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SPACE & ENVIRONMENT is primarily intended to help foreign experts and professionals in relevant fields understand overall present situations of spatial planning and policy of Korea, and published quarterly by KRIHS.

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Korea's Territorial Vision and Strategy Toward 2040

Since the global economic crisis, liberalization has been expanded worldwide and free flows of information, manpower, technology, and goods will continue. It is expected that the world economy will have new inflection points of long-term growth around 2020 and 2050. Two most important trends defining the future world will be full-fledged economic liberalization, driven by the spread of free trade agreements, and global competition and cooperation in green growth sectors and technologies aimed at fending off climate change.

Korea will undergo a drastic change in its demographic structure. Its population will decline with falling birth rates and accelerating aging of society, and increasing inflows of foreigners will make it a multicultural society.

Various new types of cities will emerge such as high-tech cities based on the convergence of information technology, nanotechnology, biotechnology, energy technology, and cultural contents; ubiquitous cities; and even overhead and underground urban spaces.

The "low carbon, green growth" drive, which aims to create a positive cycle between economic growth and environmental preservation, will accelerate, as the real threat of climate change grows and thus energy, resources, and environmental issues become decisive factors for economic competitiveness. Also, water will become the "new gold" of the 21st century.

Ultra-fast information and transportation networks, low birthrate and aging, integration of the global economy and climate change will converge and embolden each other, further accelerating the speed of change.

In a report titled "Grand Territorial Vision 2040," the Korea Research Institute for Human Settlements projected the future of Korea toward 2040 and proposed long-term territorial vision and strategies. It was presented to a meeting of the Presidential Council for Future and Vision on June 11, 2010.

Megatrends Affecting the National Territory

Seven megatrends toward 2040 will be crucial to the national territory: climate change and green growth; integration of the global economy; an era of city-regions; convergence of high-tech knowledge industries; aging and multicultural society; cultural renaissance; and a structural change of the Korean Peninsula. It is time to create new urban, transport, and residential systems to cope with these megatrends and make use of such changes to make a new leap forward.

Vision and Strategies of the Grand Territorial Vision 2040

Vision

The Grand Territorial Vision 2040 aims to build “a greater territory to which opportunities flow in from the world over.” It envisions that global talents, technology, information, and culture will move into the Korean Peninsula. The inflows will greatly contribute to an upward development of the Korean Peninsula by creating new values within it and spreading them out to the world so that Korea could play a leading role in promoting global development. “A greater territory” means an enlarged territorial horizon which will be achieved by: i) expanding its influence all over the world, ii) linking and integrating South and North Korea, iii) promoting the coexistence of man and nature, and iv) creating new territorial brand values.

Main strategies

The vision is anchored in six main strategies: i) creating a global meta-economic region centered on the Korean Peninsula, ii) forming a global strategic gateway combining land, marine, and air transports, iii) cultivating new cities based on the convergence

Figure 1: Seven Megatrends for Korean Territory 2040



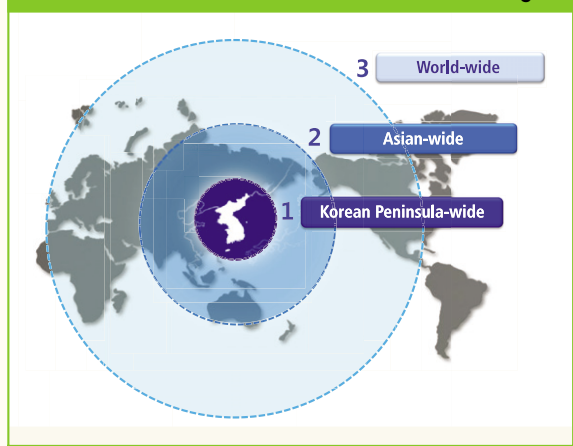
Figure 2: Vision of the Korean Territory 2040



of future-oriented high-tech and green industries, iv) creating the world’s most attractive green territory, v) linking South and North Korean economies and creating an integrated economic region on the peninsula, and vi) exploring Korea’s global soft territory.

A global meta-economic region centered on the Korean Peninsula: To create a global meta-economic region around the peninsula, the nation needs to push a strategy to realize “World Core Korea,” meaning Korea as a hub of the vast global market. The goal requires building an economic region composed of three concentric circles, which

Figure 3: Scheme of World Core Korea With Three Concentric Circles in the Global Meta-Economic Region



attracts opportunities from all over the world.

It needs to devise strategies to establish a Seoul-centered economic region on the peninsula, a Korea-centered new Asian economic bloc, and ultimately a global meta-economic region in which the entire world is integrated into a single free market and Korea is its center.

Additionally, the entire country should be reorganized into a single international free economic zone. It should be an open global territory free from three developmental hindrances—unnecessary regulations, tariffs, and language barriers—and powered by four cutting-edge growth drivers—technologies; manpower; transport, logistics, communications support systems; and finances.

A strategic gateway as hub of land-marine-air transports: The nation needs to build a new golden route in the shape of a horse shoe linking the seas, the continents, and South and North Korea, which will serve as the main axis of the Korean Peninsula for the next 100 years. The vision calls for the construction of an integrated network of land, marine, and air transports that links major locations within peninsula to the world—e.g., transcontinental railroads and international airports—and the expansion of the Korea Train eXpress(KTX) network that spans the entire country by adding new railways including Seoul-Gangwon and Busan-Mokpo lines.

In addition, constructing a 700km/hr high-speed transport network would transform the entire nation

Figure 4: Scheme of a Grand Horse Shoe-Shaped Golden Route, a Korean Gateway to the World



into a single city-region that makes it possible to travel to anywhere in the country within an hour. It will also lay the foundation for turning Northeast Asia into an area in which any places are reachable within a single day.

Convergence cities of future high-tech green industries: It is necessary to rebuild major hub cities across the nation as high-tech “green industry poleis.” High-tech cities based on the convergence of IT, nanotechnology, biotechnology, energy technology, and culture and design industries, should be built, and a group of those cities could form an integrated megalopolis that links mega-economic regions. Furthermore, Saemangeum on the western coast could be developed into a hub economic city in Northeast Asia. Korea could be “capital of Asia” in terms of peace, eco-friendliness, culture and contents industries. The nation also needs to devise a strategy, for example farm buildings, to restructure the agricultural sector into a high-tech, high value-added industry.

The world’s most attractive green territory: A new approach is needed to preserve and make use of Korea’s natural beauty in a way that fits the 21st century and better harmonizes rivers, mountains, the seas and humans. Waterfront corridors need to be built around rivers with abundant clean water. Mountainous areas could be made into Switzerland-like places where people can savor rural life. The vast archipelago in the South Sea can be upgraded into international green island parks.

Korean-style green cities and green farming and

fishing villages need to be developed. The territory should be organized into a resource saving and resource recycling territory by increasing transport means like electric vehicles that reduce energy consumption. At the same time, it should be turned into a universal territory that meets new needs of residential welfare, longer life, and multicultural population.

As part of efforts to increase the housing supply ratio to 120 percent by 2040, affordable “nest housing” communities should be expanded to help low-income families own a home. More life-long health towns should be built for the aged and the socially vulnerable, and multicultural residential towns should be expanded to accommodate an increasing number of foreigners.

An integrated economic region of South and North Korea: In order for the Korean Peninsula to take off as a hub in this era of meta-economic region, it needs to utilize its geo-economic strength. In other words, it should forge conditions to better advance to Eurasia and the Pacific. To realize this, the two Koreas should be linked and integrated into a single economic community. A framework for peninsula-wide prosperity should be established including global special economic zones for new industries, logistics, and international businesses along the eastern and western coastal areas, high speed railway transport, cutting-edge information and communications networks, and green energy infrastructure. Furthermore, city regeneration projects can be launched in cities to develop new dwelling spaces, spur economic growth, and improve the quality of life.

In addition, a “green, cultural and tourism axis of the Korean Peninsula” can be constructed through an eco-network along the Baekdudaegan mountain range and a cultural tourism corridor that showcases historical assets of South and North Korea.

A global soft territory: The nation needs to build global networks to create national wealth. Trans-border networks for economic and cultural exchanges should be expanded along with the nation’s overseas centers to promote exchanges with foreign countries. It is required to establish overseas hubs to support territorial development in places like Africa and enhance global assistance and exchanges in the fields of nuclear power plants, high-speed railways, resources development, new green cities, water management technology, etc. A global Korean expat network should also be promoted to help the nation’s global outreach.

Vision of Korea’s National Territory Toward 2040

Surrounded by the sea on three sides, Korea is located in a strategic point where Eurasia meets the Pacific Ocean. Korea will grow into a hub in this era of global meta-economic region when the entire world merges into a single economic bloc. In step with the global economic trend, the entire nation will be transformed into a single international free economic zone. High-tech cities based on the convergence of IT, biotechnology, energy, and other new growth industries will lead development. Saemangeum on the western coast will become a global hub of future industries and the home of a

Figure 5: Developing Trans-Border Meta-City Region
(Meta-city linking Seoul, Beijing, Shanghai, Osaka, and Tokyo)

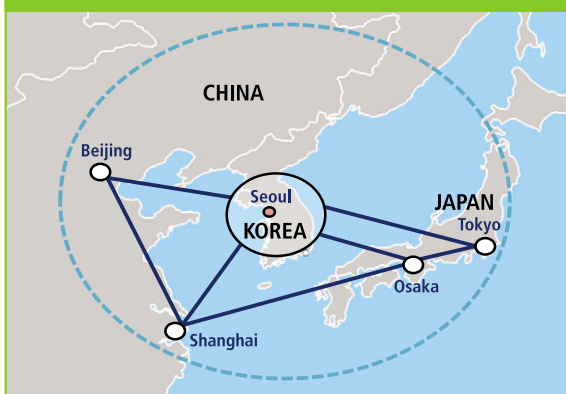
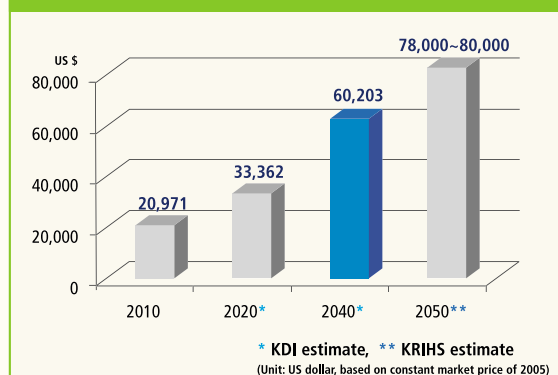


Figure 6: Per Capita GDP of Korea Toward 2040



new civilization.

The huge horse shoe-shaped axis that links the seas along the eastern, western and southern coasts with inland areas and South and North Korea will become the new golden route of the 21st century leading to the world. It will become an arrival and departure point and strategic gateway for integrated land, marine, and air transport networks that include transcontinental railroads. A new 700 km/h high-speed maglev train network will integrate the entire territory into a single city-region, where anywhere is reachable within an hour.

Our territory will be transformed into one huge scenic park. It will become an eco-friendly corridor where abundant clean water flows in all seasons and where nature and humans coexist. In the mountains, people will be able to enjoy rural life of the kind available in Switzerland.

The era of housing welfare will set in allowing all families to realize their dream of owning a home.

Life will be easier for foreigners, multiculturalism will flourish, and Korea will become the cultural and arts capital of Asia.

Korea will become one of the Group of 10 countries, with a per capita income topping US\$60,000 in 2040 and reaching around US\$80,000 in 2050. The nation will become a global leader, actively contributing to the development of the world community. By disseminating green cities and the KTX, and green growth technologies such as water management and nuclear power plants, Korea will take its roots around the world and will take pride in its international prestige as a leading player in the global affairs.

Where is Korea heading? It is clearly the spectacular era of the "Greater Korean Territory."

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Futures of the National Territory

Megatrends and the National Territory

Megatrends in such areas as politics, economy, society and culture, environment, and science and technology, have a gradual and great influence on the future as well as the present conditions of the national territory. The purpose of this article is to foresee futures of the national territory by examining the influence of these megatrends. It looks at the Korean Peninsula and its islands and territorial waters. In this article, the national territory is divided into three components: physical features of the natural environment and the ocean; functions and policies in such areas as residential and urban management, industry, tourism, and transportation; and a spatial structure which is composed of all the aforementioned elements. It projects the futures of the national territory 20 years ahead, toward 2030. Based on futures research methodology used at home and abroad, this article

forged a methodology customized for Korea and provided overall foresights on futures of the national territory. It suggested the future trends and issues of the national territory.

Through meta-analysis, the megatrends of six areas have been analyzed to examine their effects on the national territory. In the area of politics, global society is becoming multipolarized, terror threats and regional wars are escalating, increased governance is being applied, and powers are becoming decentralized. In the area of economy, there is increasing economic cooperation among regions and countries, multilateral economic networks are being strengthened, and the global finance market is taking on diverse features. In the area of the environment and resources, the megatrends are climate change and the shortage of resources. Of all the megatrends, climate change, represented by global warming, has the greatest effect on the global community. Megatrends in the

area of demographics are low birth rate and aging, and in the case of Korea, a decline in the size of the population and households. In the social and cultural dimension, value systems and cultures are becoming more varied. Individuals are seeking a better quality of life, well-being, emotional fulfillment, pleasant environment and amenities, and individualism is driving its roots deeper. In the social dimension, there is greater labor flexibility, accelerating multiculturalism, and improvement in women's status. Science and technology are bringing the most rapid and greatest changes to the national territory, and of course, the daily lives of the public. The megatrends in the area of science and technology are rapid development and convergence of new technologies such as information technology, biotechnology, energy and environmental technology, and nanotechnology.

Megatrends affect the value systems and behaviors of individuals, corporations, and the public, who are users of the national territory, which in turn, bring about changes to its physical form and features, spatial structure, policies, systems, and functions. The six megatrends influencing the national territory were put together, public and specialist surveys were conducted, and specialists were consulted to derive and draft ten territorial trends and issues.

Proposed National Territorial Trends

Territorial trends refer to trends of the national territory that move in a certain direction with regard to its form, function, or structure. Among the effects of the megatrends on the national territory, the ones that are moving in a set direction and considered to be significant to the future of the national territory were selected as national territorial trends. The ten territorial trends toward 2030 are as follows:

1. The climate in the national territory is becoming more subtropical: Global warming brings about a shift in temperature and precipitation and creates abnormal climatic conditions. It has a direct impact on the eco-system, including fauna and flora, crops, and marine life, which in turn, has a secondary impact on the production of food, health and the settlement of humans, and the economy. In the end, climate change in the Korean Peninsula brings about a change in the eco-system, and it will have a broad

impact on the farming and the fishing industry and tourism. Meanwhile, the number of natural disasters will increase.

2. The ocean will be utilized more: In the future, there will be more use of oceans. Examples include the use of tidal power and wave power, marine minerals, the development of deep-sea water, and the use of marine spaces. As the world becomes depleted of raw materials, energy, and food, it is looking to the ocean as the last resort for solving environmental, resource, and food problems. The advancement of science and technology will enable the exploration and development of marine resources and the construction of marine cities. In the case of Korea, there is strong awareness of the importance of the ocean as a secondary territory since it has great potential, and the ocean is expected to be utilized more.

3. Farmlands, mountains, and waterfronts will increasingly be used as recreational resources: Diversified value systems, improved income levels, and climate change will increase the demand for eco tours and recreational activities, and farmlands, mountains, coastal areas, and waterfront spaces will be actively utilized as recreational and tour resources. Improved high-speed transportation and linked transportation improve accessibility to distant farming and fishing villages, upgrading their position as recreational spaces. The use of farmland, mountains, and waterfront spaces as recreational resources would have a great influence on the invigoration of farming and fishing villages while sustaining and strengthening the national territory, which is the foundation of national development.

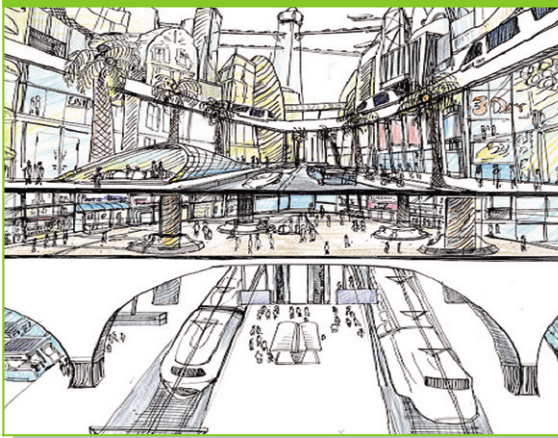
4. Buildings will become green, smart, and diverse: Zero carbon houses utilizing green technologies such as new renewable energy will become widespread due to the shortage of resources and climate change. Technological advances will cause green technologies to be grafted into an IT-based ubiquitous environment, increasing the number of green smart residential and office buildings and skyscrapers. In the future, more emphasis will be placed on the quality of life, increasing the number of town houses, terrace houses, or mobile homes, where people can enjoy rural life, and housing types will become more varied, e.g., medical homes and emergency homes.

Figure 1: Green, Smart, and Various Housings of the Future



5. Urban spaces will become multidimensional and multifunctional: In the future, urban spaces will be used in a more multidimensional and multifunctional way, as seen in the development of underground and overhead spaces, multicomplexes, and multifunctional buildings. With advances in science and technology in such areas as cutting-edge construction technologies, and the increasing demand for multifunctional complexes, more spaces will be used as multidimensional spaces, like skyscrapers and underground spaces. To enhance energy efficiency through high-intensity land use, roads and major urban facilities will be used in more multidimensional and multifunctional ways.

Figure 2: Multidimensional and Multifunctional Urban Spaces of the Future



6. Urban services will become varied and barrier

free: In the future, the proportion of senior citizens and foreigners will increase due to a low birth rate, aging, and a multicultural society. Also, the improved status of women will cause them to engage more actively in economic activities. Various services will be launched and barrier-free designs will be introduced to promote the participation of the elderly, foreigners, women, and the handicapped in economic activities. Diverse facility demands, including barrier-free facility demands, will influence the types and designs of urban facilities and change urban land use and spatial structures.

Figure 3: Diverse and Barrier-Free Urban Services of the Future

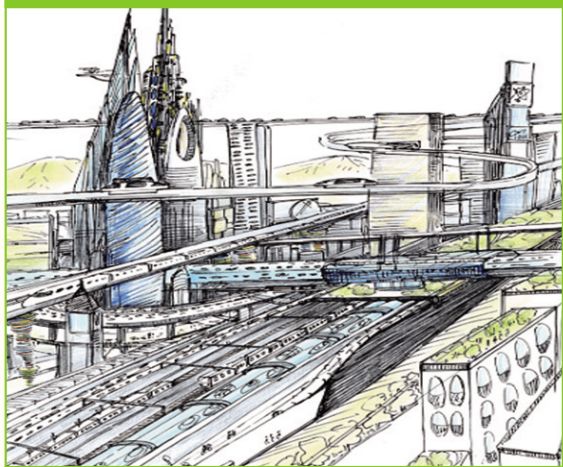


7. Industrial estates will be recycled and reused: In the future, a greater number of industrial complexes will undergo redevelopment, and the number of eco-friendly complexes where resources are recycled will increase. The complexes will also become multifunctional, housing residential, business, and commercial functions, and multipurpose buildings like apartment-type factories will increase.

8. Green, smart, and ultra-fast transportations will become widespread: The transportation of the future will gradually become green, smart, and ultra-fast as more restrictions are placed on the environment due to climate change, as the price of fossil fuels rises due to resource depletion, and as science and technology develop. Eco-friendly green transport systems will be used widely, including hybrid cars, hydrogen fuel-cell vehicles, electric cars, and BRT. Ultra-fast transportations such as ultra supersonic

airplanes, Wing-In-Ground effect ships, and maglev trains will be adopted, and smart transport facilities like smart roads will increase. All of these will transform the overall transport system, including user behavior and the transport network.

Figure 4: Green, Smart, and Ultra-Fast Transportation of the Future



9. Metropolitan functions will be strengthened: In the future, international business and exchange, commercial, cultural, and industrial functions will be strengthened in metropolitan cities such as Seoul, Busan, Daegu, Gwangju, and Daejeon. Changes are taking place worldwide. The era is coming when the economic competitiveness of core city-regions will become a decisive factor for the economic competitiveness of a nation. These changes will be reflected in Korea, strengthening the function of Korean metropolitan cities, where most economic activities take place.

10. A Northeast Asian economic community of Korea-China-Russia-Japan will emerge: As the global community becomes multipolarized, there will be a growing need to forge a regional economic community among major nations in Northeast Asia like Korea, China, Japan, and Russia. In particular, Korea's function as the hub of international financial exchanges and trade will be strengthened due to its geographic strength. Free trade agreements and global production networks will be expanded, driven by the globalization of economies. Furthermore, economic and cultural exchanges among Northeast

Asian countries will become everyday events, helped by the development of ultra-fast transportation. This will expand international exchanges among Northeast Asian countries, enlarging trade volume in the region and promoting the development of the logistics industry.

Proposed National Territorial Issues

Territorial issues refer to issues relating to the daily lives of the public, business earnings, and public policies. They have been selected based on topics that will emerge as areas of national interest, compelled by mega and territorial trends, and changes which are expected to become crucial in futures of the national territory. It is difficult to foresee the direction and details of change, so various scenarios that envision territorial futures should be forged. Succeeding studies will perform this task. The ten territorial issues that will become crucial toward 2030 are as follows:

1. Is the future national territory, which is becoming increasingly subtropical, safe from natural disasters?
2. How would residential behavior change in view of the low birth rate, the aging society, diversification of value systems and culture, climate change and shortage of resources, and the development of science and technology?
3. How would industrial location change in view of the globalization of economies and scientific and technological advances?
4. How would the transportation system change, in view of the advancement and convergence of science and technology, climate change, and the shortage of resources?
5. What kind of effect would the changes in residential behavior, industrial location, and the transport system have on land use in the future?
6. Would farming and fishing villages and islands become depressed or revitalized?
7. What kind of cities will rise or fall in the future?
8. Would city-regions of the future show patterns of

sprawl or decentralized concentration?

9. Would the Gyeongbu (Seoul-Busan) axis continue to serve as a core territorial axis? Or would a new territorial axis emerge?

10. What kind of effect would the change of farming and fishing villages, islands, cities, city-regions, and territorial axes, have on the spatial structure of the future?

Future tasks

The research on Futures of the National Territory seeks to portray diverse futures of the national

territory without any intention of establishing strategies or policies. This is a research conducted to meet the challenges ahead. It foresees futures of the national territory for the next 20 years or more to make it possible for strategies to be established accordingly. However, as the concept “national territory” is multifaceted and its spatial scope relative, people can have different expectations about the foresight outcomes and, therefore, may find it hard to embrace the result. Consequently, in futures studies more specific foresights should be provided for more specific sectors or regions of the national territory.

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Cooperative Strategies for Capacity Building on Spatial Planning Systems of Developing Countries

The global community is engaged in a heated discussion about improving development assistance policies. Many developing countries are urging Korea to share its development expertise and knowhow. A new era has dawned in Korea in terms of its overseas assistance.

Korea's inclusion in the Development Assistance Committee (DAC) of OECD in January, 2010 is expected to garner worldwide recognition of its status as a donor nation. Despite such a change, however, insufficient effort is applied to share our experiences and capacity on spatial planning systems with developing countries. Strategies need to be formed to promote the kind of partnership that meets the demands of global society and developing countries.

Official Development Assistance (ODA) and Spatial Planning

At the UN Millenium Summit Meeting held in 2000, attended by the presidents of 189 countries, a “Millenium Declaration” was adopted, which specified seven objectives towards 2015. Additionally, eight “Millenium Development Goals

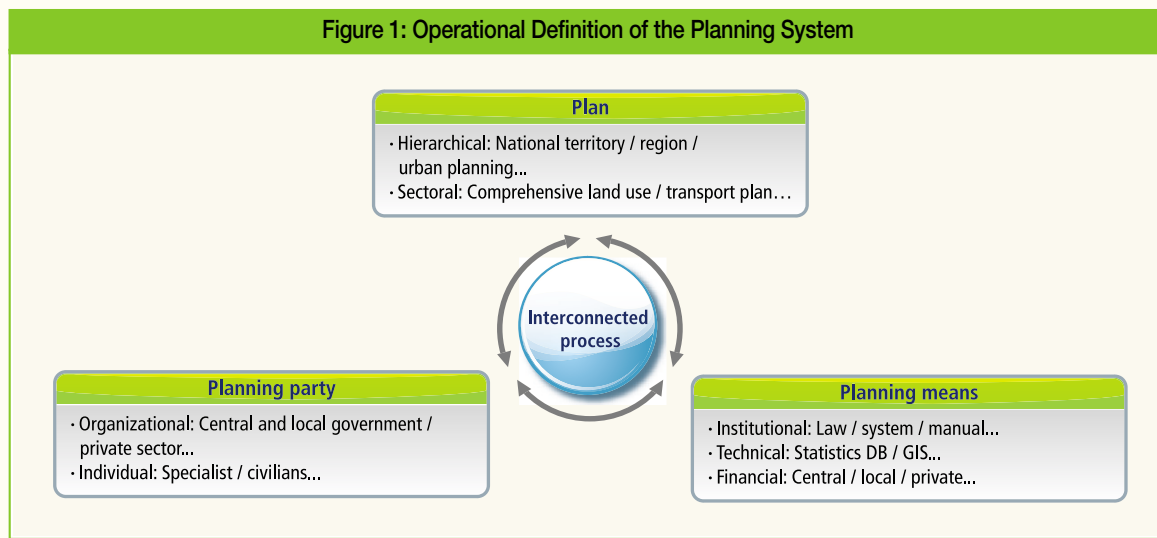
(MDGs)” were adopted to realize the vision of spurring economic development and removing poverty. It was agreed globally that donor nations would allocate 0.7% of their gross national income towards the ODA fund.

The ODA paradigm is changing as well. Spearheaded by the DAC, the form of assistance is changing from providing development assistance to reinforcing partnerships with developing countries, and diverse efforts are being exerted to this end. Instead of humanitarian and disposable assistance, reciprocal assistance grounded on mutuality is being emphasized. Furthermore, the form of assistance is changing currently from project-oriented assistance to technical assistance such as policy consulting.

Spatial Planning System of Developing Countries

In accordance with the dictionary definition and the definition used in previous research, the “planning system” used in this research is defined operationally as “a comprehensive planning framework that includes the details and the interconnectivity of each planning element.” There are three elements to the

Figure 1: Operational Definition of the Planning System



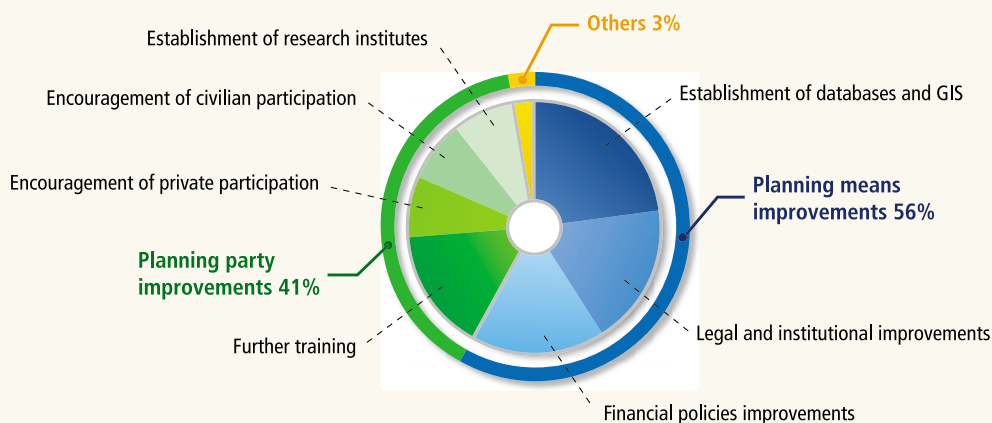
planning system. The first element is the “plan,” or physical product (report, maps, etc). Hierarchically, it can be divided into territorial, regional, urban, and local plans, and in terms of the sector, it can be divided into comprehensive land use, transport, and a greenbelt plan. The second element is the “planning party.” This includes the government and experts who play main roles in the establishment of the plan as well as various stakeholders, including citizens and private sectors involved in the planning. The final element is “planning means,” which includes the institutional, technical, and financial bases required for the planning party to make plans. Institutional bases include laws, regulations, and guidelines, and technical bases include statistical databases and the available GIS.

KRIHS’s relatively ample database and network of specialists from developing countries were used in this research. These specialists were surveyed to identify the present condition of the spatial planning system in their respective countries (Table 1) and their preferred areas of assistance (Figure 2). In particular, the number of persons who had participated in the KOICA-commissioned training program of KRIHS, which began in 1987, reached 500. Among these, the survey was sent to specialists who have visited KRIHS over the past ten years and whose emails were available. Visiting researchers or participants in relevant seminars were also among the survey groups. The survey was conducted using emails and face-to-face interviews. The problems identified through the survey are as follows.

Table 1: Summary of Problems in the Spatial Planning Systems of Developing Countries

Classification	Problem
Plan	- Lack of high-level plans such as national territorial plans
Planning party	- Insufficient participation of foreigners, civilians, or citizens - Lack of the number of qualified professionals in local governments
Planning means	- Insufficient institutional bases for spatial planning such as laws, regulations, or guidelines - Insufficient technical bases such as statistical databases or GIS
Overall evaluation	- Overall poor planning conditions in local governments (professional talents, finances, etc.)
Comparison by economic level	- Overall poor planning conditions in extremely poor countries

Figure 2: Preferred Areas of Assistance



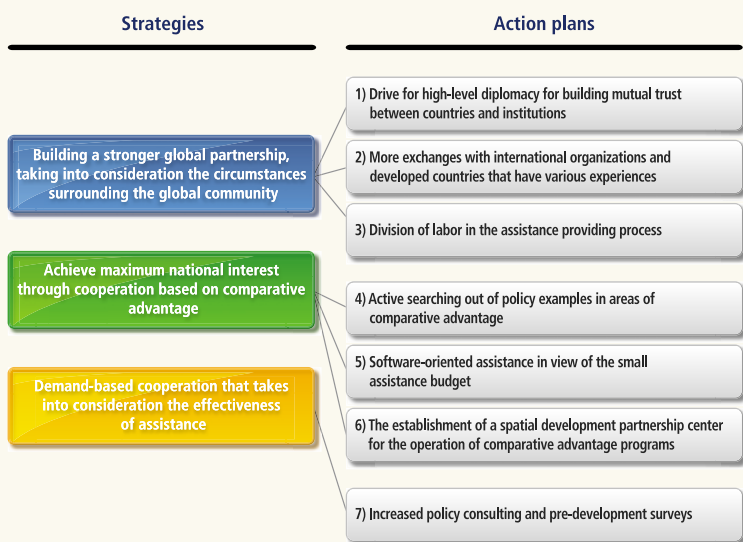
According to the respondents, the preferred areas of assistance for capacity building on the spatial planning system were relatively evenly spread out: construction of statistical database and GIS (24%), institutional and legal improvements (19%), further training (18%), and improvement of financial policies (13%). If we classify these by element in the planning system, the request for support in the area

of planning means, such as the establishment of databases and GIS, legal and institutional improvements, and financial policies improvements made up 56%, which is a bit higher than the 41% of requests for support in the area of the planning party such as further training, the establishment of research institutes, and the encouragement of private and civilian participation.

This article suggests three basic strategies for solving the problems listed above. First is building a stronger global partnership, considering the circumstances surrounding the global community. Second is establishing partnerships based on comparative advantage that are truly efficient from the viewpoint of national interests. The last one is demand-based cooperation that considers the effectiveness of assistance. In addition, it suggests a basic framework for seven action plans crucial for implementing the three strategies.

In order to forge strong partnerships, it is important to reassess foreign aid policy and improve its management system in accordance with the

Figure 3: Strategies and Action Plans for the Development of a Spatial Planning System in Developing Countries



paradigm change in international development cooperation. In this paper, three action plans—"drive for high-level diplomacy to build mutual trust between countries and institutions," "more exchanges with international organizations and developed countries that have various experiences," and "division of labor in assistance providing process"—are suggested. The following efforts are essential for countries to receive maximum benefit from aid: "active searching out of policy examples in areas that have comparative advantage,"

"software-oriented assistance in view of the small assistance budget," and "the establishment of a spatial development partnership center for the operation of comparative advantage programs." Finally, to improve the effectiveness of aid, this paper suggests demand-based action plans such as "increased policy consulting and pre-development survey."

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Building Safe Cities with Integrated Mechanisms to Cope With Climate Change-Induced Natural Disasters

Soaring Natural Disasters

Extreme weather conditions are posing a serious threat to the world, and countless numbers of people were affected by natural disasters such as typhoons and heavy rain during the last few decades. The extent of damage from flood due to climate change is growing bigger, and coastal cities are in danger of being swamped due to rising sea levels, which previously was not considered a risk factor.

In 2004 alone, ten typhoons, unprecedented in number, struck Japan, and a great number of casualties and property damages occurred in New Orleans in 2005 due to Hurricane Katrina, the worst storm ever to hit the United States. In 2007, 1,400 people in India and 700 in Bangladesh became the victims of natural disasters, and in 2009, particularly Southeast Asia suffered from major typhoon damage. In Taiwan, 136 people died, and 400 were recorded missing from 2,500 mm of heavy rain caused by typhoon Morako, whereas in the Philippines, 300 people died from Typhoon Ketsana, and in Vietnam, 130 from Typhoon Mirinae.

Financial damages from natural disasters also are escalating. In 2003, the recorded damage from typhoons was US\$65 billion and in 2004, US\$150 billion. In 2005, the financial damage from such hurricanes as Rita or Katrina amounted to US\$220 billion. About US\$100 billion of the cost from the

damage was covered by insurance companies. The financial cost from a rapidly increasing number of natural disasters far exceeds the amount coverable by private insurance companies (www.munichre.com). The year 2008 saw the greatest number of such natural disasters as floods, storms, and hurricanes, recording a financial loss of up to US\$269 billion (www.swissre.com).

In Korea, too, the damage from floods and drought is getting severer of late, and the number of tropical nights with a minimum temperature of 25°C is multiplying. The financial loss from natural disasters is continuing to rise. The cost from property damage multiplied by 4.4 times over the ten years from 1998 through 2007 compared to 1988 to 1997. The cost of property damage caused by Typhoon Rusa in 2002 was about 5.7 trillion won (based on the asset value of 2002) with a death toll of 246, and in case of Typhoon Maemi in 2003, the property damage was approximately 4.6 trillion won (based on the asset value of 2003) with 131 deaths.

Climate change is emerging as the most serious threat to the global community. Climate change can bring about changes to human life and, moreover, affect the lifestyle of various organisms and animals¹⁾. Rising sea level, heat island effect, changing daylight amount, etc., caused by climate change not only affect urban life but also paralyze urban regions by engendering severe dry spells or floods²⁾.

Figure 1: Damage From Concentrated Heavy Rain in 2006



Flooded riverside house (Pyeongchang-gun)

Road swept away by flood (Inje-gun)

Because a city is where a great population and various infrastructures are jammed into a small area, it is greatly exposed to dangers from climate change. In order to build a city safe from climate change, the effects of climate change on cities should be identified and effective and customized coping measures should be developed for each city.

Effects of the Climate Change on Cities

The fourth assessment report of an Intergovernmental Panel on Climate Change (IPCC) forecasts an increase in the temperature, heat waves, number of concentrated heavy rains, number of areas suffering from drought, activities of strong tropical low pressure, and rising sea level. These extreme changes will have an influence on urban citizens, urban infrastructures, and buildings.

In terms of their influence on urban citizens, if the temperature rises, the stress level due to tropical nights intensifies as well, and increased heat waves pose a deadly threat to the elderly and infants who are most vulnerable to heat. The increase in the frequency of concentrated heavy rain and the activities of strong tropical low pressure boosts the death toll from flood damages and avalanches, and respiratory disease, waterborne epidemic, food poisoning, and skin disease are likely to follow in its wake. In addition, an increase in the number of

regions with dry spells mitigates agricultural production, increasing the danger of food shortages and malnutrition. If the sea level rises, the number of deaths rises among those living in such vulnerable areas as seaside or the foot of rivers, and the populations in these regions are likely to migrate to other areas.

In terms of the influence of the climate change on urban infrastructures, rising temperature affects the water resource, which is created from melted snow, and increased heat wave gives rise to water demand and generates red tide in rivers and lakes, causing problems in water quality. Moreover, heat wave expands or sinks roads or railroads. An increased number of concentrated heavy rain and strong tropical low pressure damages infrastructures such as riverside or coastal roads, generates flood, or causes blackouts in subways and underground paths. In addition, concentrated heavy rain can create an avalanche, collapsing or damaging such infrastructures as roads or rivers. When the number of areas suffering from drought multiplies, the water volume at rivers diminishes, incurring a blow to water supply, and when the sea level rises, there is high likelihood of flooding of such infrastructures as coastal roads or railroads and the migration of coastal infrastructures. The rising sea level affects estuaries, but its effects also can be felt in the upper stream; its capacity to hold fresh water diminishes and the fresh water along

1) "Governance for Sustainability : Towards a 'Thick' Analysis of Environmental Decision-Making," by Adger et al., 2003, *Environment and Planning A*, 35 (6) June.

2) *Urban Planning for Climate Change*, by Edward, 2007.

the coast turns into salt water.

In the case of buildings, increased temperature gives rise to more demand for air conditioning in summer, and excessive heat waves cause increases in water demand at buildings and facilities. As the number of concentrated heavy rain and strong low pressure increases, flood damages at low points at riverside increase, semi-underground buildings become swamped, and landslides collapse or damage buildings at the bottom of the mountains. Strong winds incur heavy damages on building windows, sign boards, roofs, etc. The increase in the number of areas suffering from drought intensifies water shortage problems at residential and commercial areas, making it difficult to maintain buildings. A rising sea level raises the likelihood of flooding of coastal structures. This results in the relocation of the structures.

Thus, the cities most vulnerable to climate change are the coasts, riversides, underground, and the foot of mountains, and the infrastructures and buildings and citizens residing in these vulnerable areas become highly exposed to the danger of natural disasters.

The extent of damage from natural disasters, caused by climate change, varies, depending on the city's location and land use characteristics. In case of Korea, a great proportion of coastal cities are industrial (46% of coastal cities), and a great proportion of inland cities are residential and commercial (53% of inland cities). Population and infrastructure facilities are heavily concentrated in coastal industrial cities, and it is expected that the rise of sea level or typhoon, etc., would have a great effect on citizens and infrastructure facilities, with the likelihood that buildings and facilities might be damaged from strong wind, salty wind, and high degree of moisture. Among inland cities, it appears that residents of residential and commercial cities would suffer the greatest blow from heat wave and drought, and in case of industrial cities, the greatest damage will be in the area of infrastructures such as transportation facilities.

Effective Coping Strategies in Urban Areas

In the case of urban citizens, purchasing or renting a shaded house in preparation for heat waves, managing risks, and spatial planning are some effective measures to cope with climate change. In

terms of risk management, speedy communication, making and supplying hazard maps, designating and managing shelters and emergency routes, and offering special care for the elderly and infants are effective measures. In terms of spatial planning strategies, effective measures include building resilient coping mechanisms throughout the city, such as urban forestation, securing of water spaces, building wind corridors, and improving permeability ratio, as well as performing flood risk analysis when planning cities and discouraging the construction of population attracting facilities in these areas.

Among planned urban facilities, there are some such short-term devices as barrier walls for flood prevention, but given their limitation in coping with natural disasters, it is better to employ spatial planning strategies at the city planning stage. There needs to be a long-term forecast of rising sea level along the coast and flood risk analysis of riversides in view of the climate change. These will help identify vulnerable regions, which then can be reflected in land use plans to place transportation facilities at efficient places and determine the location and size of water reservoirs. In addition, it is necessary to secure water space at rivers and use it in multiple ways—for flood prevention, reserving water, mitigating heat island effect, utilizing waterfronts—and strengthen design standards for such structures as sewage pipes.

In the case of buildings, like planned urban facilities, short-term measures have their limits. Countermeasures should be approached from a spatial planning and systematic perspective. Various coping measures should be built into the city to make the city resilient—forestation, securing of water space and wind-resistant roads. Buildings should be located strategically, based on flood risk analysis linked with land use plans, and natural ventilation, air-conditioning, and rainwater retention systems should be built into buildings.

In order to cope with and mitigate natural disasters that are becoming large scale and diversified due to climate change, along with individual building-oriented anti-disaster measures, it is important to employ integrated spatial measures that are linked with land use and strengthen city's resilience by building greens, water spaces, and wind corridors.

INTERNATIONAL COOPERATION

Visit by Chinese Officials

On June 28, 2010, the International Cooperation Team of KRIHS met with Mr. Chen Shiwen, vice chairman of the Association for Economic Development of China, and his team in the conference room of KRIHS. Attendees included KRIHS president and Mr. Lee Sang-mu, chairman of the Global Agriculture Policy Institute; and Mr. Park Chang-Shik, professor of the Agricultural Cooperative College. Dr. Jung Hee-nam, head of the Center for Land Policy at KRIHS, introduced Korea's farming policies over the past 60 years and their outcomes. Mr. Shiwen expressed his wish to continue such exchanges with KRIHS to promote development of both countries.

Debriefing Session for Cambodia's NSDI Master Plan

On June 29, 2010, KRIHS held a debriefing session in the conference room of Cambodia's Ministry of Land Management, Urban Planning & Construction regarding the "Production of the National Base Map and the Establishment of the Master Plan for the National Spatial Data Infrastructure (NSDI) in Cambodia." Attendees included ten government officials attached to the General Department of Cadastre and Geography (GDCG) and KRIHS research fellows. The two sides discussed the NSDI of Korea and Cambodia and the direction of the Cambodian NSDI master plan. They will release a rough draft of the master plan for Cambodia's NSDI by late 2010 and have a working-level meeting early in 2011.

Regional Development Conference

The 2010 International Conference for Regional Development co-hosted by the Presidential Committee on Regional Development; Ministry of Land, Transport and Maritime Affairs; and the Ministry of Knowledge Economy, and

organized by KRIHS, was held between July 7 and July 9, 2010 at the Jeju Shilla Hotel. The purpose of this conference was to explore ways to promote active exchanges and cooperation between the central and local governments in forming the "Northeast Asian Economic Community" declared during the summit of the three nations—Korea, China, and Japan—last October. More than 300 people, including renowned scholars from both home and abroad, attended the conference. It is expected that this international conference will play a significant role in enhancing cooperation among the regions in Northeast Asia.



Conference on River Restoration Planning

On July 30, 2010, Dr. Lee Dong-woo, senior research fellow of KRIHS, organized a Conference on River Restoration Planning in the LA Korean Cultural Center. Staffers from LA City, LA County, and LA Watershed Council were invited. The flooding of the LA River between 1914 and 1934 inflicted tremendous damage on the area, and to prevent further damage the riverbed was subsequently changed to concrete. However, in April 2007, the state government, environmental organizations, and civic groups drew up a Los Angeles River Revitalization Master Plan to remove the concrete, revitalize the river, and greenify the neighborhoods. The master plan and specific measures for developing the neighborhoods were presented at the conference. This was an opportunity to derive implications for utilizing Korea's riverside areas.

NEWS & ANNOUNCEMENTS

Training on the Use of ILIN

KRIHS, commissioned by the Ministry of Land, Transport and Maritime Affairs, has provided user training on the Industrial Land Information Network (ILIN). The training was given to staff related to industrial complexes across the nation for three days from May 26 to May 28, 2010 in the 12th-floor computer room at Anyang Knowledge Industry Promotion Agency in Gyeonggi-do. The goal was to train staff in the use of the Industrial Land Information System and Industrial Complex Permission Monitoring System in order to improve data accuracy and to provide a venue for communication and knowledge sharing among the staff.

MOU With Graduate Schools of Spatial Information

On May 28, 2010, KRIHS signed an MOU with eight graduate schools of spatial information to support the “2010 project for training talented people in the area of spatial information.” Staffers of the Ministry of Land, Transport and Maritime Affairs, KRIHS, and professors of the eight graduate schools attended the ceremony and discussed the annual evaluation criteria for 2010 and the development direction of the graduate school of spatial information. This project seeks to enhance core talents who will lead the new IT-

integrated spatial information industry. A total of 720 professional talents are planned to be produced between 2009 and 2013. It is expected that this project will help solve the shortage of professional manpower in the spatial information industry and contribute greatly to the progress of the domestic spatial information industry in the future.

Inaugural Assembly for Urban and Architectural Policy Forum

The “Inaugural Assembly for Urban and Architectural Policy Forum” was held at KRIHS on June 10, 2010. Participants included chairmen of urban and architectural associations, presidents of regional research institutes, members of the main forum, chairmen of sectoral forums, and related staff of the Ministry of Land, Transport and Maritime Affairs. Members of the main forum were appointed, and the chairmen of each sectoral forum gave presentations related to the main discussion topics. The Urban and Architectural Policy Forum consists of a main forum and five sectoral forums (urban policy, urban regeneration, green city, urban culture, and architecture policy) held each month. The forum is expected to serve as a venue for exploring policy agenda and alternatives to meet the challenge of changing the urban policy environment. It is also expected to help build a policy network among private, public, and academic sectors, and research institutes.

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KRIHS carries out various activities to collaborate with the international research community in solving theoretical and practical problems concerning human settlement issues and planning. Also, it provides research expertise and consulting services along with training programs for foreign governments and institutions.

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