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The effect of land use zonings on housing development: the introduction of cdl approach in the border area of Surabaya and Sidoarjo Regency, Indonesia

Pindo Tutuko^{a*}, Zhenjiang Shen^b

^aUniversity of Merdeka Malang, Jl. Puncak Jaya 28, Malang 65146, Indonesia

^bKanazawa University, Kakuma-machi, Kanazawa-shi, Ishikawa 920-1192, Japan

Abstract

The Land use zoning (LUZ) is necessary to control the urban land use. Due to the housing development, the urban sprawl took place in fringe areas of Surabaya in which the real sector has rapidly increased in the rural-urban fringe between Sidoarjo and Surabaya. It leads the problems of despairing rural housing and decreased production of natural resources due to social inequality in the rapid development process. In achieving a sustainable urban form in urban fringe, this project is conducted with zoning review in the border area of Sidoarjo and Surabaya. The existing zoning does not distinguish between project-based housing development and home owner-based housing development. Co-existing Dividing Line (CDL) as a clear line between different types of residential use is suggested in order to provide a basis for planners and developers in the construction of project-based housing without disturbing the home owner-based housing for a sustainable urban form.

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* Corresponding author. Tel.: +62-811366494; fax: +62-341-584293.
E-mail address: pindotutuko@unmer.ac.id

1. Introduction

Every city in Indonesia has a Land Use Zoning (LUZ) plan for its residential. Unfortunately, until now, there is no clear boundary zone of land earmarked for different types of residential buildings, such as a group of similarly designed houses or apartment buildings. The housing development supports the needs of the community as a manifestation of the city's economic progress, while the existing housing also needs to be maintained in order to preserve the characteristics of rural and agricultural lands as a natural resource. Beside, in achieving the co-existing of any development, which is in accordance with their respective development patterns, they should consider about a clear drawing line. It is necessary to control land use using LUZ. In the regulation of LUZ in the suburbs, a lot of rules on parcels are an important part as a tool for local planners to restrict land use in high density or to control growth and preserve open space and farmland. As a result, the home owner-based housing and natural resources are not optimally preserved. In order to achieve that, it requires a study about a clear boundary about the allocation of land for a residential zone.

The land use plan is a tool of urban planning to control the provision of land and buildings (Mark and Goldberg (1986)) and also land use is the key for human activity that drives socio-economic development in rural regions (Borges, Fragoso, et al. (2010)). The Government of Indonesia establishes LUZ in less detail on each zone, so that planners can plan what kind and type of building should be constructed. The effect of LUZs often occurs in the border area between the cities, such as the case in Surabaya and Sidoarjo. The conditions in the field show that the home owner-based housing displaced by the project-based housing development. If this condition continues then the whole residential area will disappear and the natural aspect will be lost as well.

Another discussion is about confliction between economic and existing conventional life; Local Government is the decision maker to determine a local land use policy on housing provision. Assche and Djanibekov (2012) said that land use policy issues continue to integrate economic and environmental land use development, arguing that land use planning is used as a tool to find a good integration. On the contrary, the establishment of a special land use zoning for the residential were not differentiated for housing development, this resulted in the expansion of project-based housing development in the home owner-based housing area. In the home owner-based housing has a lot bigger land, because it still need a large yard, and most in the urban fringe area still have large amounts of land for agriculture (Haregeweyn, Fikadu, et al. (2012); Amsalu, Stroonijder, et al. (2007)). In the case in Sidoarjo city, most of them have a vast land, and they have paddy field and ponds. Price of paddy land and ponds is relatively cheap. The relative phenomenon also has been discussed in other studies as follows: land use transformation tend to take profits, the developer buys their land for new residential development to increase of private land for new comers (Tse (2001); Weaver and Lawton (2001); Shahraki, Sauri, et al., (2011)). The developers improve public infrastructure and social services, however, without available land use control.

From the view of social equality between developer and local residents, we suggest that land use zoning is a possible tool to keep co-existing of project-based housing development and home owner-based housing in the urban fringe area in order to achieve the traditional residential area as a sustainable form in the urban fringe area. In Indonesia, competition for land in the region has increased significantly in the 1990s. Land is much cheaper than land in the city center, and many industries are built in the suburbs.

There are many new developments in Northern Sidoarjo because Surabaya's sprawl. Some discussions about urban sprawl; if it continues, then the most of the natural environment will be destroyed. Based on some study of land use zoning in urban fringe areas, there are some issues that arise in the environment on urban fringe areas, such as land degradation, ecological issues, and financing (Tai-Yang, Xian-Jin, et al, (2011); Saint-Macarya, Keil, et al, (2010); Zhao (2010); Lestrelin (2010); Aguilar and Santos (2011)). In this area, the pattern of mixed use urban development makes the existing planning should be adjusted to the facilities already built before, so that mixed use city are expected to be achieved. Housing developments in this area give effect to the existing housing and environment. The sustainable urban form is not achieved because the traditional residential environment is occupied by housing development gradually. The sustainable development for traditional housing should be interrelated between economy, society and ecology in order to keep developments going well.

This paper discusses the LUZ, which will be helpful to support project-based housing development, home owner-based housing, and explain the impacts of LUZ in the urban fringe area. It's compiled in three sections. First section, it presents the facts on housing and its development in Sidoarjo, which have significant implications for the provision of housing development. In the second section, it examines urban growth in the border area between the

two cities and the changes in housing around that area due to housing development. The last section contains the conclusion section, which highlights the role of LUZ between project-based housing development and home owner-based housing development.

2. Approach

This paper is the review for effects of LUZ on housing development in Sidoarjo city. The sampling was taken in the border area of Surabaya and Sidoarjo. Data took from the local government documents, housing developers, and Tambaksumur village officers. The field data took from the interviews and photos are able to map out the situation there. The existing zoning does not distinguish between project-based housing development and home owner-based housing, so that should be examined. The steps in this research is to conduct a review of the implementation of LUZ in Indonesia and later explored more in the application of land use zoning in border cities of Surabaya and Sidoarjo.

Understanding both project-based housing development and home owner-based housing condition are important in order to understand patterns of Land cover and land use change as well as their social and environmental implications at different spatial and temporal scales (Lopez, Boccoa, et al., (2001); Firman and Dharmapatni (1994); Firman (2002); Firman (2004)). Land cover were influenced by historical land policies, protected area management as well as regional power structures, land use histories, local culture, affordability, the socio-economic conditions and community involvement are important in evaluating and understanding land cover change (Muriuki, Seabrook, et al. (2011); Sivam (2002)).

The parcel of home owner-based follows the geographical conditions and the existing road as a reference in its construction, while the parcel of project-based housing development created by the planner in accordance with the design of housing built. In the mixed-use development, the parcel coordination should occur at LUZ, resulting in harmony between the project-based housing development and home owner-based housing. In the allotment of land for housing, the traditional residential environment is expected to be used as a basic pattern of the new residential environment. Through the traditional residential environment we can create drawing lines for the optimal construction of project-based housing development, can determine the shape of the line, and can determine the shape of the border areas. The line is the divider between the two types of development called Co-existing Dividing Line (CDL). In order to determine the shape of the CDL, the patterns of the original traditional residential environment should be known in advance, including the things contained in the border areas such as agricultural land, house yards, and roads. Some factors for considering to CDL and differences between the two environments are shown in *table 1* below.

Table 1. The factors for CDL in existing housing and housing development

Factors	Home Owner-based Housing	Project-based Housing development
Housing parcel	Natural parcel	Designed parcel
Housing type	Design by house owner	Designed by planner (a group of people, company, government)
Road system	Follow the topography of land (natural)	Designed by planner to provide housing demand
Green open space	Natural green space and its a part of living support for house owners (agriculture, fish ponds)	Artificial green space (play ground, park)
Topography	Topography of housing was following the natural surface.	Planner designs topography of housing area.
Historical form	Has historical or sacred venues (grave yard)	Does not have
Public building	It provide by local government	It provide by developer
Housing demarcation	Natural form such as meadow, fields, paddy land, river.	Artificial form such as fences, wall, gate, canal, row of vegetation.

Some factors contained in the home owner-based housing and project-based housing development needs to be defined in advance, because it should be considered when making the CDL. Some aspects of the housing are used to the basis for the determination of these factors:

1. HS= Housing shape (loop, cluster, linear, cul-de-sac)

2. HT= Housing type (Luxury, simple, traditional)
3. HDL= Housing demarcation line (in meters).
4. EPBS= The existence of public buildings and social facilities (shopping, education, health, work, worship).
5. PR= The presence of roads (arterials, collectors, local)
6. UL= Utility lines (water, waste water, rain water disposal, garbage disposal, electrical grid, telephone network).
7. GOS= Green open space (parks, playgrounds, agriculture, aquaculture)
8. TP= Topography (rivers, valleys, hills)
9. HF= Historical form.

These factors are the basis for the determination of CDL, to what extent is the area that allowed for housing development. This paper is noticeable that the CDL is the set of coherent planning between project-based housing development and home owner-based housing and it is expected that every planning should pay attention about CDL. If the factor has been determined, then it adjusted based on the existing map. Thus factors are considered in housing development planning. Any points that allow for development are determined factors of its CDL, thus it can make clearly which part are considered for housing development. There are 3 important actors, which contribute on this situation, that are government, community, and developer. Zoning is also used as a reference for the development of parcels with clear boundaries between project-based housing and home owner-based housing.

Furthermore, step review conducted are: first, studying LUZ in the border areas in the two cities, observing zone intended for housing as well as the surrounding zones designated for industrial development and the CBD; Second, the analysis points are the growth and traffic patterns in the border area. This analysis also describes the history of the growth of project-based housing developments derived from statistical data; Third, an analysis of the conditions at the housing in one of the areas in the border region; Fourth, discuss the impact resulting from project-based housing developments in the home owner-based housing area; Fifth, make recommendations for decision-makers, planners, and developers for the next development.

3. Zoning System of Indonesia

The Indonesian government set the National Spatial Plan (NSP), as well as all city in Indonesia has NSP. NSP is further elaborated in City Detail Spatial Plan (CDSP), through Regional Development Planning Agency (it is called as BAPPEDA) that establishes land use zoning with two main criteria for the development of the developing zone and conservation zone. Specially in residential zone there is no specific zone between the housing development and the existing residential area that must be maintained. The situation is different with other countries such as Japan. Japan uses 12 (twelve) categories of LUZ provide zoning land use patterns in each type of urban areas. It can be generally categorized into residential, commercial and industrial use. Each LUZ have specifications regarding the use of the building that can be built in the zone; especially for residential zones are grouped into 7 (seven) categories (Ministry of Land, Infrastructure and Transport, Japan, 2003). This categorization will facilitate planners in planning, thus reducing the overlap between home owner-based housing and project-based housing development.

3.1. Land use zoning in Sidoarjo-Surabaya, Indonesia

Expansion development of Indonesia cities is happening largely through administrative boundaries. In the case of Surabaya-Sidoarjo as a corridor, this phenomenon was happened because fast growth city of Surabaya. The color code use yellow for determining the settlement's area. The zoning for residential land is not distinguished for different types of residential buildings, such as project-based housing development built by developer and house owner-based houses maintained by residents. There are no clear boundaries between them on the map (*Fig. 1*). Waru sub-district was divided into settlements, industrial, commerce, services, agriculture, and ponds.

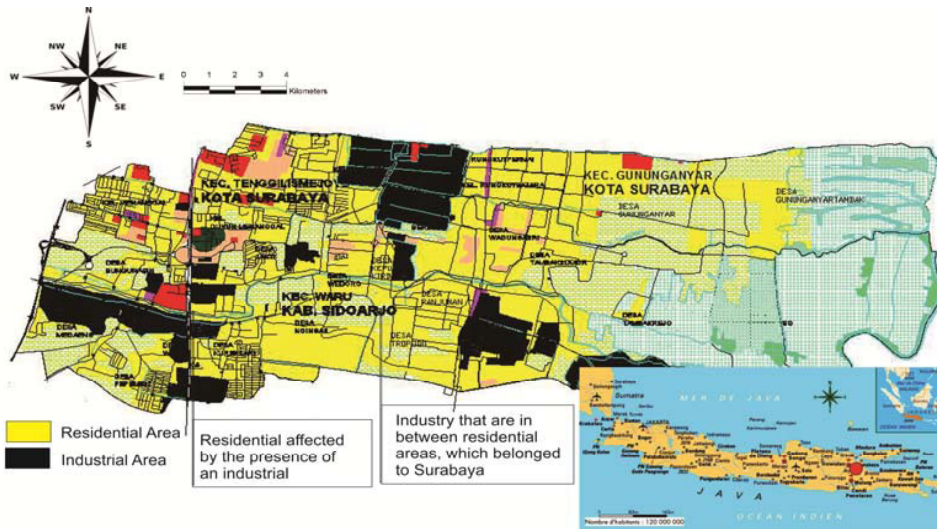


Fig.1. Industrial and Residential Condition between Surabaya-Sidoarjo area

3.2. Existing Condition in Tambaksumur Village

The designations marked on the map are for residential land use, so that housing developments legal to build. Tambaksumur village located on the border of the city of Surabaya while the location of housing development is administratively located in two cities, it looks the difference between the patterns of the home owner-based housing and project-based housing development. In accordance with the case in the Tambaksumur village and Pondok Tjandra Indah Housing (PTIH), located in District Waru, Sidoarjo regencies are very fast progressing. This is due to its location next to the city of Surabaya, which is directly or indirectly affected by the development of the Surabaya city. This situation is giving out a major influence on housing and settlement sector. Changes in housing in Tambaksumur also occurred on the road pattern, due to opening access connecting the two areas.

4. CDL in Tambaksumur Village

To determine the CDL in this area carried out several steps. Once we know the boundaries between project-based housing and home owner-based housing, then the next step is to determine the factors contained in home owner-based housing, and then choose the optimization area that could be used as a development boundary of project-based housing development, and each home owner-based housing has different factor depending on location.

Priority factors become important in determining the factors of the decision which will be inserted into the CDL (table 2). The factors should adjacent to the border areas between cities. In the case of Tambaksumur village there are several factors as follows:

Table 2. Aspect of CDL in Tambaksumur Village

No	Factors	Determination of Tambaksumur	CDL
1	HS	Linear	Considered
2	HT	Traditional	Considered
3	HDL	3 m	Considered
4	EPBS	Being in the middle of the village / not on the border.	Not considered
5	UL	Power lines, rain water drainage, waste disposal, telephone network	Considered
6	PR	Collectors road and Local road	Considered

7	GOS	Aquaculture, farm.	Considered
8	TP	The river located on the South side, not in border areas.	Not considered
9	HF	Not being in border city	Not considered

The land use map is the most common of the land-based presentation of data. In general, land use is shown in a different color. The map illustrates the land use effectively use the concept of land-uses graphic displays, roads, public infrastructure, and community facilities. There is a deviation in the planning and implementation, specifically on the residential use on the land use map in Indonesia does not distinguish tagging for project-based housing development. Because the color coding scheme used is already commonly used in every plan, then it is ignored. Developers do not have a guide to distinguish the extent to where they should not do development under land use control of local government.

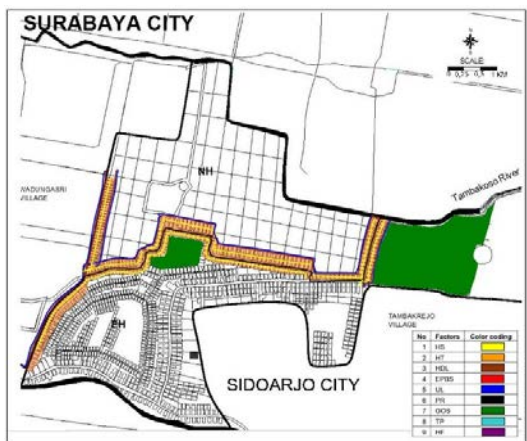


Fig. 2a. The CDL factors on housing development in Tambaksumur village



Fig. 2b. The CDL factors in every part of existing housing

Therefore, in addition to the notation used color coding scheme for the determination of residential use is also required a clear boundary line between housing development and existing housing (Fig. 2a and Fig. 2b). This

should be done starting from the survey in the field in the existing mapping which will be translated in the process of making land use maps.

5. Discussions

As we know that every development is essentially based on economic considerations, similarly, the housing development. Economic development in the city of Sidoarjo, and particularly in sub Waru is rapidly increasing by the industrial sector, which in turn requires the need for the housing provision. The growth on Tambaksumur village and PTIH affected by the Surabaya development, this requires the role of the various parties involved in the development of housing on the basis of economic development. Tambaksumur village is strategic for the development in the housing sector. This development was also influenced by the urban development and housing in the surrounding area.

Home owner-based housing built by the resident itself will have an impact because of unplanned by professional planners, but by owner itself. It led to be uncontrolled in terms of design and building quality. In addition, in a formal estate planning does not include planning for home owner-based housing. Various types and styles used to build their homes. They adopted the style of a residential building next to their areas. So it can be concluded that the construction of houses in Tambaksumur not appear by itself, but caused by project-based housing development next to its areas. The project-based housing development and home owner-based housing are influenced by the city development. Each effect is shown in the process of building their houses. Kombe and Kreibich (2000) also have an opinion on project-based housing development and home owner-based development is “the limited resources available to the public sector for land management and service delivery require a reorientation of urban planning concepts and measures towards strategic fields of intervention.”

6. Conclusions

In particular, project-based housing development can be followed by zoning, but there is no clear zoning in residential areas. Government does not have clear zoning statutes for residential development; so, developers easily create new residential parcels. In this area, there are many village houses with extensive agricultural land.

CDL on LUZ is effective in achieving co-existing development on border area. All developments should be referred, even the project-based housing development itself. It is used as a guide for developer and policy maker to develop in regional areas. The concept of residential development which go hand-in-hand with the development of rural areas and housing depending on the actor because the actor plays the greatest role in business development of settlements. Executors include government, private, joint community, and individuals. The effort of community for the procurement of housing is now affected by the residential development of the private sector, fewer lands to build houses, high land prices increased highly; this is what causes the deployment of the housing at the present time.

There are several aspects that will keep the harmony between project-based housing development and home owner-based housing. To achieve harmony, it takes good coordination between the private sector, public sector, and society. Further more, each area has different characteristics, particularly in the area between the two cities. Both of these areas should inquiry each other and maintain their form. To achieve that, it is necessary to set clear boundaries by CDL in LUZ for residential zones. This CDL will help local governments and developers in planning and designing facilities and infrastructure between two cities. When this is accomplished it will achieve sustainable urban form in the urban fringe area.

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References

- Aguilar, A.G. and Santos, C. (2011). "Informal settlements' needs and environmental conservation in Mexico City: An unsolved challenge for land-use policy", *Land Use Policy* 28 (2011) 649-662, Elsevier.
- Amsalu, A., Stroonijder, L., Graaff, J. (2007). "Long-term dynamics in land resource use and the driving forces in the Beressa watershed, highlands of Ethiopia", *Journal of Environmental Management* 83 (2007) 448-459, Elsevier.
- Archer, R. W. (1994). "Urban Land Consolidation for Metropolitan Jakarta Expansion, 1990-2010", *Habitat International*. Vol. IX. No. 4, pp. 37-52. 1994, Elsevier Science Ltd., Printed in Great Britain, Pergamon.
- Assche, K. and Djanibekov, N. (2012). "Spatial planning as policy integration: The need for an evolutionary perspective. Lessons from Uzbekistan", *Land Use Policy*, Vol 29, Issue 1, 179-186, Elsevier.
- Borges, P.J., Fragoso, R., Garcia-Gonzalo, J., Borges, J.G., Marques, S., Lucas, M.R., (2010). "Assessing impacts of Common Agricultural Policy changes on regional land use patterns with a decision support system; An application in Southern Portugal", *Forest Policy and Economics* 12 (2010), p. 111-120, Elsevier.
- Datta, K. and Jones, G.A. (2001). "Housing and Finance in Developing Countries: Invisible issues on Research and Policy Agendas", *Habitat International* 25 (2001) 333-357, Pergamon.
- Detailed Spatial Plan of the City of Sidoarjo 1992/1993-2013/2014
- Firman, T. and Dharmapatri, I.A.I. (1994). "The Challenges to Sustainable Development in Jakarta Metropolitan Region", *Habitat International*, Vol. IX. No. 3, pp. 79-94, Elsevier Science Ltd., Printed in Great Britain, Pergamon.
- Firman, T. (2002). "Urban development in Indonesia, 1990-2001: from the boom to the early reform era through the crisis", *Habitat International* 26 (2002) 229-249, Pergamon.
- Firman, T. (2004). "New town development in Jakarta Metropolitan Region: a perspective of spatial segregation", *Habitat International* 28 (2004) 349-368, Pergamon.
- Haregeweyn, N., Fikadu, G., Tsunekawa, A., Tsubo, M., Meshesha, D.T. (2012). "The dynamics of urban expansion and its impacts on land use/land cover change and small-scale farmers living near the urban fringe: A case study of Bahir Dar, Ethiopia", *Journal of Landscape and Urban Planning* 106, 149-157, Elsevier.
- Kombe, W.J and Kreibich, V. (2000). "Reconciling informal and formal land management: an agenda for improving tenure security and urban governance in poor countries", *Habitat International* 24 pp. 231-240, PERGAMON Press.
- Listrelin, G., (2010). "Land degradation in the Lao PDR: Discourses and policy", *Land Use Policy* 27 (2010) 424-439, Elsevier.
- Lopez, E., Boccoa, G., Mendoza, M., & Duhau, E., (2001). "Predicting land-cover and land-use change in the urban fringe A case in Morelia city, Mexico", *Landscape and Urban Planning* 55 (2001) p. 271-285, Elsevier.
- Mark, J.H. and Goldberg, M.A.,(1986). "A Study of the Impact of Zoning on Housing Values Over Time", *Journal of Urban Economics* 20, 257-273.
- Ministry of Land, Infrastructure and Transport, Japan. (2003). *Introduction of Urban Land Use Planning System in Japan*, Published in January 2003 by the City Planning Division, City and Regional Development Bureau, Ministry of Land, Infrastructure and Transport, 1-3 Kasumigaseki 2-chome, Chiyoda-ku, Tokyo, Japan
- Muriuki, G., Seabrook, L., Clive McAlpine, C., Jacobson, C., Bronwyn Priced, B., Baxter, G., (2011). "Land cover change under unplanned human settlements: A study of the Chyulu Hills squatters, Kenya", *Landscape and Urban Planning* 99 (2011) p. 154-165, Elsevier.
- Saint-Macarya, C., Keil, A., Zeller, M., Heidhuesa, F.,Dung, P.T.M. (2010). "Land tiling policy and soil conservation in the northern uplands of Vietnam", *Land Use Policy* 27 (2010) 617-627, Elsevier.
- Shahraki, S.Z, Sauri, D., Serra, P., Modugno, S., Seifolddini, F. and Pourahmad, A. (2011). "Urban sprawl pattern and land-use change detection in Yazd, Iran", *Habitat International* 35 (2011) 521-528, Elsevier.
- Sivam, A. (2002). "Constraints affecting the efficiency of the urban residential land market in developing countries: a case study of India", *Habitat International* 26 (2002) 523-537, Pergamon.
- Tai-Yang, Z., Xian-Jin, H., Xiu-Ying, Z. & Ke, W. (2011). "Temporal And Spatial Variability Of Agricultural Land Loss In Relation To Policy And Accessibility In A Low Hilly Region Of Southeast China", *Land Use Policy* 28 (2011) 762-769, Elsevier.
- Tse, R.Y.C. (2001). "Impact of Comprehensive Development Zoning on Real Estate Development in Hong Kong", *Land Use Policy* 18 (2001) 321-328, Pergamon Press.
- Weaver, D.B. and Lawton, L.J. (2001). "Resident Perceptions In The Urban-Rural Fringe", *Annals of Tourism Research*, Vol. 28, No. 2, pp. 439-458, Pergamon Press, Printed in Great Britain.
- Zhao, P. (2010). "Sustainable urban expansion and transportation in a growing megacity: Consequences of urban sprawl for mobility on the urban fringe of Beijing", *Habitat International* 34 (2010) 236-243, Elsevier.