

## ISSUES & TRENDS 01

### ISSUES & TRENDS

Future Prospects of Metropolitan Regions and Response Strategies  
01

Study on the Integrated Urban Policy for Safe Cities  
06

### IN-DEPTH LOOK

Urban Microclimate Management: A Smart Canopy Cover Strategy  
10

Utilization of Geospatial Information Convergence Models for Supporting Regional Policy-making  
15

### GLOBAL PARTNERSHIP NEWS

20



**KRIHS Gazette**

KRIHS (Korea Research Institute for Human Settlements) was established in 1978 with a mission of creating a beautiful and pleasant living environment. To achieve the mission, KRIHS has been committed to enhancing the quality of life and well-being of the people in the nation with its spatial planning studies and policy suggestions. Since its foundation, KRIHS has carried out a variety of studies on the efficient use, development, and conservation of territorial resources. Its research areas range from sustainable and balanced territorial development and conservation of the territory to the provision of housing and infrastructure.

## Future Prospects of Metropolitan Regions and Response Strategies

Yongwoo Lee, Jiyoung Lim

### 1. Metropolitan Regions, Central Space for Modern Life

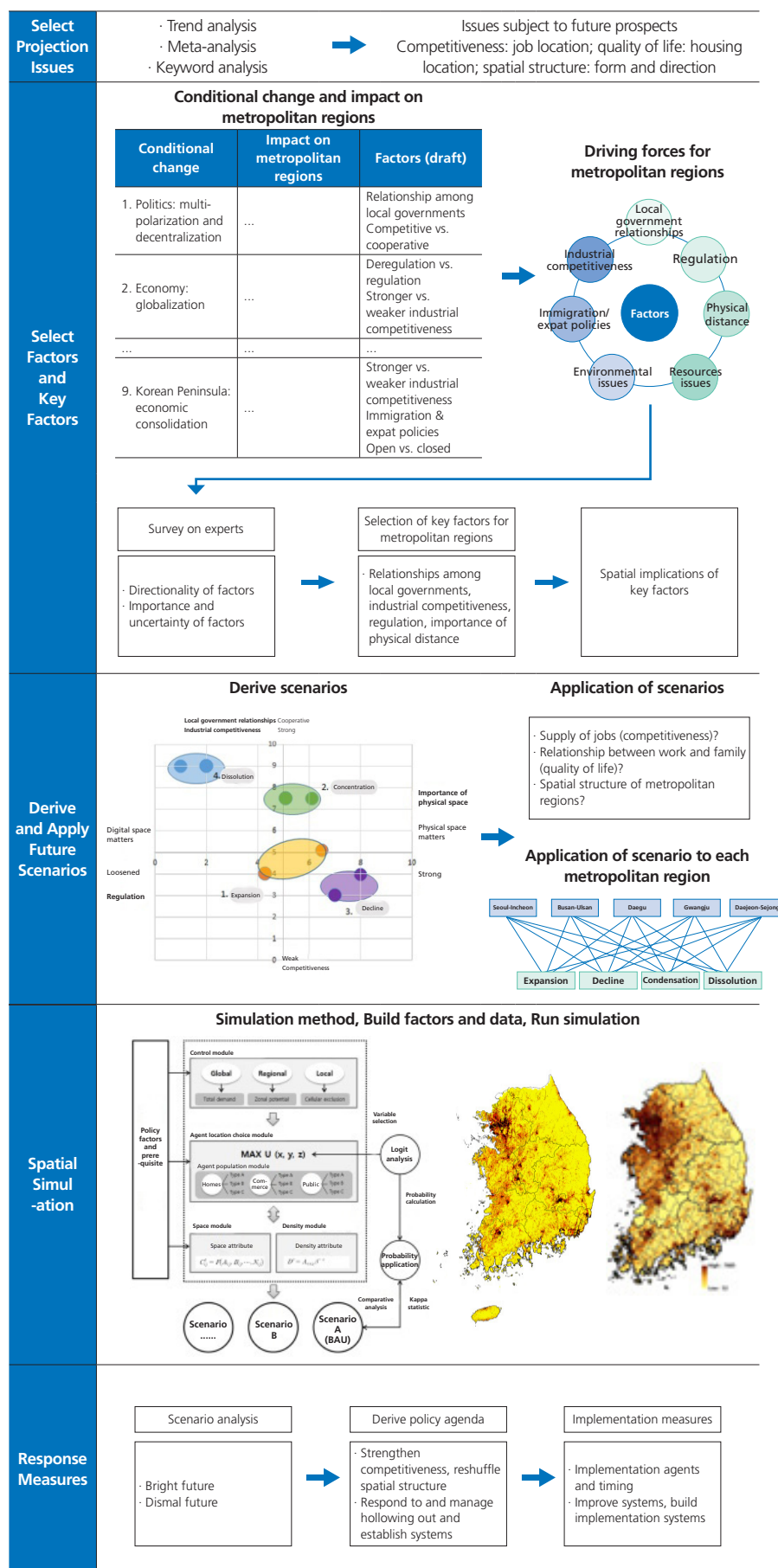
Metropolitan regions account for 31.1% of Korea's territory but are home to 79.1 percent of the population, 2015. As such, such areas are the center of modern life in the country and drive economic development. Uncertainty for metropolitan regions loom large, however, given the changes they experience due to the Fourth Industrial Revolution like development of the advanced convergence industry, improvement of high-speed transportation and access, smart automation and unmanned technology. This study seeks to foresee what metropolitan regions in the country could look like in 2045 and suggest strategies to preemptively respond to forthcoming changes.

### 2. Methodology Combining Scenario Planning and Spatial Simulation

① The issues in metropolitan areas forecast in this study were selected using meta-analysis, keyword analysis, and analysis of spatial metrics and geographic information on spatial structure. ② Meta-analysis was performed to derive factors of metropolitan surroundings, including social, technological, economic, environmental and political (STEEP) factors. ③ Scenarios were drawn using multiple key factors, and the future of metropolitan regions along with STEEP conditions were depicted by scenario and region. ④ To spatially visualize the scenarios, the land use were spatially simulated. ⑤ For each scenario, future prospects were identified, including both desirable and undesirable aspects, and corresponding policy agendas were developed. Moreover, measures to improve feasibility of the policy agenda were suggested (see Figure 1 on page 2).

To analyze current states and trends of the metropolitan regions, related data were used, including the population and housing census and data on housing site/industrial complex development projects and arterial road networks. To select issues subject to our study and to forecast their future aspects, literature study was performed on articles regarding metropolitan regions and their future. Survey results conducted with the general public and experts were used to analyze factors, draw up scenarios, and prepare response strategies.

Figure 1. Methodology Combining Scenario Planning and Spatial Simulation



**Source**

Yongwoo Lee (2016). Future Prospects and Strategies for Megacity Regions, Korea Research Institute for Human Settlements.

### 3. Four Scenarios That Would Deal a Blow to Future of Metropolitan Region

With articles on future and metropolitan regions, the impact of conditional changes on the metropolitan regions were meta-analyzed, and seven factors related to politics, economy, society, population, environment, and technology were derived (see Table 1 on page 4). To use factors to develop scenarios, four factors with high levels of importance and uncertainty were set as key factors, and spatial implications were derived. Future probabilities of the four factors (relationships among local governments, industrial competitiveness, regulations, and physical/digital distance) located in the middle ( $\pm 5$  points, it is uncertain which direction the variable would develop into) of the two directions. The level of uncertainty was also high for the four factors with considerable standard deviations (SD), and the level of importance was also high (over 7.5 out of 10 points) (See Tables 1 and 2 on page 4). Using the four factors, four scenarios were developed.

- The expansion scenario describes a future in which a metropolitan region expands along with main traffic network nodes such as railway station spheres and main highway interchanges amid intensifying competition among local governments to achieve economies of scale in metropolitan regions.
- The decline scenario has a metropolitan region suffering from minus growth due to slow rises in population and economy. The region sees a spatial decrease as traditional industrial complexes outside its metropolitan region, individual industrial locations, old low-rise residential areas and apartments on the metropolitan outskirts are hollowed out.
- The condensation scenario is one in which local governments implement selective concentration in housing, industrial location and infrastructure expansion after joint consultations among them to share economies of scale in metropolitan regions. This scenario expects urban revitalization through regeneration and utilization of unused government-owned land and unused sites, revival of local economy, and strengthening of connections between key locations through compact development featuring the combination of housing and jobs.
- The dissolution scenario sees the importance of physical distance diminish due to technological advancement such as the Fourth Industrial Revolution. Existing limits on jobs and housing location are greatly eased thanks to the emergence of unmanned factories and flexibility in logistics, distribution and work. These trends practically remove the distinction of a metropolitan region, strengthen online and off-line connections of the entire nation, and allow more flexibility in selecting locations.

Table 1. Analysis of Importance and Uncertainty of Metropolitan Factors

	Relationships among Local Governments	Industrial Competitiveness	Regulations	Policies on Immigration & Expats	Environmental Issues	Resource Issues	Importance of Physical Distance (Space)
Importance	8.3	9.2	7.9	7.6	8.6	8	8.3
Uncertainty (SD of responses regarding future conditions)	2.82	2.22	2.09	1.51	2.11	1.93	2.75
Future probability	4.98 0 = very competitive, 10 = very cooperative	6.08 0 = very weak, 10 = very strong	5.65 0 = very weak, 10 = very strong	7.99 0 = very closed, 10 = very open	7.94 0 = no problem 10 = very serious	7.84 0 = no problem 10 = very serious	7.32 0 = not important at all 10 = very important

#### Note

Factors are more uncertain as their probability is closer to 5 (unsure which direction it would develop into) and their SD is bigger.

#### Source

Korea Research Institute for Human Settlements, a survey on experts (2016).

Table 2. Description and Spatial Implications of Key Factors for Metropolitan Regions

Key Factors	Description	Development Direction	Spatial Implications
Relationships among local governments (city-province; city-gun)	What kind of relationships would local governments in metropolitan regions build regarding adding jobs, homes, and arterial road network and their locations?	Cooperative vs. Competitive	<ul style="list-style-type: none"> <li>• In a cooperative relationship, focus can be placed selectively in a direction that will enhance overall competitiveness of the metropolitan regions.</li> <li>• In a competitive relationship, facilities and locations would scatter around the metropolitan regions.</li> </ul>
Industrial competitiveness	What is the level of global competitiveness of the advanced convergence industry?	Stronger vs. Weaker	<ul style="list-style-type: none"> <li>• If strengthened, advanced convergence companies would further concentrate in the metropolitan regions given their business nature.</li> <li>• If weakened, population would concentrate in metropolitan cities where there are more jobs. At the same time, more people would move to rural regions.</li> </ul>
Regulation	How strong are the regulations on land use and location?	Stronger vs. Weaker	<ul style="list-style-type: none"> <li>• If strengthened, the regulations on greenbelt lands as well as the Seoul metropolitan area will stay intact. Demand for development would be satisfied in non-Seoul metropolitan regions and the outskirts of the metropolitan regions (would be scattered).</li> <li>• If weakened, greenbelt lands in the vicinity of the metropolitan regions or those with good access can be developed, and people and business would concentrate around those areas.</li> </ul>
Importance of physical distance (space) brought by technological development	Would digital space matter more than physical space due to high speed transportation, digitalization, unmanned technology, flexible working hours, etc.?	Physical space vs. Digital space	<ul style="list-style-type: none"> <li>• If physical space becomes important, jobs and homes would locate according to their physical locations and accessibility. Thus, people and business would concentrate in metropolitan area</li> <li>• If digital space becomes important, locations for companies and homes would matter less, and people and business would scatter.</li> </ul>

**Source**

Yongwoo Lee (2016). Future Prospects and Strategies for Megacity Regions, Korea Research Institute for Human Settlements.

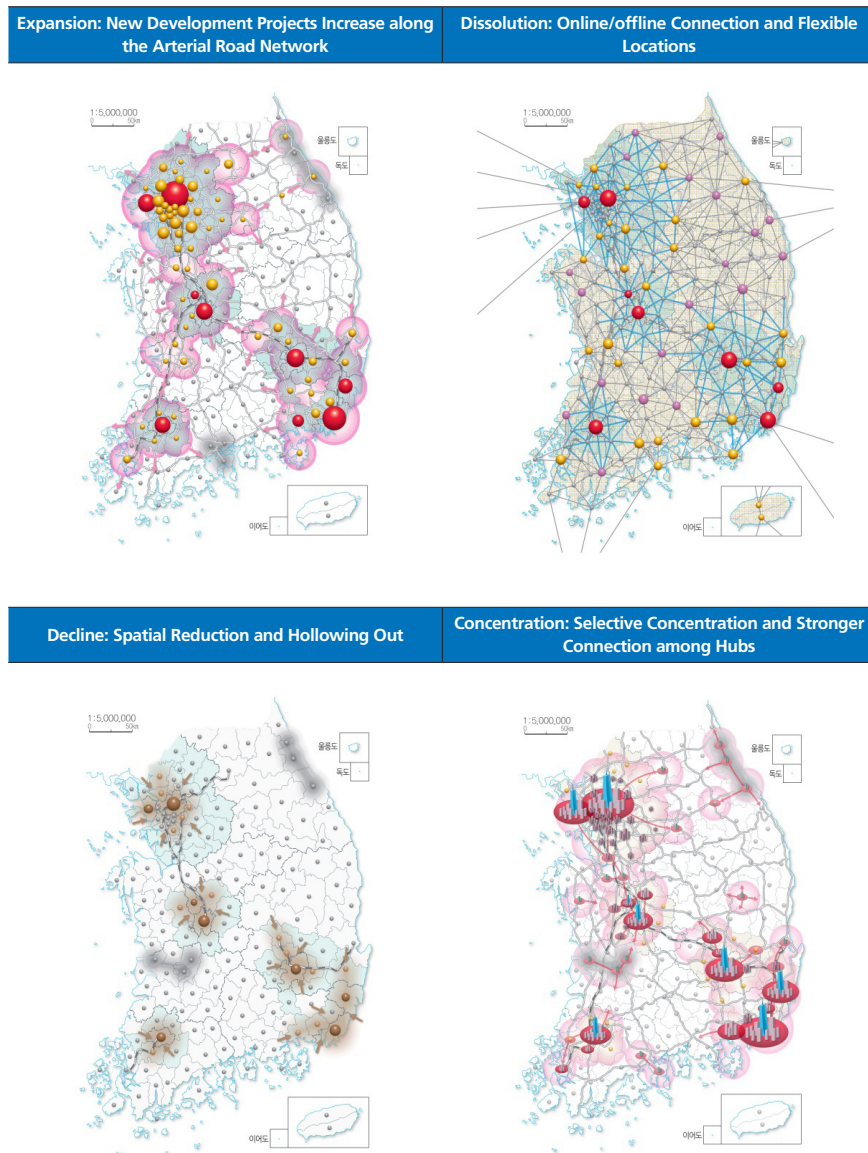
#### 4. Future Metropolitan Response Measures

- In the expansion scenario, growth management plans to promote optimal-size growth and systematic development is needed to minimize external diseconomy caused by expansion and maximize economies of scale.
- In the decline scenario, new bases for growth must be developed to revive the national economy, and solutions to reduce the number of vacant spaces in metropolitan regions are needed by fostering a related industry to revitalize them.
- In the condensation scenario, a metropolitan administrative system or organizations for cooperation are needed to promote selective concentration, in addition to financial incentives to raise cooperation in metropolitan regions.
- In the dissolution scenario, an online-offline structure (O2O) must be used to

respond to the rise in the online use of land and provide offline emergency services and elderly care.

- Above all, the status of a metropolitan region must be secured through legal regionalization to respond to these scenarios. The Framework Act on National Land and the Fifth Comprehensive National Territorial Plan(to be established) should reflect related issues such as new bases for growth, unmanned land utilization, a space structure for online and offline connections, and management of metropolitan growth.

Figure 2. Concept Map of Future Scenarios for Metropolitan Regions



#### Source

Yongwoo Lee (2016). Future Prospects and Strategies for Megacity Regions, Korea Research Institute for Human Settlements.

ywlee@krihs.re.kr  
jylim@krihs.re.kr

## ISSUES &amp; TRENDS 02

## Study on the Integrated Urban Policy for Safe Cities

Myoengsoo Kim

### 1. Research Overview

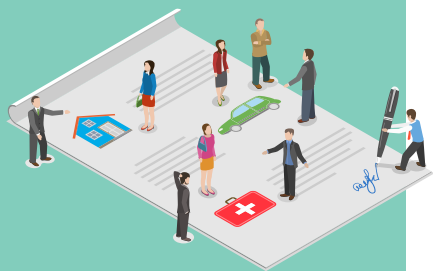
One of the important values cherished by an advanced society is protecting its citizens' lives and property, which requires policies to enhance city safety. This study proposes policy-related plans for comprehensively implementing different policies across different fields, as well as an overhaul of the system for conducting such policies, plans, and projects. It also aims to develop urban policies to realize a safe city that is essential to an advanced society. After key issues are drawn from the expertise of various specialists, the study will identify policy tasks regarding key issues and suggest integrated urban policies that can be implemented across different governmental departments.

### 2. Current Policies in Response to Key Issues

#### Current Policies

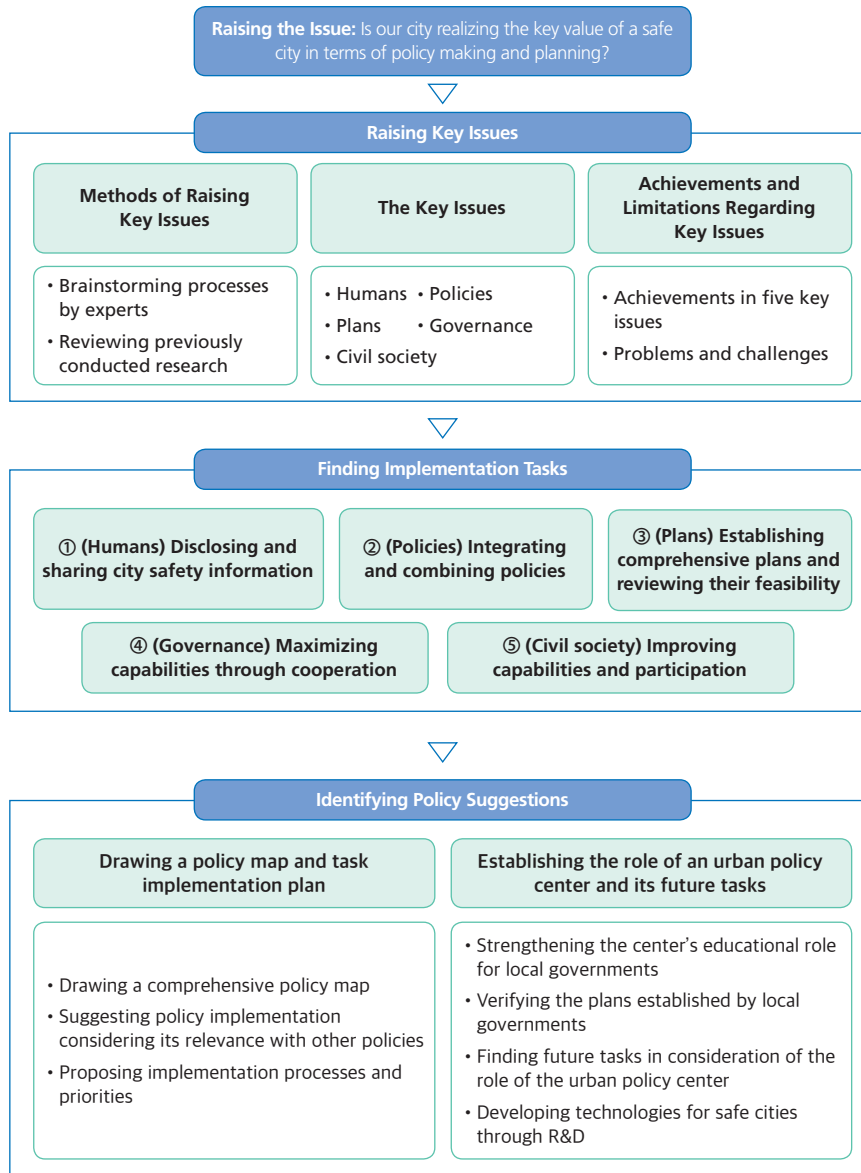
Platforms that disclose and share information on city safety include the National Disaster Management System (NDMS), the National Disaster and Safety Management Portal, the Disaster and Safety Data Portal, the Water Resources Management Information System, Seoul Safety Nuri, and the Landslide Information System. Analyzing natural disaster vulnerabilities, diagnosing safety levels in each local area and establishing plans to reduce storm and flood related damages, and designating and managing natural disaster-vulnerable areas are among the efforts being made to integrate different city safety policies. Regarding social disasters, measures such as evaluating safety levels based on figures and indexes, promoting safe local communities, and implementing Crime Prevention through Environmental Design (CPTED) strategies are under way.

Regarding dividing the roles of and attempting a linkage between safety-related plans, various plans including the national emergency management plan, the comprehensive storm and flood damage plan, the comprehensive national territorial plan, urban plans on city and province levels including county and district levels, comprehensive national environmental planning, and the mid-term plan on environmental conservation are established, but they lack a linkage and coherence as a whole. Currently, cooperation between government agencies is nothing more than a top-down implementation; the local governments merely execute policy measures given by the central government. Furthermore, departments inside local governments fail to fully cooperate with each other. The private sector is merely included in various councils and committees, not encouraged to participate in actual implementation processes. For example, civil agencies are part of the safe city project



promoted by central governmental agencies such as the Ministry of the Interior, but they fail to engage themselves fully enough to influence decision-making. It is necessary to increase civil society's capabilities and raise the awareness of a safe city by enhancing education and promotion on the importance of safety.

Figure 1. Research Flow



Source  
Author

### Policy Problems

A number of policies for safe cities have been established and implemented thus far. After a massive disaster occurs, a number of changes are made such as implementing new policies and systems or moderating existing ones. Still, there remain many policy issues to tackle. In terms of five key issues—disclosing information, integrating policies, reviewing plan coherence, promoting cooperation between agencies, and encouraging the participation of civil society—the problems of the existing safety policies can be summarized:



Figure 2. Policy Problems

Key Issues	Policy Problems
<b>Securing psychological safety by disclosing and sharing city safety information</b>	<ul style="list-style-type: none"> <li>① Simply collecting and not analyzing information provided by disaster management agencies</li> <li>② Limited information disclosure through local area networks</li> <li>③ Lack of detailed information such as metropolitan council-level information</li> </ul>
<b>Reviewing feasibility of city safety plans by integrating and combining policies</b>	<ul style="list-style-type: none"> <li>① Past-oriented policies that weaken preventive function</li> <li>② Limitation of figure-oriented analyses and diagnoses</li> <li>③ Discordance between policy methods and purposes</li> <li>④ Lack of consideration of spatial stratification and characteristics</li> </ul>
<b>Maintaining consistency by reviewing coherence of safe city plans</b>	<ul style="list-style-type: none"> <li>① Confusion of plan systems (lack of hierarchical systems in plans)</li> <li>② Lack of linkage to local governments' city planning</li> <li>③ Lack of plan-implementation capabilities and resources (budgets and institutions)</li> </ul>
<b>Maximizing capabilities through cooperation between safe city agencies</b>	<ul style="list-style-type: none"> <li>① Inherent limitation of cooperation between central governmental agencies (such as the function of a control tower)</li> <li>② Unilateral and benevolent relationships between central and local governments</li> <li>③ Private and public sector cooperation system still in its early stage</li> </ul>
<b>Realizing a safe community by enhancing capabilities and participation of civil society</b>	<ul style="list-style-type: none"> <li>① Top-down implementation as conducted in public assistance projects</li> <li>② Failing to strengthen capabilities of civil society through promotion and education</li> <li>③ Encouraging civil society's participation for disaster prevention and response</li> </ul>

Source  
Author

This section proposes basic policy directions regarding key issues outlined by the second section. It suggests detailed policy plans regarding disclosure and sharing of information, integrating and combining policies, maintaining coherence of policy plans, promoting cooperation between agencies, and enhancing capabilities and participation of the civil society.



Figure 3. Policy Suggestions

Key Issues	Policy Directions
Securing psychological safety through disclosing and sharing city safety information	<ul style="list-style-type: none"> <li>① Raising safety awareness through sharing and disclosing safety information</li> <li>② Drawing a safety and danger map that is scientific and objective</li> </ul>
Reviewing feasibility of city safety plans through integrating and combining policies	<ul style="list-style-type: none"> <li>① Implementing governance for each specific situation</li> <li>② Integrating policies using scenarios</li> <li>③ Developing policies by identifying elements of danger and their path to expansion</li> </ul>
Maintaining consistency through reviewing coherence of safe city plans	<ul style="list-style-type: none"> <li>① Adjusting the timeframe for developing safety plans</li> <li>② Improving city safety management plans</li> <li>③ Implementing safety plans considering the danger characteristics of each city</li> </ul>
Maximizing capabilities through cooperation between safe city agencies	<ul style="list-style-type: none"> <li>① Establishing roles of central and local governments</li> <li>② Designing a cooperation system between central and local governments</li> </ul>
Realizing safe communities through enhancing the capabilities and participation of civil society	<ul style="list-style-type: none"> <li>① Implementing a citizen-oriented decision-making processes</li> <li>② Establishing a cooperation system between agencies in civil society</li> <li>③ Providing city safety information to promote citizen participation</li> </ul>

Source  
Author

#### 4. Conclusion & Future Tasks

First, psychological safety for citizens should be secured through disclosing and sharing city safety information. Second, by integrating and combining safe city policies, the feasibility of plans should also be reviewed. Third, policy consistency must be maintained through enhancing the coherence of city safety plans. Fourth, capabilities of safety agencies need to be increased through cooperation. Fifth, by enhancing capabilities and participation of civil society, a safe community should be realized. The key value in achieving a safe city should lie in protecting the lives of its citizens. Efforts should be made to reduce safety-related accidents that can happen in the everyday lives of citizens. It is also important to introduce the concept of safety welfare. In other words, policy priority should be placed on enhancing the safety of marginalized groups and areas in society.

The urban policy research center needs to focus its research on proposing policy directions on city safety, implementing safety plans regarding spatial plans, and developing governance on the local government level. It also needs to suggest detailed disaster prevention policies that local governments can actually execute. For this, research on central government policy directions and assistance measures needs to be conducted.

## IN-DEPTH LOOK 01

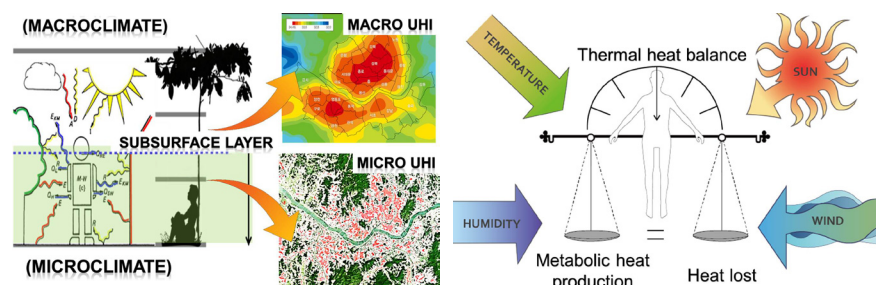
## Urban Microclimate Management: A Smart Canopy Cover Strategy

Seung Man An

### 1. Urban Microclimate?

Urban microclimate refers to the local climate that occurs within small urban areas near the surface. Similar to other northern mid-latitude cities, urban microclimate conditions in Korea vary seasonally. However, global warming and climate change are making seasonal changes more uncomfortable and dangerous for city dwellers. Extremely hot or cold weather can threaten people's lives and usually increases the personal adaptation cost. At present, monitoring physically measurable indicators of thermal comfort experienced by urban residents such as solar radiation, temperature, humidity, and wind is common. The major goal of urban microclimate management is to build and maintain comfortable microclimate environments where urban dwellers can enjoy healthy lives.

Figure 1. Microclimate Domain and Major Factors Affecting Outdoor Human Comfort Factors



#### Source

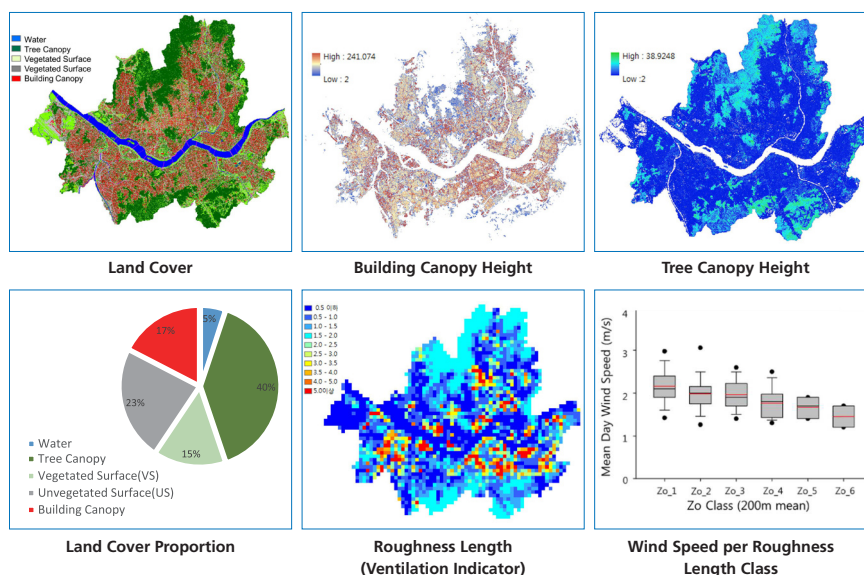
An, S. M. et al. 2016. A Study on the Urban Area Microclimate Management Direction. KRIHS No.16-3.

### 2. Economy Oriented Urban Growth Has Altered Urban Microclimate

Urbanization involves a process in which a population increases and alters the urban landscape through land development. Artificial urban reforming activities include clearing of existing natural areas, land leveling, and new urban-style landscaping, such as the construction of residential and transportation infrastructure to meet the urban dwellers' lifestyles. The resulting artificial urban landscape components give rise to a new urban microclimate system, which has spatially and temporally unique temperature and humidity variation patterns. Newly adjusted urban shadows, heat load and transfer, and ventilation corridors in the urbanized area can be significantly different from those of natural microclimates. Over the past 60 years, Korea's major city planning focused on human settlements and transportation infrastructure utilities primarily in urban areas to support optimized land development and empower economic growth. However, seamless urban growth has accelerated the decline in the

canopy area in the Seoul Metropolitan Area (SMA). The phenomenon is similar to other northern mid-latitude cities. Actually, vulnerability to climate change in urban areas is mainly due to the urban sprawl processes—increase in iron, asphalt, and concrete infrastructure together with the decline in natural urban canopy. Expanding smart urban canopy as a means of providing healthy urban environments with qualified shadow areas to offset climate change impacts such as heat stroke is an urgent issue in microclimate terms. In addition, when expanding smart urban canopy, the urban air circulation mechanism (urban ventilation corridor) should be considered. Numerous buildings in the city of Seoul currently impede wind circulation. In addition, most high-rise buildings have few horizontal or vertical openings. The adjustment of ventilation routes is necessary to maintain a comfortable urban microclimate environment. Strong strategies and efforts are essential to mitigate localized aerodynamic wind shear (gusts) arising from groups of skyscrapers, and to boost the weakened wind circulation system at the general urban scale in order to introduce cool and fresh air generated outside urban areas (mountain forest) into the central urban districts. To achieve this goal in the urban, all available natural and artificial structures should be utilized. For example, generating many openings in high-rise buildings and expanding the tree canopy with an artificial canopy to provide shade, are practical utilization strategies. The urban canopy should be better planned and multi-functional. There are many functions that natural and artificial canopies can provide for urban infrastructure services, such as urban heat island (UHI) management, water storage, wind corridor control, renewable energy recycling (such as solar or wind power), and supporting urban biological diversity or ecological services such as biotopes, all of which are related to urban microclimate management.

Figure 2. Canopy Land Cover Property and Ventilation Indicators in Seoul



The current urban sprawl with high-rise buildings creates a negative cycle it by adversely affecting the natural wind circulation and temperature/humidity balance, contributing to air pollution, disrupting ecosystems, reducing biological diversity, and also threatening urban dwellers' lives (Akbari et al., 2001; Yi et al., 2015). As shown in Figure 3, both UHI data obtained via Landsat 8 thermal infrared (TIR) and that physically obtained by automatic weather stations (AWS) in and around the

#### Note

Urban tree or forest canopy area (over 2 m height) covered only 40% of the Seoul administrative area in 2010. Building canopy covered 17% and other areas (43%) did not have higher canopy cover (5% water, 23% impermeable surfaces such as asphalt, and 1% permeable surfaces).

#### Note

In the case of Seoul, the average building canopy height is 14.2 m, which is significantly higher than the average forest canopy height (8.3 m)

#### Note

Some discrepancy with Korea Forest Service figures (forest rate of approximately 25%) due to differences in survey methods (LiDAR Survey).

#### Source

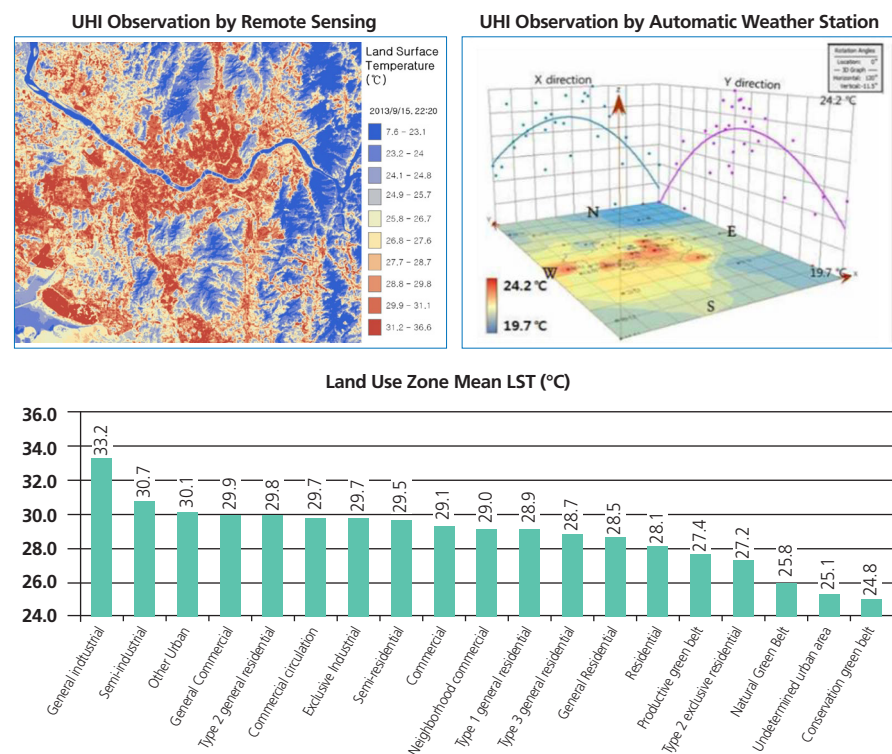
National Institute of Meteorological Sciences ([www.nimr.go.kr](http://www.nimr.go.kr))

#### Source

Yi, C., Kwon, T. H., Park, M. S., Choi, Y. J., & An, S. M. 2015. A Study on the Roughness Length Spatial Distribution in Relation to the Seoul Building Morphology.

Seoul administrative area reveals that the influence of the UHI has been expanding and intensifying continuously. It suggests that considerable urban cover has already converted from materials that absorb and conduct less heat to materials that absorb and conduct more heat, which boosts nighttime urban heat emissions in the urban core. The urban land use should be carefully planned in order to mitigate the UHI effect, because general industrial zones showed the highest average nighttime summer surface temperatures (33.2°C), while conservation green belts zones showed the lowest temperatures (24.9°C). Considering the geographic location of the city in the mountainous region of Korea, it is important to maintain the ventilation corridor that brings cool and fresh air formed in the mountains into the urban core.

Figure 3. Observed UHI and Ventilation in and around Seoul



#### Source

An et al. (2016).

Consequently, Seoul's UHI has resulted from long and steady urban development activities. A huge amount of smart urban canopy infrastructure investment is inevitable to lessen global warming impacts, properly perform a city-scale adaptation initiative, avoid unnecessary societal costs, and maximize public co-benefits.

### 3. Avenues for the Smart Urban Canopy Expansion in Korea

Traditionally, both quantitative and qualitative urban tree cover expansion is an essential avenue to increase a city dweller's extreme weather adaptability. Mean air temperature in South Korea's megacities has increased by 1.8°C during the last century, which is a surprising and worrying number when compared with other mid-latitude cities. With the increase in the number of days in the year on which extreme weather was recorded, urban climate vulnerability is creating new social problems. In the case of Korea in September 2011, economic growth with the uncontrolled use of air conditioning in industrial and domestic domains triggered a severe electricity

crisis (power blackout). Since then, to prevent power failure, several coal-fired power plants were built in Chungcheongnam-do and plans were made to increase electric power reserve rates at peak times. However, these policies have introduced a complex mixture of social conflicts, and have increased societal costs because power plants are a major source of pollution that worsen the air quality of the SMA. Actually, urban electricity demand-supply policy is so complicated that it should consider all related social and environmental interactions if possible. However, decision makers had approached it as a simple problem related only to a shortfall in energy supply. The unsuitable policy was a result of inexperience with this issue. Reduction of energy demand in a city will require the use of all available methods, such as community-wide collaboration, economic support, and technological developments. Akbari et al. (2001) studied the complicated interactions between urban energy demand and air quality and proposed a comprehensive approach for an integrated urban cover management framework. To date, energy demand reduction policy is a strong and fundamental method to comprehensively control urban microclimates. However, urban canopy expansion policy should consider emerging new normal megatrends such as low-interest rate (economic rebuilding after the 2008 international financial crisis), the Fourth Industrial Revolution (rapidly changing technology and industry), aging society, regional inequality, atmospheric environments, and sustainability. Most of all, urban canopy expansion policy should be based on a comprehensive survey. Hence, administrative, business, and community domain-based urban planning projects or management policies relating to canopy expansion are important. The government domain approach relating to the revitalization of old towns, low-carbon green growth, renewable energy installation, urban forest projects, carbon-neutral buildings or towns are worth implementation. Both the business domain approach (inexpensive, creative, high-performance, and culturally permeable or familiar urban canopy developments including rooftop eco-garden and solar power canopy) and community domain activities performed by citizen volunteers (urban farming or cultivation) should be implemented for multi-purpose avenues.

#### Source

Akbari, H., Pomerantz, M., & Taha, H. 2001. Cool Surfaces and Shade Trees to Reduce Energy Use and Improve Air Quality in Urban Areas.

## 4. Further Urban Canopy Expansion Policies

### Enforcement Regulations

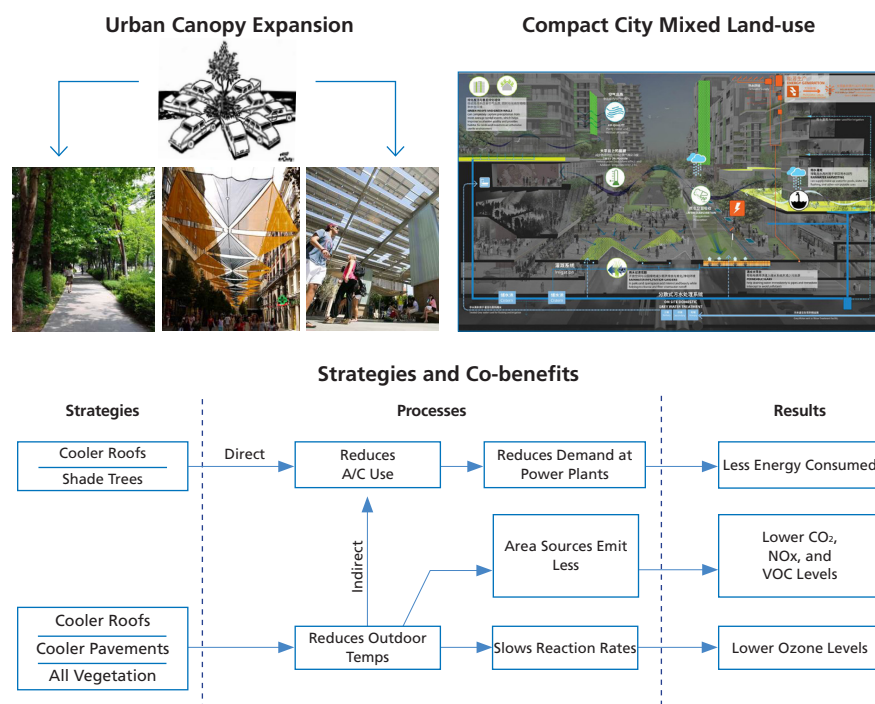
Although a major goal of urban canopy expansion policy is increasing public welfare and city sustainability, it could potentially violate individual rights or privacy. To reduce conflicts due to the infringement of individual rights, it is essential to arrive at a societal consensus and share appropriate information with the public. This requires many scientific and strategic indicators such as heat load reduction and also needs a regulatory base for administrative execution. Korea's regulatory base for sustainable development merely states the need and avenues, but lacks regulations for their enforcement. National-level enforcement regulations for the urban microclimate such as surveys, research and development for assessment, and administrative execution are needed.

### Integrated Urban Canopy Management

A significant amount of urban canopy expansion and urban canopy relocation will be essential for ensuring a comfortable urban microclimate. Nevertheless, natural

canopy areas like forests are so deficient in urban areas that artificial canopy expansion is an inevitable method. Soon, artificial urban canopy will provide reasonable solar energy management such as shade control, renewable energy charge and reuse, rainwater reservoirs for urban farming. Like a mixed land use planning for compact city, three-dimensional canopy infrastructure on roads or cultivated areas will help to reform urban areas more comfortable, sustainable, and resilient to climate change.

Figure 4. Urban Canopy Expansion Strategy and Anticipated Co-benefits



Source

An et al. (2016)

Source

HYPERLINK \*<http://www.arch2o.com/forest-city-master-plan-sasaki-associates>\* [www.arch2o.com/forest-city-master-plan-sasaki-associates](http://www.arch2o.com/forest-city-master-plan-sasaki-associates)

Source

Akbari et al. (2001)

### Joint Policy Development and Execution

Urban infrastructure improvements cannot be achieved by one individual promotion. For that reason, joint development and policy execution are essential to link related policies. In the joint formulation and execution of urban canopy expansion, it is useful to drive maximum social benefits as follows. This may reduce failure risks and maximize the social benefits of urban climate management through individual project implementation.

- Maintain a "Goldilocks" microclimate that is less warm in the summer and less cold in the winter
- Health and safety enhancement through ozone reductions and other air quality improvements
- Promote renewable energy-based industries and low-carbon green growth
- Collaborate with city residents and improve dwellers' quality of life
- Sustainable urban infrastructure development that with the Fourth Industrial Revolution
- Promote ecosystem sustainability and biological diversity



## IN-DEPTH LOOK 02

## Utilization of Geospatial Information Convergence Models for Supporting Regional Policy-making

Youngjoo Lee, Eunsun Im, Misook Cha

### 1. Why Utilization of Geospatial Information Convergence Models for Supporting Regional Policy-making?

The current paradigms of regional policies with a focus on aggregate growth and development are being transformed into everyday life policies which emphasize people's well-being and quality of life. Recently, analyzing everyday life spaces and realities and drawing measures to effectively implement regional policies and to enhance their utilization have emerged as a crucial issue. To this end, it is essential to analyze everyday life spaces and local realities in detail.

Geospatial information of integrating with a wide array of social phenomena based on location is useful in identifying and addressing inherent problems of local situations, often hidden in local and regional statistics. To implement evidence-based regional policies, it is helpful to employ a scientific and objective analysis on local situations like a convergence analysis of geospatial information. Also important is to develop scenarios of how and where to utilize the geospatial information convergence model and what information to utilize and why to utilize it.

When implementing regional policies, geospatial information can be widely used in a series of monitoring processes for regional policy that include evaluating local situations, building cooperation with local residents to establish policies, seeking solutions, policy simulation, and outcome analysis (Figure 1).

Also needed is a place-based integrated approach of integrating and analyzing a wide variety of spatial information on regional policy's target groups and spaces where local residents live, work, and rest. Through this approach, geospatial information plays its role as a scientific tool for diagnosing local areas, a cooperative promoter of policy-making, and an effective tool for information convergence.

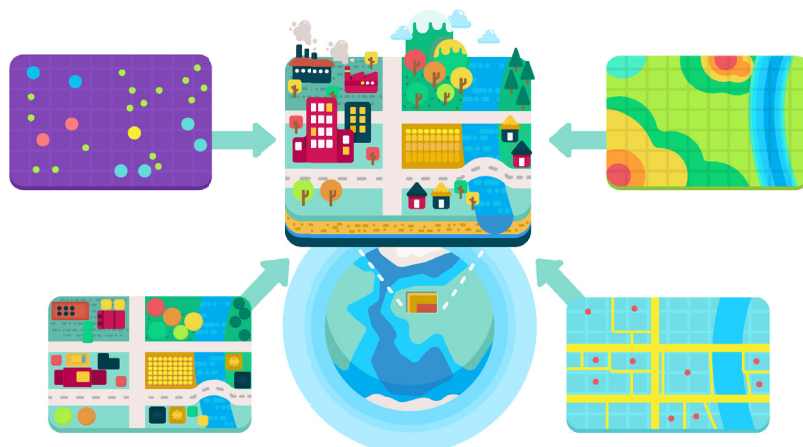
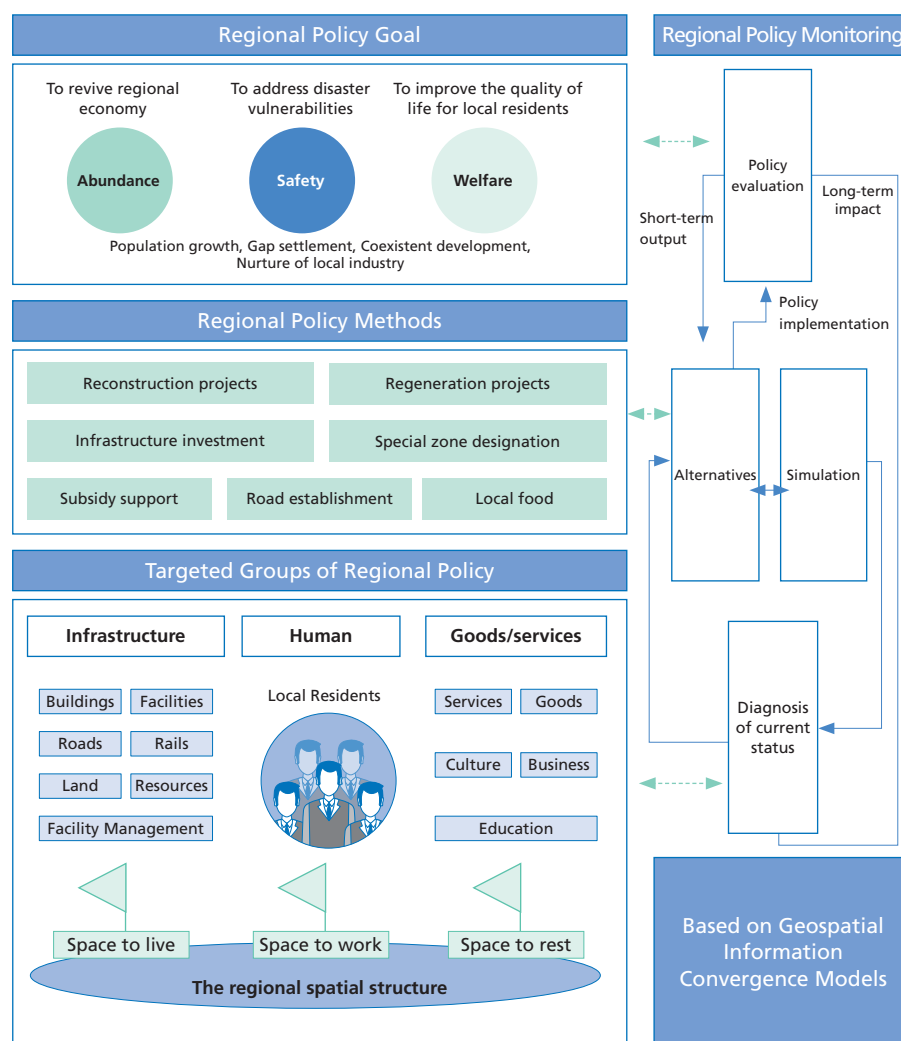




Figure 1. The Role of Geospatial Information for Supporting Regional Policy



## 2. Utilization of Geospatial Information Convergence Models for Implementing Regional Policy-making

## Establishment of Geospatial Information Convergence Model

Considering the announced regional development plans and government policies, geospatial information convergence models have been established along with the issues where these models are expected to be best utilized. Issues in which existing geospatial information has not been utilized and the need for utilizing geospatial information has been growing, and issues of prioritized community-based local policies in line with government projects have been selected.

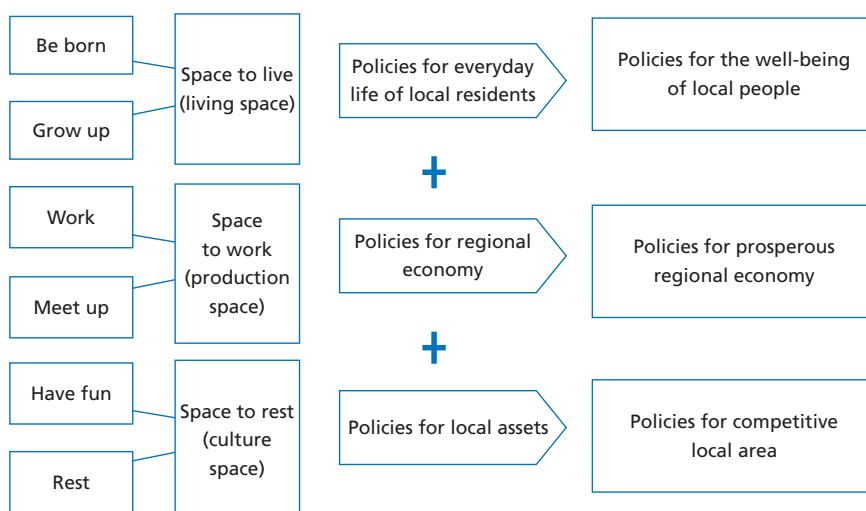
Those include “a space to live” issues that deal with local residents’ everyday life and welfare, “a space to work” issues on regional economy, and “a space to rest” issues on local assets (Figure 2).

Based on a place-based integrated approach, exemplary geospatial information convergence models of Cheongju addressing three issues have been established as below:

Source

Youngjoo Lee, Eunsun Im, Misook Cha(2015) Utilization on Geospatial Information Convergence Model for Supporting Regional Policy-making, Korea Research Institute for Human Settlements 15-09.

Figure 2. Developing Geospatial Information Convergence Models on Local Issues

**Source**

Youngjoo Lee, Eunsun Im, Misook Cha(2015) Utilization on Geospatial Information Convergence Model for Supporting Regional Policy-making, Korea Research Institute for Human Settlements 15-09.

**The Outcome of Utilizing Geospatial Information Convergence Model**

*"A space to work" issues on regional economy: utilization of geospatial information for local food policies*

The local government has implemented a "local food" policy of promoting locally-grown food and creating a virtuous cycle of regional economy in an attempt to build a coexisting community based on local food. In the process, it utilized the geospatial model in analyzing the spatial arrangement between different local assets and establishing solutions for a spatial match between demand and supply of local food, based on its agricultural business survey to promote a systemic supply chain of local food.

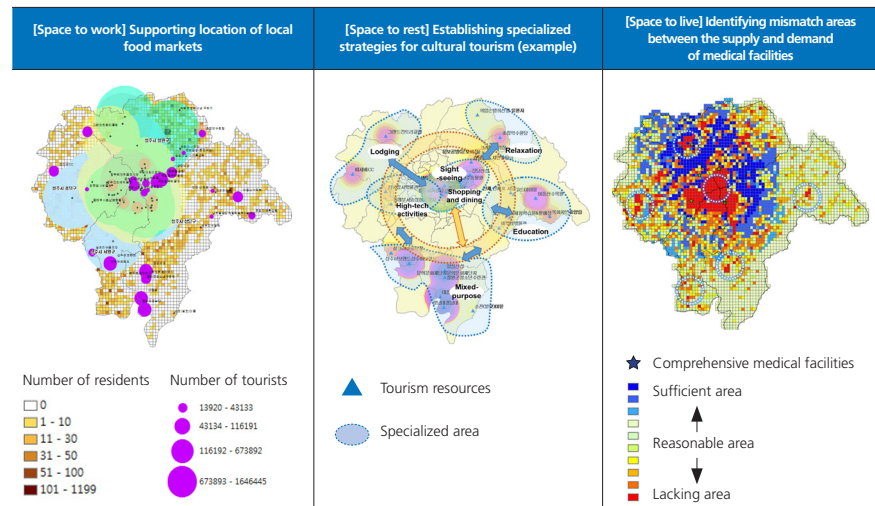
*"A space to rest" issues on local assets: utilization of geospatial information for cultural tourism policies*

To develop cultural tourism and create tourism bases, the local government needs to develop themed content based on its local culture and natural environment and implement cultural tourism policies, considering the relationship between consumers and its cultural tourism resources, the local characteristics, and demands. To this end, the government integrated materials and information on cultural tourism assets, analyzed the existing information on cultural tourism, and identified the spatial characteristics of its tourism consumers and established a strategy specialized in cultural tourism. In other words, the government utilized the geospatial information as a supportive tool for cultural tourism policies.

*"A space to live" issues on local residents' life: utilization of geospatial information for policies on welfare facilities(comprehensive medical facilities)*

As part of "HOPE(Happiness, Opportunity, Partnership, Everywhere) area" quality of life, the government has cooperated with neighboring regions and implemented policies to build a basic infrastructure, expand medical and welfare facilities, and improve the conditions of the marginalized areas. It also set up a medical service zone which shows the scale of and the distance from medical facilities(supply) to its population distribution(demand) to spatially identify the blind spots of medical services. Based on this geospatial convergence model, the government evaluated the optimality of demand-supply and identified areas which require attention from the government.

Figure 3. Results of Geospatial Information Convergence Model Utilization

**Source**

Youngjoo Lee, Eunsun Im, Misook Cha(2015) Utilization on Geospatial Information Convergence Model for Supporting Regional Policy-making, Korea Research Institute for Human Settlements 15-09.

**Implications of Geospatial Information Convergence Model Utilization**

First, geospatial information provided an important opportunity for both interested parties and policy makers to identify local issues, seek policy solutions, and discuss a variety of policy alternatives based on data. In the process, interested parties and policy makers need to consider in detail which geospatial information should be utilized and where and how it has to be used, and share the effectiveness and limitation of the information with each other.

Second, geospatial information has to be utilized more broadly as a supportive policy tool to address the problems of local community, and additional issues where geospatial information can be employed should be identified. The interested parties and policy makers should continue their communication, discuss detailed plans to materialize their ideas into customized community-based local policies, and utilize geospatial information as a policy tool for objective and scientific solutions. It is important to analyze beneficiaries of the community-based local policies in every small area and identify the marginalized areas which have to be addressed by the government, and calculate specific demands of those in needs.

Third, the environment in which data are utilized has to be improved in order to expand the geospatial information convergence models. It is true that data is increasingly used in various fields, but the levels and methods of opening and sharing data with the public vary from one local government to another. The local government has to establish policies to enhance the accessibility of data, collect unstructured data from various sources such as residents' needs, and integrate these data with geospatial information. The government should also plan, build, and process a data structure to increase data utility from the initial planning stage, sharing the experience of utilizing data with the related department in local government, which builds and manages data, to continuously increase the quality of collected data.

**3. Plans to Utilize Geospatial Information Convergence in Implementing Regional Policies****Building Infrastructures for Geospatial Information Convergence Utilization Based on Local Characteristics**

In order to establish local policies based on the characteristics and demands of local areas, it is necessary to build a foundation for geospatial information convergence, which leads to a comprehensive approach to policy demand and supply (a support structure). It is also important that utilization of geospatial information convergence is conducted based on local originalities such as the characteristics of the local area.

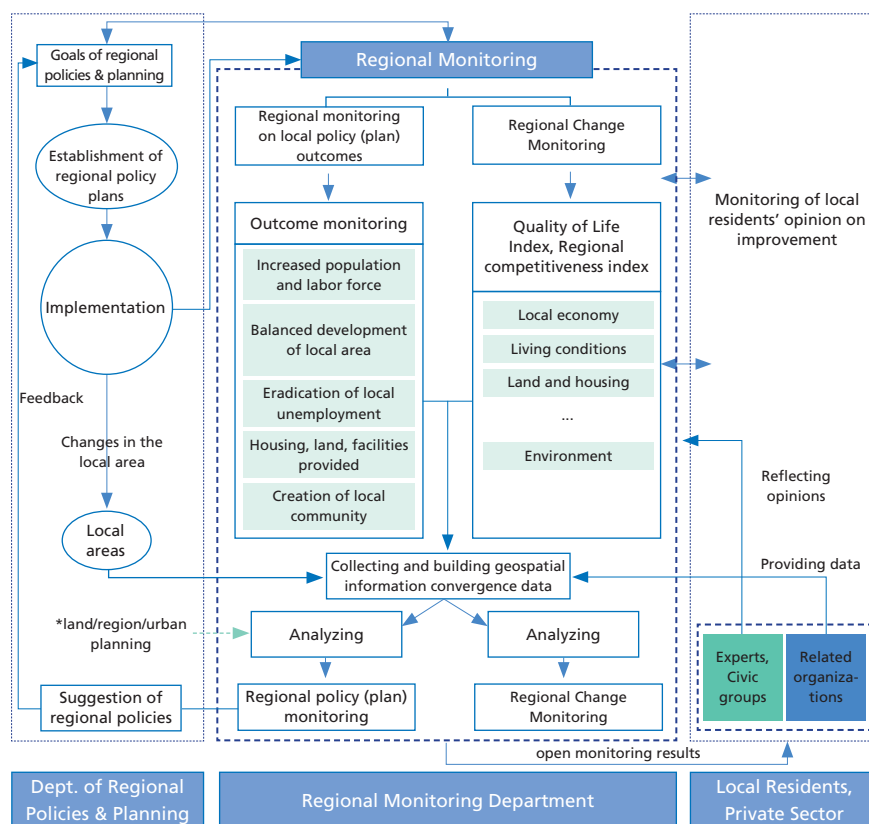
### Creating application of an Ecosystem that Promotes Communication between Demand and Suppliers

It is needed to discover and collect geospatial information to evaluate various local situations and, with the collected information, to create an ecosystem where information collection and its utilization are in a virtuous cycle based on the communication between demand and suppliers.

### Building and Utilizing a Monitoring System Based on Geospatial Information for Continuous Regional Diagnosis

A regional monitoring system based on geospatial information consists of two monitoring parts. One is regional policy monitoring, which evaluates if local policies achieved their aims. The second is regional change monitoring, which follows the changes in local statistics (Figure 4). At the moment, legal grounds are needed to build and manage the monitoring system, which continuously diagnoses local situations and incorporates the results into local policies.

Figure 4. Building a Regional Monitoring System Based on Geospatial Information



#### Source

Youngjoo Lee, Eunsun Im, Misook Cha(2015) Utilization on Geospatial Information Convergence Model for Supporting Regional Policy-making, Korea Research Institute for Human Settlements 15-09.

leeyj@krihs.re.kr  
esim@krihs.re.kr  
mscha@krihs.re.kr

## GLOBAL PARTNERSHIP NEWS

## Host Country Seminar of AIIB's 2017 Annual Meeting



The 2nd Annual Meeting of AIIB, which was newly established in 2015, was held on June, 16-18 in ICC Jeju in great success. The Host Country Seminar was planned and organized by 7 organizations and especially KRIHS co-organized the first session, "The Era of 4th Industrial

Revolution and Infrastructure" and managed the whole event. The first session included specialists' presentation on "The Changes on ICT Infrastructure in the era of 4th Industrial Revolution" and "Land Development including Infrastructure and Smart City in the era of the 4th Industrial Revolution and Transportation Infrastructure Investment" and discussions.

## 2017 KRIHS-KOICA National Territorial Policy Responding to Climate Change



The Global Development Partnership Center (GDPC) of KRIHS conducted a program, "2017 KRIHS-KOICA National Territorial Policy Responding to Climate Change" with 20 participants from 5 Asian countries including Laos, Mongolia,

Myanmar, Vietnam and Sri Lanka from July 6 to 22 in KRIHS. As the second of the three-year long KOICA (Korea International Cooperation Agency) program, it provided expert lectures on Korea's national territorial policy responding to climate change, urban resilience, green technology, infrastructure, water resources and other sectors. The participants discussed various topics: management and early warning system for disasters and explored final action plans for developing countries.

## 2017 KRIHS-WBG Joint Workshop



The GDPC of KRIHS held the '2017 KRIHS-WBG Joint Workshop' from June 11 (Tue) to 13 (Thu), 2017 at the Westin Chosun Hotel and the Conrad Seoul Hotel. The participants were policy officers and staff

from 7 developing countries including Argentina, China, Morocco, Serbia, Sri Lanka, Tanzania and Vietnam and the World Bank Group's Urbanscape team. They shared knowledge and experiences on waterfront development and management of Korea and other countries under the theme of 'Vitalizing Cities with Public Space'. Also they discussed challenges and cooperative methods for the future and stressed the trilateral cooperation among the World Bank, KRIHS and participating countries by sharing experiences and developing policy consultation.

Copyright 2017 ©Korea Research  
Institute for Human Settlements  
All Rights Reserved.

5 Gukchaegyongwon-ro, Sejong-si,  
30149, Korea

Published by the Korea Research Institute  
for Human Settlements (KRIHS, <http://www.krihs.re.kr/>)

Edited by the Global Development  
Partnership Center  
(GDPC, <http://gdpc.kr/>)  
Tel. +82-44-960-0596  
Fax. +82-44-960-4772

Designed and Produced by  
Designintro Co., Ltd.  
(<http://www.gointro.com>)  
Tel. +82-2-2285-0789