

# Towards sustainable compact city planning in a society facing population decline

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## 1. Foreword

Our country's population decline reached its peak in 2008, and the uneven regional distribution of the population is expected to accelerate. For this reason, the Ministry of Land, Infrastructure, Transport and Tourism fixed its sights last July on the year 2050, by announcing the "National Development Plan Grand Design 2050," which indicated principles and ideas that would shape the future of the country. As well, in May of last year, the Act on Special Measures concerning Urban Reconstruction was revised, and its institutionalization and various supporting measures were planned and developed to realize a compact city planning, where medical care/welfare institutions, commercial facilities and housing could be placed in one location with easy access to these public facilities using public transportation so that elderly people and child carers can live comfortably in good health.

## 2. The direction in which research and development should head

Research and development is demanded from the following viewpoints regarding the further development of compact city planning.

- ① Long-term future forecast of urban environments: As population decline and a super aging society is expected to continue, it is necessary to forecast how future urban area environments will change, keeping the entire city in perspective as well as the urban area characteristics and resident conditions from the city center to the city suburbs.
- ② Forecast of the influence to the city infrastructure and services: on the other hand, these chronological forecasts are important from the standpoint of a sustainable city management under financial restrictions, as the burdens of the aging infrastructure, medical care and welfare services are expected to increase.
- ③ Quantification of the city problem, visualization: regarding the various facilities located in the city, optimization of land use, crowd or urban traffic problems in the city center, it is necessary to develop the technology to "quantify" objective data pertaining to the location so that it is easy to understand and "visualize."
- ④ The use of ICT and new technology: the application of big data and sensing technology is necessary in order to grasp the actual state of the various facilities and transportation structuring the city and the condition of its residents and companies by its location, so that the current issues can be reflected in future forecasts.
- ⑤ Reflecting the disaster risk of cities: by reflecting the disaster risk like earthquakes, tsunami and floods of various cities, focusing the use of low disaster risk areas and take strategic initiatives to reduce risks in an urgent matter.
- ⑥ Explanation of living environment changes and measurement effects: since the understanding of the local residents and company is indispensable for the consolidation of city functions etc., it is important to develop a tool that can intelligibly explain the gradual consolidation process from the assumed future forecasts and the resulting living environment changes and measurement effects.
- ⑦ Establishment of the city management method: it is necessary to establish a city management method that is based on the cooperation and sharing of roles between the main public constituent with local residents and private businesses, in order to cope with the operation management of each city's

infrastructure, consolidation, maintenance of the urban area's layout, and reorganization efforts for improved functionality of the city in accordance with the vision of the ideal future city.

Below, we will introduce the research content being promoted by the Urban Planning Department.

### 3. Developing support tools for land suitability evaluations

To enable the current urban policy issue of compacting cities, city planning based on the right admixture of development and maintenance, and public transportation holds the key, however, the rational decision-making information of local public bodies who conduct land use control and location instructions is required. Because of this, "the research regarding land suitability evaluation technology for the strategic management of land use in city planning", a program to evaluate a land's suitability was developed.

In this land suitability evaluation program, land gradient, road proximity, the degree of affinity with adjacent use and the accessibility to public facilities is calculated for each 10m mesh. As well, by calculating the suitability the value of land use based on the information of assumed hazardous flood/landslide disaster sites, for the residence system, customer collection system and agricultural system, suitability results can be expressed on a map in 10m mesh, 100m mesh or block increments. In the future, we plan on creating a user's manual for this program and release it with the program on the NILIM homepage.

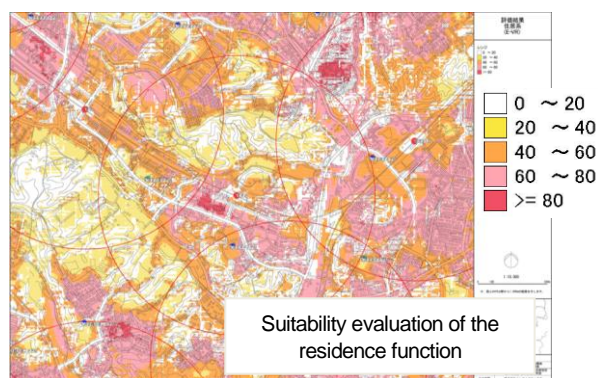


Figure: Example of a land suitability evaluation

### 4. Developing tools to evaluate urban accessibility

As the reorganization of future urban structures and

renovations are being pushed forward under the premise that population decline and a super aging society will continually progress, many regional hub cities are striving for a "compact city planning centered on public transportation."

Because of this, we are developing an "accessibility index" to calculate the ease of access to public facilities etc. including wait times for public transportation using objective data on a map, and at the same time creating a user's guide that we are releasing on the NILIM homepage. As well, we are developing a program that can easily calculate and map the "accessibility index" using the geospatial data of public facilities etc. and traffic information of public transportation, which we are scheduled to release with a user's manual on the NILIM homepage.

### 5. Developing tools to diagnose bustling crowds in the city center

To support the planning initiatives that prioritize pedestrians in declining city centers of provincial towns, it is required to accurately grasp the conditions of pedestrians and to strategically develop policies that will bring the bustling crowds back.

Because of this, simple steps were taken to grasp the pedestrian conditions using bicycles with GPS-equipped miniature cameras and conducting hearing surveys. At the same time, using the "spatial network analysis" method, the distribution and a migration route of the bustling crowds, the visualization of the facility location situation and the present problems were arranged from a spatial viewpoint. Through the indexing of the pedestrian environment's spatial structure, the spatial factors affecting the present condition was clarified and methods on how to propose policies to create more bustling crowds was drafted into a manual and released.

### 6. Developing forecast methods of future district images in the suburbs

In order to systematically advance the city's consolidation, developments are being made in the simple forecast and operation and maintenance technology in future district images as a method to objectively evaluate and select the downsizing urban

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areas/restructuring candidate districts in the city suburbs.

Regarding simple forecasts of future district images, based on the forecasts of future population/household structures in a fluctuating society, evaluations will be conducted on living-related services and medical care, the continuation of welfare and public utilities facilities etc., and the classification methods of districts where downsizing/restructuring countermeasures will be enforced, will be developed.

As well, regarding the maintenance method of the suburban areas that have agreed to the downsizing/restructuring measures, the technological development of a gradual and optimal reduction/closing program for the urban area and infrastructure service will be provided according to the service life of the infrastructure as well as the lifestyle and intentions of the residents. A restructuring business scheme that will be integrated with the former business is also scheduled for proposal.

#### 7. Future initiatives for creating a compact city

In the future, we will continue to promote the research and development of these initiatives and promote the wider use of the results. At the same time, we will also work with related departments starting from the next fiscal year in the "strategic stock management technology development of regionally secure residential functions," to develop the evaluation technology of appropriate locations for city functions to support local residents in anticipation of a super aging society. As well, we also plan on participating in the "development of strategic disaster risk reduction methods in cities under climate change" to develop an integrated flood risk evaluation method and low risk society construction frame for cities under climate change.

We hope these research results will be utilized in the sustainable compact city planning initiatives in each city.