Spatial utilization control for supporting development acceleration: case study in South Tangerang city, Banten Indonesia

D T Cahyani¹, K Munibah², B Mulyanto²

¹ Ministry of Agraria, Spatial Planning/National Land Agency, The Republic of Indonesia
² IPB University, Indonesia

Email: dewinda.titah@gmail.com

Abstract. Spatial plan is a guideline for a country’s development containing strategic policies and spatial utilization programs. The high dynamics of space needs for development implementation impacting to the spatial uses change and raising number of spatial unsuitability. South Tangerang city, as an urban area which serves as a capital buffer zone, experiences a fairly high development intensity, that giving a development effect to some areas in economic and ecological ways. The existing land use analyses found that 21.91% of the existing land use are not suitable with the spatial plan, 55.28% suitable, and 22.81% are still in transition. The change of the land uses are dominated by trade and services area and areas which has an access to an infrastructure facilities. This development activity including infrastructure, potentialy raised spatial utilization unsuitability. This research is about to map the land use gradations and the consistency of spatial utilization related with the development planning in South Tangerang city in order to raise the effectiveness of spatial utilization control. Detailed instrument are needed, so the Government must accelerate the preparation of Detailed Spatial Plan (RDTR).

1. Introduction
Spatial plan is a guideline for a country’s development containing strategic policies and spatial utilization programs in a specific periods [1]. In which, the spatial plan should realistically operational as a coordination tools for development programs from vary budgeting source [2]. The high dynamics of space needs for development requires a regional spatial plan that is able to accommodate the stakeholders interest. The ineffectiveness of spatial utilization control has creates the opportunities of spatial infringement. The minimum aspect of supervision and spatial law enforcement, and the spatial plan (and it’s derivatives) that have not been used as the main reference of the development, has raised the spatial utilization infringements. One of the spatial development obstacle is the less participation and utilization of detailed spatial plan (RDTR), and also the lack of socialization regarding the spatial utilization control from the government [3]. Institutionally speaking, there is even an indication that the revised general spatial plan is done by justified spatial infringements that have occurred by changing their designation [4].

Generally, the development concept in Indonesia devided into 2 (two) planning reference document, that is development planning document and spatial planning document who need to be harmonious, in addition to become an estuary for cross-sectoral agreements. Spatial plan must be a reference for the development plans. The city spatial planning is aims to direct the city development so that there’s dynamic and harmonious conditions between the space various function [5]. The insistence of
population growth, economic needs, climate change, and increasing human activities, including migration, land conversion, and agricultural intensification Lambin and Geist, [6] encourage the rapid development and the mismatch between spatial utilization and the spatial plan that even indicates to a spatial infringements. This research is about to analyze the connections between spatial and development planning and the spatial utilization control in order to accelerate the region development, and giving an alternative solutions to development problems based on the mismatch between spatial and development planning.

2. Materials and Methods

2.1. Materials
This research is located at South Tangerang City, Banten Province, consist of 7 (seven) sub-district (Fig.1). The total area of South Tangerang City is 165.42 km$^2$ or 1.63% of the Banten Province area.

![Administration Map of South Tangerang City](image)

**Figure 1.** Administration Map of South Tangerang City

2.2. Methods
The methods of this research is overlaying the spatial planning map with the land use map to analyze the unsuitability between them. To generate the land use gradation map, land use map from 2010 is overlayed with the land use map from 2018. Next, is juxtaposing the program indication from general spatial plan (RTRW) with the development priority program stated in Mid-term Development Plan (RPJMD) to find out their synchronization. Least, analyzing the inconsistencies, land use change, development synchronization to the spatial utilization control to address the problems and solutions.

3. Results & Discussion
The national development approach is complemented by a regional approach, which the regional approach is detailed with spatial-locational approach, the development must be started from a broad concept to a detailed concept [7].

3.1. Spatial Plan Completion
Spatial plan, wether the general spatial plan or detailed spatial plan, has to be prepared by every single region all across Indonesia as a reference to utilize the space. The limited space are needed by various users, so it has to be maintained so as not to occur the space decreasing quality [8] that so, regulation is a necessity to prevent conflicts between the space users. By January 2019, the completion of spatial planning document seen in Table 1.
Table 1  Indonesia’s Spatial Planning Progress

| Spatial Plans Regulations | Regulations Amount | Total | Percentage |
|---------------------------|--------------------|-------|------------|
| Province                  | 34                 | 34    | 100 %      |
| District                  | 390                | 425   | 93,97 %    |
| City                      | 88                 | 93    | 94,62 %    |
| Detailed Spatial Plan     | 51                 | 1838  | 2,77 %     |
| (RDTR)                    |                    |       |            |

Source: Directorate General of Spatial Planning, January 2019

Basicly, the regional spatial planning is an effort in formulating an optimize and efficient use of space to accommodate the sectoral development, region, private sectors, and society achieved in some periods of time. The RTRW has a crucial meaning for issuing the decisive function of spatial utilization lead to spatial utilization control and as a tools to anticipating the decrease quality of space [9]. Without the regulations of space who follow the the rules of regional planning as a system, inefficient and ineffective development will happens, and also could widen the gap between developed and undeveloped regions [10]. The general spatial plan as the main regulation for utilizing space, should be legalized no later than 2 (two) years for Province, and 3 (three) years for District after the Law Act Number 26/2007 are legalized. But many districts just started to legalized their general spatial plan after 2010, which is way too long from the Law Act Number 26/2007 mandate (Fig.2). The major escalation happened in 2011 and 2012 when Directorate of Spatial Plan doing the acceleration programs to complish the local general spatial plan (RTRW).

![Figure 2](completion_graphic.png)

**Figure 2** Completion Graphic of District General Spatial Plan (RTRW) in Indonesia

The general regional spatial plan is a general plan regulates the dominance of function. Operational devices managing spatial utilization and spatial utilization control is RDTR. The progress of RDTR in Indonesia shown in Fig.3.
The RDTR works as a quality control of the spatial utilization based on RTRW, reference for a more detailed spatial utilization, reference for spatial utilization control, reference for issuing permits for space utilization, and reference in the preparation of Building and Environmental Planning (RTBL). The small amount of RDTR today, is also contribute to the low spatial utilization control, and lead to the slow pace of regional development.

The legal basis of spatial utilization is needed to accommodate the increasing pressure on community needs for regional development. The development program and the renewal and harmonization between the law act concerning to spatial plan, need to be harmonized to achieve development and environmental goals [11]. The Ministry of Agraria and Spatial Planning/National Land Agency as a central government who responsible to spatial planning, needs to works together with other sectors to accelerate the completion of RTRW and RDTR, as a reference to the national development.

3.2. South Tangerang City Spatial Planning System

South Tangerang City RTRW was legalized in December 30th, 2011 with Local Regulation Number 15/2011. This law act has been entering the judicial review period, but no reviews are come out until today. In spatial detailed planning case, South Tangerang City are now working out for 7 RDTR which are now still seeking for the Governor recommendation. No RDTR are come out today, so the research is only limited to RTRW.

3.3. South Tangerang City Land Use Suitability With General Spatial Planning

The spatial plan pattern, basically developed with optimizing spatial utilization pattern and the effectiveness of human movement patterns. South Tangerang City is predicted to experience a very rapid growth, considering the geographical location as a capital buffer area, the increasing population, and the dynamic human movement.

| No. | Land Use Types       | RTRW 2011-2031 (Acres) | Land Use 2018 (Acres) |
|-----|----------------------|------------------------|-----------------------|
|     |                      | Suit  | Transition | Unsuitable |                      |
| A   | Protected Area       | 1108.41 | 369.55 | 258.99 | 479.88 |
|     | Main River           | 117.05  | 35.28  |          | 81.77  |
|     | Lake                 | 96.79   | 84.18  |          | 12.61  |
|     | City Forest          | 160.63  |        | 114.03  | 46.60  |
|     | Lake Riparian        | 101.14  | 42.79  |          | 58.36  |
|     | Gas Pipeline Border  | 24.23   | 8.86   |          | 15.37  |
| No. | Land Use Types                     | RTRW 2011-2031 (Acres) | Land Use 2018 (Acres) | Suitable | Transition | Unsuitable |
|-----|-----------------------------------|------------------------|-----------------------|----------|------------|------------|
|     |                                   |                        |                       |          |            |            |
|     | High Voltage Electricity Border   | 179.21                 | 55.79                 | 123.42   |            |            |
|     | Railroad Border                   | 35.01                  | 21.66                 | 13.35    |            |            |
|     | River Riparian                    | 143.79                 | 111.74                | 32.04    |            |            |
|     | Cemetery                           | 116.69                 | 86.55                 | 30.14    |            |            |
|     | Park/SPORT Facility               | 133.87                 | 9.25                  | 58.41    | 66.23      |            |
|     | B Built Area                      | **15434.03**           | **8775.27**           | **3514.71** | **3144.04**|            |
|     | Airport                            | 131.69                 | 110.48                | 4.54     | 16.67      |            |
|     | Education                          | 123.27                 | 37.53                 | 18.29    | 67.44      |            |
|     | Industrial                         | 230.94                 | 180.02                | 26.03    | 24.90      |            |
|     | Tourism                            | 115.26                 | 106.82                | 4.92     | 3.52       |            |
|     | Trade and Services                | 3913.49                | 442.60                | 876.85   | 2594.04    |            |
|     | Warehousing                        | 31.01                  |                      | 1.18     | 29.81      |            |
|     | Defense and Security              | 89.87                  | 33.53                 | 40.84    | 15.51      |            |
|     | Mid Density Settlement            | 4267.03                | 2940.71               | 1189.40  | 136.92     |            |
|     | High Density Settlement           | 6251.68                | 4923.58               | 1228.14  | 99.96      |            |
|     | Research and Technology Facility  | 279.80                 |                      | 124.53   | 155.27     |            |
|     | Total                              | **16542.44**           | **9144.82**           | **3773.70** | **3623.92**|            |
|     | Suitability Percentage (%)         |                       |                       | 55.28%   | 22.81%     | 21.91%     |

![Figure 4](accessibility-check) (a) Spatial Pattern Map; (b) 2018 Land Use Map; (c) Suitability Map
The major land use is the high density settlement and mid density settlement. The suitable land use in 2018 whose in line with the spatial plan pattern dominated by settlement area, while the unsuitable land use dominated by trade and services area. The major transition land use is the settlement area, where some area is still available to convert to the settlement area such as shrub and field (Fig.4).

The biggest area from the trade and services area who are not suitable with the spatial plan pattern is the areas who has an infrastructure access, especially road access (Fig.5). The existence of infrastructure is highly connected with the region development, characterized by the economic growth and the public welfare [12] [13] [14] [15] [16] [17] [18], which also triggering the spatial infringement. So that, the effective spatial utilization control are highly needed.

**Figure 5** (a) Spatial Structure Plan Map; (b) Suitability Map; (c) Infrastructure Development Correlation with Land Use Suitability Map

### 3.4 South Tangerang City Land Use Gradation

The land use gradation analysis in South Tangerang City is to map the area who tend to change from 2010 to 2018, see Table 3.
Table 3  Land Use Gradation from 2010 to 2018

| No. | Land Use Types                  | Land Use 2010 (Acres) | Land Use 2018 (Acres) | Changing Percentage |
|-----|--------------------------------|-----------------------|-----------------------|---------------------|
|     |                                | Fixed                 | Change                |                     |
| 1   | Airport                         | 133.24                | 111.75                | 21.49               | 16.13%              |
| 2   | Lake Research and Technology Facility | 224.46            | 86.14                 | 138.32              | 61.62%              |
| 3   | Rice Fields Park/Green Open Space | 370.95              | 233.45                | 137.51              | 37.07%              |
| 4   | Rice Fields                      | 241.26                | 183.96                | 57.30               | 23.75%              |
| 5   | Rice Fields                      | 2697.81               | 1172.87               | 1511.26             | 56.02%              |
| 6   | Industry                         | 97.58                 | 97.02                 | 0.56                | 0.57%               |
| 7   | Trade and Services               | 127.99                | 16.20                 | 111.80              | 87.35%              |
| 8   | Settlement                       | 8395.65               | 7597.44               | 780.42              | 9.3%                |
| 9   | Company Land                     | 114.76                | 1.18                  | 113.57              | 98.96%              |
| 10  | Bare Land                        | 4094.76               | 2009.11               | 2058.29             | 50.27%              |
| 11  | Undefined*                       |                       |                       |                     |                     |
|     | Total                            | 16586.06              | 11509.11              | 5076.95             |                     |

*map’s border area difference

Total Land Use Change (%)  69.39%  30.61%

Figure 6  (a) 2010 Land Use Map; (b) 2018 Land Use Map; (c) Land Use Gradation Map
The biggest land use change is company land and trade and services, but this changes are still in built up area. The next biggest land use change from 2010 to 2018 significantly occurred at the lake and green open space area (Fig.6). The land use conversion from the enviromental buffer zone such as bare land, lake/water body, and park/green open space into built up area is still a mass. The land use change in a huge or small scale usually has the main problems, which is: (1) location efficiency and economic resource distribution; (2) the connection with the even distribution and the resources domination; (3) the connection with resources and enviroment degradation [19]. The spatial utilization control is needed with maximizing the Central Government performance in order to push the Local Government to limit the land conversion not to keep increasing, and the spatial infringement is decreased with the spatial utilization control.

3.5. Suitability of Development Plan and Spatial Plan
RPJMD as the regional development plan document, containing the regional development plan, while main indication program stated in the RTRW containing the main programs with the funding, implementer institutions, and execution timeframe. The main indication program is the main reference for the spatial utilization programs, which is also the main key to implement the purpose of spatial planning and also the reference for many sectors to draw up the strategic development plans.

Eventhough the national development vision and mission as stated in National Long-Term Development Planning (RPJPN) 2005-2025, specifically giving a guidance to spatial development which is harmony between development planning and spatial planning, and the spatial planning key role as a reference for sectoral policies, unfortunately there is still a gap between the spatial planning document and development planning document in South Tangerang City. There is a strong commitment needed from the Local Government to synchronize the sectoral programs in order to accelerate the development progress.

Table 4  Comparison Between Main Indication Programs of RTRW 2011-2031 with Priority Programs of RPJMD 2016-2021

| Exist Both RTRW and RPJMD | Exist in RTRW, not in RPJMD | Exist in RPJMD, not in RTRW |
|---------------------------|-----------------------------|---------------------------|
| Spatial Planning Plan     | Energy, Electricity, and Telecommunication Network System | Development and Improvement of Building Facilities |
| Spatial Utilization Control | City Infrastructure System (garbage, pedestrian, bicycle lane, evacuation route, parking system) | Social Welfare Services and Rehabilitation |
| Road Development Plan     | Protected Area Embodiment | |
| Water Resources Network System | Built Area Embodiment (Trade and Services, Government, Industry, Tourism, Green Open Space, Evacuation Route, Informal Sectors, Agriculture, Farming, Airport, Defense and Security) | |
| Drinking Water Infrastructure System | Strategic Area Embodiment | |
4. Conclusion

The late completion of general and detailed spatial plans in Indonesia is not only influenced by technical factors, such as the lack of funding, the existance of the experts, and the region wide and characteristics [20] but also a political will and the lack of community participation. The unavailability of RDTR is also influencing the regional development and the spatial utilization control.

Tightening spatial utilization control basically an effort to accelerate regional development compatible with the plan, wether the spatial plan or the development plan. This will going well if the development plan is already synchronized with the spatial plan. The development concept of South Tangerang City should be based on South Tangerang City RTRW, vice versa.

A few problems connected with the uneffective of spatial and development plan is: (a) the incomplete of spatial planning products as a reference of regional development and spatial utilization control; (b) the high number of spatial inconsistencies lead to the spatial infringements; (c) unsyncronized spatial planning document with the development planning document, and that the spatial planning has not been used as a reference for development by sectors; (d) unoptimize spatial utilization control, impacting to the regional development that does not appropriate with the plan; (e) the weakness of law enforcement maintaining order (or regularity) in space utilization.

The Central Government must give a massive push to the Local Government to immediately legalized their RDTR by doing the RDTR acceleration program and synchronize the sectoral programs in order to accelerate the development progress.

Acknowledgement

This study was funded by the Indonesian Ministry of National Development Planning through PUSBINDIKLATREN.

References

[1] Sujarto, D. (1985). *Beberapa Pengertian Tentang Perencanaan Fisik*. Jakarta: Bhratara.
[2] Kartasasmita, G. (1996). *Pembangunan Untuk Rakyat. Memadukan Pertumbuhan dan Pemerataan*. Jakarta: CIDES.
[3] Wardenia, A., & Hirsan, F. (2018). Identifikasi Pengendalian Pemanfaatan Ruang Melalui Instrumen Insentif dan Disinsentif Pada Kawasan Pariwisata Pesisir di Pantai Amahami dan Ni’u. *Jurnal Planoeart* 4(1), 30-35.
[4] Nugroho, P., & Sugiri, A. (2009). Studi Kebijakan Pembangunan Terhadap Perubahan Tata Ruang di Kota Semarang. *Jurnal Riptek*. 3 (2), 41-51.
[5] Muhajir, A. (2017). Kebijakan Pengendalian Pemanfaatan Ruang Dalam Pelaksanaan Ketentuan Penataan Ruang di Kota Baubau Provinsi Sulawesi Tenggara. *Jurnal Renaissance* 2(2), 184-193.
[6] Lambin, E., & Geist, H. (2006). *Land-Use and Land Cover Change. Local Processes and Global Impact Series*. Berlin, Germany: Springer.
[7] Adisasmita, R. (2012). *Analisis Tata Ruang Pembangunan*. Yogyakarta: Graha Ilmu.
[8] Kantaatmadja, M. (1994). *Hukum Angkasa dan Hukum Tata Ruang*. Bandung: Mandar Maju.
[9] Budihardjo, E., & Sujarto, D. (2005). *Kota Berkelanjutan*. Bandung: Alumni.
[10] Wahid, Y. (2014). *Pengantar Hukum Tata Ruang*. Jakarta: Kencana Prenadamedia Group.
[11] Priyanta, M. (2015). Pembaruan dan Harmonisasi Peraturan Perundang-Undangan Bidang Lingkungan dan Penataan Ruang Menuju Pembangunan Berkelanjutan. *Hasanuddin Law Review* 1(3), 337-349.
[12] Calderòn, C., & Servèn, L. (2014). *Infrastructure, growth, and inequality: An overview (Policy Research Working Paper No. 7034).* Retrieved from https://openknowledge.worldbank.org/handle/10986/20365

[13] Charlery, L., Qaim, M., & Smith-Hall, C. (2016). Impact of infrastructure on rural household income and inequality in Nepal. *Journal of Development Effectiveness* 8(2), 266-286.

[14] Chatterjee, S., & Turnovsky, S. (2012). Infrastructure and inequality. *European Economic Review* 56(8), 1730-1745.

[15] Dèmurger, S. (2001). Infrastructure development and economic growth: An explanation for regional disparities in China. *Journal of Comparative Economics* 29(1), 95-117.

[16] Kateja, A., & Maurya, N. (2011). Inequality in Infrastructure and Economic Development: Interrelationship Re-Examined. *The Indian Economic Journal* 58(4), 111-127.

[17] Maryaningsih, N., Hermansyah, O., & Savitri, M. (2014). Pengaruh infrastruktur terhadap pertumbuhan ekonomi Indonesia. *Buletin Ekonomi Moneter Dan Perbankan* 17(1), 61-98.

[18] Umiyati, E. (2013). Analisa pertumbuhan ekonomi dan ketimpangan pembangunan antar wilayah di Pulau Sumatera. *Jurnal Paradigma Ekonomika* 1(7), 42-50.

[19] Rustiadi, E., Saefulhakim, S., & Panuju, D. (2018). *Perencanaan dan Pengembangan Wilayah.* Jakarta: Crestpent Press dan Yayasan Pustaka Obor Indonesia.

[20] Afridayanti, R., Wijaksono, A., & Rachmawati, T. (2015). Faktor Penghambat Penyusunan RTRW Kabupaten Pasca Ditetapkannya UU 26/2007 Tentang Penataan Ruang. *Indonesian Green Technology Journal*, 68-76.