 2010) analyses addressed in the previous section (as shown in Table 5-6 and Figure 5-8) in order to present the KNVM matrix for the ecological assessment of community resilience. The cross-scale analysis provided findings and insights in terms of ecological resilience, which have similarities and difference with those from the cross-scale analysis on population relative change done in Chapter 4. First of all, the upper-scale systems were much more uniform than the lower-scale systems in the values of mean, range, and standard deviation, which was the same as shown in Chapter 4. For example, as the system moved from local to provincial, the standard deviation greatly decreased.

Second, the upper-scale systems showed very similar changes to the lower-scale systems, even though there were several inconsistencies between the two. For example, Korean reforestation in the period between 1970 to 2010 had increased over all of the spatial scales. However, the national-scale peak of reforestation was between 1980 and 1990 while the local-scale peak was between 1970 and 1980. Nevertheless, each system revealed similar details regardless of the scale.

Although the historical trend of the mean values showed dynamic fluctuations, that of the standard deviations displayed a continuous decrease. This implies that forest growing stock relative changes inside the systems were getting more and more similar or homogeneous even though they were continuously in the growth (r ► K) phase.

Table 5-6 Cross-scale Analysis on Forest Growing Stock Relative Change, 1970-2010

Temporal Periods	**Spatial Scales**			
	Village	Local	Provincial	National
1970-1980	Hanam: -0.21 Yangpyeong: 0.45 Hongcheon: 0.89	-0.6398 to 104.3665 • M: 8.2648 • SD: 15.4400 • G: 175 • R: 9	0.0159 to 6.0017 • M: 1.9428 • SD: 1.6447 • G: 11 • R: 0	0.7160
1980-1990	Hanam: NA Yangpyeong: 1.48 Hongcheon: 1.45	-0.6733 to 11.2996 • M: 1.1492 • SD: 1.1945 • G: 206 • R: 7	0.5078 to 2.2736 • M: 1.0623 • SD: 0.6207 • G: 11 • R: 0	1.1058
1990-2000	Hanam: 1.23 Yangpyeong: 0.54 Hongcheon: 0.09	-0.4212 to 3.9136 • M: 0.8093 • SD: 0.6220 • G: 210 • R: 8	0.1623 to 1.2130 • M: 0.7212 • SD: 0.3392 • G: 15 • R: 0	0.6544
2000-2010	Hanam: 1.15 Yangpyeong: 1.43 Hongcheon: 1.32	-0.0480 to 4.6750 • M: 1.1161 • SD: 0.4073 • G: 228 • R: 1	0.4370 to 1.4838 • M: 1.0976 • SD: 0.3178 • G: 16 • R: 0	0.9793

Note: M – mean; SD – standard deviation; G – administrative divisions in growth phase; R – in release phase.

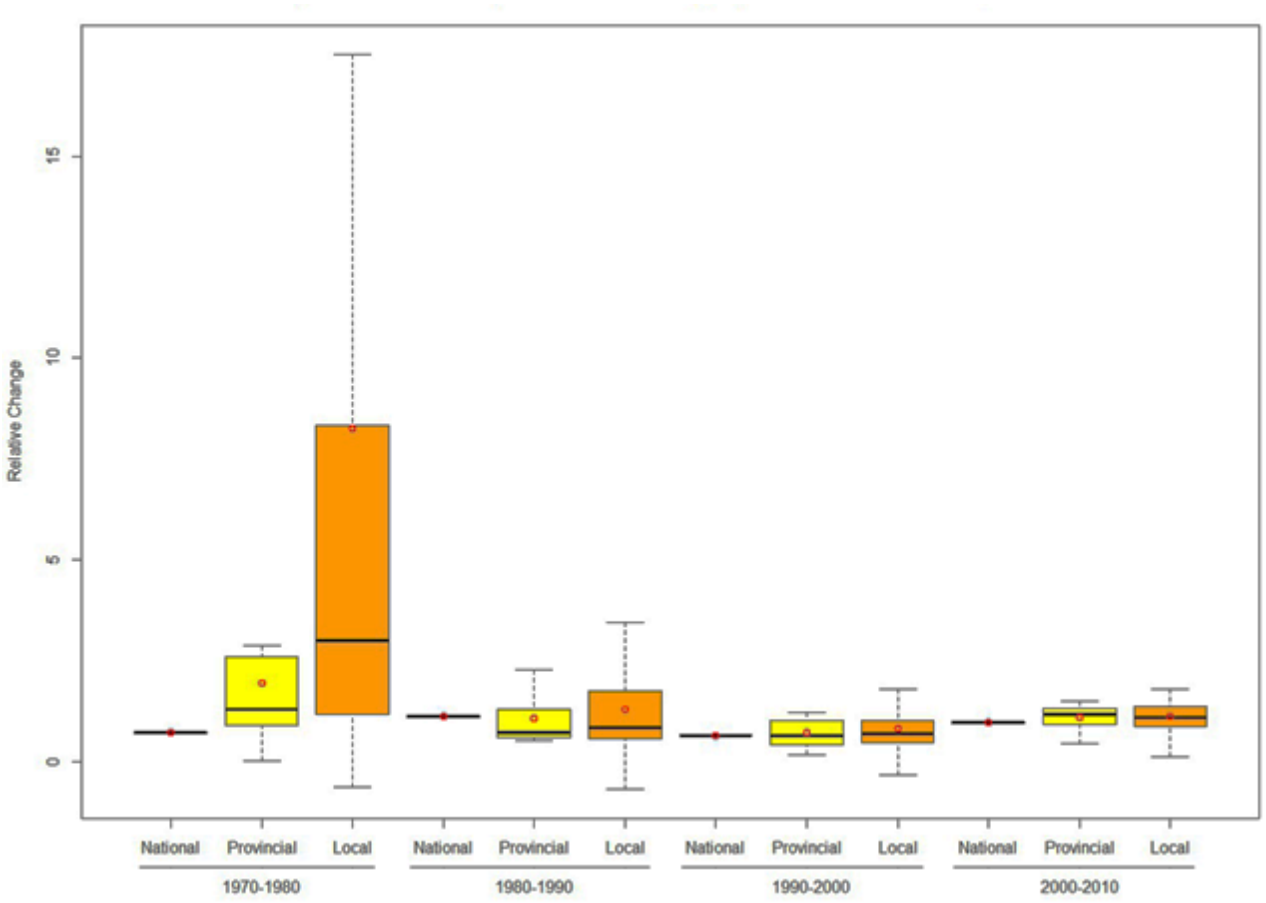


Figure 5-8 Boxplot of Forest Growing Stock Relative Change, 1970-2010

Finally, I presented the KNVM matrix on ecological assessment of community resilience to rapid urbanization as shown in Table 5-7, which reflected the above cross-scale analysis, and included two variables: primary energy source and foreign energy dependence. In conclusion, I assessed the KNVM as the contribution of national-scale and local-scale reforestation, but the global-scale consequence of high foreign dependence of resource and energy in terms of ecological resilience, which is discussed in detail in the next section. Rural villages supported by the KNVM between 1970 and 1980 greatly enhanced ecological resilience in forest growing stock. However, the KNVM also created a rapid transition of resource management in rural villages' primary energy source. As a result, rural villages has been under the vulnerable influence of extremely high foreign

energy dependence of South Korea. However, this was fundamentally unavoidable because of the industrial economy system with scarce natural resources.

Table 5-7 KNVM Matrix on Ecological Resilience Assessment

Variables of Interest	Temporal Periods	Spatial Scales					
		Village	Local	Provincial	Urban /Rural	National	Global
Forest Growing Stock	1970-1980	Given the mean forest growing stock relative changes, all (i.e., national, provincial, and local) systems were in the growth phase with high variances inside the systems. Geographically, rapid forest growing stock increases were observed throughout the country. Relatively speaking, many local divisions in the west region showed a larger increase of forest growing stock than those in the east.					
	1970-2010	As time went on, the speed of forest growing stock growth decreased. Almost all systems were in the growth phase between 1970 and 2010 even though there were several systems in the release phase for each 10-year period. Geographically, faster growth areas of forest growing stock had been moving for each 10-year period. The growth of local divisions in the eastern region was fast between 1980 and 1990 while that of local divisions in the region of northwest and southeast diagonally crossing over South Korea were prominent since 1990.					
Primary Energy Source	1970-1980	The rapid regime shift of household resource management happened from firewood to fossil fuels. As a result, the use of fossil fuels such as petroleum and coal as primary energy sources was intensified and reached to more than 90% of households in 1980.					
	1970-2010	The primary energy sources were gradually diversified. Since 1980, petroleum and coal decreased its portion while nuclear and LNG emerged as two of the major primary energy sources. Nevertheless, hydro and nuclear energy continuously took a marginalized portion. Meanwhile, for the past 40 years between 1970 and 2010, the Ton of Oil Equivalent					

		(TOE) per capita increased almost nine times from 0.61 in 1970 to 5.37 in 2010.
Foreign Energy Dependence	1970-1980	Foreign energy dependence greatly increased from 47.5 to 73.5% between 1970 and 1980, which was mainly due to petroleum imports from the Middle East. Despite two oil crises of 1973 and 1979, foreign dependence on oil from the Middle East was severe. Although nuclear energy use was initiated in 1977 from South Korea, nuclear energy took up a marginalized portion due to the rapid increase of overall energy consumption.
	1970-2010	Foreign energy dependence increased to 96.5% in 2010 since 1980, which points to an extremely high dependence, in other words, almost no self-sufficiency of energy. Under this dominant trend of foreign energy dependence, the petroleum portion of imported energy and crude oil imports dependence on the Middle East had decreased much more than before. Nevertheless, absolute foreign energy dependence was perpetuated because of scarce endowed resources in South Korea.

5.4.2 *Ecological Resilience Assessment: National-scale and Global-scale*

5.4.2.1 National-scale Resilience: Reforestation Success

As discussed in Chapter 5.3.2 Ecological Pattern since KNVM, the KNVM and the Korean Reforestation in the 1970s had undoubtedly positive aspects and were unprecedented all of the world in terms of the ecological impact. Regardless of spatial scales ranging from village to national, the forest growing stock rapidly increased over the 40 years from 1970 to 2010. In addition, the forest growing stock is currently being accelerated even though the forest land areas are decreasing slightly but gradually. Therefore, it is evident that the KNVM and the Korean Reforestation in the 1970s have contributed to enhancing national-scale and local-scale ecological

resilience to rapid urbanization. Accordingly, it is meaningful to highlight why and how Korean reforestation succeeded.

First of all, President Park had powerful leadership in reforesting the whole country rapidly and passionately. He prioritized the issue of reforestation as an important government agenda. He monitored the progress continuously and thoroughly, mobilizing public officers as well as encouraging people. Governmental ministries cooperated closely with each other in order to realize President Park's goal. For example, the Ministry of Agriculture and Fisheries (농수산부, 農水産部) had been in charge of the reforestation before the First Reforestation Period (1973-1978). However, since the result of the reforestation was not satisfactory, President Park ordered the Ministry of Home Affairs (내무부, 內務部) to undertake the task. The Ministry of Home Affairs was one of the most powerful government ministries at that time because it included all administrative public officials such as the police and the prosecution.

Second, the government could strongly ban slash-and-burn fields in the 1970s. Despite a series of laws and regulations concerning forests or slash-and-burn fields including the Forest Law (산림법, 山林法) in 1962 and the Readjustment of Slash-and-Burn Fields Act (화전정리에 관한 법률, 火田整理法律) in 1966, it was not until the Five-year Plan for the Readjustment of Slash-and-Burn Fields (화전정리 5 개년계획, 火田整理五個年計劃: 1974-1978) that the laws and regulations were not effective. After President Park ordered a full national-scale investigation of slash-and-burn fields in 1973, the government issued a ban of slash-and-burn fields (산림병해충

방제대책과 화전정리사무지침 제정, 山林病害蟲防除對策 火田整理事務指針) in 1974 and strongly implemented the Five-year Plan from 1974 to 1978. To be specific, the government followed a simple rule based on the land slope of slash-and-burn fields as shown in Table 5-8. Less steep slash-and-burn fields than 20-degree slope were converted to farmlands and the households surviving from the lands were settled down there. On the other hand, more steep slash-and-burn fields than 20-degree slope were reforested and the households surviving there were moved to far locations or relocated to close locations. Finally, this project recovered 124,643 ha slash-and-burn fields (i.e., 86,073 ha reforestation; 38,570 ha farmland reclamation). In addition, the project also resettled 300,796 households (i.e., 25,857 households' move; 2,349 households' relocation; 272,590 households' settlement) (Korea Forest Service, 1980).

Table 5-8 Final Result of Slash-and-Burn Fields Readjustment

	Land Slope		
	More than 20 °	Less than 20 °	
A. Slash-and-burn Land Readjustment			
Measure	Reforestation	Reclamation	Total
Area (ha)	86,073	38,570	124,643
B. Slash-and-burn Household Readjustment			
Measure	Move	Relocation	Settlement	Total
Household	25,827	2,349	272,590	300,796

Note: The specific measures of slash-and-burn fields readjustment were translated from the final result report's following terms: Reforestation (산림복구, 山林復舊), Reclamation (농경지화, 農耕地化), Move (이주, 移住), Relocation (이전, 移轉), and Settlement (현지정착, 現地定着).

(Source: Korea Forest Service, 1980)

Next, villagers participated in the reforestation passionately without any labor return or money compensation. It is thought that they were aware of the possible environmental and aesthetic benefits of the reforestation (Lee et al., 2005). Although the Park government was a fearsome authoritarian regime, villagers were happy to actively join in the reforestation. Further, planting trees was regarded as a part of everyday life. At that time, Korea had two holidays dedicated to reforestation: tree-planting day (식목일, 植木日) on April 5 and tree-culturing day (육림의 날, 育林日) on the first Saturday of November. In addition, Korea also had a specific period (March 21-April 20) for all people to plant trees (국민식수기간, 國民植樹期間) (Bae et al., 2006). Even today, planting trees is still important and meaningful to many people in Korea and is perceived as a kind of cultural ceremony. For example, many leaders enjoy planting trees in important public places to commemorate taking up or retiring from a post.

Finally, the continuous economic growth in the 1970s in Korea created a regime shift of resource management from natural materials to industrial products, which strongly contributed to Korea's reforestation. Due to the success of the Five-year Economic Development Plans in the 1960s and 1970s, the Park government had money enough to support the task of reforestation and people generally had increasing disposable incomes, which led to the fundamental change of resource management. As a result, firewood for home use of cooking and heating was rapidly replaced with fossil fuels such as coal, oil, or gas as shown in Table 5-9. To be specific, firewood and coal were the most important fuels for cooking in 1970. At that time, coal was mainly used in urban areas while firewood was used in rural areas. However, the use of firewood as a cooking fuel decreased continuously since then, reaching 2.5% of the entire consumption in 1990. Meanwhile, the use of coal hit its peak of 65.7% in 1980. After that, it decreased to 10.3% in 1990

because of other noticeable change of resource management happening at that time, such as the use of gas that is now the dominant cooking fuel in South Korea. In other words, rapidly reforested trees in the 1970s did not need to be used for firewood any longer, which was a remarkable historical change of resource management because traditional Korean houses mainly used the firewood to heat the underground heating system called *Ondol* since the period of Goguryeo (고구려, 高句麗, 37 BC-668 AD).

Table 5-9 Cooking Fuel Consumption by Source, 1970-1990

Year	1970	1975	1980	1985	1990
Coal	3,016,873 (52.1%)	4,330,663 (64.2%)	5,238,919 (65.7%)	4,612,344 (48.2%)	1,166,223 (10.3%)
Oil	37,907 (0.7%)	58,481 (0.9%)	200,619 (2.5%)	782,345 (8.2%)	253,297 (2.2%)
Gas	11,481 (0.2%)	50,764 (0.8%)	482,910 (6.1%)	2,526,366 (26.4%)	9,298,171 (81.9%)
Electricity	4,316 (0.1%)	16,583 (0.2%)	22,640 (0.3%)	139,060 (1.5%)	307,690 (2.7%)
Firewood	2,720,275 (47.0%)	2,289,302 (33.9%)	1,794,113 (22.5%)	1,406,105 (14.7%)	280,687 (2.5%)
Others	1,914 (0.0%)	4,557 (0.1%)	230,000 (2.9%)	105,141 (1.1%)	48,472 (0.4%)
Total	5,792,766 (100.0%)	6,750,350 (100.0%)	7,969,201 (100.0%)	9,571,361 (100.0%)	11,354,540 (100.0%)

Note: unit - number of households

(Source: Bae et al., 2006)

5.4.2.2 Global-scale Resilience: High Foreign Energy Dependence

Despite the national-scale and local-scale success of the KNVM and the Korean Reforestation, these initiatives also contributed to the global-scale consequence of high foreign dependence of resource and energy, which is deeply connected to the change in primary energy sources. As shown in Table 5-10, Korean primary energy sources had rapidly changed for the past 40 years from 1970 to 2010. More specifically, firewood in the 1970s still occupied the majority of primary energy consumption. However, several rapid regime shifts of resource management left South Korea completely dependent on fossil fuels, including coal and petroleum, even though nuclear energy made up 10 to 15% of the whole primary energy consumption, and the use of LNG also continued to increase substantially. In the meantime, new or renewable energies were still marginalized in South Korea.

Table 5-10 Primary Energy Consumption Change by Source, 1970-2010

Year	1970	1980	1990	2000	2010
Coal	5,829 (29.6%)	13,199 (30.1%)	24,385 (26.2%)	42,911 (22.3%)	77,092 (29.2%)
Petroleum	9,293 (47.2%)	26,830 (61.1%)	50,175 (53.8%)	100,279 (52.0%)	104,301 (39.5%)
LNG	-	-	3,023 (3.2%)	18,924 (9.8%)	43,008 (16.3%)
Hydro	305 (1.5%)	497 (1.1%)	1,590 (1.7%)	1,403 (0.7%)	1,391 (0.5%)
Nuclear	-	869 (2.0%)	13,222 (14.2%)	27,241 (14.1%)	31,948 (12.1%)
Others*	4,251 (21.6%)	2,517 (5.7%)	797 (0.9%)	2,130 (1.1%)	6,064 (2.3%)
Total	19,678 (100.0%)	43,912 (100.0%)	93,192 (100.0%)	192,888 (100.0%)	263,805 (100.0%)

TOE per capita	0.61	1.15	2.17	4.10	5.37

Note 1: unit - 1,000 Ton of Oil Equivalent (TOE)
Note 2: Others include firewood and renewable energy. However, this mostly refers to firewood between 1970 and 1990 while the data between 2000 and 2010 mostly shows renewable energy sources. Meanwhile, according to Korean energy stats, nuclear energy started in 1977 while LNG in 1986.

(Source: KEEI, 2001 for 1970 to 1990; KEEI, 2015 for 2010)

As a result, South Korea came to confront the vulnerable foreign dependence of resource and energy. For example, South Korea currently has very low domestic self-sufficiency in lumber as shown in Table 5-11, even though the figure increased from 5.2% in 1990 to 13.5% in 2010. Meanwhile, timber alone had a slightly higher domestic self-sufficiency, reaching from 12.1% (1.14 million m^3) in 1990 to 46.8% (3.72 million m^3) in 2010 (Kang et al., 2015). As a result, the very low lumber self-sufficiency of South Korea contributed to the increase of forest growing stock. As of 2010, the total lumber demand (27 million m^3) reached 3.5% of the total forest growing stock (800 million m^3), which means that South Korea can utilize domestic timber more and more within the limit of annual increase of forest growing stock.

Table 5-11 Korean Foreign Dependence Change of Timber and Lumber, 1990-2010

Year		**1990**	**1995**	**2000**	**2005**	**2010**
Lumber Supply	Timber Domestic (A)	1,138	1,055	1,592	2,350	3,715
	Timber Import (B)	8,285	8,229	6,735	6,022	4,227
	Lumber Product Import (C)	12,323	16,041	19,643	18,347	19,670

Total Lumber Demand (D=A+B+C)	21,746	25,325	27,970	26,719	27,612
Lumber Self-Sufficiency (A÷D, %)	5.2	4.2	5.7	8.8	13.5
Forest Growing Stock	248,426	308,826	407,576	506,377	800,025

Note: The units of timber, lumber, and forest growing stock are the same or 1,000 m^3.
(Source: Forestry Stats, Korea Forest Service)

Further, South Korea has an extremely high degree of foreign dependence of energy. As shown in Table 5-12, South Korea has long depended on foreign energy, especially fossil fuels imported mainly from the Middle East. More specifically, this dependence continuously increased from 47.5% in 1970 to 96.5% in 2010. The total amount of energy import reached 262.6 million Ton of Oil Equivalent (TOE), which came to $121.6 billion of energy import, representing 30% of all imports in 2010.

Table 5-12 Korean Foreign Dependence Change of Energy and Oil, 1970-2010

Year	1970	1980	1990	2000	2010
Energy Imports (Million $)	-	6,585	10,926	37,565	121,655
Energy Imports Percent of Total Imports (%)	-	29.5	15.6	23.4	28.6
Energy Foreign Dependence (%) (including nuclear energy resource)	47.5	73.5	87.9	97.2	96.5
Petroleum Percent of Imported Energy (%) (based on primary energy consumption)	99.4	83.1	61.3	53.5	41.2
Crude Oil Imports Dependence on Middle East (%)	-	98.8	74.3	76.8	81.8

(Source: KEEI, 2001 for 1970 to 1990; KEEI, 2015 for 2010)

Finally, the absolute foreign dependence of resource and energy has pushed South Korea into a global-scale vulnerability. This phenomenon has fundamentally resulted from the distinct economic structure of South Korea, which is heavily dependent on international trade. Since South Korea has few natural resources and a small economic market, the Park government concentrated on export-centered economic growth. The key economic policy has been sustained since it was established in the 1960s. Interestingly, energy imports reached 28.6% of all imports in 2010 as shown in Table 5-10, which was equivalent to the total exports of main manufacturing industries in South Korea such as semiconductors, automobiles, and shipbuilding. In other words, Samsung Electronics, Hyundai & Kia Motors, Daewoo Shipbuilding earn dollars in order to buy oil and gas from the Middle East as shown in Figure 5-9.

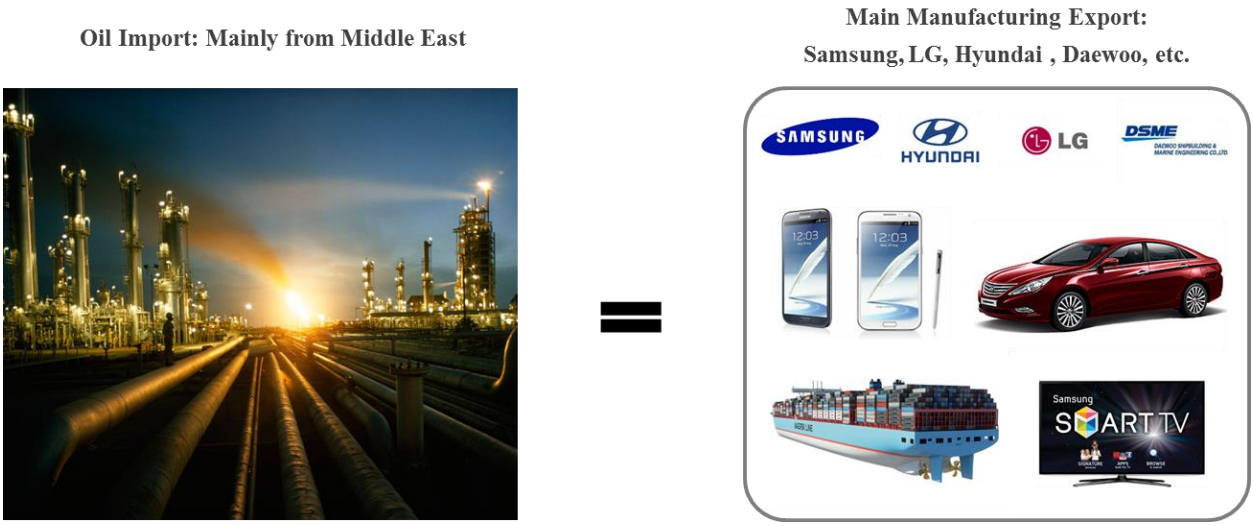


Figure 5-9 Comparison between Oil Import and Main Manufacturing Export
(Note: This diagram is drawn by the author)

5.4.3 *Limitation of Analysis: Next Steps*

The ecological assessment of community resilience specified in this chapter demonstrates fundamental challenges and limitations of analysis. First of all, this research aims at exploratory and historical research covering 40-year temporal periods and spatial scales ranging from village to national. However, it is impossible to completely separate the temporal and spatial impacts of the KNVM alone from other government-led plans in the 1970s. I thus investigated the KNVM and the Korean Reforestation as important implementations in doing the historical interpretation of ecological resilience. In addition, I created a variety of ecological patterns showing the time since the KNVM ended, from national-scale statistical data, multi-scale spatiotemporal data, and village-scale sample survey. Nevertheless, it would be great to do the same analysis with the multi-scale spatiotemporal data showing the time before the KNVM took place, especially from 1945 to 1970. However, it was impossible to collect the local-scale data showing Korean forestry before 1968. Although I am not sure whether the local-scale data exists, it seems possible to collect them because I collected the national-scale data since 1934. As a next step, both forestry data of old statistical references and area maps of old administrative divisions should be first digitalized into spreadsheet files and GIS maps respectively for extended time-series analysis.

I presented the KNVM matrix for an ecological assessment of community resilience to rapid urbanization, based on the three variables of forest growing stock, primary energy source, and foreign energy dependence. My data and reasoning were tied with administrative divisions because of the data limitations of the Korean forestry. However, spatial scales of community resilience may be different from the hierarchical administrative divisions of Korean forestry. Other spatial scales (e.g., forest land, watershed, or mountain range) can show the cross-scale interaction of community resilience more clearly. In addition, forests, strictly saying, cannot represent the whole

ecological system that includes natural habitat, water, soil, air, and bio diversity. As a next step, it would be great to investigate other variables of ecological system beyond the above three variables. For example, the KNVM matrix can be more developed through historical imageries that were remotely sensed, which can provide geospatial patterns of forest land more vividly even though they would be different from those of forest growing stock.

The discussion in this chapter can be tested with numerous empirical studies. Although forestry datasets are not as detailed and systematic as population datasets, the growth and decline of local-scale forest growing stocks from 1970 to 2010 can be answered through the regression analysis in the similar manner as explained in Chapter 4. The following variables can be explored in the regression: local forest (e.g., tree type, forest pattern), local environment (e.g., soil type and quality, access to water / ground water, elevation), local weather (e.g., sunshine, temperature, precipitation), and local development (e.g., project, subsidy).

5.5 Chapter Conclusion

This chapter investigated the relationship between the KNVM and resource management change, and performed an ecological assessment of community resilience to rapid urbanization considering historical reforestation in Korea. Korea's reforestation has been appreciated as a successful model for the rest of world because South Korea is successfully reforested from the large deforestation of only 50 years ago. Given the rapid and large-scale reforestation success, I confronted the following questions on the KNVM and resource management change towards sustainable and resilient rural development: Q1) How did the KNVM create resource management change in the 1970s? Q2) How have Korean ecological patterns of forest growing stock changed

since the KNVM ended? Q3) How has the KNVM affected Korean ecological resilience on national and global scales? Q4) What lessons and implications can be drawn from the historical experience of the KNVM and the Korean Reforestation?

With the above questions in mind, I first clearly identified the mechanism of the KNVM and the Korean Reforestation with regard to resource management change in the 1970s. Second, I displayed a variety of spatiotemporal ecological patterns using a macro overview based on national-scale statistical data, a cross-scale analysis based on multi-scale spatiotemporal data, and micro survey based on village-scale sample data. Next, I conducted an ecological assessment of community resilience based on three main variables of forest growing stock, primary energy type, and foreign energy dependence. Finally, I discussed national-scale efficacy and global-scale vulnerability of strong top-down implementations in Korea such as the KNVM and the Korean Reforestation.

In conclusion, the research reached the following main findings:

First of all, the KNVM and the Korean Reforestation strongly affected resource management change and positively contributed to ecological restoration based on forest growing stock in the 1970s. Although Korea's reforestation has continuously been implemented since 1962 along with the First Five-year Economic Plan, it was not until the First Reforestation period (1973-1978) that the Korea's reforestation achieved substantive effects through the KNVM's direct or indirect influence. More specifically, the achievements resulted from strong leadership by President Park, cross-sectoral support by various governmental ministries, villagers' passionate participation, continuous economic growth, and the switch from firewood to fossil fuels for home uses.

Second, it is difficult to identify ecological patterns of local-scale administrative divisions into several groups because almost all of them showed continuous growth in forest growing stock

relative change over the past 40 years (1970-2010). Instead, it is meaningful to identify which period the forest growing stock increased more rapidly than the others. Between 1970 and 1980, there was the largest growth in the forest growing stock, followed by the period between 1980 and 1990, then between 2000 and 2010, and finally between 1990 and 2000.

The cross-scale (i.e., national, provincial, and local) analysis of ecological patterns since the KNVM provided findings and insights in terms of ecological resilience. Similar to those analyzed in Chapter 4, the upper-scale systems were much more uniform than the lower-scale systems in the values of the mean, range, and standard deviation. However, the upper-scale systems showed very similar changes as the lower-scale systems even though there were several inconsistencies between the two systems. In other words, Korea's forest growing stock increased from 1970 to 2010 over all scales (i.e., national, provincial, and local). Meanwhile, although the historical trend of mean values of the forest growing stock according to the three spatial scales (i.e., national, provincial, and local) showed dynamic fluctuations over the four temporal periods (i.e., 1970-1980, 1980-1990, 1990-2000, and 2000-2010), that of the standard deviations displayed a continuous decrease.

I assessed the KNVM as the contribution of national-scale and local-scale reforestation, but the global-scale consequence of high foreign dependence of resource and energy in terms of ecological resilience. Rural villages supported by the KNVM between 1970 and 1980 greatly enhanced ecological resilience in forest growing stock. However, the KNVM also created the rapid resource management transition of rural villages' primary energy sources. As a result, rural villages has been under the vulnerable influence of extremely high foreign dependence of resource and energy of South Korea even though it is fundamentally unavoidable due to Korea's industrial economy with scarce natural resources.

Finally, it was meaningful to investigate the positive impact of the KNVM and the Korean Reforestation as a mode of short-term intensification and examine the accompanying adverse effects on the national and global scales. This chapter addressed the cross-sectoral interaction among the seemingly irrelevant sectors of strong top-down government implementations, resource management change, and ecological impact, which reveals how the interconnected sectors created emergent phenomena that the community system as a complex system could have.

Chapter 6. CONCLUSION

6.1 CONCLUSION SUMMARY AND FINAL SYNTHESIS

Conclusion Summary

This dissertation investigated the KNVM (Saemaul Undong, New Rural Community Movement) driven by the strong top-down leadership of President Park, Chung-hee in the 1970s. The KNVM, as a reaction to Korean rapid urbanization, aimed to support rural villages, transform traditional human settlements, and create social-ecological regime shifts of population and resource management. In this context, I investigated the community resilience of rural villages supported by the KNVM in the 1970s to rapid urbanization through a framework of social-ecological resilience.

For this, I structured this dissertation into five actions: 1) to present a comprehensive research framework to interpret and assess the KNVM's community resilience to rapid urbanization; 2) to identify the KNVM's rationale, historical progress, and transformation of built environments, comparing and contrasting the KNVM's national-scale plans with the village-scale projects based on sample villages; 3) to interpret the KNVM's transformation in terms of human settlements, contextualizing it with Korean traditional houses and villages; 4) and 5) to assess the community resilience of rural villages supported by the KNVM to rapid urbanization in two dimensions of demography and ecology, addressing the cross-scale and cross-sectoral interaction of the KNVM to population and resource management change.

In conclusion, I discussed the following main findings: 1) The KNVM was an urban development in the rural sector rather than a rural development. The KNVM's rapid and large-scale transformation created functional changes of rural villages in terms of human settlements,

which was to value service and infrastructure of rural villages rather than shelter. As a result, the KNVM caused rural villages to fall into high urban dependence and lose existing self-sufficiency. 2) The KNVM's social-ecological resilience assessments showed inconsistent results depending on temporal or spatial dimensions as shown in Table 6-1. More specifically, the KNVM was responsible for the short-term population mitigation of rapid urbanization, but the long-term urban-rural population polarization in terms of demographic resilience. Meanwhile, the KNVM contributed to the national-scale and local-scale reforestation, but the global-scale consequence of high foreign dependence of resource and energy in terms of ecological resilience.

Table 6-1 KNVM's Social-Ecological Resilience Assessments

Resilience Type	**Resilience Dimension of Interest**	**Resilience Assessments**	
		Assessment I Small and Fast Scale	Assessment II Large and Slow Scale
Demographic Resilience	Temporal Periods	Short-term Mitigation of Korean Rapid Urbanization Impact	Long-term Consequence of Urban-Rural Population Polarization
Ecological Resilience	Spatial Scales	National-scale and Local-scale Reforestation of Korea	Global-scale Consequence of High Foreign Dependence of Resource and Energy

Final Synthesis of Main Findings

I did an experimental final synthesis of main findings in this dissertation in order to draw a cross-sectoral analysis of social-ecological resilience. This dissertation mainly addressed four different systems such as built environments, resource management, population, and forestry. In addition, I located the KNVM into three broad historical contexts of Korea including human

settlements, population, and forestry. This is because I aimed to interpret and assess the KNVM in a comprehensive way towards long-term, regionalized, and contextualized sustainability. Thus, I looked through the systems changes and relevant historical contexts before and after the KNVM even though the KNVM was strongly implemented in the 1970s.

As a result, I found that the KNVM itself was a regime shift in the 1970s and the KNVM was closely related to other regime shifts from 1960 to 2010. As shown in Table 6-2, the KNVM created regime shifts of built environments and resource management mainly in the rural sector. However, it was possible because President Park established an authoritarian government and drove rapid economic development in the 1960s. Although it may be controversial to discuss the extent to which economic growth in the 1960s had a trickle-down effect for the KNVM in the 1970s, it is obvious that the KNVM in the 1970s could not have existed without the economic growth in the 1960s. Further, it is hard to deny that the strong top-down leadership and implementations of President Park conceived other undesirable legacies after the 1970s including a population regime shift and political turmoil in the 1980s, an economic crisis in the 1990s, and a settlements regime shift in the 2000s.

Table 6-2 Korean History of Regime Shifts, 1960-2010: When, What System, and How

When	What System	How
1960s	Political System	After Park's military coup in 1961, central government came to have authoritarian powers ruling the whole society including locals and villages.
	Economic System	Five-year economic development plans started to be implemented from 1962. The Park government aimed at export-centered economic growth through industrialization.

1970s	Built Environments	The KNVM triggered a transformation of built environments in the rural sector from traditional to modern in terms of house types and village layouts.
	Resource Management	The KNVM created a change of resource management from natural materials to industrial products such as cement, glass, and fossil fuels, even in the rural sector.
	Energy Regime	Foreign dependence of primary energy rose higher than 50%. Petroleum coming from the Middle East occupied the majority.
1980s	Population Regime	The urban population started to exceed the rural population. Even town centers in the rural sector rapidly decreased in population.
	Political Turmoil	After a 25-year military regime, there was a huge nation-wide democratic uprising movement in June 1987, which led to the establishment of the Sixth Republic of Korea and allowed for direct election of the President.
1990s	Economic Crisis	South Korea suffered from an Asian financial crisis in 1997. The International Monetary Fund (IMF) asked for large-scale business restructuring and financial sector reform for foreign investment in return for a bailout package.
2000s	Settlements Regime	Apartments that had more than five stories came to be a dominant housing type for the first time, exceeding single family houses and attached houses.

Korean modernization since 1962 has faithfully followed the development strategy of Choose and Concentrate (선택과 집중, 選擇集中). In fact, the wording of Choose and Concentrate became famous and popular in Korea after Lee, Kun-hee, chairman of Samsung Group strongly emphasized it in the early 1990s in order to reform Samsung Group into a world-class company producing high-quality goods in the high-tech industries. Conceptually, Chairman Lee's idea was similar to focus strategy in marketing meaning that a company concentrates its

resource in a narrow market or industry segment to produce competitive goods (Porter, 1985). Despite the wording's late popularity, the strategy has already been employed in Korea since 1962 even though President Park and his planners did not explicitly use the wording. Given scarce natural resources and weak economic base of Korea, the government proactively chose and concentrated on main industries, core development areas, and even key figures, which led to a conglomerate-oriented, metropolitan-centered, and elite-led society.

As a result, the strategy of Choose and Concentrate allowed for rapid and large-scale transformation of many aspects of society, which was not a minor improvement inside the system, but a major regime shift in the system or between systems. The main rationale was to increase efficiency by sacrificing diversity and lowering self-sufficiency. Consequently, Korean modernization reveals opportunities, achievements, consequences, and vulnerabilities of living through the Choose and Concentrate motto. Nevertheless, the lack of diversity and vulnerable self-sufficiency of social-ecological systems including built environments, resource management, human settlements, population, and forestry could lead to neither sustainable nor resilient communities in the long run because lower-scale systems could even show the opposite direction from upper-scale systems. Interpretation of the Korean modernization experience can be an asset to other less developed countries, especially in East and Southeast Asia, where countries are historically and culturally accustomed to government-driven social engineering.

Final Synthesis of Methodological Approach

I did a final synthesis of methodological approach in this dissertation in order to review how useful the approach was for this dissertation as well as other research. I employed a hybrid methodology to address the community resilience of rural villages supported by the KNVM to

rapid urbanization. My approach was to integrate historical interpretation of built environments transformation with resilience assessments of population and resource management changes. As a result, I could achieve the following advantages with the methodological approach: First, I captured not only historical narratives on the KNVM's implementation, but also descriptive statistics revealing the KNVM's impact. The historical narratives addressed the KNVM's own particular story while the descriptive statistics provided specific figures that can be used to compare and contrast the KNVM with other cases. Second, I showed how a house-scale or village-scale qualitative transformation of built environments could lead to a national-scale or global-scale quantitative impact on demography and ecology.

More specifically, I performed the following distinctive analyses in this dissertation to be generalizable for other research: First, I discussed the KNVM in the 1970s with three different histories (built environments, demography, and ecology), focusing on three temporal periods (before / during / after the KNVM) with reference to pre-modern practices going back centuries. In addition, I observed the KNVM's impact by the year of 2010. Through this long-term understanding, I identified how regime shifts of rural systems (rural villages, rural population, and rural forest) happened in the transition from tradition to modern and what benefits and vulnerabilities rural systems confronted. However, the interdisciplinary historical analysis had fundamental challenges because of a lack of the relevant old data or existing study. Especially, the pre-modern historical analysis could have potential changes or various interpretations with in-depth investigation and follow-up study.

Second, I presented a resilience matrix as a practical tool of resilience assessments. The resilience matrix was devised to systematically synthesize the KNVM's cross-scale and cross-sectoral interaction, which is conceptually based on the structure and dynamics of panarchy

referring to a nested set of adaptive cycles. Figure 6-1 shows how different single-scale, cross-scale, and cross-scale / cross-sectoral systems are using three diagrams of adaptive cycle, panarchy, and stacked panarchy of resilience theory. The resilience matrix based on stacked panarchy allows resilience assessments to include many different variables of interest with longer temporal periods and larger spatial scales. Through this resilience matrix, I pointed out the inconsistency of resilience assessments depending on temporal periods or spatial scales. Further, the matrix can be used as guiding or assessment tools for long-term and large-scale plans beyond planning practices that generally tend to focus on certain temporal period and certain spatial scale.

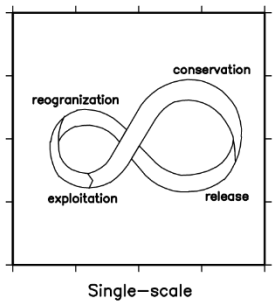
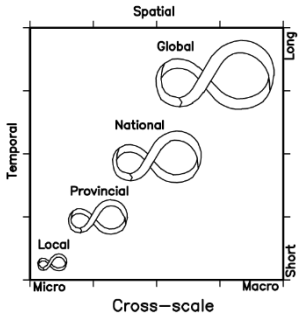
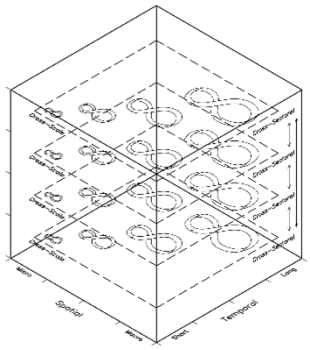
Step 1 Adaptive Cycle Single-scale System	**Step 2 Panarchy** Cross-scale System	**Step 3 Stacked Panarchy** Cross-scale / Cross-sectoral System
		

Figure 6-1 Conceptual Diagrams of Single-scale, Cross-scale, and Cross-sectoral Systems

Third, I conducted a cross-scale analysis based on multi-scale spatiotemporal data. For this, I displayed a variety of spatiotemporal patterns using GIS as shown in Figure 6-2. The series of maps revealed dynamic changes (growth / release) with a same legend, which were used as basic and fundamental materials for resilience assessments in this dissertation. Further, this cross-scale analysis can be easily expanded with any relevant variables of interest. For example, the demographic patterns can be expressed with the following variables: life expectancy, median or

average age, sex ratio, fertility or mortality rate. In the same way, the ecological patterns can be drawn with the following variables: bio diversity, natural disaster damage, soil, or water quality.

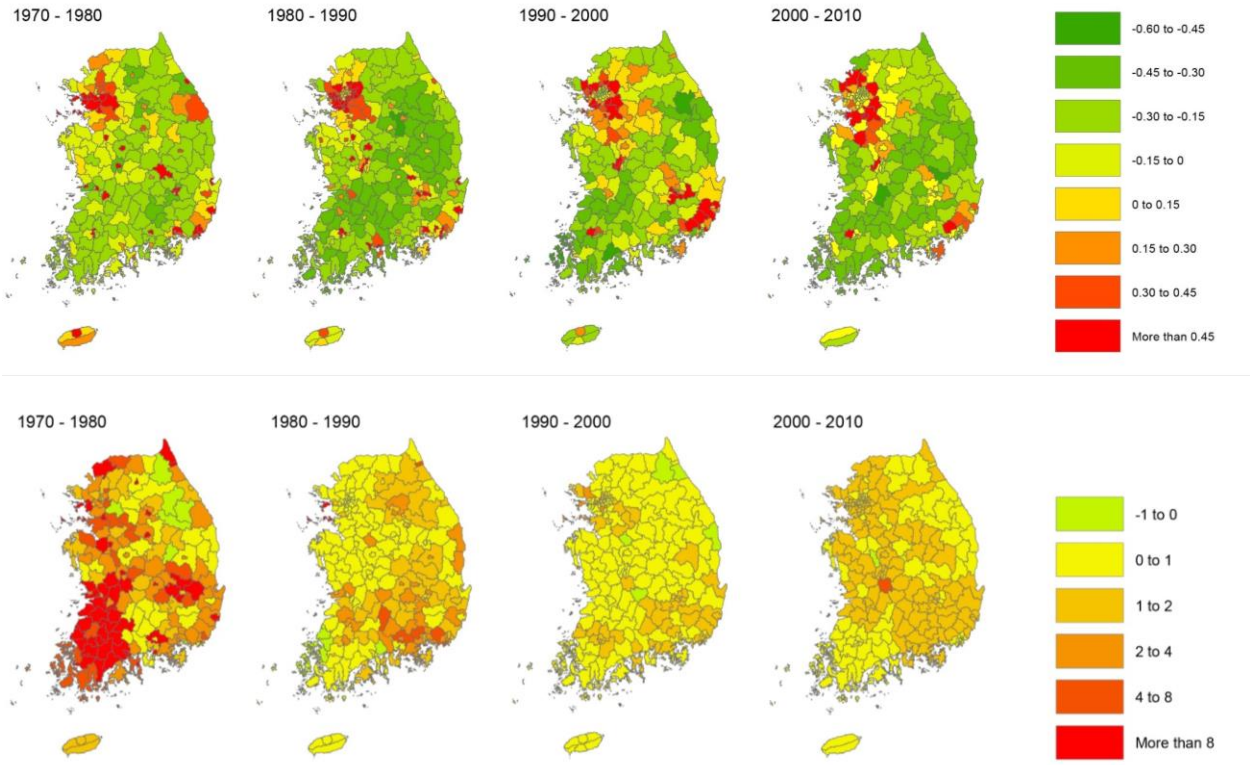


Figure 6-2 Multi-scale Spatiotemporal Data Mapping using GIS

Note: The top maps show local-scale demographic patterns from 1970 to 2010 while the bottom maps display the corresponding ecological patterns. The two series of maps represent relative changes of population and forest growing stock respectively every 10 years. This approach using a series of maps with consistent legends can be applied to various cross-scale analyses based on multi-scale spatiotemporal data.

6.2 Self-Critical Commentary

This critical commentary is to review this dissertation's research problem and theoretical framework, and discuss the dissertation's internal and external validity for next steps.

Research Problem Review: High-Modernist Developmentalism

I chose the KNVM in the 1970s as the dissertation's research problem because it was an extreme historical case revealing efficacy and limitation of high-modernist developmentalism. The KNVM's extremeness was attributable to then authoritarian regime's strong top-down leadership. In fact, the leadership was new to rural villages at that time. It was not until President Park's military coup in 1961 that the central government had an authoritarian power ruling locals and villages of South Korea. Historically, rural villages had been ruled by the local gentry called *yangban* (양반, 兩班) since the Joseon Dynasty (1392-1897). Most of them resided in the rural villages except that they passed civil service exams called *gwageo* (과거, 科擧) and worked as bureaucrats in the cities or administrative centers. The local gentry exerted their local powers based on hereditary land directly to the lower classes in villages (Jeon, 1992). In addition, the local powers were handed down to their decedents for a long time even though the traditional feudal system of *yangban* and *gwageo* was abolished by Gabo Reform (갑오개혁, 甲午改革) in 1894.

In other words, the KNVM would have never been implemented in the 1970s without President Park's authoritarian regime. The KNVM itself reveals the strong centralization of political power of rural villages in the 1970s. Then village leaders were not proponents of the old local gentry's vested interests, but loyal and passionate workers of the central government. In this political context of rural villages, President Park's high-modernist developmentalism acted as a

new ideology and practical policy for rural villages. As a result, the KNVM aimed to create a complete break with traditional human settlements by transforming rural villages and providing new resources. This intentional physical change was explicitly symbolic of development and modernization to mobilize rural villagers and justify the authoritarian regime. Nevertheless, the authoritarian regime was a necessary condition for an unprecedented rural development, but not a sufficient condition for an actual and successful rural development.

Although President Park was assassinated in 1979, his heritage of strong top-down leadership has persisted over the past 40 years in Korean planning and development history such as New Towns Project (신도시 사업, 新都市事業) in 1980s and 1990s, New Capital Project (신행정수도 사업, 新行政首都事業) in 2000s, and Four Major Rivers Project (4 대강 사업, 四大江事業) in 2010s. In fact, Korean authoritarianism including developmental dictatorship, strong top-down planning, and elite-led development projects showed positive aspects in rational decision making, speedy implementation, and active investment of social overhead capital (SOC). However, the authoritarianism cannot be a panacea for Korean national planning and development. In addition, it is no longer applicable to Korea in the 2010s because Korean people today have much more human rights and information power than those in the 1970s. Therefore, Korean planning and development requires new leadership and sincere community engagement with tailored approach, which can lead to social consensus, cultural diversity, and intrinsic creativity for today's successful planning and development, escaping from probable government failure.

The Korean historical experience may provide important insights on authoritarianism because Korea was not the only country led by the authoritarianism in national planning and development. Other countries in East Asia show the similar authoritarianism's strong top-down

leadership. Especially, China has historically been skillful to maintain the authoritarian regime as a socialist country, which has strong relevance to Korean national planning and development. For example, the Chinese New Socialist Countryside Construction (CNSCC) since 2006 benchmarked the KNVM in the 1970s (Perry, 2011; Looney, 2012). Interestingly, Chinese authoritarianism is often appreciated as an effective leadership or at least historically resilient management (Perry, 1993; Perry 2002). More specifically, Looney (2012) claimed that authoritarian states make it possible to reverse urban-biased policies, given the rural modernization campaign of CNSCC. Perry (2015) also observed the similar possibility, pointing out that the Chinese Communist Party (CCP) managed the authoritarian regime stably through a state-scholar nexus that supported intellectuals in order to sustain their loyalty to the CCP.

Nevertheless, it is quite questionable how long Chinese authoritarianism will be effective in the future. Considering the Korean historical experience, it may be impossible for the CNSCC to reverse urban-biased policies. In addition, the CNSCC might itself be fundamentally an urban-biased policy, especially when implemented at a national scale, as Looney (2015) has more recently acknowledged. As I discussed the KNVM in this dissertation, it could be reasonable to discuss the CNSCC closely with Chinese current urbanization because both have been strongly affected by the central government's national-scale zoning agenda that recasts rural areas as national areas to achieve national-scale goals including economic growth, regime stability, and environmental protection (Chen et al., 2016; Looney et al. 2016). In this sense, the CNSCC's ongoing results, given the case of Chengdu's urban-rural integration policy as a regional-scale, coordinated development of urban and rural areas, has revealed that my above questionable speculation regarding the Chinese authoritarianism would be true in the end because the policy has a strong preference for urban areas that leads rural areas to exist for the purpose of physical

construction, food production, and eco-tourism under the upper-level government's control rather than rural autonomy, village self-sufficiency, and cultural diversity (Abramson et al., 2015; Abramson, 2016; Wilczak, 2016).

Theoretical Framework Review: Specified Community Resilience

I presented a theoretical framework of specified community resilience based on social-ecological resilience theory in this dissertation. Beyond the dissertation's discussion on the KNVM, the theoretical framework allows for the following fundamental questions on urbanization: Q1) What does urbanization itself mean in terms of resilience theory? Q2) and Q3) What changes does urbanization create to rural villages eventually in the two dimensions of time and space?

In the above first question, urbanization can be interpreted as a process of human migration to reach a stable equilibrium of human population in terms of resilience theory. As the theory assumes multiple stable states or regimes that are hard to bounce back, there have been historically multiple equilibria of human population that are highly associated to human production and human settlements. For example, traditional society had its own equilibrium of human population that were characterized by agricultural production and rural areas. Modern society has also its own equilibrium reached through human migration that are driven by industrial production and urban areas. In this respect, it may be not so meaningful to evaluate whether urbanization itself is good or bad, advantageous or disadvantageous. Instead, it would be useful to identify universality and particularity of urbanization across countries and to figure out what aspects of urbanization have been more related to certain issues and problems. In this dissertation, I especially discussed the KNVM's rapid and extensive transformation of rural built environments under President Park's

authoritarian regime and the corresponding social-ecological impact on longer temporal periods and larger spatial scales.

Answering the second and third questions above requires an understanding of relative change of rural villages' time and space in the process of urbanization: temporal lag and spatial re-scaling. In this dissertation, I assumed that rural development can be either reaction or sub-action of urbanization, which means that rural development has an inseparable relationship with urbanization. Although urbanization can be a process of compressing time and space (i.e., fast change and density increase) in urban areas, urbanization can be also a process of releasing time and space (i.e., slow change and density decrease) in rural areas. In this sense, the dissertation reveals how Korean rural development and/or urbanization affected the relative change of rural villages' time and space. As a result, the KNVM and Korean urbanization had a releasing effect on rural communities' population, but they simultaneously had a compressing, or growth effect on the forest system over the past 40 years.

Table 6-3 Temporal Lag of Rural Development: Cross-sectoral Interaction

System Type	Specific System	Temporal Period		
		Before KNVM	KNVM (1970-1979)	After KNVM
Human Settlements	Rural Houses and Villages	-	Action	-
Social System	Rural Population	Release	Regime Mitigation	More Release
Ecological System	Rural Forest	Release	Regime Change	Growth

Table 6-3 shows how the KNVM's transformation of built environments in the 1970s functioned temporally in the development of rural social-ecological systems. The KNVM

contributed to the regime mitigation of rural population, but it did not shift the regime of rural population release as shown in Table 6-3. On the other hand, the KNVM shifted the regime of rural forest release. In addition, the cross-sectoral interaction of rural population and rural forest happened with a temporal lag from the KNVM's transformation of built environments.

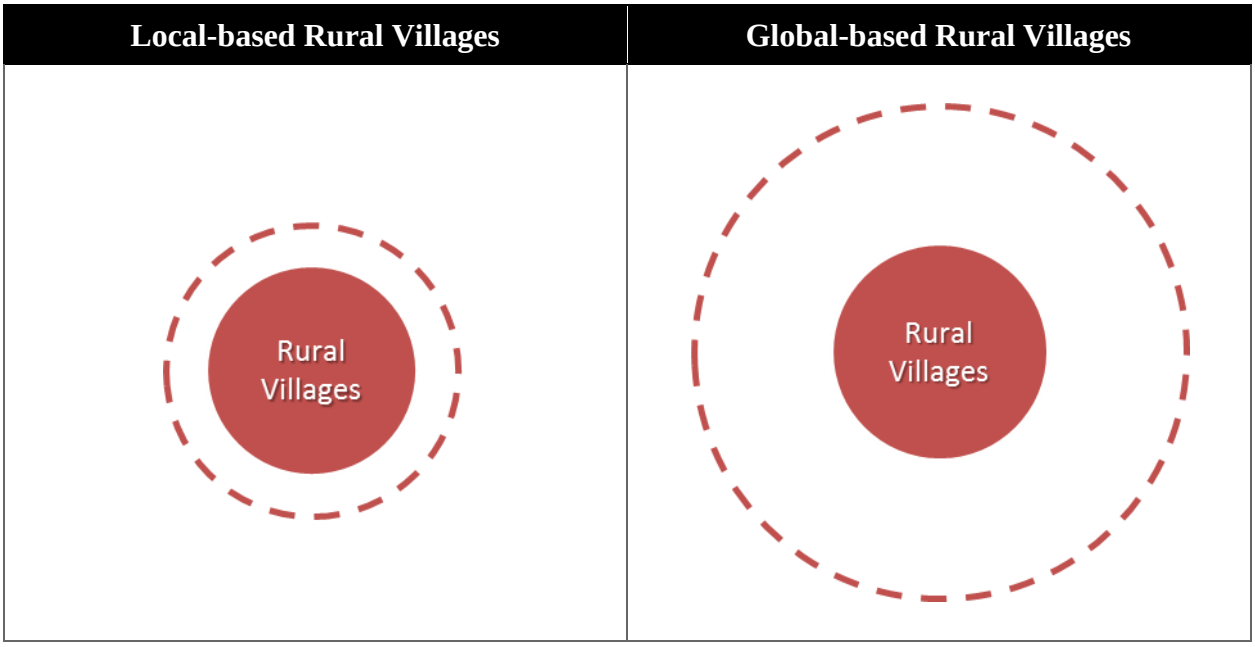


Figure 6-3 Spatial Re-scaling of Rural Development: Cross-scale Interaction

In the meantime, the KNVM and Korean urbanization put rural villages into a completely different context from local-based to global-based as shown in Figure 6-3 even though rural villages did not aim at the situation. In other words, traditional rural villages were based on local population and resources while contemporary rural villages are much more related to global population and resources. For example, rural villages in Korea are currently using industrial materials and fossil fuels imported from foreign countries. Even agricultural products are also imported from other countries. Similarly but far less intensively, old men in the rural villages are depending on young women coming from less developed countries in terms of marriage and reproduction. Unlike the globalization referring to the process of international integration, this

spatial re-scaling shows that there is a dominant direction, i.e. a selective influx of global population and resources to rural villages.

In addition, the spatial re-scaling implies, in terms of resilience theory, that the adaptive cycles of post-KNVM rural villages became more tightly related to those of upper-scale systems (e.g., local, regional, national, and even global systems) than pre-KNVM ones, which means that the post-KNVM villages have more increased interdependence and more frequent feedbacks under more complex systems than the pre-KNVM ones. In other words, the post-KNVM villages are more uncertain or less predictable than the pre-KNVM ones. Nevertheless, it does not mean that the post-KNVM ones are less resilient in the function, structure, feedbacks, and identity than the pre-KNVM ones because the former could absorb shocks and disturbances better than the latter. The expanded and increased connection of post-KNVM villages could be either opportunities or threats in maintaining themselves. Therefore, it is fundamentally required that future research examine many empirical cases and build theories continuously to explain the empirical findings.

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APPENDIX A

KOREAN-CHINESE-ENGLISH GLOSSARY FOR MAIN WORDS

Korean	Chinese	English
새마을운동	新村運動	Korean New Village Movement Korean Saemaul Undong
새마을 주택	新村住宅	Saemaul House
가족계획	家族計劃	Korean Family Plan
산림녹화	山林綠化	Korean Reforestation
박정희	朴正熙	Park, Chung-hee
유신체제	維新體制	Yushin Regime
경제개발 5 개년계획	經濟開發五個年計劃	Five-year Economic Plan
국토종합개발계획	國土綜合開發計劃	Comprehensive National Territorial Development Plan
농어촌 전화사업 장기계획	農漁村電化事業 長期計劃	Long-Term Rural Electrification Project
인간정주	人間定住	Human Settlements
도시	都市, 城市	Urban, City
농촌	農村	Rural

마을, 촌락	村落	Village
지속가능성	持續可能性	Sustainability
회복탄력성	回復彈力性	Resilience
사회생태시스템	社會生態體系	Social-Ecological System
적응순환	適應循環	Adaptive Cycle
체제변환	體制變化	Regime Shift
건조환경	建造環境	Built Environments
변형	變形	Transformation
경상북도 청도군 청도읍 신도리	慶尙北道 淸道郡 淸道邑 新道里	Sindo-ri, Cheongdo-eup, Cheongdo-gun, Gyeongsangbuk-do
충청남도 서북구 성거읍 삼곡리	忠淸南道 天安市 西北區 聖居邑 三谷里	Samgok-ri, Seonggeo-eup, Seobuk-gu, Cheonan-si, Chungcheongnam-do
경기도 하남시 풍산동	京畿道 河南市 豊山洞	Pungsan-dong, Hanam-si, Gyeonggi-do
경기도 양평군 강상면	京畿道 楊平郡 江上面	Gangsang-myeon, Yangpyeong-gun, Gyeonggi-do
강원도 홍천군 서면	江原道 洪川郡 西面	Seo-myeon, Hongcheon-gun, Gangwon-do
강원도 홍천군 서석면	江原道 洪川郡 瑞石面	Seoseok-myeon, Hongcheon-gun, Gangwon-do

APPENDIX B

FIELDWORK SUMMARY: PROGRESS, INTERVIEW, AND SITE SURVEY

The dissertation conducted a six-week field research in Korea ranging from Sep 16 to Oct 24. The field research was based on Field Research Design Report approved by all supervisory committee members. The schedule was followed by the pre-arranged plan, but it was modified and updated more or less because of data availability and better dissertation. The actual field research progress conducted in Korea was summarized as below:

Date	Task	Place and Work
Week 1 (9/14-9/20)	Literature Institutions I	▪ Seoul National University (Library) ➢ Reading and Annotated Bibliography
	Literature Institutions II	▪ President Park Chung Hee Library & Museum ▪ Yeongnam University, Park Chung Hee School ➢ Reading, Primary Visual Collection, and Interview
Week 2 (9/21-9/27)	Village Survey I	▪ Saemaul Birthplace (Cheong-do, North Gyeongsang Province) ▪ Saemaul House (Yongin, Gyeonggi Province) ▪ Saemaul Village (Cheonan, South Chungcheong Province) ➢ Drawing Documentation, Site Survey, and Interview
Week 3 (9/28-10/4)	Data Repositories	▪ Statistics Korea / National Archives of Korea ➢ Primary Statistics (GIS) Collection
Week 4 (10/5-10/11)	Village Survey II	▪ Four Selected Villages (Han River Water Basin) ▪ Administrative Office Visits which are in charge of Four Selected Villages (Yangju, Yangpyeong, Hongcheon) ➢ Site Survey and Interview

Week 5 (10/12-10/18)	Interview Visits	▪ Korea International Cooperation Agency (KOICA) ▪ National Council of Saemaul Undong ➢ Interview
Week 6 (10/19-10/24)	Final Report	➢ Report Outline + Final Report Initiation ➢ Materials Supplement

To be brief, relevant literature, ArcGIS files, and village-scale statistical data were collected during the field research. In addition, open-ended interviews with keepers, residents, villagers, and relevant scholars were conducted according to the interview protocols qualified by the University of Washington Human Subjects Division. On top of those, relevant houses and villages were visited, documenting them into architectural drawings and gathering their historical pictures from residents. Finally, all of these materials were organized as two parts of Fieldwork Report.

The first part, Data Collection for Macro Overview was to include materials for the KNVM's national-scale overview. For this, the following universities and institutes were visited.

- Literature: Seoul National University, National Archives of Korea / Presidential Archives, National Council of Saemaul Undong, President Park Chung Hee Library & Museum
- Statistical Data: Statistics Korea, Statistics GIS
- Interviews: Park Chung Hee School of Policy and Saemaul (Professor Chung, Yong Kyo) / Park Chung Hee Saemaul Undong Institute (Researcher Lee, Soo Hyung) / Yeongnam University, Korea International Cooperation Agency (Director Moon, Sang Won), Korea Saemaul Undong Center (General Manager Lee, Kab Soo)/ Saemaul Undong Center Training Institute (Section Chief Ryu, Young Hyun, Deputy Manager Ha, Ki Chul).

The second part, Village Survey for Micro Analysis was to embrace village survey for the KNVM's village-scale analysis. To be specific, one house and six villages were surveyed, collecting the following data:

- Model Projects: one house and two villages shaping the KNVM

► House and villages surveyed for the KNVM's historical interpretation

- A: Birthplace of Saemaul Undong - Sindo-ri, Cheongdo-eup, Cheongdo-gun, Gyeongsangbuk-do
  - Memorial Park Visit
- B: First Saemaul House - 650 Dongtangiheung-ro, Giheung-gu, Yongin-si, Gyeonggi-do
  - Interview: Director Lee, Byoung Wha
  - Drawing Documentation
- C: First Saemaul Village - Samgok-ri, Seonggeo-eup, Seobuk-gu, Cheonan-si, Chungcheongnam-do
  - Interview: Village Head Lim, Kyung Uk
    Type A Resident (Male, Born in 1993)
    Type B Resident (Female, Born in 1933)
    Type C Resident (Female, Born in 1942)
  - Drawing Documentation: House Type A, B, C

- Representative Villages: four villages in the watershed of the Han River

► Villages surveyed for the KNVM's resilience assessments

- Statistical Data: statistical data at the scale of township *Myeon* was collected.

- D: Pungsan-dong, Hanam-si, Gyeonggi-do
  - Interview: Pungsan-dong Resident (Male, Born in 1936)
- E: Gangsang-myeon, Yangpyeong-gun, Gyeonggi-do
  - Interview: Byungsan-ri Village Head (Male, Born in 1959)
- F: Seo-myeon, Hongcheon-gun, Gangwon-do
  - Interview: Yeoyupo-ri Resident (Male, Born in 1933)
- G: Seoseok-myeon, Hongcheon-gun, Gangwon-do
  - Interview: Sangok 2-ri Resident (Male, Born in 1945)

APPENDIX C

HUMAN SUBJECTS DIVISION REPORT

UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195-9470

Human Subjects Division Box 359470
Office of Research

September 15, 2014

To: Chung Ho Kim
Urban Design and Planning

From: Geri C. Faris, Administrator

Re: Determination of Exemption Status for #48211, "Community Resilience of Korean New Village Movement, 1970-1979: Historical Interpretation and Resilience Assessment"

Chung Ho Kim,

The University of Washington Human Subjects Division (HSD) has determined that your research qualifies for exempt status in accordance with the federal regulations under 45 CFR 46.101/ 21 CFR 56.104. Details of this Human Subjects determination are as follows:

Exempt category determination: **Category #2**
Determination period is from: 9/15/2014 – 9/14/2019

Although research that qualifies for exempt status is not governed by federal requirements for research involving human subjects, investigators still have a responsibility to protect the rights and welfare of their subjects, and are expected to conduct their research in accordance with the ethical principles of *Justice, Beneficence* and *Respect for Persons* described in the Belmont Report as well as state and local institutional policy.

Determination Period: An exempt determination is valid for five years from the date of the determination, as long as the nature of the research activity remains the same. If there is any substantive change to the activity that has determined to be exempt, such that the overall design, procedures, or risk/benefit ration to subjects is altered, the exempt determination will no longer be valid. It is not necessary to formally request that your study be closed. Should you need to continue your research activity beyond the five-year determination period, you will need to submit a new *Request for Determination of Exempt Status* form for review and determination *prior to implementation*.

Revisions: Only modifications that are deemed "minor" are allowable, given that they do not change the nature of the research and therefore the validity of the exempt determination. Please refer to the Guidance document for more information about what are considered minor changes. If changes occur to the research that are considered to be "substantive", such that they change the nature of the research and therefore the validity of the exempt

determination, a new *Request for Determination of Exempt Status* must be submitted to HSD as a new exempt determination for review and determination *prior to implementation*.

Problems: If issues should arise during the conduct of the research, such unanticipated problems, adverse events or any problem that may increase the risk to the human subjects and change the category of review, notify the HSD promptly. Any complaints from subjects regarding the risk and benefits of the research must be reported to HSD.

Please use the HSD study number listed above on any forms submitted which relate to this research, or on any correspondence with the HSD office. If we can be of further assistance, please contact us at (206) 543-0098 or via email at hsdinfo@uw.edu. Thank you, and good luck with your research.

APPENDIX D

ASKED OPEN-ENDED INTERVIEW QUESTIONS

A. Questions on the KNVM in the 1970s

1) Can you describe what happened in your village during the KNVM period in the 1970s? What is your basic perception for the KNVM? Do you think that the KNVM was positive or negative to your village?

2) What kinds of activities did your villagers engage at that time? Were the villagers' participation voluntary or involuntary? What was the role of public officials for the KNVM's actual village-scale implementations? Did the public officials work together, help, supervise, or order?

3) Do you have any episodes or experiences which you can remember and want to share?

B. Questions on Demographical Change in the 1970s

1) Can you describe how your village's migration was in the 1970s in terms of scale and period? Generally speaking, there were huge migration from rural villages to urban areas in the 1970s. Do you think that the KNVM decreased migration from your village to urban areas in the 1970s?

2) Can you compare how different your village's population structures between the 1970s and nowadays are in terms of age, sex, and so on? Was there any reverse migration from urban areas to your village since the 1970s?

C. Questions on Resource Management Change in the 1970s

1) Can you describe what time you or your neighbors stared to change your resources? For example, water system (from well to tap water), building materials (from soil and straw to cements, concrete blocks, slate roof, and so on), fuel (from firewood to coal, oil, and gas), lighting (from kerosene lamp to electricity), and so on.

2) Can you describe what happened in your village during the Korean Reforestation period in the 1970s? Was it successful or not in your village? Can you explain what the relationship between the KNVM and the Korean Reforestation was at that time? Do you think how much the resource management change contributed to the Korean Reforestation's success?

VITA

Chungho Kim was born in Daejeon, Korea, on April 28, 1979, the son of Kitae Kim and Kyungnam Min. He entered Department of Architecture at Seoul National University in 1999, receiving the degrees of Bachelor of Science in February 2003 and Master of Science in February 2006. In addition, he was a visiting scholar for his master thesis at the University of Pennsylvania, Philadelphia in 2005.

Meanwhile, he was a professional architect and urban designer at Samoo Architects & Engineers and Haeahn Architecture from 2003 to 2009. He has been awarded many prizes from a variety of international or domestic competitions such as Sejong Prime Minister's Official Residence (3rd Prize), Incheon Children's Science Museum (1st Prize, KIRA Excellent Prize), Korea University New Campus Center (1st Prize, KIA Best 7 Award).

Prior to his PhD program, he was a research associate at Seoul National University from 2010 to 2011 and also an author of creative publications on architecture, urbanism, and design including Desire City, Seoul and Design 3 Minutes Speech.

He entered Interdisciplinary PhD Program in Urban Design and Planning at the University of Washington, Seattle in 2011, receiving Graduate Certificate in Demographic Methods from UW-CSDE (Center for Studies in Demography and Ecology) in March 2016 and the degree of Doctor of Philosophy in March 2017. As the only winner of 2010 Korean Government Study-abroad Scholarship in the field of architecture and urban planning, he investigated East Asia's rapid urbanization and built-environments driven developments, conducting historical interpretation and resilience assessment. In addition, he participated in the FEMA's Risk Map research project.

During his stay in PhD program, his doctoral research honored Outstanding PhD Student Award from the Department of Urban Design and Planning as well as Karen R. Polenske Best Student Paper Award from the International Association for Chinese Planning (IACP) in 2013 and 2014. In addition, he taught China Village Studio, Urban Design Studios (Redmond, WA and El Salvador), Urban Planning Studio, Planning Methods, Digital Design Practicum, and Urban Form.

He is husband to Jiyeon Han and father to his two daughters Yeonseo and Julie Yeonji.

This dissertation was typed entirely by the author.