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Urbanization and Urban Policies in Korea

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The following article is the summary of a paper prepared for presentation at the International Conference on "Urbanization Review: Lessons from Korea and International Experiences," co-organized by the World Bank and KRIHS on December 13, 2010.

According to the 2005 Revision of the UN World Urbanization report and the 2007 UN State of the World Population report, the population in urban areas will increase from 3.2 billion in 2005 to 4.9 billion in 2030. Approximately 93% of the added population will live in urban areas of developing countries. Developing countries are very concerned about how to achieve economic growth while accommodating such rapid urbanization. Korea has successfully achieved both industrialization and urbanization simultaneously in a different way than Western developed countries. In this respect, Korea can be the very role model that developing countries want to follow for their successful urbanization and economic growth in the future.

Charged with assisting developing countries, the World Bank showed an interest in Korea's urbanization experiences. The World Bank requested that Korea Research Institute for Human Settlements (KRIHS) review Korea's past urbanization experiences. The G20 summit conference, held in November 2010, also adopted capacity building of developing countries as a new agenda. Korea's urbanization experience and urban policies to date can be shared with developing countries.

Economic Growth and Territorial Development Policy

Korea was a very poor country prior to the 1960s, with a nominal Gross National Income (GNI) per capita of only 79 US dollars in 1960. Due to six times implementation of economic development plan initiated by the Korean government between 1962 and 1991, the nominal GNI per

capita increased to 6,147 US dollars in 1990. The economic capacity of the private sector grew bigger and more competitive after 1990, and the GNI per capita in 2009 reached 17,000 US dollars. The government-initiated economic development plans provided a guide to the private sector related to economic performance and institutionalized the surrounding system for a free market economy through midterm policies. A spatial planning system was also established to support the economic policies and accommodate urbanization. The first national comprehensive territory plan adopted in 1972 was focused on growth pole development, but the subsequent plans from 1982 promoted reshaping the existing spatial structure and forming the regional or metropolitan economic and settlement sphere.

Urbanization processes can be generally divided into incipient, intermediate, and advanced phases according to the urbanization procedure. Along with modernization, urbanization in Korea first emerged after the opening of Korean ports in 1876. Throughout the colonized era and the chaotic time of the Korean War in the 1950s, the incipient urbanization in Korea continued until 1960, when the urbanization rate reached 35.8%. Between 1960 and 1990, Korea experienced great structural changes in its territorial settlement system as a result of the accelerating urbanization, with an 82.6% urbanization rate in 1990. Since the 1990s, new urbanization patterns have changed Korea's focus from urban to metropolitan as its urbanization phase matured.

Figure 1: Urbanization Rate[1] of Korea between 1920 and 2010 (Statistics of Korea Census)

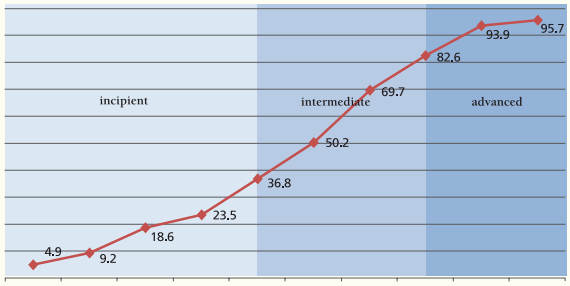


Figure 2: Change in Distribution of Cities by Size (1960-2005)

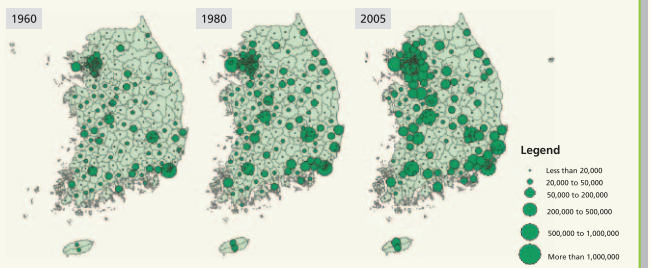
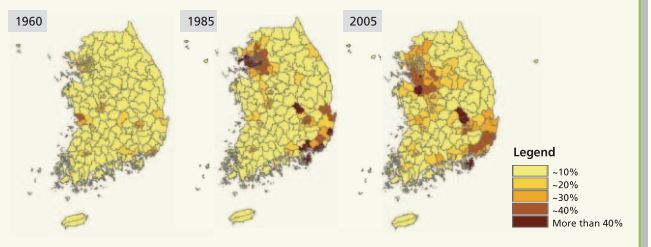


Figure 3: Change in the Share of Manufacturing Employees at the City-County Level(1960, 1985, and 2005)



Indicator-based Diagnosis of Urbanization Process

The Korean urbanization profile of the accelerating urbanization since the 1960s can be analyzed through indicators representing urbanization procedures, urban development, and transportation linkages. The indicators are derived using the data on 165 cities and counties, including metropolitan cities.

According to Figure 2, large metropolitan cities experienced remarkable urban growth in the intermediate urbanization phase, and the population of cities over one million reached the peak of 49.3% growth in 1990. On the other hand, the share of population living in cities (populations of 20,000 to 50,000) has continuously decreased since 1980. In the advanced urbanization phase, the number of cities and the share of population living in cities

1) Urbanization rate was calculated with the population who live in Eup (town) or bigger city.

Table 1: Urban Land Area Change by Land Use Categories

		1975	1980	1985	1990	1995	2000	2005	2009
Urban Land	㎢	2,792	3,327	3,708	4,216	4,850	5,030	6,101	6,638
	Increment (Rate,%)	-	535 (16.1)	381 (10.3)	507 (12.0)	634 (13.1)	179 (3.6)	1,071 (17.6)	536 (8.1)
Agricultural land		21,338	21,661	21,696	21,822	21,989	21,600	21,216	20,845
Mountains		63,776	63,203	64,249	64,346	65,506	65,143	64,805	64,472
Others		4,846	5,793	6,046	6,434	6,942	7,689	7,524	7,943
Total		92,752	93,983	95,700	96,817	99,286	99,461	99,646	99,897

Source: Annual Cadastral Statistics, the Ministry of Land, Transport and Maritime Affairs (MLMT)

Figure 4: Change of Housing Supply Ratios by Regions

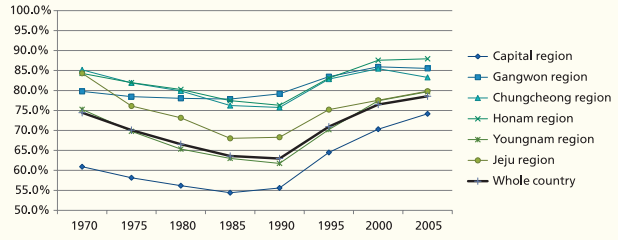
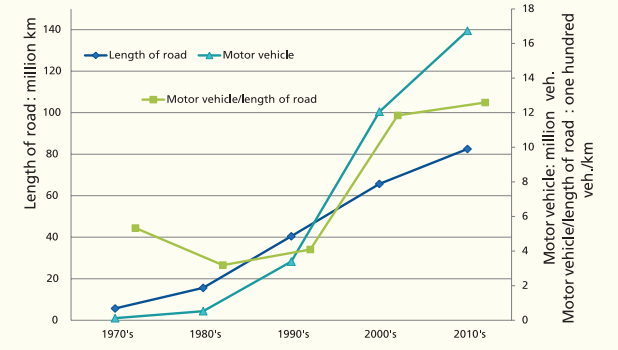


Figure 5: Change in the Number of Registered Vehicles per Road Length



with a population of between 200,000 and 500,000 relatively increased.

In 1960, the proportion of the employees working in the manufacturing sector was very small and evenly distributed across the Country, but in 1985 the employees in the manufacturing sector were concentrated in the Capital region and Youngnam region (southeastern Korea). The concentration of the manufacturing sector in both regions declined in 2005 (see figure 3).

Urban development can be analyzed using urban land expansion and housing supply. On average, 113 km2 of urban land has been developed every year from 1975 to 2009; this development was not concentrated in a specific region, but evenly distributed across the nation. The supply of urban land decreased between 1995 and 2000 due to Korea's 1997 financial crisis, but a large amount of urban land became available between 2000 and 2005 to compensate for the temporary decrease (see table1).

Until 1985, the housing supply ratio continuously decreased as the production of housing units did not keep up with the increasing number of households. However, housing supply ratios have steadily increased since 1990 as a result of the construction of housing units proposed by the 2-Million Housing Construction Plan (1988-1992). Although housing supply ratios for all regions have increased since 1990, the capital region is still showing a 5% lower housing supply ratio than the national average (see figure 4).

Railroads have been continuously extended, but the number of registered vehicles has "skyrocketed" since 1990. Since 2000, the increasing trend of registered vehicles has gradually slowed (see figure 5).

Urban Policies for Accommodating Urbanization

In the incipient urbanization phase, laws were enacted to implement urban development projects (1934); however, in the intermediate and phase, land use laws and regulations such as floor area ratio controls (1970) and land use conversion

permits (1972) and planning systems such as long-term urban comprehensive planning (1981) were continuously adopted. And also, urban development systems were added to 'land acquisition by complete purchase' to the existing 'land readjustment' (1980). In the advanced urbanization phase, various kinds of urban development institutions and land use regulations began to be integrated respectively (2002), and regional planning was put in place (2000).

Housing supply policies were not a major concern in the incipient urbanization phase. In the intermediate urbanization phase, housing shortages became serious social issues and gradually worsened due to rapid urbanization. Recognizing this problem, the government endeavored to find a solution to the housing shortage and constructed numerous housing units, primarily apartments. The government's housing construction policies, such as the Housing Construction Promotion Act (1973) and the 2 million housing construction plan (1988), led to large-scale residential development focused on apartment construction. Due to these policy efforts, the most serious housing problems were greatly solved when entering the advanced urbanization phase.

As a railroad network had been formed at the end of Chosun dynasty after the opening of Gyeongbu(Seoul-Busan) railroad, Korea was able to prepare for the formation of a modern urban structure in the early incipient urbanization period. Korea was able to prepare for the formation of a more modern urban structure in the incipient urbanization phase. In the intermediate urbanization phase, road networks based on expressways such as Gyeongbu (1970) were also constructed and contributed to the development of nationwide transportation systems. In the latter half of the intermediate urbanization phase, urban highways and subway lines were built. During the advanced urbanization phase, the Korea Train Express (KTX) line was constructed (2004), making it possible for people to reach the entire nation within a half day.

In the incipient urbanization phase, land ownership by a few landlords or the ruling class forced farmers to lose their land and move to urban areas. The Korean War also caused significant migration to cities. In the intermediate urbanization phase, industrialization caused rural people to move to cities in order to take advantage of greater job opportunities. While this rural population concentration in urban areas was in progress, numerous low-income, deteriorated neighborhoods, such as shantytowns and deprived areas on the hillside, emerged within urban areas. Later, during the intermediate urbanization phase, these poor neighborhoods were removed to create more efficient land use, and a great number of apartments replaced the poor-quality houses. Such efforts led to a great reduction in low-income, deteriorated residential areas during the advanced urbanization phase. However, the residents from low-income neighborhoods were scattered over outlying metropolitan areas or satellite cities and have been living in sub-standard housing units, such as building attics or basements.

Implications of Urban Policies for Developing Countries

Based on the Korean experiences, the railroad infrastructure invested in the incipient phase played an important role in population concentration to cities throughout the country. Consequently, modern cities were able to be built around railroad stations. Urban planning regulations during the incipient urbanization phase focused on carrying land development projects. However, as urbanization progressed, efforts to institutionalize a land use control system emerged in the intermediate phase of the 1970s; meanwhile, during the advanced phase, the planning system for long-term plans was established.

However, during these urbanization processes, the housing shortage problem worsened until the large-scale housing construction policy was developed and implemented within rapidly developing metropolitan areas. Since the 1990s, Korea's urbanization and urban policies had been moving toward a metropolitan focus with a goal of solving the housing shortage problems. These policy issues differed from the preceding issues, mainly due to the large city growth. This entire process could be characterized as a process of accommodating the urbanization to the spatial characteristics of economic growth, which is different from Western experiences. In the future, new urban policies are expected to focus on environmental quality and regional cooperation, which is more similar to Western developed countries' experiences.

A Korean Green Island: Ulleungdo

Wang Kwang-ik, associate research fellow

The republic of Korea established a vision for low carbon green growth as a new paradigm of national development. To facilitate the vision, the government enacted various laws and regulations. The Presidential Committee on Green Growth was launched in February 2009, national strategies and a five-year action plan for green growth were introduced in December 2008, and the Framework Act on Green Growth was enacted in December was enacted in December 2009 and came into effect in October 2010. During the 9th Green Growth Committee Reporting Session for the President on October 13, 2010, the government decided to invest a total of 40 trillion won in nurturing solar energy and wind power through partnerships with both the private and public sectors to advance into the world's fifth largest renewable energy country by 2015.

Advanced countries have already been developing and implementing a wide range of green technologies, introducing renewable energy and recycling resources, thereby moving toward a green society. In addition, they are supporting low carbon facilities in various ways as a national priority and creating a place for the public to experience low carbon life. Some advanced countries like Denmark, which favors the use of renewable energy, are trying to link their low carbon measures into tourism resources, coordinating a variety of hands-on activities.

Meanwhile, Korea is actively conducting basic research and investigation in various fields in order to introduce low carbon technologies meeting regional needs; however, Korea's islands are not following suit as these regions have low accessibility. Although most Korean islands are self-sufficient in generating electricity, they primarily rely on fossil fuel-fired powers, such as internal combustion generation. Yet these regions have several advantages in specializing specific aspects associated with low carbon green growth and applying low carbon technologies to their energy use in accordance with their regional conditions. Islands usually have independent power systems, making them an appropriate place to serve as a test bed for using renewable energy technologies. Thus, these regions could be positioned as the outposts for smoothly applying low carbon technologies to inland regions in Korea and further export them to other countries such as East Asian nations. In addition, it is expected that higher synergy effect will be generated for improving housing conditions when introducing renewable energy facilities that help reduce greenhouse gas emissions, green transportation systems and passive housing as well as linking them with islands' tourism aspects.

Figure 1 : Ulleungdo in the East Sea

Ulleungdo, the largest island in the East Sea, is visited by many tourists. If the island were transformed into a low carbon green island by adopting various green technologies, it could serve as a place to give people a chance to experience "low carbon green life." In addition, as facilities like electric power systems and homes on the island are outdated, revamping them into low carbon facilities

would maximize carbon reductions thanks to high energy efficiency. From this perspective, interest in Ulleungdo has been growing; consequently, efforts are being made to create a low carbon green island in accordance with its unique characteristics. This will lay the foundation for the national drive of green growth drive in addition to revitalizing the island's economy.

To create a desirable green island on Ulleungdo, it is advisable to review best practices in other countries and learn from them, such as Samso Island, a 114 square kilometers south of Copenhagen, Denmark, and Hachijo Island, which is located 290 square kilometers south of Tokyo, Japan.

Best Practices in Realizing a Green Island

The Danish Ministry of Environment and Energy designated Samso Island (with a population of 4,124) as a green energy island in 1997. Under this project, the island was to rely on renewable energy for 100% of its needs within ten years. After implementing the project, the island which previously relied on only 6-7% of renewable energy successfully achieved the goal of 100% use of renewable energy. A wind turbine was installed on the island in 2000 to generate electric power on a self-sustaining basis. Offshore wind turbines were then installed in 2003 and have since been generating surplus electricity, which is sold in the market through a public electric network. In the process, residents on the island have profited by directly investing in and managing wind turbines; at the same time, they also have enjoyed lower electricity bills. Furthermore, district heating is currently available through solar energy and a wood-burning plant, and biodiesel from rapeseed oil is being widely used for transport. As a result, the island's carbon dioxide emissions have decreased by 140%, and the annual number of visitors has grown from 150,000 to 500,000 since 1997.

Meanwhile, Hachijo Island, an area of 66 square kilometers with a population of about 9,300, is running a 3,300 KW geothermal power plant using high temperature geothermal water and also operating a 500KW and four 5KW wind power plants. After thorough earth surface investigations and excavation and heavy equipment tests lasting 8 years since 1989, the geothermal power plant was established in 1989 and became operational in 1999. A museum was opened to help visitors understand how geothermal power generation works. As for wind power, to conduct a field test on the stability of power output of wind power plant, a 430KW sodium sulfur (NAS) battery was introduced. Small wind power generators were installed on ranches to power refrigerators and the lights in rest areas.

Figure 2 : Geothermal Power Plant in Hachijo Island

These cases provide useful implications for creating a green Ulleungdo for several reasons. First, systematic measures to use renewable energy effectively were sought in both cases. The islands successfully minimized the use of fossil fuels by taking into account their regional conditions and reduced carbon dioxide emissions by adopting renewable energy sources such as wind power. Hachijo Island set up a measure to introduce renewable energy in phases after considering the features of renewable energy that need a long period of investigation and tests, such as geothermal power plant. The continuing efforts to discover available renewable energy sources provide significant implications. Second, residents on both islands were urged to actively engage in the process of adopting renewable energy. Encouraging residents to participate in the energy project through continuing education for them and opinion-gathering served as a major factor enabling these renewable energy projects on Samso Island and Hachijo Island to achieve successful results. As seen in both cases, for renewable energy projects to be recognized as best practices, it is important to encourage residents' participation, create jobs for local residents, and lay a foundation to nurture professionals from their regions in all areas of the renewable energy project.

Finally, recycling measures to minimize the wasteful use of resources were sought. For example, materials such as wood and agricultural by-products were recycled as new energy sources, resulting in reducing the amount of waste and strengthening environmental protection.

Vision and Strategies of the Comprehensive Plan for a Green Ulleungdo

"The Comprehensive Plan for a Green Ulleungdo" emphasizes preserving the island's unique characteristics and historical and cultural resources as well as utilizing the island as a model region for promoting low carbon islands. The plan presents several directions.

To transform Ulleungdo into a global green island leading the national drive for green growth, three goals have been set up: green energy (GE), green tourism (GT), and green life (GL). To achieve these three goals, four strategies have been established to reduce carbon emissions and create an environment for green tourism and green life: create an environment for a green island in line with the national drive for green growth and protect the national territory; move away from fossil fuel consumption as a major energy source and toward renewable energy; create a global tourism environment, in connection with its natural environment, that is conducive to having an experience in low carbon green growth; and promote low-carbon infrastructure appropriate for islands and green life.

To realize the vision of a green Ulleungdo, detailed projects have been planned to carry out the creation of GE, GT, and GL (see table). These detailed projects will be prioritized based on the extent to which they contribute to the national drive for green growth and creating low carbon green life. Specifically, in the short term, for the period leading up to 2015, the basis for developing an environment for low carbon green tourism and green life is to be established. For the mid-term period until 2020, a wide variety of renewable energy sources should be adopted to form a low carbon green energy island. For the long term until 2025, the goal of a low carbon green island should be achieved so that the island will lead the national green growth drive and be a place where people experience low carbon life.

Ordered by North Gyeongsang province, the comprehensive framework plan for forming green Ulleungdo and Dokdo was established by KRIHS on February 2011. Currently, as part of the plan overseen by the Korea Institute of Energy Research(KIER), the North Gyeongsang province and the Ministry of Knowledge Economy are carrying out several projects. All renewable energy sources found in Ulleungdo and Dokdo regions and available technologies are being thoroughly analyzed to establish phased plans for the purposes of building up a green energy infrastructure to replace fossil fuel energy. Feasibility studies on the geological features of Ulleungdo are being considered to examine whether renewable energy power generation facilities such as solar, geothermal, and small hydropower plants are installed. Also under consideration are ways to improve housing conditions and supply high efficiency energy appliances through a green home project, coupled with measures to expand the existing solar power generation and add a small wind power generation system in Dokdo. In addition, a comprehensive plan for turning Ulleungdo and Dokdo into eco-tourism attractions will be put into place.

Figure 3: Vision and Strategies of a Green Ulleungdo

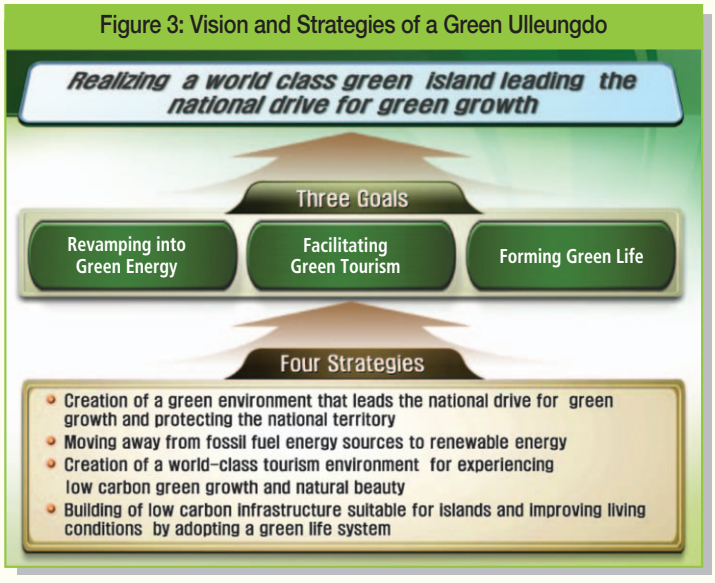


Table 1: Detailed Projects for Forming a Green Ulleungdo

Classification	Detailed Projects
Green Energy Project	Formation of a smart grid with independent power supply fitting for island Green wind power generation Improvement of facilities for small hydro power plants Utilization of wood bioenergy Utilization of waste bioenergy Building of geothermal power plants R&D project for demonstration study on desalination system using solar energy Creation of a test-bed for bioenergy using marine micro-algae Building of a complex designed for Water Electrolysis Hydrogen Production Setting up of air conditioning and heating system using the difference in sea water temperature
Green Tourism Project	Introduction of electric cars and bicycles for touring costal roads Operation of cruise ship for sailing around Ulleungdo Formation of green ranches Promotion of mobile coupons for touring Establishment of U-tourism system Setting up of a center for experiencing green energy
Green Life Project	Formation of a low carbon green village Remodeling project for low carbon green buildings Construction of green roads Incorporation of energy-saving monorail for farming Replacement of cuttle fishing boats with oil-reduction appliances and LED light fishing lamps

Such efforts are already being recognized globally. For the first time in Asia, Ulleungdo has joined ISLENET, a network of European Island Authorities which promotes sustainable and efficient energy and environmental management. This means that the island has been officially declared as an international green island.

If these efforts are carried out as planned, Ulleungdo will become an eco-friendly tourism attraction where a wonderful natural environment and eco-friendly green energy coexist. Through the comprehensive plan for forming a green Ulleungdo, Ulleungdo will be reborn as a must-see and one of the most beloved travel destinations.

Korea to Develop and Apply Low Carbon Green National Territory Index

Kim Myung-su, research fellow / Park Jung-eun, associate research fellow

The government is implementing various policy initiatives following its adoption of low-carbon green growth as the national vision of future development. Notwithstanding the initial confusion over the concept, the government is now at a critical juncture when it must ingrain and sustain the policies. However, applicable policies have yet to be ingrained in the field. Among several possible reasons, the primary reason seems to be the lack of policies developed considering the local conditions and capabilities. It is high time that the low-carbon green national territory index be developed based on an appropriate understanding of low-carbon green growth to assess the local conditions and capabilities, and low-carbon green growth policies aligned to

specific local needs have been identified and implemented based on such an assessment.

Concept of Low Carbon Green National Territory Index

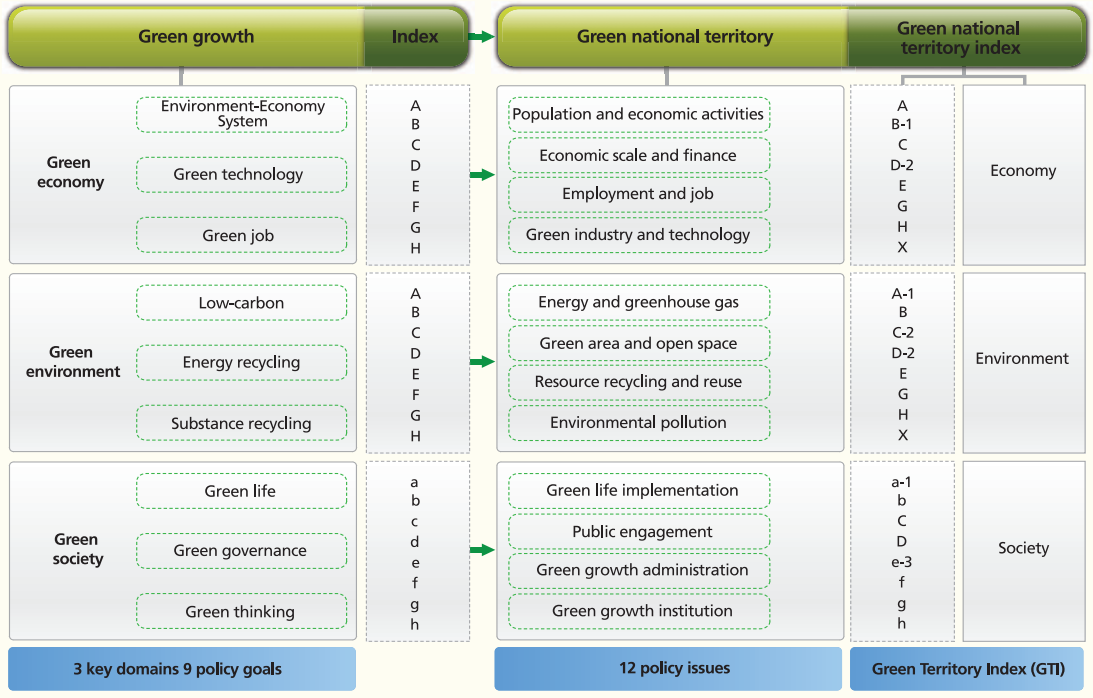
To set the concept of low-carbon green national territory index correctly, the relationship between green growth and other similar concepts has been defined, and the concept of green growth has been clarified. Against this backdrop, the concepts of low-carbon green national territory and low-carbon green national territory index were developed and refined. Whereas sustainable development is an abstract, declaratory concept, green growth is a more specific policy goal. Since green growth is a concept that is modified and refined with practical aspects from sustainable development that existed conceptually and ideally, green growth is deemed to be included in sustainable development as a sub-concept by many.

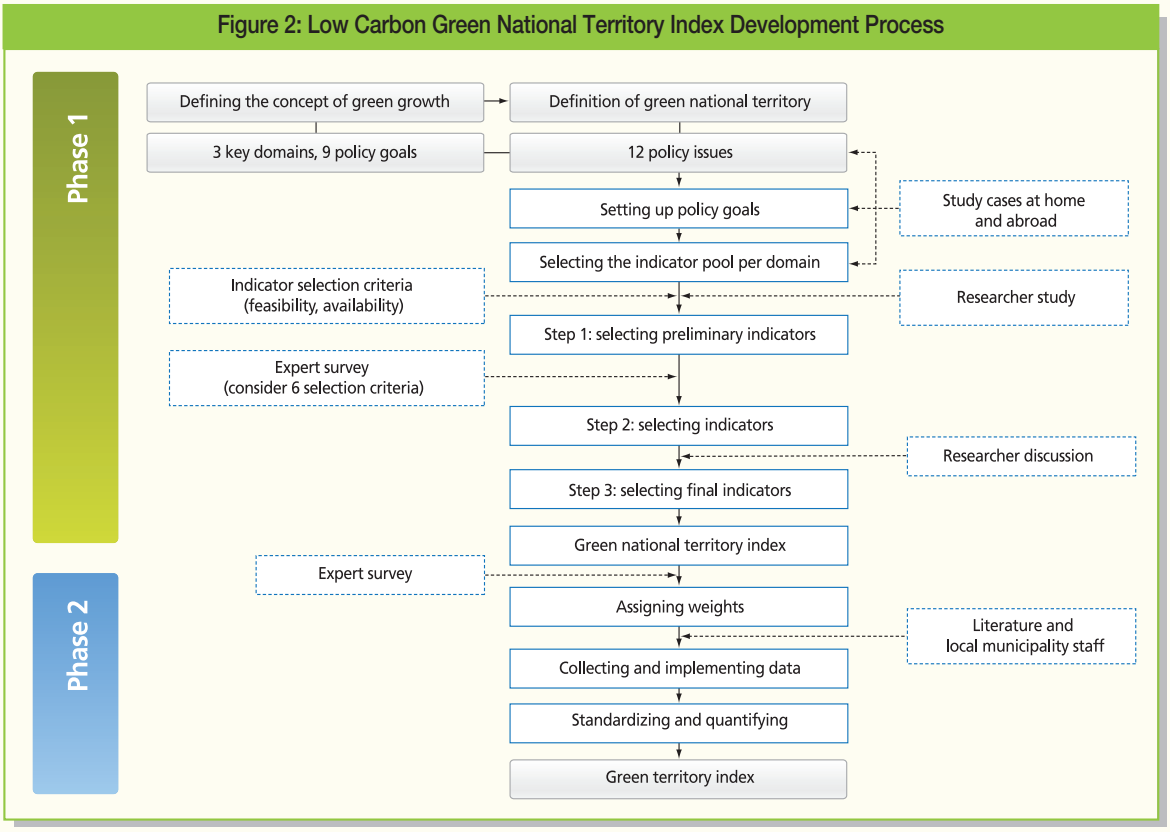
Low-carbon green national territory can be said to be the economic, environmental, and societal platform that supports the implementation of green economy, green environment, and green society as the three key domains of green growth at the national territory level. A total of 12 policy issues required for the development of economic, environmental, and societal platform for green growth were identified in a case study(see figure 1). Indices were suggested based on the policy issues, with the selection being finalized by referring to expert recommendations. In order to assess the conditions and capabilities of national territory, which serve as the economic, environmental, and societal platform for green growth, the low-carbon green national territory index is one of the systems that assesses the conditions and capabilities of the national territory intended for accomplishing policy goals in key domains namely, green economy, green environment, and green society and serves as a self-inspection tool for the vulnerabilities and strengths of different cities.

Development of Low-Carbon Green National Territory Index

Policy issues at the national territory level have been identified with reference to the concepts of low-

Figure 1: Low Carbon Green National Territory Index System





carbon green growth and low-carbon green national territory. An index pool was developed for each policy issue, and the index was selected in accordance with the index selection criteria. To develop the index, the guiding principles utilized were approach by theme, consideration of the Bellagio principles, consideration of the causal relationship between indices, and consideration of the possibility of applying index by phase. The low-carbon green national territory index will take on different shapes depending on the purpose of development. For index development, this study adopted the understanding of the local conditions and capabilities, the provision of underlying data for policymakers, the understanding of the time-series change of conditions and capabilities, and the provision of the problem prevention function.

Index development was carried out in two phases. Phase 1 was the indicator selection process, which included the selection of preliminary indicators (step 1), the selection of indicators (step 2), and the finalization of indicator selection (step 3). Phase 2 was the index development process including the assignment of weights to the selected indicators via an expert survey, collection of data per indicators, the processing of collected data, and quantification and standardization(see figure 2).

Weights were assigned to the finally selected indicators by domain, policy goal, and indicators via expert survey. A total of 30 indicators were finally selected, and the weights assigned to each indicator are shown in the table below. Weights turned out to be similar across the three key domains. Weights were not significantly different across the key domains, with economy (0.31), environment (0.39), and society (0.30). According to the policy goal, the weights revealed a 0.06 to 0.18 difference(see table 1).

Application of Low Carbon Green National Territory Index

The low-carbon green national territory index was applied to seven metropolitan cities (i.e., Seoul, Busan, Daegu, Incheon, Gwangju, Daejeon, and Woolsan) selected as pilot cities based on the ease

of obtaining data. In the analysis of the low-carbon green national territory index by key domain, A, E, and B cities were rated above average in terms of comprehensive index, but G and C cities were found to be inferior. A, E, and B cities were above average across the entire three key domains, whereas G city was found to be below average in all key domains. D city was above average in green economy, while F city rated above average in green society(see figure 3).

Each index can be classified according to pressure, state, or response. It is important to identify the pressure (P), state (S), and response (R) to problem per city and understand the vulnerable link in the P-S-R structure if effective policies are to be developed. To this end, the causal relationship (P-S-R structure) was analyzed for each city.

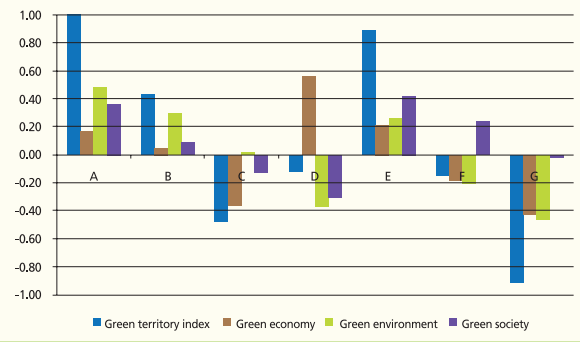
This research stemmed from the need for a condition and capability assessment system for each city in keeping with the concept of low-carbon green growth. For such a capability assessment system, the development of a low-carbon green national territory index was attempted. Indicators

Table 1: Weights per Low Carbon Green National Territory Index

Key domain	Weight	Policy goal	Weight	Indicator	Weight
Green economy (10 indicators)	0.31	Environment-economy synergy system	0.11	Population growth rate	0.02
				GRDP growth rate	0.02
				Ratio of economically active population	0.02
				Financial integrity	0.02
				Greenhouse gas emission per GRDP	0.04
		Green industry · technology promotion	0.12	Share of green industry throughput in GRDP	0.04
				Green technology R&D budget growth rate	0.04
				Number of green businesses	0.03
		Green job creation	0.08	Ratio of green jobs	0.04
				Number of new green jobs	0.04
Green environment (14 indicators)	0.39	Low-carbon environment implementation	0.16	Ratio of coal/petroleum product consumption	0.04
				Per capita GHG emission	0.04
				Ratio of GHG absorbing area	0.03
				Absorption/Emission	0.03
				Number of green-certified buildings	0.02
		Energy recycling expansion	0.13	Per capita final energy consumption	0.03
				Recycled energy supply	0.04
				Number of cars per 1,000 persons	0.02
				Number of LNG buses in operation	0.02
				Thermal energy (district heating) throughput	0.02
		Substance recycling expansion	0.10	Per capita waste generation	0.03
				Waste recycling rate	0.03
				Per capita water use	0.02
				Annual groundwater use	0.02
Green society (6 indicators)	0.30	Green life promotion	0.11	Per capita bicycle road length	0.04
				Bus use ratio	0.07
		Green governance implementation	0.08	Civil organization engagement ratio	0.03
				Industrial energy saving investment	0.05
		Green thinking promotion	0.11	Low-carbon, green growth ordinances in effect	0.06
				Number of government employees related to green growth	0.04

consistent with the concept of a low-carbon green national territory were selected and turned into a low-carbon green national territory index that was applied to seven metropolitan cities to identify the strengths and weaknesses of each city. The assessment was not intended to rank the cities, but rather to identify the conditions and capabilities of each to enable effective policy development in response. The development of the low-carbon green national territory index is expected to help ingrain low-carbon green growth policies in the field and promote public awareness of low-carbon green growth.

Figure 3: Comprehensive Low Carbon Green National Territory Index by Domain (category) (2008)



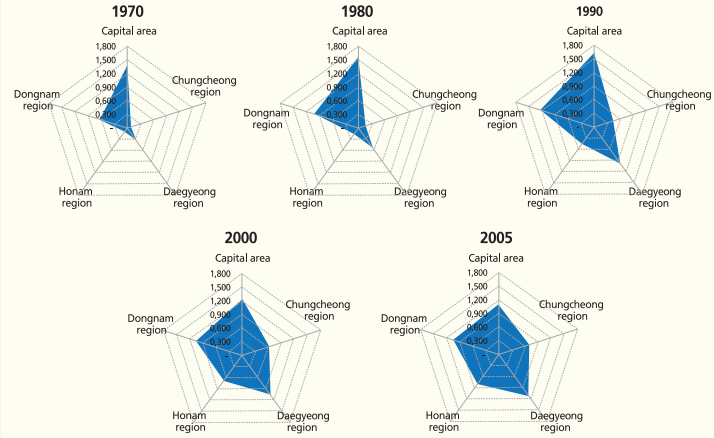
Change in the Spatial Structure of the Mega Economic Region and Growth of the Metropolitan Area

Im Eun-sun, research fellow

As globalization and localization progress, the importance of the region rather than borders is emphasized, economy of scale is pursued, and interest is consequently focused on metropolitan development. Accordingly, the world's major countries are promoting spatial policy that develops urban centers, mega economic regions, metropolitan areas, etc., as a source of territorial competitiveness. Korea has fostered mega economic regions (the Capital area, Chungcheong region, Honam region, Dongnam region, Daegyeong region, Gangwon region, and Jeju region) as a strategy for reinforcing territorial competitiveness since 2008.

However, it is hard to overcome the limits of growth strategies since spatial policy and plans are drawn up according to administrative boundaries. The mega economic region is expected to develop the policy for deregulation within its area to create a better environment for the industry, thereby potentially causing indiscriminate development without considering the environment. As such, the spatial plan like the plan for the development of the mega economic region needs to apply the potential of spatial structure as much as possible while addressing its weaknesses. In this article, the strategy for growth management in a metropolitan area with features of the spatial structure of mega economic region will be examined.

Figure 1: Change in Population Concentration by Region: Change of Relative Entropy (1970-2005)



Change in the Urban System of the Mega Economic Region

A country's urban system is closely related to its level of economic development. The urban system is a collective concept that considers city groups existing in one country or region as a system and understands the correlation between cities. Generally, primacy is initially high during city development, but its importance decreases during the maturity stage, and the entire city grows equally. Figure 1 shows the change in primacy of the urban system in each region using relative entropy. Primacy was high until the 1990s due to the high population concentration in the capital area. The primacy of the capital area started to decrease in 2000, with the population concentration gradually increasing in the local mega economic region as large cities have grown.

Figure 2 shows the urban system and conurbation potential by city population and location. In the Dongnam region, three adjacent big cities exist with a population of more than 1 million, so the conurbation potential is higher compared to any other region. The region with the second highest conurbation potential is the Chungcheong region, which has two secondary cities; the Honam region and Daegyeong region have low conurbation potential because both regions are far from a secondary city.

In addition, the stage of urban development occurring in a big city, which serves as the driving force of the mega economic region, and its periphery areas is shown in figure 3. In the Chungcheong region, the second stage of urbanization and the third stage of suburbanization are noted around Daejeon, where both urbanization and suburbanization are underway. The Honam region is in the first and second stages of urbanization, which is underway around Gwangju. The Daegyeong region is in the fourth stage of suburbanization. Since 2004, the population has

Figure 2: Urban System and Conurbation Potential of Regions

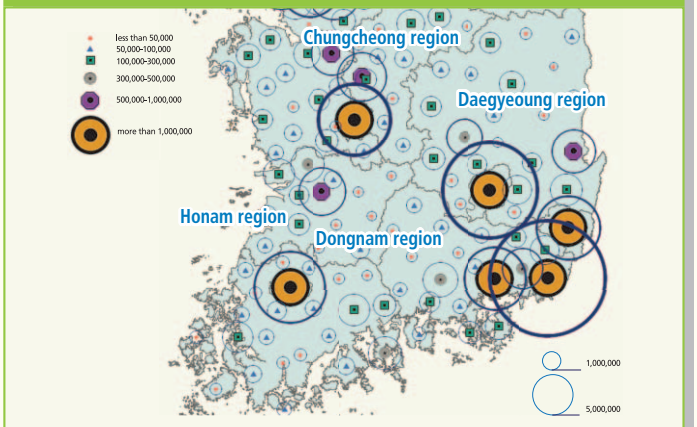


Figure 3: Stage of Population Growth in Mega Economic Regions and Development in Urban Areas

Stage of urbanization progress	Urbanization		Suburbanization		Counter-urbanization	
Type	Absolute concentration	Relative concentration	Relative deconcentration	Absolute deconcentration	Absolute deconcentration	Relative deconcentration
Population in city region	+	++	++	+	-	- -
Periphery area / Core	+ (-)	++ (+)	+ (++)	- (+)	- (+)	- - (-)
Population Growth of City-Region	Gwangju city-region (Honam)		Daegu city-region (Chuncheong)			
	Daejeon city-region (Daegyeong)		Busan city-region (Dongnam)			

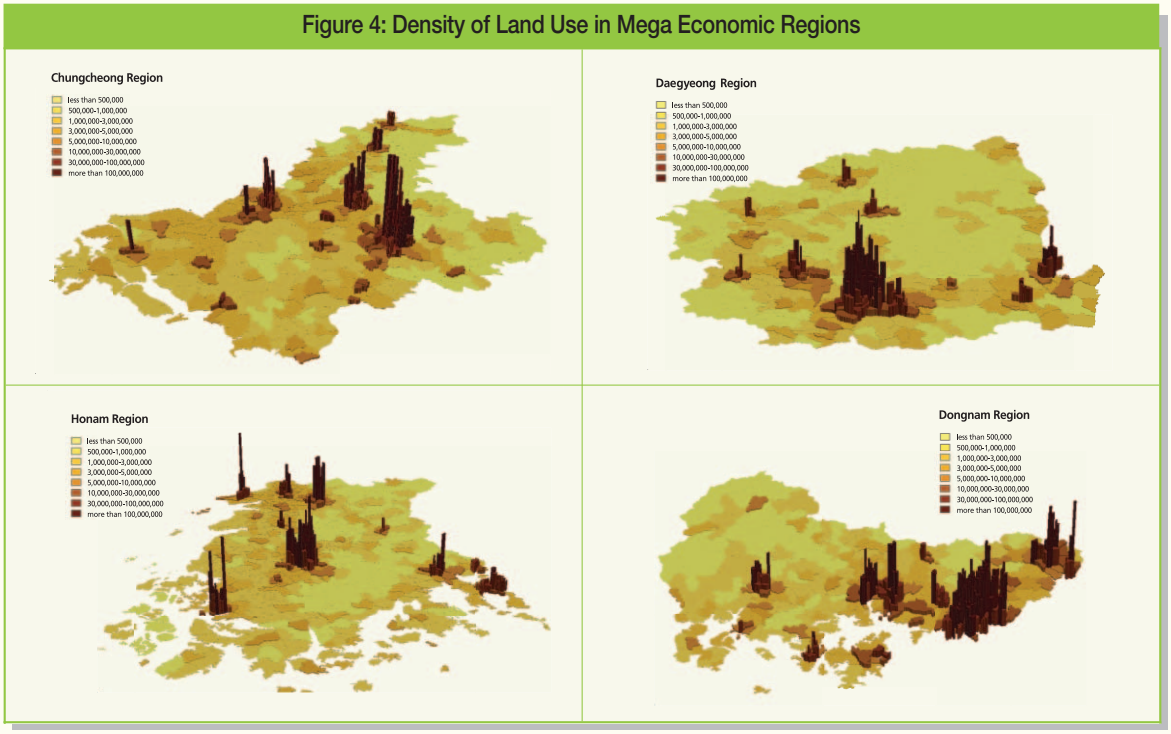
been decreasing in Daegu while relatively increasing in the periphery areas. The initial phenomenon of counter-urbanization (Stage 5) can also be observed. The southeast region has been characterized by suburbanization as the population has increased in the metropolitan area since 2009, after counter-urbanization (Stage 5) occurred in 2005 through urbanization and suburbanization.

Change of Land Use in Mega Economic Regions

Figure 4 shows the intensity of land use with the data on population density in each mega economic region. Most cities with a population of more than 1 million have higher population density, so they become the center of social and economic activities. Intensive structure functioning is essential and a key to growth, but over-intensity can translate into inefficiency for several social aspects, such as environment and transportation. Therefore, a "sustainable growth management model for fostering the metropolitan area" should be constructed based on growth in the mega economic region. Land conservation development should be introduced to apply the potential of periphery areas of metropolitan sufficiently and prevent indiscriminate development without considering the environment.

Land use in city regions has been changed by promoting various kinds of development projects from past to present. Figure 5 shows the analysis of the change in land use in a big city and its surrounding areas in the mega economic region with the Landscape Ecological Index. As a result of examining the change in the built-up area, LPI[1], PD[2], and MSI[3] have been on the rise. As a result, the built-up area has become fragmented. On the other hand, green areas such as forests and farmland have become significantly fragmented due to various development projects lasting until the beginning of the 1990s; their areas were considerably reduced as well. In addition, the landscape shape of green areas has been simplified by promoting various kinds of road construction and large-scale housing site development projects.

Figure 4: Density of Land Use in Mega Economic Regions

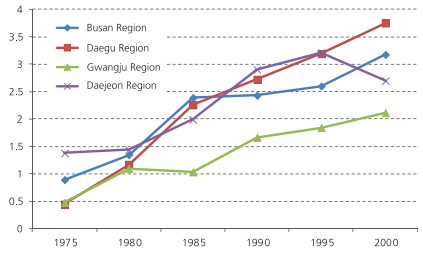
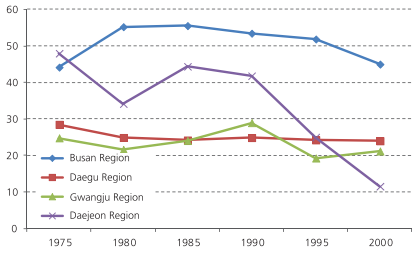
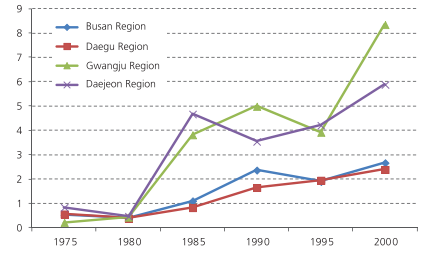
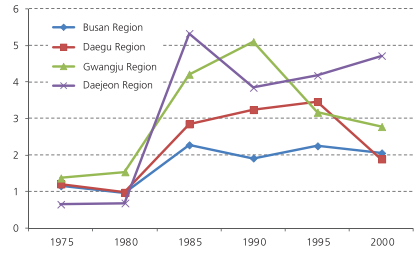
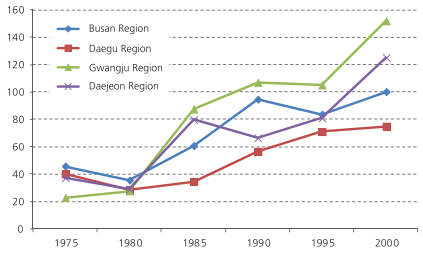
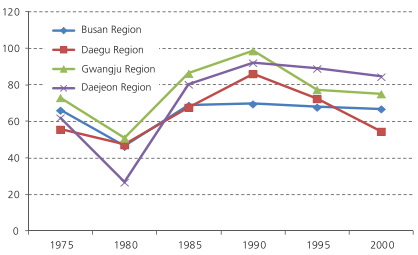


1) Largest Patch Index (LPI) is the index that indicates the proportion of biggest patch in patches distributed in the target area.
2) Patch Density (PD) means the number of patches per unit area (100ha). The higher PD is, the more unstable the structure.
3) Mean Shape Index (MSI) is the index that quantifies the shape of landscape on the basis of complexity of patch shape.

Management of Growth of Metropolitan Areas beyond the Administrative District

It is necessary to complement the weak spatial structure beyond the administrative district of individual local governments in the mega economic region. Cooperative projects in the mega economy region are being promoted in a trail basis, but most such projects are R&D projects rather than actual metropolitan projects; hence, the need to foster large city areas, small and medium city areas, farmland living territories, etc., strategically as space units actually lead the development of the mega economic region. In particular, it is important to secure political means that can curb the inefficient, disorderly spread of urban areas caused by development projects competitively promoted by individual local governments. This in turn requires providing an institutional strategy for establishing the metropolitan area as well as small and medium urban areas that integrate cities and farmland, making a plan for the management of growth in cooperation with local governments in the urban area, and reflecting such on city planning. In addition, a mega ecological network connecting mountains, rivers, and seas should be constructed in the mega economy region; the preservation and management of the ecosystem in each living space should further be reinforced. For the Chungcheong region, it is possible to construct a mega ecological network connecting the main ecological resources (e.g., Mt. Wolak, Mt.Sobaek, GeumRiver, ChungjooLake, DaechungLake, WestSea). The construction of an ecological park by applying the main ecological resources (e.g., rivers, forests, lakes, animals, plants) near living spaces is strongly recommended, including preserving and restoring weak ecosystems.

Figure 5: Change of Landscape Economy Index

	Change of Built-up Area	Change of Green Field (forest, farmland, etc.)
LPI (Largest Patch Density)		
PD (Patch Density)		
MSI (Mean Shape Index)		

INTERNATIONAL COLLABORATION OF KRIHS

Int'l Seminar Delved into Transportation Infrastructure Development in Mekong River Delta

On July 7, the Global Development Partnership Center (GDPC), an affiliate of KRIHS, hosted an international seminar in Can To, Vietnam, jointly coordinated by the Vietnam Ministry of Finance, KRIHS, and the World Bank. To share information on transportation infrastructure development in Mekong River Delta region, the seminar was attended by a diverse group of about 80 individuals representing the Development Committee of the Vietnam's Southwest, the General Department of Land Administration from Vietnam, and local government officials in charge of infrastructure development in the Mekong River Delta region, and National Construction Policy Committee, and the Land, Transport and Maritime Affairs Ministry(MLTM) from Korea.

From the KRIHS side, Dr. Jo Jin-cheol delivered congratulatory remarks, and Dr. Park Jae-Gil and Dr. Lee Sang-keon made presentations on the current situation of Korean urbanization and applying cutting-edge technologies to transport infrastructure in Korea, respectively. From the World Bank side, Mr. Dean A. Cira and Mr. Hyoung Gun Wang made presentations on the Vietnam urbanization review, discussing diagnostic and policy priorities for urbanization in Vietnam as well as the operationalization of the World Bank's urban and local government strategy. From Vietnam, Pham Dinh Cuong from the Vietnam Ministry of Finance and Doan Canh Hoang from the Vietnam Ministry of Transportation delivered presentations on the current situation of the management of roadway transport infrastructure in Vietnam and the current status and directions for capital mobilization in the transport infrastructure system in the Mekong River Delta region.

The seminar, led by the Vietnam Ministry of Finance, provided a good opportunity to identify differences surrounding how to develop infrastructure in the Mekong River Delta region as well as to discuss countermeasures.

Latin America and Caribbean UKP Launch Seminar

On July 18-19, 2011, KRIHS participated in the Latin America and Caribbean Urbanization Knowledge Platform (UKP) Launch seminar held in Bogota, Columbia. Organized by the World Bank, the UKP launch aimed to share knowledge about the strategic policy for Latin America and Caribbean countries, followed by the South Asian UKP seminar jointly held by the World Bank and KRIHS on June 30 and July 1, when both institutions signed a UKP agreement. The seminar was attended by approximately 150 renowned scholars and professionals from 12 Latin American countries, the United States, and Korea, including Dr. Sohn Kyung-hwan, vice-president of KRIHS, and Dr. Jo Jin-cheol, vice-director of the GDPC, for the purpose of discussing urban issues. KRIHS made a presentation on Korea's experience of national territory and urban development. In particular, a

special session was given to KRIHS, in which Dr. Jo Jin-cheol introduced KRIHS and presented KRIHS-led research projects in the fields of national territory, land use, and infrastructure development.

Int'l Smart Aging Symposium Kicked off

The 2011 Smart Aging International Symposium held September 1 focused on the theme "Directions of Housing Policy towards Housing Stability for the Baby Boomer Generation," a platform for sharing information on the impact of baby boomers' retirement on the housing market and policy directions of housing policy for the baby boomer generation. Jointly organized by five government ministries, including the Minister of Land, Transport and Maritime Affairs(MLTM) as well as KRIHS, the symposium aimed at sharing information on government-related policies and experiences of advanced countries in preparing for the onset of an aged society. The event was divided into four sessions that covered the topics of healthcare, finance, housing, and the social and cultural lifestyle of baby boomers. Of the four sessions, KRIHS was responsible for the housing session, which featured two presentations: Aging and Housing Policies for Baby Boomers in Japan by Akashi Tasuo, director of the City Planning Research Division of the National Institute for Land and Infrastructure Management in Japan, and Paradigm Shift in Housing Market and Housing Stability of Baby Boomers by Dr. Sohn Kyoung-hwan, vice-president of KRIHS. In his presentation, Dr. Akashi Tasuo introduced the Japanese housing policy responding to an aged society, as Japan faced a retiring and aging society earlier than Korea. Dr. Sohn Kyoung-hwan claimed that Korea's fertility rate, unlike that in the US and Japan, remained high even after the baby boomer period (1955-1963); consequently, the implication of the looming retirement of Korean baby boomers will be more significant than in these other countries. He called for a strengthened policy response for low-income baby boomers as they are likely to be burdened with housing costs after retirement. Experts in related fields, such as Dr. Park Shin-young of the Land and Housing Institute, Prof. Chung Eui-chul of Konkuk University, and Dr. Jung Ho-sung of the Global Studies Department of the Samsung Research Institute, engaged in the ensuing discussion on housing policies.

2011 International Symposium on City Planning

From August 25 to 27, the 2011 International Symposium on City Planning, entitled "Preservation of Historic City and Planning," took place in Gyeongju, a city located in North Gyeongsang Province. The 3-day event was jointly organized by Korea Planners Association and International Academic Affairs Committee and sponsored by the Presidential Committee on Regional Development, KRIHS, North Geyonsang Province, and the City of Gyeongju. It was attended by 200 people from related fields, including the City Planning Institute of Japan, Taiwan Institute of Urban Planning, and City Planning Institute of Hong Kong.

The symposium began with a welcoming address by Lee Soon-ja, president of Gyeongju

University, and congratulatory remarks by Hong Chul, chairman of Presidential Committee on Regional Development. The symposium was divided into 18 sessions, which included 115 paper presentations.

In particular, a policy seminar held on the second day featured presentations of best practices of Korea, Japan, and Taiwan in developing old cities boasting of cultural and history heritage and urban planning as well as the ensuing discussion session. The three presentations were "Spatial Characteristics of the Ancient Capital Gyeongju & Its Conservation Plan," by Dr. Chae Mie-pak and Dr. Byung Choon-hwang; "Conservation of Historic Cities: Recent challenges in Kyoto and Niigata," by Atsuki Okazaki; and "Planning Practice of the Historic Preservation in Tainam City of Taiwan," by Mei-Jung Lai.

Urbanization Knowledge Platform's Website Launched

The Urbanization Knowledge Platform has launched an initial web presence at www.urbanknowledge.org, providing easy access to videos, presentations, summaries, and photos from UKP regional events and knowledge exchanges, including the East Asia Launch Seminar organized by KRIHS. The Urbanization Knowledge Platform is one of six knowledge platforms selected by the Knowledge and Learning Council under the "democratizing development" agenda of the World Bank. Its mission is to put the world's best knowledge and data in the hands of policymakers, practitioners, and bank staff in order to harness urban growth for better development outcomes. The site aims to facilitate interactive knowledge exchanges on the most pressing challenges and opportunities, disseminate knowledge of best practices on urban issues, and foster peer-to-peer connections among urban practitioners and policy makers.

Consultative Meeting on Cooperation between the World Bank, MLTM and KRIHS

The consultative meeting on further cooperation between the World Bank, the Land, Transport and Maritime Affairs Ministry (MLTM) and KRIHS was held in Washington from August 24 to 28. The meeting focused on coming up with measures to boost cooperation regarding UKP. Participants from Korea included working-level officials from the Ministry of Land Transport and Maritime Affairs led by Mr. Jeong Na-sam, director of the Office of Construction and Water Resource Policy; Dr. Jo Jin-cheol, vice-director of the GDPC; Mr. Kim Jong-in, Korea Expressway Corporation; and Mr. Hwang Dae-soo, Korea Airports Corporation. An urban sector manager of the World Bank requested help from KRIHS, citing that he hopes to launch UKP in Turkey by December 2011 as the country has great interest in Korea's urban planning. The World Bank also expressed its gratitude to the continuous efforts made by KRIHS as a core partner of UKP.

Held every year since 1976, the symposium is aimed at engaging members in sharing information on city planning in Northeast Asia as well as establishing a mutual cooperation system.

NEWS & ANNOUNCEMENTS OF KRIHS

Workshop on Urban Disaster Prevention

With the climate change resulting from the emissions of greenhouse gases, natural disasters have become commonplace all over the world. Korea is no exception. This year, record downpours have triggered deadly landslides and floods in the central part of the nation. To raise awareness about climate change and urban disaster management, a workshop on urban disaster prevention was held on August 5, 2011. Dr. Sim Woo-bae made a presentation regarding the use of scientific techniques to prevent urban disasters and improve the current management systems.

He also stressed that the existing disaster preventive systems should be transformed in tandem with increasingly large-scale natural disasters. Thus, a comprehensive urban disaster prevention system should be put in place that unlike the existing system responding to natural disasters by using only rivers and sewage systems responds to cataclysmic natural disasters by diversifying risks using all urban facilities, such as parks, green belts, roads, airports, and ports.

Experts Gave Lectures on National Territory Policy Simulation System

On August 10, Prof. Paul Waddell, University of California Berkeley, and Dr. Kenneth K. Choi, transportation planner of the Maryland Department of Planning in Baltimore, delivered lectures entitled "Overview of UrbanSim, Recent Development Activities" and "Planning Application Tools in the State of Maryland," respectively. Coordinated by the Center for Territorial Policy Simulation of KRIHS, the lectures were convened as part of a joint international workshop on "A Research on Establishing National Territory Policy Simulation System" held August 10 to 12. Prof. Waddell was also a joint researcher of the research team members. Prof. Waddell introduced UrbanSim, an open source urban simulation system, and UrbanVision, a 3-dimensional vision tool currently under development. He focused in particular on the modeling of urban development to integrate land use changes and transportation and environmental plans. Dr. Choi, who is currently responsible for transportation planning in the state of Maryland in the US, discussed projects being carried out in the state.

KRIHS to Join IDB's Sustainable Emergency Cities Initiative

KRIHS has decided to join a Joint Consulting Project on Sustainable Emerging Cities Initiatives carried out by Inter-American Development Bank (IDB) from September to December 2011. As part of a knowledge-sharing program, the project aims to present urban development strategies utilizing information and communication technology (ICT) for three South American cities: Santa Ana, El Salvador; Montevideo, Uruguay, and Goiania, Brazil. To push ahead with the project, a GDPC research team is planning to analyze the three cities' ICT-based environment, index development, infrastructure, and accessibility based on the smart

city strategy that will be established. The research project will help pave the way for KRIHS to advance into the field of urban development utilizing ICT in developing countries.

KRIHS and Korea Planners Association Signs MOU

On August 4, KRIHS signed an MOU with the Korea Planners Association to support exchanging knowledge on national territory and urban development. The MOU contains agreements regarding closely cooperating in effectively operating and developing global knowledge exchange programs held by the KRIHS affiliated Global Development Partnership Center(GDPC); jointly cooperating in discovering, ordering and performing international projects on urban and regional development. The signing ceremony of MOU was attended by the heads and researchers of both institutions and researchers, and experts from related fields such as KRIHS president Park Yang-ho, Dr. Ryu Jai-young, Dr. Sagon Ho-sang and Dr Jo Jin-cheol from KRIHS, and Hur Jae-wan, president of the Korea Planners Association.

2nd AURI Urban Construction Policy Forum

The 2nd AURI Urban Construction Policy Forum was held on June 30; it was organized by AURI and sponsored by the Presidential Commission on Architecture Policy, the Ministry of Land, Transport and Maritime Affairs and the Korean Society of Civil Engineers. Following the theme "What is the problem of SOC facility design?" the forum opened

with a speech by Dr. Son Se-gwan, director of AURI, and motivational remarks by Go Hyeon-mu, Korean Society of Civil Engineering

The forum included three presentations: the current situation of the Korea SOC facility design, by Dr. Cha Ju-young, AURI; the SOC facility designs in terms of structural aesthetics, by Dr. Kim Nam-hee, Korea Bridge Design & Engineering Research Center of the Seoul National University; and the improvement of the systems for SOC design facility by Kim Kyung-in, CEO of V.I. Land Co. LTD.

Moderated by Prof. Ryu Joong-seok, Chung Ang University, participants such as Dr. Ryu Jae-young and Dr. Chung Moon-sub of KRIHS, Prof. Seo, Hyun of Hanyang University, and Dr. Jin Kyoung-ho of Korea Institute of Constriction Technology engaged in the ensuing discussion session. Their discussion revolved around the importance of collaboration among fields such as construction and civil engineering and a need to raise the awareness of the design value that we should move toward.

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