

# 首届“环境·遗产·城镇规划” 国际学术研讨会论文集

SHOUJIE HUANJING YICHAN CHENGZHEN GUIHUA  
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## 序

进入 21 世纪的中国,城镇化进程正迈向新的发展阶段。随着经济全球化的发展,中国的城镇化问题逐渐进入国际视野,并日益受到国际社会的广泛关注。诺贝尔经济学奖得主斯蒂格利茨曾预言:“21 世纪对世界影响最大的两件事,一是美国的高科技产业,二是中国的城镇化。”中国政府提出“新型城镇化”的方针,将“坚持走中国特色新型城镇化道路”提到国家重大发展战略高度,得到了社会各界的积极响应,也对城乡规划学界提出了明确的要求。

作为世界上城镇建设较早、城镇密度最高的文明古国,中国的城镇发展拥有悠久的历史传统和深刻的营造智慧。然而随着经济和文化的全球一体化,当今世界各国广泛出现的“城市病”也逐渐蔓延至中国,城乡发展失衡、生态环境破坏、土地资源浪费、千城一面等问题使中国的城镇化进程面临诸多挑战。2012 年 3 月温家宝总理在《政府工作报告》中提出:“将加强环境保护,着力解决重金属、饮用水源、大气、土壤、海洋污染等关系民生的突出环境问题。”2012 年 5 月,国际欧亚科学院中国科学中心《中国城市发展报告 2011》提出:中国城镇可持续发展面临的诸多问题和危机需依靠城乡统筹发展予以破解,而中国城乡统筹规划要从认识中国国情开始,并结合本地化去寻求城市不同的发展路径,避免同质化现象。目前,城乡规划学领域中区域经济一体化、城乡建设一体化、生态环境保护、土地资源管理、历史遗产保护等一系列课题,正成为中国城镇化研究的热点。

在此背景下,2013 年 11 月 9 日至 10 日,在英国物流与交通规划协会、浙江省规划学会、《规划师》杂志社等单位支持下,由浙江工商大学主办、浙江工商大学旅游与城市管理学院承办的首届“环境·遗产·城镇规划”国际学术研讨会在浙江工商大学下沙校区举行。著名遥感信息技术专家、中国工程院院士潘德炉,伦敦大学博士、世界知名交通规划专家张旭教授,法国波尔多景观大学教授、西安交通大学特聘教授 Fayolle Lussac Bruno,日本熊本大学教授位寄和久等 80 余位国内外相关领域知名专家学者出席了会议。

本次学术研讨会旨在推动区域规划、城市规划与设计、城市生态环境保护及相关领域的发展,共同探讨中国特色的新型城镇化发展模式。中国工程院院士潘德炉以“浙江沿海环境和灾害在城镇化规划中的思考”为题做了主题发言。英国物流与交通规划协会高级项目主管 Dorothea Carvalho、日本熊本大学工学部副部长位寄和久教授、南京师范大学闫国年教授等六位国内外专家学者围绕“环境·遗产·城镇规划”这一主题,分别结合各自研究领域做了大会发言。此外,来自美国、日本以及我国多所高校的专家学者围绕“环境规划与 GIS”和“遗产与城镇规划”两大主题进行热烈的学术探讨,交流了国内外环境规划与 GIS 运用的最新研究,展示了遗产与城镇规划领域的前沿成果。在本次会议的青年论坛上,来自浙江大学

建筑工程学院、同济大学建筑与城市规划学院、浙江工商大学旅游与城市管理学院等多所高校的学生围绕“遗产与城镇规划”“环境与城镇规划”主题并结合各自的论文也做了精彩发言。

本次学术研讨会是中国城乡规划界的一次学术盛宴,云集了学术翘楚和行业精英,共同探讨中国新型城镇化的新思路、新方法。会议收到了日本、法国、英国等八个国家的专家学者近百篇论文,现择其精要编辑成册,以飨读者。

唐代剑

2013年11月20日于钱塘江畔

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# 第一篇

## 城镇生态环境 保护与土地资 源管理



# Accessibility of Urban Form Towards a Low-carbon Society

## —A Case Study in Kumamoto

Jun YE<sup>①</sup> Riken HOMMA<sup>②</sup> Kazuhisa IKI<sup>③</sup>

### 1. Introduction

A large amount of green house gases (GHGs) have been exhausted with the rapid development of urbanization and human activity, and the reduction of environmental load on energy consumption of daily transportation has caused extensive concern. A low-carbon society (LCS)<sup>④</sup> is a society which has a minimal output of GHG emissions into the biosphere. GHGs specifically refers to CO<sub>2</sub>. The international community has come to the conclusion that there is such an accumulation of GHGs (especially CO<sub>2</sub>) in the atmosphere due to anthropogenic causes that the climate is changing, with negative impacts on humanity in the foreseeable future.

Man-made CO<sub>2</sub>, as a major component of greenhouse gas emissions, contributes significantly to the imminent environmental challenges. Although cities are being recognized as the major contributors to the global GHG emissions, they also form an integral part of the sources of solutions. Previous researches indicated that it is necessary to formulate and investigate a mid/long-term action projects on municipal level, such as the urban morphology, traffic system, land use change, etc. to achieve a low-carbon society. Some of the frequently proposed strategies such as more efficient use of fuel, improvement of public transportation, education of citizens, and implementation of “car free day” were put forward in European and American areas.<sup>⑤</sup> In Japan, three types of representative strategies were approached for realizing a low-carbon society: construction of an institutional social system, maintenance of social capital on software and hardware, natural

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④ Maatta-Juntunen, H., et al. Using GIS tools to estimate CO<sub>2</sub> emissions related to the accessibility of large retail stores in the Oulu region, Finland. *J. Transp. Geogr.* (2010), doi: 10.1016/j.jtrangeo.2010.03.001.

⑤ Maatta-Juntunen, H., et al. Using GIS tools to estimate CO<sub>2</sub> emissions related to the accessibility of large retail stores in the Oulu region, Finland. *J. Transp. Geogr.* (2010), doi: 10.1016/j.jtrangeo.2010.03.001.

environment management. Implement the low-carbon lifestyle, developing efficient market systems for the carbon-emission tax, emissions trading and sharing the successful experiences to the world—these were the main representative measures for constructing of institutional social system. On the aspect of natural environment management, citizen's participation and a connected ecological network with excellent natural environment were constructed. Moreover, the genetic strategy concerning biomass resources was promoted on the agriculture and forestry ground. The study on urban spatial structure of low-carbon city becomes a hotspot in recent years.<sup>①</sup>

With the large commercial facilities moving to the outskirts and the number of the public transportation users decreasing, the vehicle usage and the environmental load increase in recent years. Aiming at building Kumamoto City as a low-carbon city, there are three key strategic guidelines of urban development and construction on the aspect of urban structure, the formation of the interrelated urban structure between downtown and sub-center residential area, the establishment of new vitasphere where daily life can be managed with on foot and the bicycle, and the inhibition of transport energy consumption.

In 2011, Ye J. & IKI K.<sup>②</sup> indicated that strong correlation between the regional geographical features and lifestyle of daily activity were evaluated. Previous researches provided methods to analyze the internal relationship between the regional feature and CO<sub>2</sub> emissions per person or total. The traffic energy consumption on the CO<sub>2</sub> emissions of per trip and the total CO<sub>2</sub> emissions of each region from individual activities were calculated by using Person-trip (PT) survey data in Kumamoto City. The study concluded that under a precondition of taking full account of regional characteristics, it is a high feasibility to achieve LCS with less CO<sub>2</sub> emissions by adjusting the city's social structure and urban structure in the future transportation planning. The consequence of PT-CO<sub>2</sub> emissions in the ordinary situation, the total amount of PT-CO<sub>2</sub> emissions exhausted from urban activities were 3,517.7 tons a day and 1,266,400 tons for one year in Kumamoto City. Moreover, the situations of PT-CO<sub>2</sub> emissions per person were 5.3 kg a day and 1.9 tons per year. In previous study, four types of regional characteristics were sorted out, DID district residential type, sub-center residential type, surrounding residential type and suburban residential type. As a result of the gray correlation analysis, the most relevant indicator was the minimum distance to the convenience store (0.85), and the weakest one was the employed population index (0.65). From the viewpoint of PT-CO<sub>2</sub> emissions per person and total of PT-CO<sub>2</sub>, the effects of the traffic energy consumption reduction of the proposal III (Sub-center residential type) (5.5%, 18.95%) was larger than proposal II (DID district residential type) (2.75%, 13.96%) from the 2000 level by 2030. Sub-center

① *The Guideline of Low-carbon Society Planning*. Tokyo: Ministry of Land, Infrastructure, Transport and Tourism, 2005. 8.

② YE J., IKI K., HOMMA R. *Research on Urban Structure Towards a Low-carbon Society: A Viewpoint on Person-trip of Daily Activity in Kumamoto City, Japan*. The 9th China Urban Housing Conference, (2011)162—168.

of city residential type was considered as a most suitable urban morphology towards LCS in Kumamoto City.

Based on the previous studies, the general objective of this study is to propose a procedure for assessing the accessibility to public service facilities as one aspect of sustainable development of low-carbon urban structure in Kumamoto City and conduct in-depth discussions on how to improve the accessibility of urban form. Three steps have been set for this research. First, GIS tools (SANET) are applied to take the spatial analysis of public service facilities (bus stops, convenience stores, hospitals, supermarkets, post offices and banks) in Kumamoto City. Second, implement a method to measure and calculate the accessibility of public service facilities in this study to evaluate the sustainable development of low-carbon urban structure. Third, a public service facility layout planning is proposed on areas where public services are inadequate and the accessibility is evaluated.

## 2. Study Area

Kumamoto City is the capital city of Kumamoto Prefecture on the center of Kyushu Island in southwestern Japan. It is the 15th largest Japanese city and is well known for being the site of Kumamoto Castle, one of the finest castles in Japan. Greater Kumamoto metropolitan area has a population of 1,460,000, as of the 2000 census. It has now developed into a modern metropolis with broad

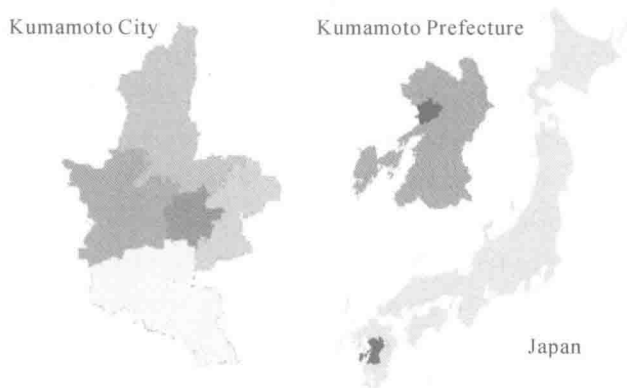


Fig. 1 Location of Kumamoto City

streets lined with high-rise buildings. A well-developed local public transport system is provided by the local government. Trams run to a few suburbs near the downtown area. A large bus terminus provides access to both local and intercity destinations. JR Kumamoto station also provides rail links to Japan's extensive rail network. Kumamoto City covers 389.53 km<sup>2</sup> as total area, and has a populations of about 730,000 (March 1, 2010) with the 1,880 km<sup>2</sup> as density.

## 3. Data Sources and Methodology

The data sets used in this study comprise road network, population and housing census data (2005), the location of the existing public service facilities data in the study area, have been digitized. The road network data which contains accurate data on the location of all roads and streets was supplied by Infrastructure Planning and Management

Laboratory in Kumamoto University. The population and housing census data was obtained from the statistics bureau, the ministry of internal affair and communications. The existing public service facilities include bus stops, convenience stores, hospitals, supermarkets, post offices and banks, etc. The location data of those facilities was got from Kumamoto GPMAP in 2010.

### 3.1 Spatial Analysis

In this study, SANET method is used to conduct the spatial analysis in Kumamoto City. SANET is the Plug-in Program which statistically analyzes spatial patterns of events that occur on/alongside networks. SANET provides a collection of ArcGIS-based tools for analyzing events that occur on or alongside a network. Three tools are used in this study: Kernel density estimation, global auto nearest neighbor distance method and global cross nearest neighbor distance method. For a given set of points on a network, Kernel density estimation estimates the density function of the points over a network and it can be showed on 3D by ArcScene. The global auto nearest neighbor distance method and global cross nearest neighbor distance method test the complete spatial randomness (CSR) hypothesis in terms of the shortest-path distance from every point in a given set of points placed on a given bounded network to its next nearest point in the set. Note that in the literature, the global auto nearest neighbor distance method is simply referred to as the nearest neighborhood distance method. The global cross nearest neighbor distance method is sometimes referred to as the conditional nearest neighborhood distance method. In general, it is assumed that type B points are temporal, while type A points are stable over time; The CSR hypothesis means that points are independently and identically distributed according to the uniform distribution over the network, or points follow the homogeneous binomial point process on the bounded network.

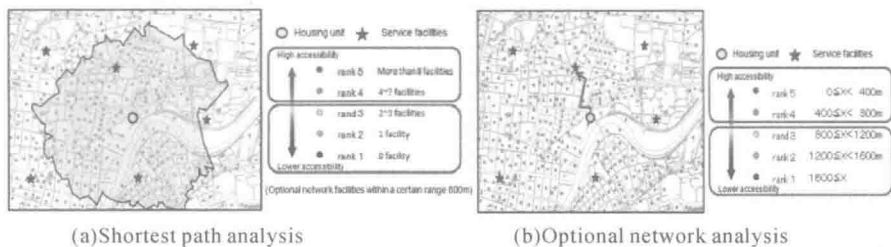


Fig. 2 Accessibility to public service facilities

### 3.2 Accessibility to Public Service Facilities

Accessibility refers to how easy it is to go to a site. In network analysis, accessibility can be measured in terms of travel time, distance, or any other impedance on the network. ArcGIS network analysis allows us to solve common network problems, such as finding the best route across a city, finding the closest facility, identifying a service area around a



location, etc. The closest facility solver measures the cost of traveling between incidents and facilities and determines which are nearest to one other, reports the shortest distance. In this study, we chose the shortest path analysis method to analyze the arrangement model. The shortest path used for analysis is the shortest distance from the housing unit to the service facilities. It is an important index for the accessibility evaluation. Accessibility analysis to locate service facilities include two parts, the distance to the nearest facility and how many optional network facilities within a certain range. In this study, we indicated less than 800m is the vitasphere where daily life can be managed on foot and by bicycle.

### 3.3 Proposal for the Location Plan

The proposal for the location plan is considered on the basis of the shortest path analysis derived from the network analysis. The following points have been applied to the new facility location plan.

(1)Based on the accessibility of different facilities in each ward in Kumamoto City, two types of facilities (mobile facility and fixed facility) are considered on proposal for the location plan to improve the accessibility in those areas.

(2)New community facilities will be considered and located in housing lots or vacant lots. Based on these points, the new location plan is shown by the GIS.

## 4. Results and Discussions

### 4.1 Spatial Analysis of Facilities

In this study, two types of Kernel density estimation were conducted by using ArcGIS network analysis, the normal one on 2D and spatial one on 3D along the Network (bus route) (Fig. 3, Fig. 4). As convenience stores for example, Kernel density in central city is higher than other wards, on the East ward and North ward, the density of convenience stores follow a gourd-shaped distribution along the bus line route Network Kernel Density of Supermarket, monetary facilities, medical facilities in Kumamoto City also follow a gourd-shaped distribution along the bus line route.

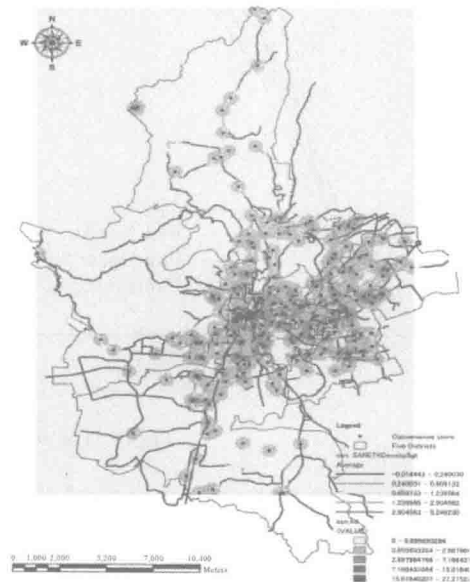


Fig. 3 Kernel density estimation convenience stores 2D