

# THE CASE STUDY OF THE REGENERATION OF KITAKAWACHI REGION BY A NEW PLANNING METHOD FOR THE SUSTAINABLE URBAN ENVIRONMENT

---

**Okinori TANIGUCHI**  
Professor  
Environmental Design Department  
Osaka Sangyo University  
3-1-1 Nakagaito Daitoshi  
Osaka 574-8530  
Japan  
Tel: +81 72 875 3001  
Fax: +81 72 870 7857  
E-mail: o-tanig@edd.osaka-sandai.ac.jp

Sunil Babu SHRESTHA  
Subha Construction (P) Ltd.  
P.O. Box. 4542, Kathmandu  
Nepal  
sunilbabus@yahoo.com

**Masatake KAWAGUCHI**  
Assistant  
Environmental Design Department  
Osaka Sangyo University  
3-1-1 Nakagaito Daitoshi  
Osaka 574-8530  
Japan  
Tel: +81 72 875 3001  
Fax: +81 72 870 7857  
E-mail: masa@edd.osaka-sandai.ac.jp

**Kazuhiko SAKAKIBARA**  
Professor  
Environmental Design Department  
Osaka Sangyo University  
3-1-1 Nakagaito Daitoshi  
Osaka 574-8530  
Japan  
Tel: +81 72 875 3001  
Fax: +81 72 870 7857  
E-mail: k-bara@edd.osaka-sandai.ac.jp

**Yoshikazu FUKUI**  
Lecturer  
Environmental Design Department  
Osaka Sangyo University  
3-1-1 Nakagaito Daitoshi  
Osaka 574-8530  
Japan  
Tel: +81 72 875 3001  
Fax: +81 72 870 7857  
E-mail: y-fukui@edd.osaka-sandai.ac.jp

---

**Abstract:** This paper discusses GIS application to the regional planning as a holistic method, namely the concept “seamlessness in GIS” takes part of the moment to seam planning and designing together. The sustainable urban regeneration takes much time, more than a generation and in order to keep planning action to the targeted future it is necessary for inhabitants in the targeted region to have common total images of the plan and to pass their significance and essence down to next generations through education systems. The holistic regional plan, therefore, must include the temporal route map from the final image to the present by a series of pictorial design visions of the plan. In order to materialize these points we show the GIS view of Food Green City Vision of Kitakawachi region (177 km<sup>2</sup>) which includes 7 cities and 1.2 million people in the eastern part of Osaka prefecture, Japan.

**Keywords:** GIS, holistic, seamless, food-green-city, Natural Farming, Kitakawachi

## THE CASE STUDY OF THE REGENERATION OF KITAKAWACHI REGION BY A NEW PLANNING METHOD FOR THE SUSTAINABLE URBAN ENVIRONMENT

### 1 HOLISTIC REGIONAL PLANNING

Generally speaking GIS gives seamless presentation of geographical data. This paper discusses GIS application to the regional planning as a holistic method in a certain sense because the concept “seamlessness in GIS” takes part of the moment to seam planning and designing together. This leads to illuminate a holistic regional planning as planning by synthesis.

Illustrating planning by synthesis, if we are given the targeted final plan in the targeted period and think about how to actualize it, we need to show the temporal route map to the targeted plan, namely a series of images on the time axis to the targeted one in order to get approval from inhabitants including the mayor and companies and collaboration with them. Planning by synthesis is compared to division in arithmetic. We are given a divisor and a dividend. We hit upon a temporary part of the answer and multiply it by divisor. If the result is within the dividend, we fix it. Then we calculate the remainder and try to do again and again. Finally we get the answer or it with the remainder less than the divisor. The dividend is likened to the final plan, the divisor is to the intermediate period and activities of inhabitants, and parts of the answer are elements of a series.

More strictly speaking, this process is formulated as ‘analysis by synthesis’. For example, in the linguistics study like this:

$$\mathbf{s}=\mathbf{f}(\mathbf{m}) \quad (1)$$

**s** as signal, **m** as message, **f** as function to code a message.

In the regional study we know the estimation of population in Jomon period ( B.C.8000-A.D. 100) in Japan.

Here we think **s** as the sustainable urban environmental image like Figure 1 or Figure 2 in the next chapter, **m** as the intermediate image in the temporal route map in the chapter 3, **f** as planning conditions and process to generate pictorial images.

## 2 FOOD GREEN CITY VISION

In order to materialize these points we start from the GIS view of Food Green City Vision (FGC Vision) of Kitakawachi region (177 km<sup>2</sup>, 69mi<sup>2</sup>) which includes 7 cities and 1.2 million people in the eastern part of Osaka prefecture, Japan (Shrestha 2004b). FGC Vision is a vision of the sustainable urban environment of Kitakawachi region in 21<sup>st</sup> century. See Figure 1, 2.

The FGC Vision satisfies the environmental viewpoints below;

1. ecological viewpoint, namely the chain of materials from high energy and low entropy to low energy and high entropy.
2. sociological viewpoint, namely people takes part of not only consumer but also producer. Here people works as tenant farmer and gets his food without loose his job.
3. economical viewpoint, namely to work as tenant farmer raises the ratio of food supply in the region.

The agriculture in this vision bases on the Natural Farming by M. Fukuoka (Fukuoka 1978), namely the agriculture must be no fertilizer, no till and no pesticides. So FGC Vision is the application of his philosophy to the regional planning.

W. Berry emphasizes in the preface of the Fukuoka's book: Fukuoka never forgets that an agriculture's wholeness includes both what he knows and what he does not know (Berry's pronouns are replaced by nouns by authors). (Fukuoka 1978, xi) Furthermore, Berry says: an agriculture that is whole nourishes the whole person, body and soul. (Fukuoka 1978, xiii) The environmental crisis comes from that although the wholeness includes what we do not know, we forget that fact. The phrase "God knows" may mean this fact.

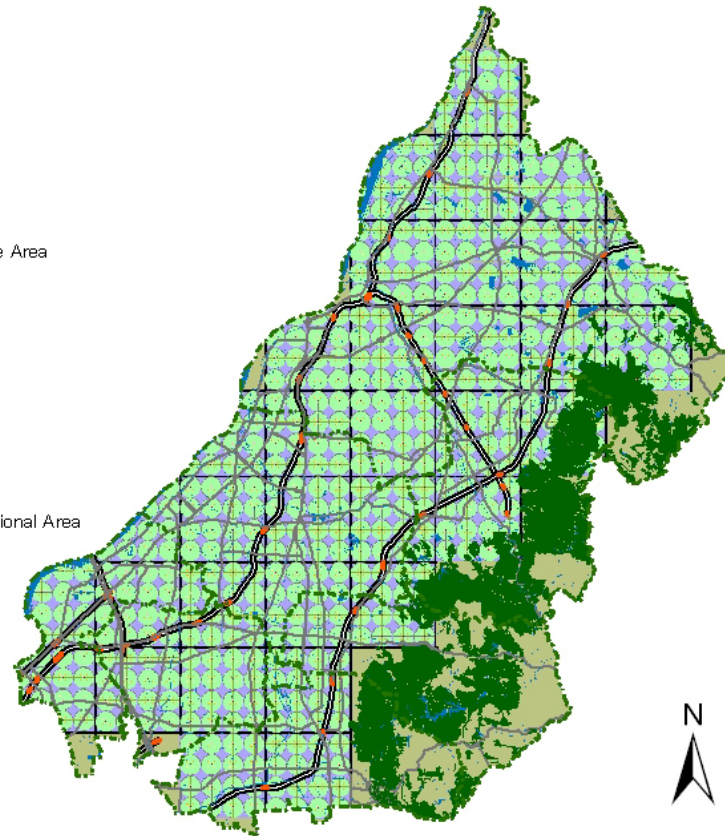
Following Natural Farming, namely no fertilizer, no till and no pesticides, is in the safe side from the environmental point of view. But people doing the scientific agriculture as their profession do not believe it and say it's only practicable as a hobby without examining in detail. It's OK as a hobby, if we get enough quantity for our family because the total labour day is little and during the residual days we can work and get money.

The urgent necessity of the regeneration of Kitakwachi region comes from the demographic trend in this region and also in Japan. The estimation of demographic trend in this region shows that the inhabitant of Kitakawachi region decreases more than half in 2060. But if we see 7 cities in detail, there are two types. Two cities, Sijonawateshi and Katanoshi, do not decrease more than half but keep their inhabitant in 2060. Other 5 cities decrease half of their inhabitants. So Kitakawachi region is the mixture of different cities in their properties. See Table1 and Figure 3.

From two cities, Sijonawateshi and Katanoshi, we can learn much about the sustainable city structure if we analyse them in detail. But here we first draw the pictorial image of Kitakwachi region. After that we can modify it according to analytical data. The pictorial image does not show what we know by analysis but what we see or what we perceive. Analysis is led by it and vice versa. This relation is reflected by GIS as table operation and feature operation, namely planning and designing.

### Legend

- Cities Boundary
- == Railways
- Stations
- Forest
- Water Bodies
- Existing Main Roads
- Neighborhood Service Building
- Neighborhood Recreational & Service Area
- Residential Buildings
- Residential Areas
- Neighborhood farms
- Neighborhood Roads
- Service Roads
- Main Roads
- Working , Manufacturing and Recreational Area
- Productive Recreational Lands

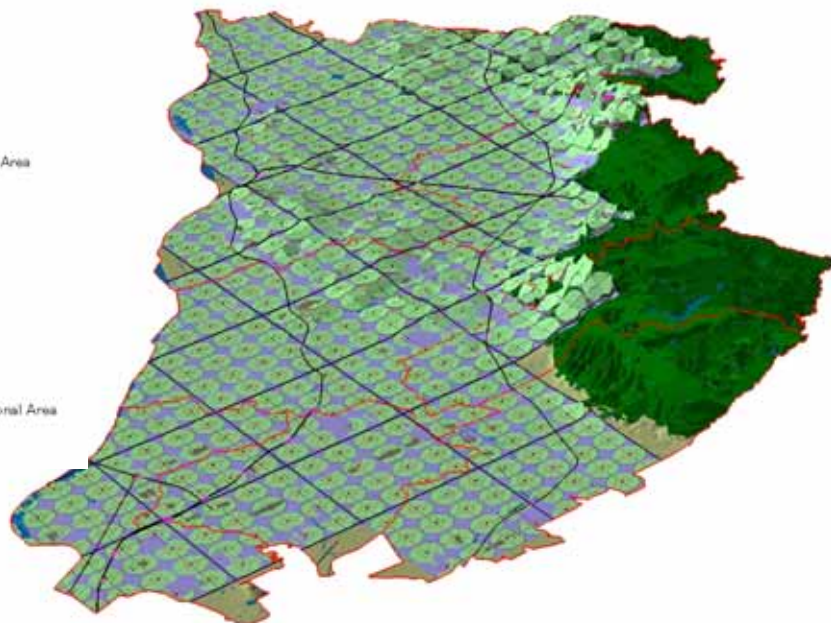


0 1.25 2.5 5 7.5 10 Kilometers

**Figure 1: FGC Vision of Kitakawachi Region**

### Legend

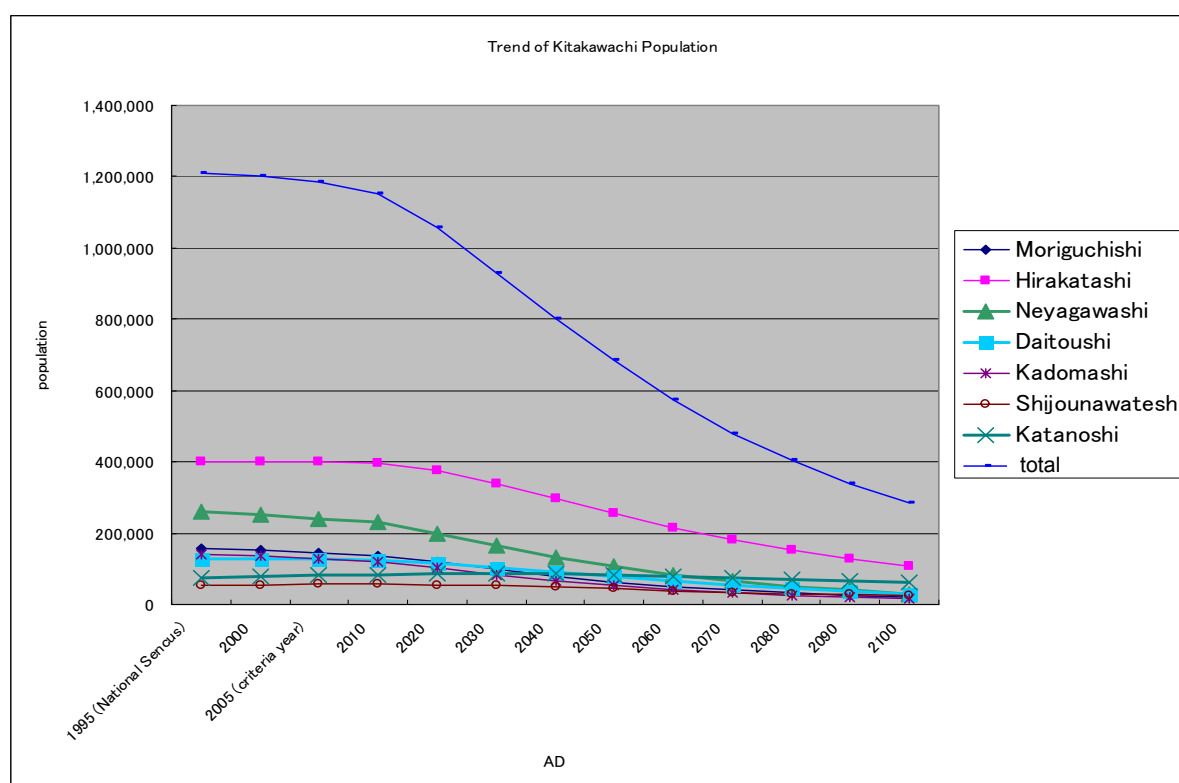
- Cities of Kitakawachi
- Forest
- Water Bodies
- Existing Stations
- Existing Main Railways
- Wayside Shrines
- Neighborhood Service Building
- Neighborhood Recreational & Service Area
- Residential Buildings
- Residential Areas
- Neighborhood farms
- Neighborhood Roads
- Service Roads
- Main Roads
- Neighborhood Roads
- Working , Manufacturing and Recreational Area
- Productive Recreational Lands



**Figure 2: 3D Vision of FGC of Kitakawachi Region**

**Table 1: Population Estimation in Kitakawachi Region**

City Name	1995 (National Census)	2005 (criteria year)	2010	2020	2030	2040	2050	2060	2070	2080	2090	2100
Moriguchishi	157,306	145,806	137,833	118,673	98,194	79,664	63,861	50,038	39,400	31,120	24,493	19,372
Hirakatashi	400,144	401,898	397,781	375,582	338,435	296,787	256,999	216,486	181,316	152,408	127,401	106,623
Neyagawashi	258,443	241,269	229,463	199,882	166,152	134,137	107,264	83,524	64,917	50,660	39,247	30,430
Daitoushi	128,838	127,831	125,108	115,663	103,016	89,638	76,919	64,219	53,369	44,212	36,218	29,635
Kadomashi	140,506	129,367	121,436	103,192	84,584	67,688	53,463	41,397	32,055	24,801	19,060	14,642
Shijounawateshi	53,763	56,156	56,507	54,999	51,704	47,763	43,433	38,586	34,404	30,624	26,974	23,773
Katanoshi	72,404	81,012	84,442	87,643	87,392	86,057	83,044	77,963	73,665	69,322	64,542	60,457
Kitakawachi	1,211,404	1,183,339	1,152,570	1,055,634	929,477	801,734	684,983	572,213	479,126	403,147	337,935	284,932



**Figure 3: Population Trend in Kitakawachi Region**

### 3 PICTORIAL DESIGN VISIONS

From two different demographic patterns we can analyse two cases in future planning in Kitakawachi region. The first one is the short term plan type, the second one is the long term plan type.

#### 3.1 Case 1: the short term plan type

5 cities (Moriguchishi, Hirakatashi, Neyagawashi, Daitoshi and Kadomashi) have their own city plans and the planning period of them is 10 to 15 years, but they do not refer to other cities or the next city and the decrease of population. The characters of

their method are with extrapolative planning method and without a long term image of the region. It is not sure where inhabitants or their heirs reach in 2060. Of course it is not shown on what kind of the route to the future they drive.

### **3.2 Case 2: the long term plan type**

The long term plan first analyzes factors which seem to support present urban situations and draws up the targeted plan based on referring them as positively or negatively. Then the plan is checked by the environmental viewpoints above, namely whether they are sustainable at least in themselves or not.

The targeted plan after generations may be far from the present image, so it is difficult for inhabitants to accept it. We show pictorially by a series of temporal visions what will happen in the course to the final stage. The pictorial presentation in planning like this raises relatively the level of cognitive power in inhabitants and the relatives and they can judge whether they should approve the plan easily by imaging that they settle themselves and spend their dairy lives in the scene.

We know how to spend a life in the present situation but when we build a new house, we are obliged to imagine a way of life in the house to be built. To build a house means not only building a new house physically but also making a new way of life. In the regional planning it is also true.

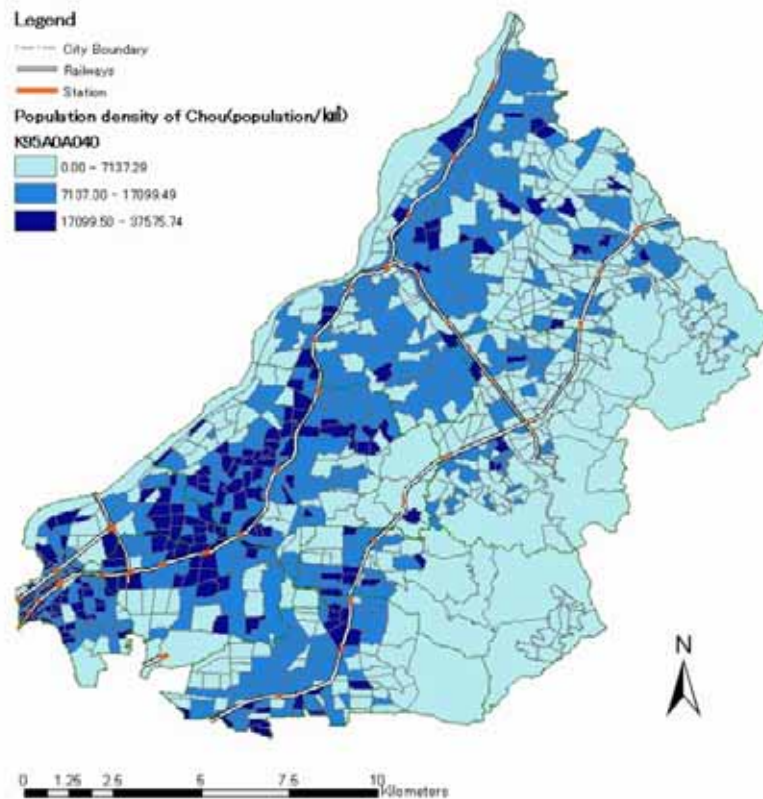
For not only inhabitants but also the designer and the planner it is more helpful in abductive inference as using pictorial or other iconic representations. By Thagard *et al.*(2005) there are instances of abductive thinking that are most plausibly interpreted as pictorial.

### **3.3 Route Map on Time Axis**

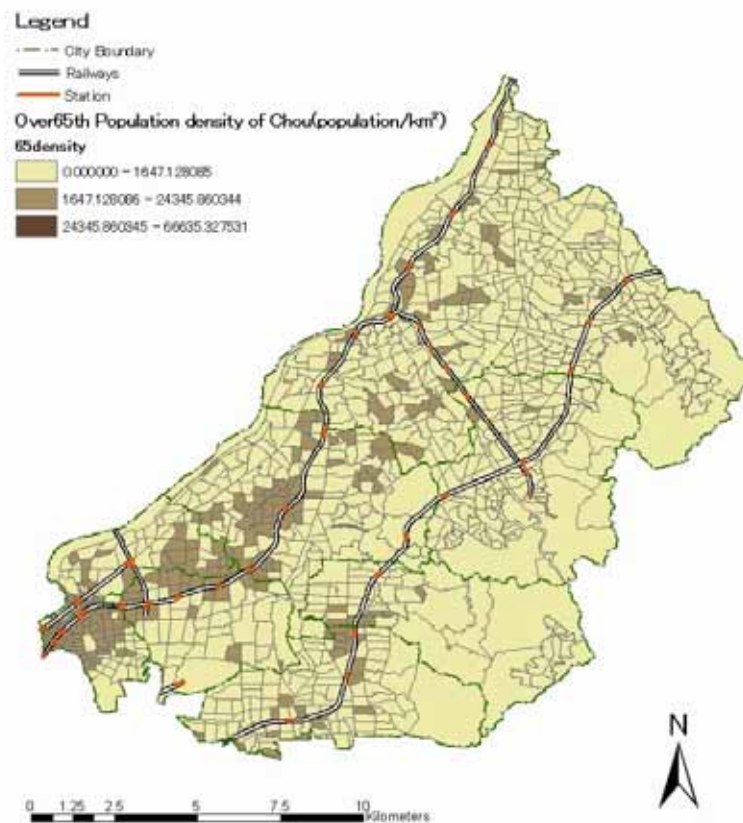
The sustainable urban regeneration takes much time, more than a generation because the concept “sustainable development” forces to consider the next generation. We need power to image the way of life beyond the contemporary way of life consecutively to the targeted future generation. We must draw not only the final plan but also the route to reach it. The latter is a meta plan about planning. In order to keep planning action to the targeted future it is necessary for inhabitants in the targeted region to have common total images of the plan and to pass their significance and essence down to next generations through education systems. The holistic regional planning, therefore, must show the route map, not spatial but temporal, from the final image to the present by a series of pictorial design visions to the targeted plan. Such route map is also to complement the limit of the environmental management system which does not give the positive future image by giving the position where we are and the orientation to which we direct on the time axis.

The properties of Kitakawachi region are;

1. The population will decrease less than half in 2060.
2. All of existing buildings expire their service life until 2060 and half of buildings should be rebuild.



**Figure 4: Population Density (1995) and Train Stations**



**Figure 5: Old Population Density near Stations**



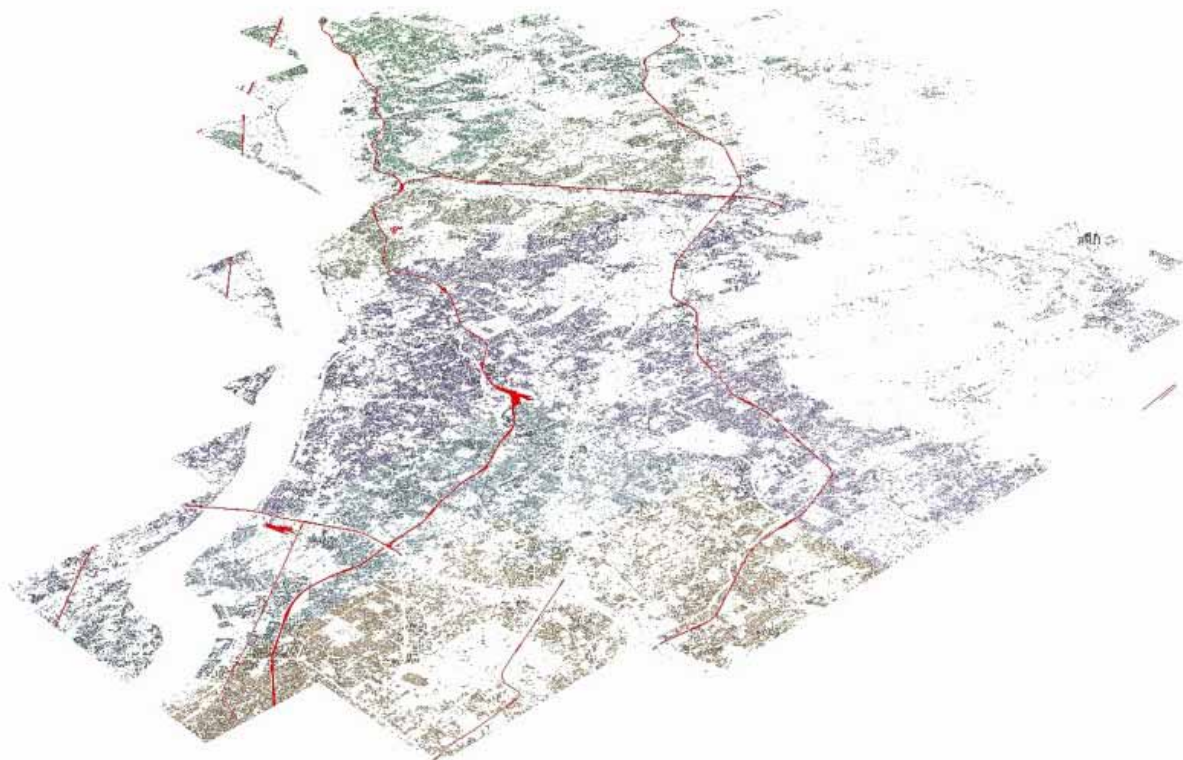
By the study of demographic data by the national census in 1995 the smallest political city boundaries called “Chou” near to train stations show higher density than average value of the region and the aging index is also high in the Chou near to the station (Shrestha *et al.* 2003b). See Figure 4 and Figure 5. So it is reasonable to articulate Kitakawachi region into two different demographic zones.

By the building type data in Kitakawachi region we set hypothesis following properties like Table 2. In this region the trend of population increase is very high from 1960 to 1975 and around these years building rush may have happened. But we don't have data of the built year of each building at hand, so we select randomly buildings and set the service life like Table 2. The table is very rough hypothesis but it's OK to convey the changing images after every twenty years with no planning (Figure 6, 7, 8).

**Table 2: Demolishing Ratio at Every 20 Years**

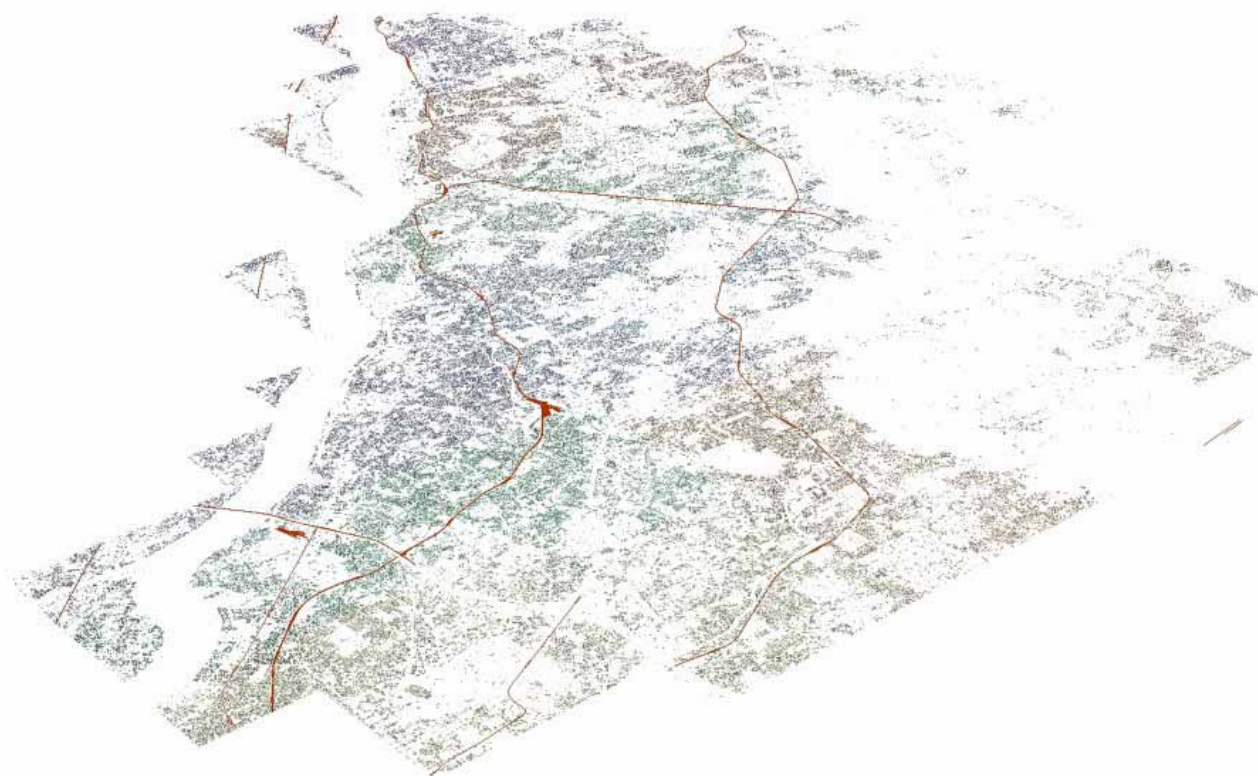
year	stories < 5	5 ≤ stories
2015	20%	15%
2035	46%	35%
2055	73%	55%
2075	100%	75%

Figure 9, 10, 11 and 12 show details around Osaka Sangyo University at every twenty years until 2075.

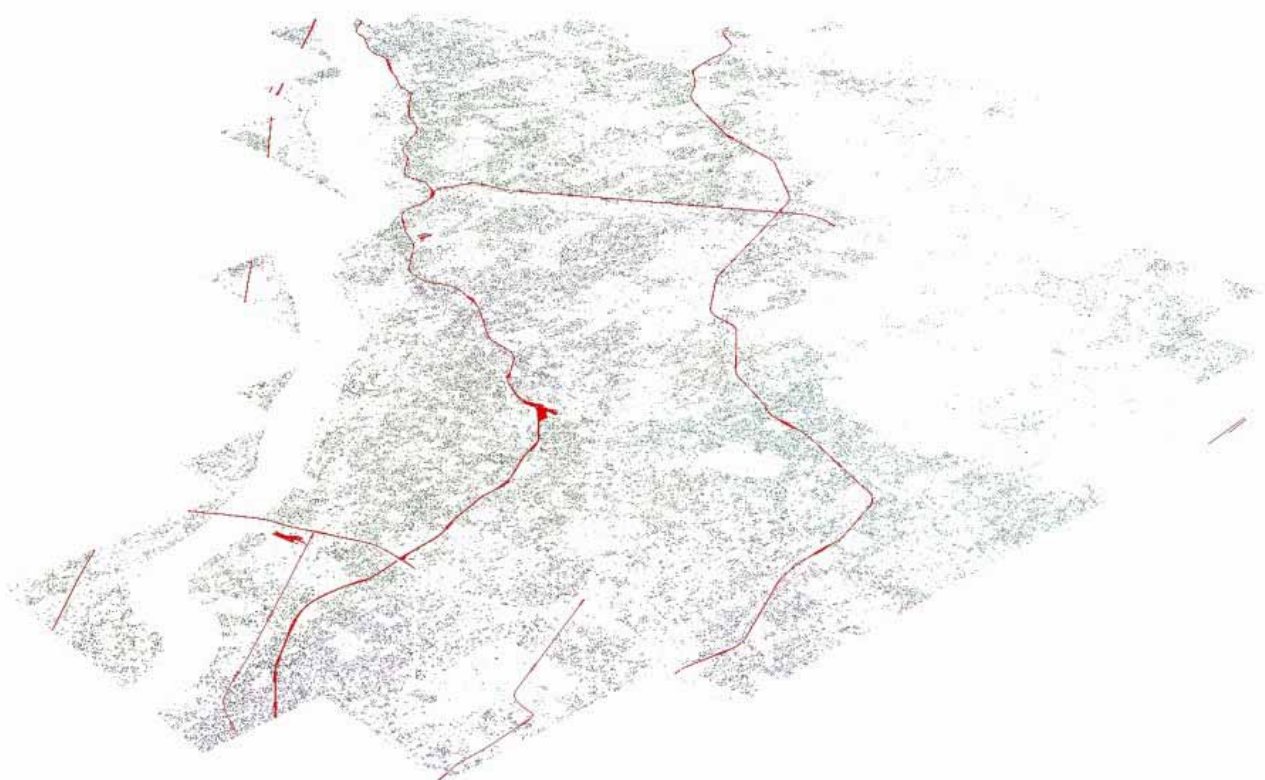


**Figure 6: Pictorial Image of Kitakawachi Region in 2015**

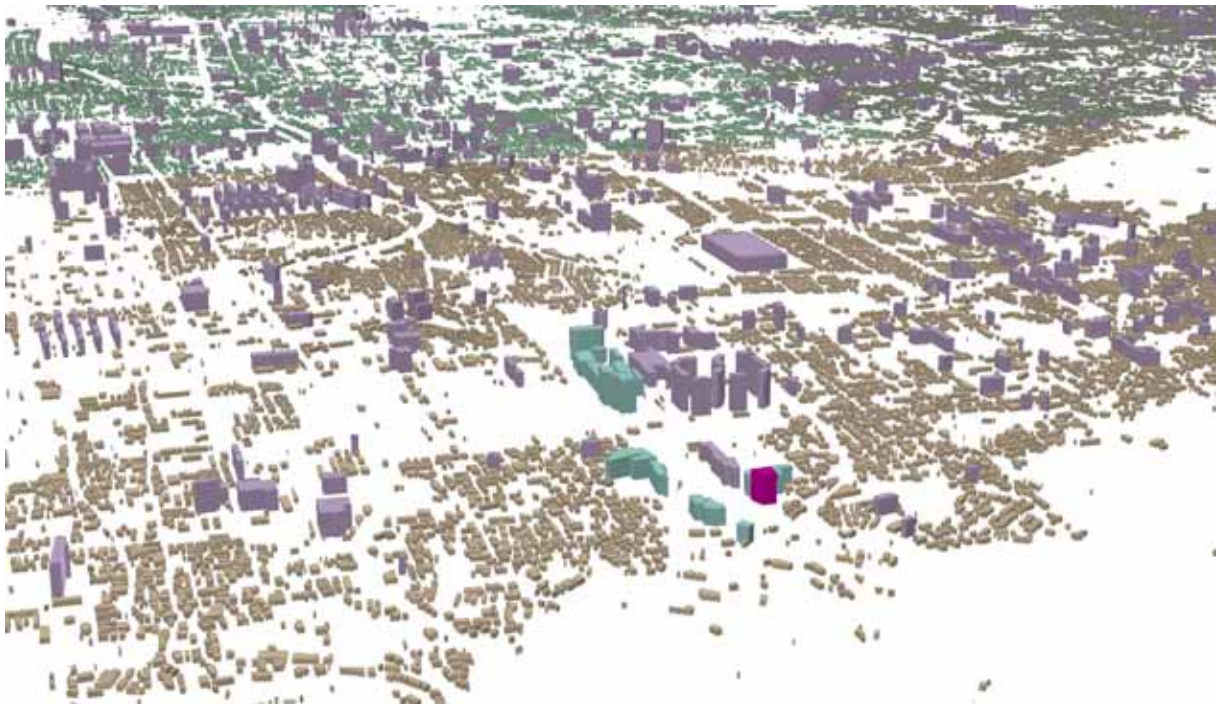




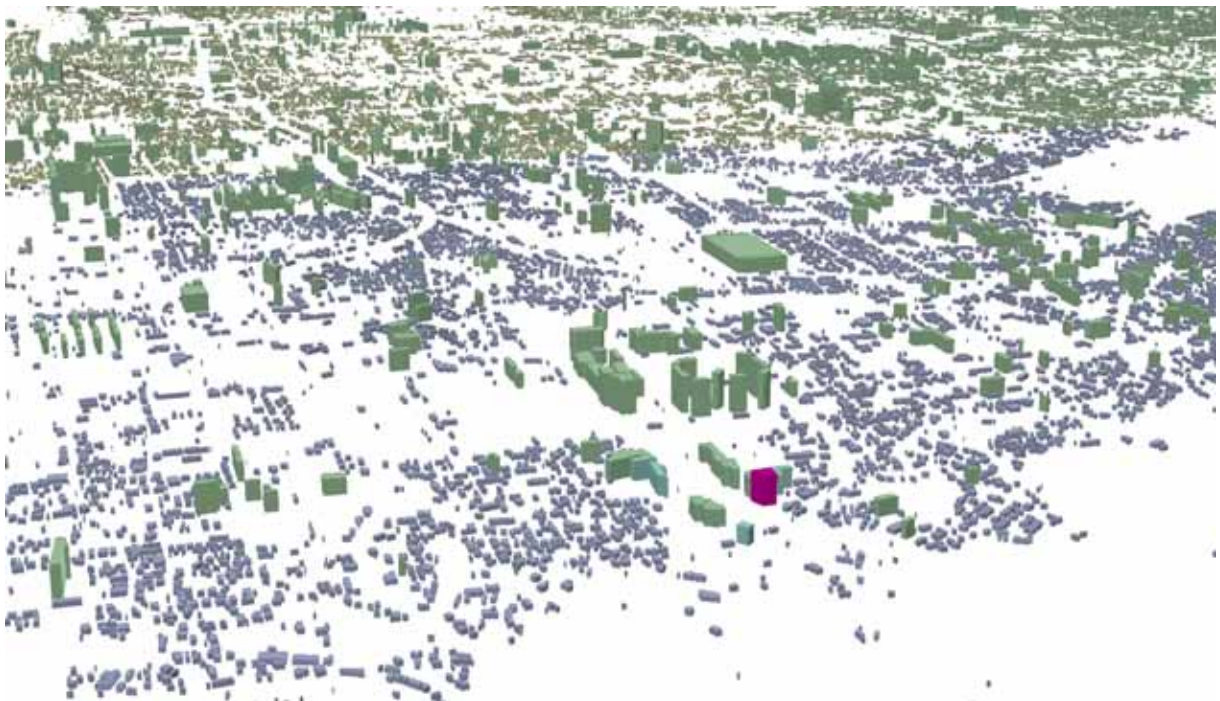
**Figure 7: Pictorial Image of Kitakawachi Region in 2035**



**Figure 8: Pictorial Image of Kitakawachi Region in 2055**

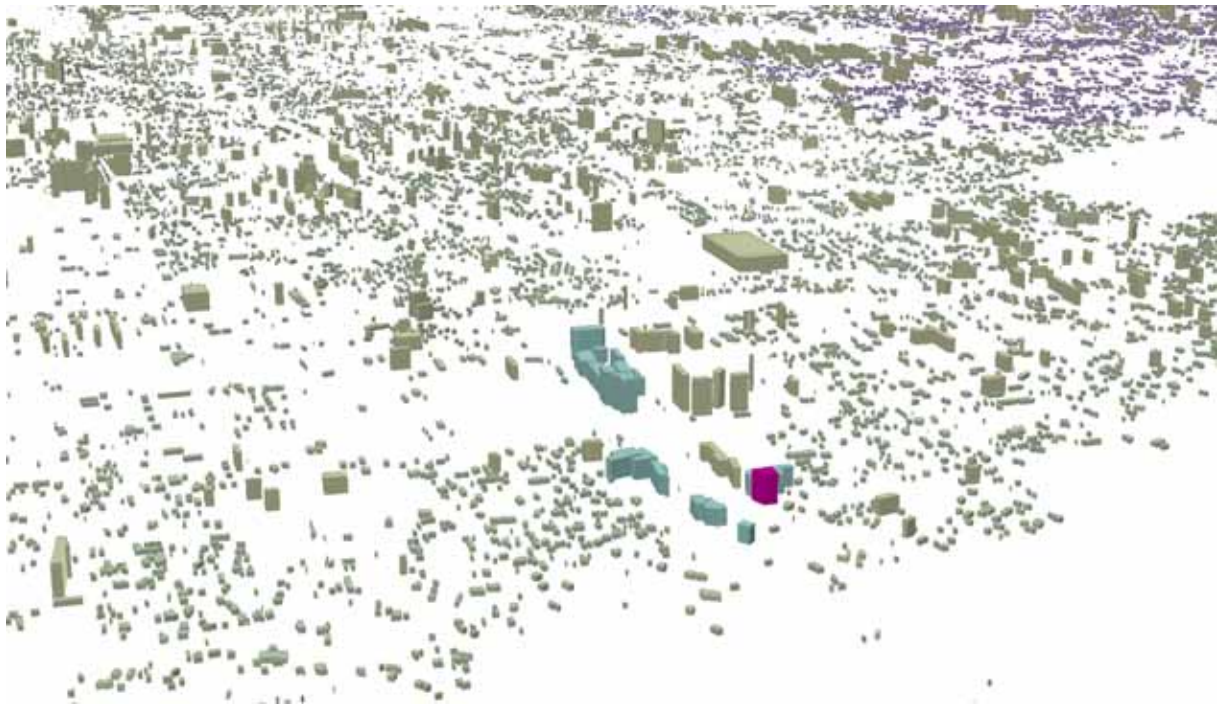


**Figure 9: Detail around Osaka Sangyo University in 2015 (of Figure 6)**

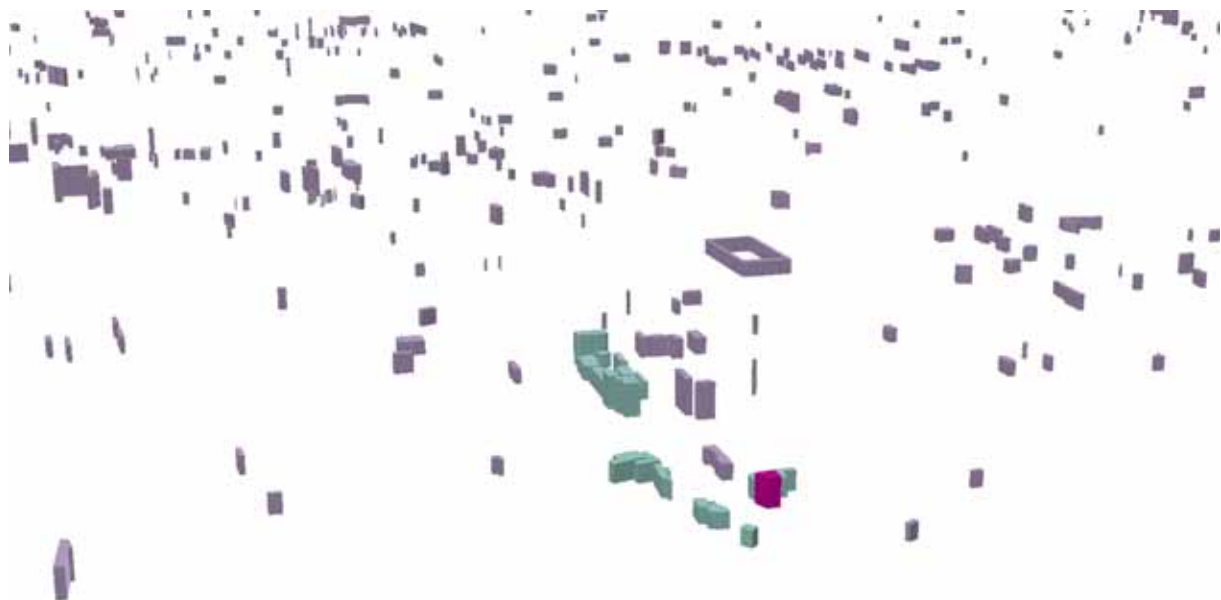


**Figure 10: Detail around Osaka Sangyo University in 2035 (of Figure 7)**





**Figure 11: Detail around Osaka Sangyo University in 2055 (of Figure 8)**



**Figure 12: Detail around Osaka Sangyo University in 2075**



Figure 13: Stereoscopic Pictorial Image of Kitakawachi Region in 2100

Figure 13 is a tentative pictorial image of Kitakawachi region in 2100. The planning process is like this:

- i) Getting the sum of all building's floor area in 2002.
- ii) Getting the necessary floor area in 2100 by population.
- iii) Division of it to the 50 storied high-rise building and less than 10 storied building.

Getting the stereoscopic figure is by using the navigator button of 3D Analyst. If we rotate the 3D image in ArcScene a little bit to the right or the left, we get two figures. But it may be difficult easy to see them as stereognosis by bare eyes for a layman but be easy for an expert.

#### 4 FROM A PLANNER-TO-BE TO A PLANNER

Kitakawachi region is the place where we settle. It is the commuting area next to Osaka, the second largest city in Japan. The study about the regeneration of the region is not the given study from outsides, but our emergent study. In this point it is the subjective study, not the objective one. The subjective study does not mean the excuse but manifest that the study is the critical one for us. We are as if in the extended loss time of the game with Nature. In this game there is no spectator but we all are players both as a planner and a daily man. We must add this viewpoint to the holistic regional planning. Not a plan but planning or the plan as keeping to plan is important because the realization of the sustainable urban environment takes much time through generations and must be supported by the educational system to grow up planners and keep promoting planning following the targeted image of Kitakawachi region. We must start to incubate planners-to-be. We must take the position even for us to be a planner-to-be for the sustainable environment because we have not succeeded to build it yet.

#### REFERENCES

Fukuoka, M. (1978), *The One-Straw Revolution*, Rodale Press, Inc., and the website of the Fukuoka farming is at

<http://larryhaftl.com/ffo/> , access date : 9. May 2005.

Koyama, S. and Sugito, S. (1984), Jomon Jinkou Simulation( A Study of Jomon Population – Computer Simulation Analysis, **Bulletin of the National Museum of Ethnology**, Vol. 9, No. 1, 1-39.

Shrestha, S.B. and Taniguchi, O. (2003a), A Holistic Approach for Providing Affordable Housing to the Urban Poor of Nepal, **Journal of Asian Architecture And Building Engineering**, Vol. 2, No. 1, 153-160

Shrestha, S.B. and Taniguchi, O. (2003b), Application of GIS for the Visualisation of Urban Demography in Kitakawachi Region, Japan, **Proceedings of 24<sup>th</sup> Asian Conference on Remote Sensing & 2003 International Symposium on Remote Sensing**, Busan Exhibition and Convention Center, Korea, 136-141, November 2003.

Shrestha, S.B. and Taniguchi, O. (2004a), GIS Application for Integration of Urban Agriculture into Land Use Planning in Kitakawachi, **Proceedings of The 4th International Symposium on City Planning and Environmental Management in**

**Asian Countries**, Korea Environment Institute in Seoul, Korea, 233-245, January 2004.

Shrestha, S.B. (2004b), **A Sustainable City Planning Methodology for 21st Century ( Concept of Food Green City )**, Doctoral Dissertation to Osaka Sangyo University, Daitoshi Japan.

Thagard, P. and Shelley, C. (2005), Abuductive reasonig: Logic, visual thinking, and coherence, [http:// cogsci.uwaterloo.ca/Articles/Pages/%7FAbuductive.html](http://cogsci.uwaterloo.ca/Articles/Pages/%7FAbuductive.html), Access date: 22 March 2005.