

Spatial-Based Analysis Of Space Utilization Violations In Residential Area Of Malang Regency

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ABSTRACT: The rapid development of residential areas in Malang Regency has giving more pressure on the spatial utilization and triggered a mismatch between spatial plans and existing condition. This study aims to identify type of violations of spatial utilization in residential areas, analyses their spatial distribution patterns, and examines influential factors for these violations. The study was conducted by comparing existing spatial utilization with the Malang Regency Spatial Plan (RTRW) for 2020–2025 using Geographic Information System (GIS)-based spatial analysis through a map overlay method. The analysis results showed approximately 27% of observation points do not comply with the RTRW provisions, with the main form of violations being residential development in non-residential zones, conversion of agricultural land, and exceeding the provisions on spatial utilization intensity. From spatial perspective, violations are not evenly distributed and tend to be concentrated in subdistricts with high pressure for residential development. Analysis of causal factors indicate violations are influenced by social, economy, and institutional factors, with social factor becomes the primary driver of violations. This finding indicates spatial utilization control in residential areas in Malang Regency is not yet implemented in full effectivity. Therefore, strengthening spatial utilization control is mandatory through several actions of increased supervision, consistent licencing, and sustainable planning and development of residential areas.

KEY WORDS: space utilization, residential area, spatial analysis, RTRW. Malang Regency

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I. INTRODUCTION

Residential area space utilization is an important aspect in regional spatial planning implementation because it has direct relation to the fulfillment of housing needs, environmental quality and sustainability of regional development. Malang Regency of East Java province in recent years has experience massive development or residential areas along with higher rate of urbanization, population growth and increasing economic activities [11]. This condition makes Malang Regency becomes one of main destination area for population migration both for work and education purposes which makes pressure on the need for residential land continues to increase. The intensive development of residential area has created serious challenges in the control of spatial utilization. Malang Regency Government is dealing with limited capacity to maintain a compliance between spatial utilization in the actual field and the established Regional Spatial Planning (*Rencana Tata Ruang Wilayah/RTRW*). Regions with high population and high development rate tend to experience an imbalance condition between space requirement and capacity of spatial management system which increases potential for spatial utilization inconsistency [11]. Although many spatial planning policies have been established (including Regulation of the Minister of Agrarian Affairs and Spatial Planning Number 16 of 2018 concerning Guidelines for Settlement Spatial Planning) development practices that do not comply with spatial planning provisions kept found in frequent times. The development of residential areas on agricultural land, protected areas, and zones not designated for settlements indicates that spatial utilization control has not been running optimally. This condition generally occurs in areas with high economic potential and rapid development dynamics, so development interests often override applicable spatial planning provisions. Violations of spatial utilization in residential areas are essentially a form of inconsistency between established spatial plans and existing conditions of spatial utilization in the field. These violations include unauthorized land conversion, residential development outside designated zones, and violations of spatial utilization intensity regulations. This phenomenon is often found in rapidly developing urban areas and urban-

rural transition areas, were supervision of spatial utilization and enforcement of spatial planning regulations relatively weak [25]. Incompatibility between spatial planning and spatial use practices revealing spatial planning issues are not solely related to the quality of planning documents but also to the effectiveness of spatial use control system. Weak oversight, limited institutional capacity, and socio-economic pressure lead to recurring and cumulative spatial use violations. If these matters left unchecked, these conditions will rise and bring potential to degrade environmental quality, increase disaster risk, trigger land use conflicts and threaten long-term sustainability of residential areas.

So far, the existing research related to violations of spatial use has generally focused more on policy aspects or normative law enforcement, without the support of spatial analysis capable of showing the patterns, distribution, and intensity of violations in detail. In fact, spatial-based analysis is needed to identify the characteristics of violations of spatial use more objectively and measurably. Therefore, this study focuses on a spatial-based analysis of violations of spatial use in residential areas in Malang Regency, with the aim of: 1) identifying the level of non-conformity of spatial use with the RTRW (Regional Spatial Plan), 2) analyzing the factors causing violations, and 3) formulating control directions and scenarios for sustainable residential area development. The results of this study are expected to serve as an empirical basis for the formulation of more effective and contextual spatial use control policies in Malang Regency.

II. LITERATURE REVIEW

(1) Spatial planning is understood as a system of regulation, control, and utilization of regional space that is arranged in a planned manner to accommodate various human activities in a sustainable manner, not only as a technical instrument for land allocation, but as a strategic policy framework that directs development so that it takes place in balance between social, economic, and environmental sustainability interests [5][7]. Effective spatial planning requires the integration of infrastructure, economic, and social aspects, where infrastructure functions to support regional activities, economic aspects encourage growth according to local potential and environmental carrying capacity, and social aspects place community welfare as the main objective through the provision of decent and inclusive housing and public spaces [12][27]. In the spatial planning system in Indonesia, the Regional Spatial Plan (RTRW) and the Detailed Spatial Plan (RDTR) have a strategic role as normative and operational instruments for controlling spatial utilization, where the RTRW regulates the structure and pattern of space at the regional scale, while the RDTR regulates the utilization of space in detail through zoning provisions and technical requirements at the site level, while also being the legal basis for licensing, supervision, and enforcement of spatial planning laws [16][8]. The regulation of residential areas is strengthened through the Regulation of the Minister of Agrarian Affairs and Spatial Planning Number 16 of 2018 which emphasizes the integration of spatial functions, environmental carrying capacity, and social aspects to prevent environmental degradation and a decline in the quality of life of the community due to uncontrolled development [14]. Various studies show that weak implementation and control of spatial planning are the dominant factors in the occurrence of violations of spatial use in residential areas which are characterized by inconsistencies in spatial functions, exceeding the intensity of land use, and development in areas that should be limited or protected, thus potentially causing environmental damage, social conflict, and irregularity in regional space [24][17]. Therefore, consistency between the RTRW, RDTR, and spatial use practices in the field is seen as the main indicator in the analysis of violations of spatial use and becomes the basis for evaluating the effectiveness of spatial-based spatial control of residential areas.

(2) Spatial Utilization is a process of using regional space by various human activities that must follow the established spatial planning and licensing provisions, so that it is not free but is controlled through the allocation of spatial functions, intensity of utilization, and technical zoning requirements as regulated in the Regional Spatial Planning Plan (RTRW) and Detailed Spatial Planning Plan (RDTR) [7][12]. Violations of spatial utilization are defined as any form of spatial use that is not in accordance with the spatial planning and/or violates licensing provisions, whether in the form of deviations from spatial functions, exceeding the intensity of land utilization, or ignoring technical provisions such as boundaries and physical limitations of space [15]. In the perspective of contemporary regional planning, violations of spatial use are not only understood as illegal activities, but also as indicators of a weak spatial use control system due to ineffective supervision, inconsistent licensing, and high development pressure, especially in rapidly developing residential areas [5][27]. Various studies show that violations of spatial use in residential areas generally take the form of land use in non-residential zones, increased building density that exceeds regulations, and development in areas that should be protected, such as river banks and disaster-prone areas [24][17]. In spatial-based research, violations of spatial utilization are identified through zoning discrepancies between existing land use and spatial plans using map overlay methods, which are then strengthened by satellite image interpretation and visual verification to ensure factual conditions in the field [20][17]. Therefore, understanding the concept of spatial utilization and violations

of spatial utilization is an important theoretical and operational basis in analyzing the suitability of spatial utilization in residential areas and evaluating the effectiveness of regional spatial planning control [8].

(3) Sustainable development in residential spatial planning is understood as an effort to regulate and utilize space that balances development needs with limited natural resources, environmental carrying capacity, and the long-term social and economic sustainability of the community [19][7]. However, in practice, this principle is often not consistently reflected, especially in rapidly developing residential areas, where discrepancies between spatial plans and actual spatial use are still frequently found. Violations of spatial use, such as residential development in protected areas or productive agricultural land, have been reported to contribute to a decrease in environmental carrying capacity, increased disaster risks, degradation of settlement quality, as well as a reduction in green open space and disruption of the area's hydrological system [12][24][9][17]. In addition to environmental impacts, discrepancies in spatial use also affect social sustainability through increased density, limited access to public facilities, and the potential for land use conflicts due to weak consistency in the implementation of spatial plans and the availability of adequate public space [22]. From the perspective of regional development efficiency, spatial utilization that does not comply with zoning results in suboptimal land use and incurs high social and environmental costs, thus hampering the effectiveness of the provision of infrastructure and basic services by local governments [27][13]. Various studies also confirm that weak spatial planning control and supervision, as well as the lack of integration between planning documents, permits, and field conditions, are the main factors causing violations of spatial utilization that hinder the achievement of sustainable development [8][17]. Therefore, the analysis of violations of spatial utilization in residential areas is important as an empirical approach to evaluate the extent to which the principles of sustainable development have been implemented in regional spatial planning practices.

(4) Control, supervision, and law enforcement are key in the spatial planning system, which aims to ensure that spatial utilization takes place in accordance with established spatial plans. Control of spatial utilization functions as a preventive mechanism implemented through licensing arrangements, providing incentives and disincentives, and imposing sanctions against violations, so that deviations in spatial utilization can be prevented from the planning stage to the implementation of development [7][12]. Supervision of spatial utilization is an integral part of spatial planning control that focuses on monitoring and evaluating existing spatial utilization to detect early discrepancies between field conditions and spatial planning provisions, which in contemporary practice is increasingly supported by the use of spatial data, geographic information systems (GIS), and satellite imagery to increase the efficiency and objectivity of identifying violations [18][17]. The normative framework for this supervision is strengthened through Regulation of the Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency Number 21 of 2021, which regulates the mechanisms for monitoring, evaluating, and reporting, as well as the classification of forms of violations of spatial utilization, including non-conformity of spatial functions, violations of zoning provisions, and utilization of space without a permit [15]. The next stage is the enforcement of spatial planning law which aims to provide legal consequences for violations found through the application of administrative, civil and criminal sanctions, although in practice in Indonesia law enforcement is more dominant through administrative sanctions such as warnings, termination of activities, freezing of permits or demolition of buildings [21][8]. Various studies show that the effectiveness of spatial law enforcement still faces obstacles in the form of weak coordination between agencies, bureaucratic complexity, and inconsistent application of sanctions, which have the potential to foster a permissive culture towards violations and encourage repeated violations, especially in residential areas with high development pressure [13][9]. These conditions have an impact on the development of uncontrolled settlements, the use of space in limited areas, and increasing land use conflicts which ultimately reduce the quality of the residential environment and regional sustainability, so that spatial data-based supervision and consistent law enforcement are seen as the main prerequisites in realizing orderly and sustainable residential spatial planning [22][17].

(5) Conflicts in the use of space in residential areas are a further implication of violations of the use of space and weak spatial planning control, which arises when the discrepancy between spatial planning and the practice of using space in the field gives rise to conflicting interests between actors, both between the government, development actors, and local communities [7][12]. From the perspective of the theory of social conflict and social interests, space is understood as a resource that is fought over by various parties with different interests, where the government tries to maintain public interests and regional sustainability, while economic actors tend to maximize profits through intensive use of space, thus encouraging zoning violations and uncontrolled land conversion [3][8]. This condition is common in residential areas with high development pressure and housing demand, which results in overlapping spatial allocations, declining quality of residential environments, limited access to public facilities, and increasing inequality and social conflict at the local level

[22][9][17]. Various studies show that conflicts over spatial use are exacerbated by weak supervision and enforcement of spatial planning laws, the complexity of licensing bureaucracy, and low community participation in controlling spatial use, so that conflicts tend to recur and become an indicator of ineffective implementation of spatial planning policies [13][8]. In this study, conflicts over spatial use are positioned as a social consequence of violations of spatial use in residential areas, which is used to emphasize the urgency of analyzing the suitability of spatial-based spatial use to spatial plans.

III. RESEARCH METHODS

3.1 Research Location

Location of this study is in Malang Regency in particular at areas with rapid growth and high land conversion factor. This location was chosen since it experiencing rapid growth in the housing sector and has high potential for regional development that does not always align with established spatial plan.



Figure 1. Malang Regency Administrative Boudary Map

3.2 Research Design and Research Approach

This study uses a qualitative descriptive approach supported by spatial analysis to examine spatial utilization violations in residential areas in Malang Regency. This approach aims to systematically describe the alignment between existing spatial utilization and spatial plans without hypothesis testing, but rather through empirical analysis of spatial conditions in the field.

Spatial analysis was conducted using a Geographic Information System (GIS) using an overlay method between existing land use maps and zoning maps from the Regional Spatial Plan (RTRW) and the Detailed Spatial Plan (RDTR) of Malang Regency. All spatial data was standardized in the same coordinate system and scale to ensure analytical accuracy. Data processing was performed using GIS software (ArcGIS).

While the data used consisted of spatial and non-spatial data. Spatial data included land use and residential area maps, RTRW and RDTR zoning maps, and spatial utilization violation distribution maps obtained from relevant technical agencies. Non-spatial data included spatial planning policy documents, technical reports, and other supporting data. Validation of the spatial interpretation results was carried out through visual verification and data matching with information from relevant agencies at 33 observation points.

Later, the overlay results are used to identify the level of suitability and non-suitability of spatial use in residential areas. Spatial use is categorized as a violation if it is located in a zone not designated for residential

use or violates intensity and technical spatial planning requirements. Violations are then classified by type, scale, and intensity using an operational assessment system to facilitate comparisons between sub-districts.

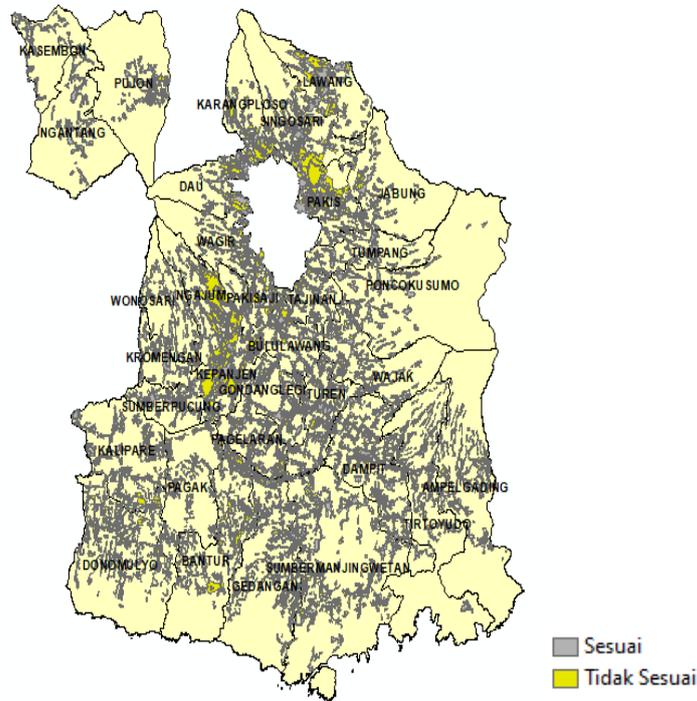


Figure 2.Land Use and Residential Area Map Overlay

The spatial illustration in Figure 2 shows the results of an overlay between the land use and residential area map and the Malang Regency RTRW and RDTR zoning maps. Furthermore, the overlay with the RTRW and RDTR zoning maps in Figure 3 was used to identify the level of spatial use mismatch in more detailed explanation.

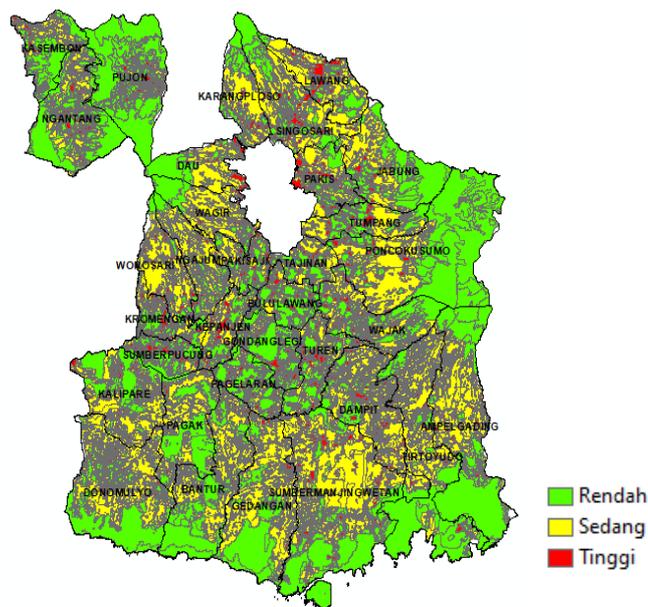


Figure 3. Overlay of Malang Regency Spatial Planning Zoning Map

The overlay results serve as the primary basis for determining indications of spatial use violations in residential areas. Areas that spatially demonstrate a high degree of mismatch between existing spatial use and the spatial designation in planning documents are designated as the focus of the research. Thus, this research design allows a systematic and measurable integration of spatial planning policies and actual conditions of spatial use on the ground.

3.3 Data and Source of Data

This study uses a combination of spatial and nonspatial data to identify and analyze spatial utilization violations in residential areas in Malang Regency. Spatial data include land use and residential area maps, zoning maps of the Regional Spatial Plan (RTRW) and Detailed Spatial Plan (RDTR) of Malang Regency, and distribution maps of spatial utilization violations obtained from relevant technical agencies. These spatial data are used as the primary basis for analyzing the conformity between existing spatial utilization and normatively determined spatial allocations. All spatial data are processed using a Geographic Information System (GIS) to ensure uniformity of the coordinate system, scale consistency, and integration between map layers.

The types and sources of spatial data used in this study are presented in the following table (Table 1 Spatial Data). This data was selected to represent existing spatial utilization conditions, spatial allocation provisions in planning documents, and official information regarding the distribution of spatial utilization violations. The use of data from local government agencies and land agencies ensures that the analysis is based on legal, verified, and relevant data within the context of spatial planning in Malang Regency.

3.4 Overlay and Spatial Analysis Method

Spatial analysis in this study was used to identify the suitability and non-suitability of residential area spatial use to the applicable spatial plan in Malang Regency. The primary method used was a spatial overlay between land use and residential area maps and the zoning maps of the Regional Spatial Plan (RTRW) and Detailed Spatial Plan (RDTR).

The overlay process is carried out using a Geographic Information System (GIS) by first ensuring uniformity of the coordinate system, scale consistency, and attribute compatibility between map layers. This stage aims to ensure that comparisons between existing spatial functions and normatively defined spatial uses can be carried out accurately and methodologically accountable.

The overlay analysis results produce spatial information regarding the location, distribution patterns, and extent of residential areas located in zones that comply with and do not comply with spatial planning regulations. This spatial information is used as an initial basis for identifying indications of spatial use violations objectively and measurably, and serves as a spatial basis for further analysis regarding the nature and extent of violation level.

3.5 Criteria and Classification of Violation of Spatial Utilization

Criteria for spatial utilization violations are determined according to conformity level between the existing spatial utilization of residential areas to the spatial allocation provisions mentioned in RTRW and RDTR documents of Malang Regency. Spatial utilization is declared a violation if the residential function is in a zone that normatively does not permit residential activities or does not meet the established technical zoning provisions.

According to results of spatial overlay analysis, violations of spatial use are classified into three main forms. The first form is violation of spatial function such as the use of residential areas located in zone designated for purposes other than residential use. The second form is violation of spatial use intensity, indicated by level of density or land use exceeding the provisions mentioned in the spatial plan, and the third form is violation of technical spatial planning provisions, such as use of space that violates boundaries or other physical provisions.

This classification is used to identify violation characters that occur in residential areas and to differentiate seriousness level of the violation based on type of non-conformity identified spatially.

3.6 Scale Analysis and Intensity of Violations

An analysis of scale and intensity of violations was conducted to assess significance level of spatial use violations in residential areas. This analysis took into account of violated areas along with the pattern and concentration of violation distribution, and temporary or permanent nature of the violations.

While extent and violation distribution were measured based on spatial overlay results in a GIS, and the nature of the violations was determined through spatial interpretation supported by technical data from relevant agencies. Based on these parameters, spatial utilization violations were classified into: (a) low scale category, (b) medium scale category and (c) high scale category.

The results of the analysis of scale and intensity of violations are used to identify residential areas with dominant level of violations, as well as plays as basis for determining priorities for controlling spatial use and evaluating the effectiveness of spatial planning policy implementation in Malang Regency.

IV. RESULTS AND DISCUSSIONS

4.1 Suitability Analysis of Spatial Utilization According to Established RTRW

The suitability analysis of residential area spatial use was conducted by overlaying the existing land use map with the zoning map of Malang Regency Spatial Plan (RTRW). The overlay result is displayed in Figure 4 by showing classification of settlement density as a representation of spatial use intensity which divided into three categories of low, medium and high.

Areas with low to moderate density indicate a relatively controlled intensity of spatial use and are in line with the RTRW direction, while high-density areas indicate development pressures that have the potential to affect environmental carrying capacity, infrastructure availability, and settlement quality, although this does not necessarily mean violations of spatial use. The distribution of settlement density provides an initial indication of the level of pressure on spatial use, where high-density areas serve as a spatial basis for the identification and analysis of spatial use violations at a later stage.

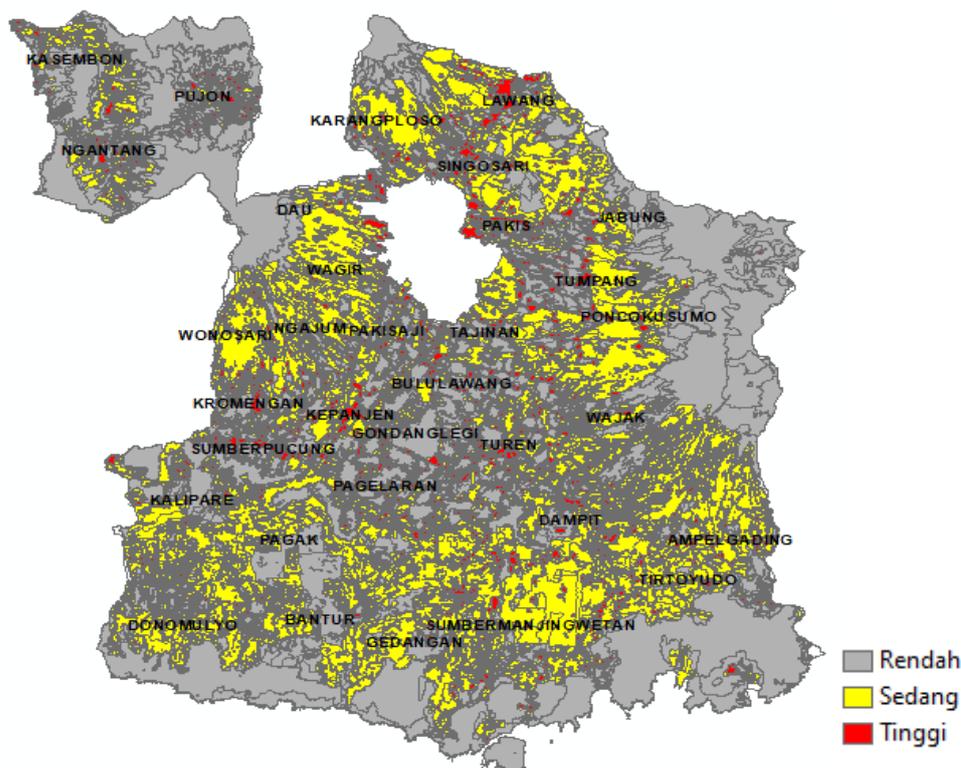


Figure 4. Result Overlay of Existing Land Use Residential Area Map and Zoning Map of the Malang Regency Spatial Plan (RTRW)

4.2 Identification and Classification of Violations of Spatial Utilization in Malang Regency

Identification and classification of spatial use violations were conducted as a follow-up to the analysis of spatial use compliance with the Malang Regency Spatial Plan (RTRW). This process integrated the overlay of existing land use maps with the RTRW zoning maps to detect discrepancy between current land use and regulated spatial allocations. The analysis results are visualized on a map as shown in figure 5, with areas classified as non conforming (red colour) and compliant (blue or yellow colour). Red areas indicate residential uses that violate RTRW provisions and are categorized as violation act. Whereas blue/yellow areas indicates land uses that comply with RTRW provisions or do not show any indication of significant violations.

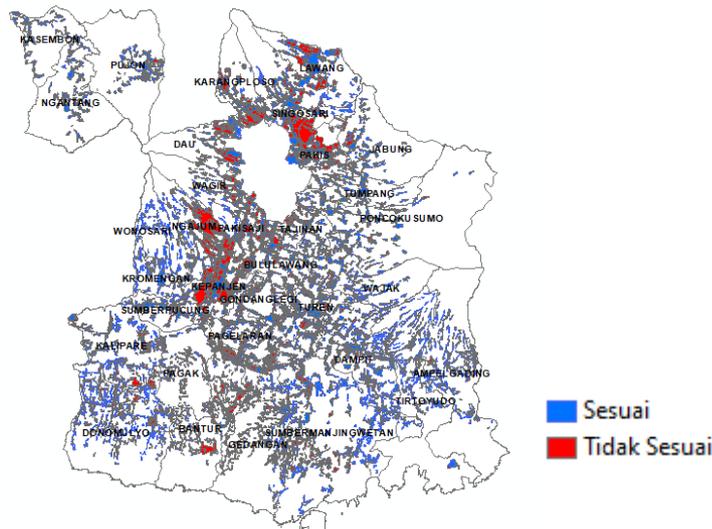


Figure 5. Analysis Result based on Residential Land

The violations or spatial use in residential areas can be classified into three categories:

1. Spatial function; settlements developing in non-residential zone or protected areas.
2. Intensity of use; for example building density exceeding the established limits.
3. Technical spatial planning provisions; for example spatial use violating river boundaries, road boundaries, or other physical boundaries.

From spatial perspective, violations are not randomly distributed, but are concentrated in areas with high accessibility and high land demand. A historical overlay (Figure 6) shows that some settlements were originally rice fields (KET_LANDUS = Rice fields). The conversion of rice paddies to settlements occurs in zones not designated for settlements according to the RTRW (Regional Spatial Plan), thus categorizing them as high-level violations. The linear development follows the road network and activity centers, indicating that land conversion is gradual and cumulative. This phenomenon has the potential to reduce the area of productive agricultural land and increase environmental risks, such as reduced water absorption and flooding.

This identification result becomes an important basis for further analysis regarding violation patterns, the scale of land conversion and their implications for the sustainability of regional spatial planning. Figure 5 displayed result of the analysis of spatial use violations in residential areas in Malang Regency where red areas indicate areas that do not comply with RTRW, while the blue or yellow areas indicate areas that comply or have no significant violations

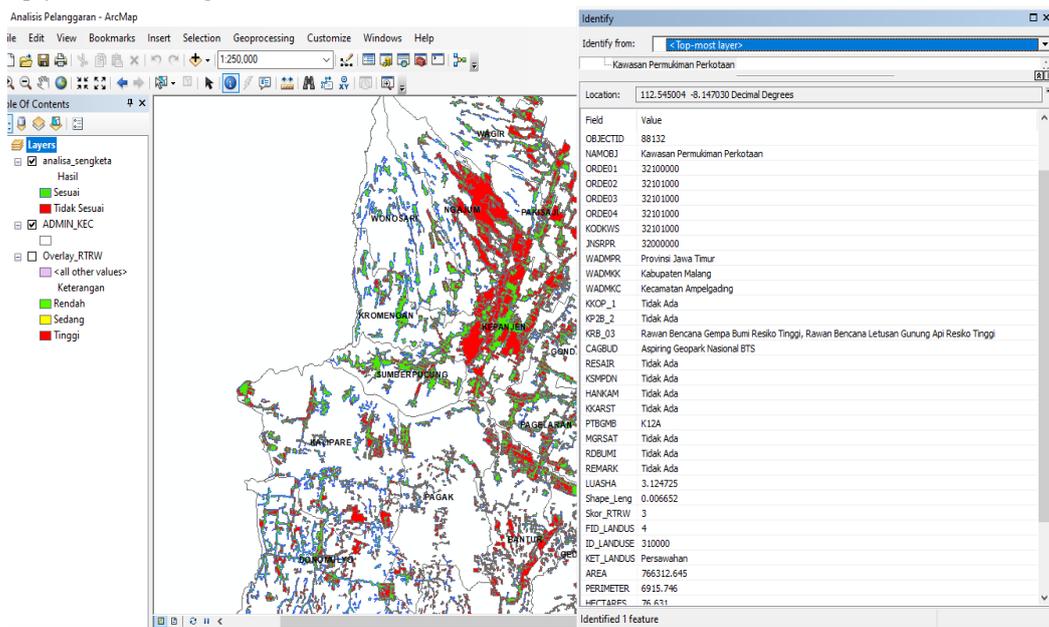


Figure 6Result of Residential Land Identification

Figure 6 is an overlay of existing land use and RTRW zoning, showing the conversion of rice fields to residential areas. The linear pattern is following the road network and activity centers and it demonstrates cumulative residential development.

4.3 Analysis of the Violation Scale and Intensity of Spatial Utilization in Residential Area

This analysis is conducted to assess violation level that have been previously identified. In the context of spatial planning, violations are not only understood as non-conformity zoning but also as spatial phenomena with variations in scale, intensity, and character between locations [4][28]. This analysis considers the size of the affected areas, number of violating buildings, the nature of violations and the level of non-conformity with zoning and technical provisions of the RTRW [28].

Each parameter is given an operational score to simplify the complexity of field condition into a classification that can be compared across location. [4]. Table 2 presents criteria for assessing the scale, intensity, character, and level of on-compliance of the violations. Total score is used to classify level of violations into minor, moderate or major categories.

Table 2. Operational Criteria for Assessing Scale and Intensity of Violations of Spatial Utilization

Aspect	Parameter	Criteria	Score
Violation scale	Size of the impacted area	Minor/fragmented	1
		Moderate/clustering	2
		Major/widespreading	3
Violation Intensity	Number of violating buildings	≤5	1
		6–20	2
		>20	3
Violation character	Nature of violation	temporary/easy recovery	1
		Semi-permanent	2
		Permanent/difficult to recover	3
Incompatibility level of RTRW	Zonation and technical provisions	Conditional fit/conform	1
		Does not conform with zoning	2
		Not accordance to zoning and technical violations	3

Result of validation tests from 33 observation points showed 73 % of areas were in accordance with RTRW provision, while 27 % were invalid (Table 3). These non-conformities generally occurred in sub-districts of Wajak, Kasembon, Tirtoyudo, Sumberpucung and Turen, which showed a higher scale and intensity of violations than other sub-districts. While sub-districts areas such as Donomulyo, Pagelaran, Kalipare, Gondanglegi, and others were dominated by valid points indicating a low level of violations.

Table 3. Result of Validation Test for Intepretation of Spatial Utilization Violation

Description	Amount	Percentage
Valid	24	73%
Not valid	9	27%
Total	33	100%

Based on the total score classification, Table 4 presents a summary of violation levels per sub-district. Sub-districts with high violation levels generally experience permanent land conversion and rapid residential development, while sub-districts with low levels show limited and fragmented violations.

Table 4. Violation Level of Spatial Utilization in Each Sub-district

Subdistricts	Violation Level	Violation General Character
Wajak	Major	Permanent residential, high score
Kasembon	Major	Land conversion from farm field
Tirtoyudo	Moderate – Major	Settlement in nonresidential zone
Sumberpucung	Moderate – Major	Urban area factor
Turen	Moderate – Major	Intensification of settlement
Other subdistricts (Donomulyo, Gedangan, Pagak, Dampit, Pagelaran, Kalipare, Gondanglegi, Kromengan, Wonosari, Poncokusumo, Tanjinan, Wagir, Dau, Ngantang)	Minor	Limited violation

The analysis shows scale and intensity of spatial use violations are in spatial and contextually diverse in nature. Sub districts with high residential growth have greater violations both due to demographic pressures and economy activities which need priority control in the spatial management of residential areas.

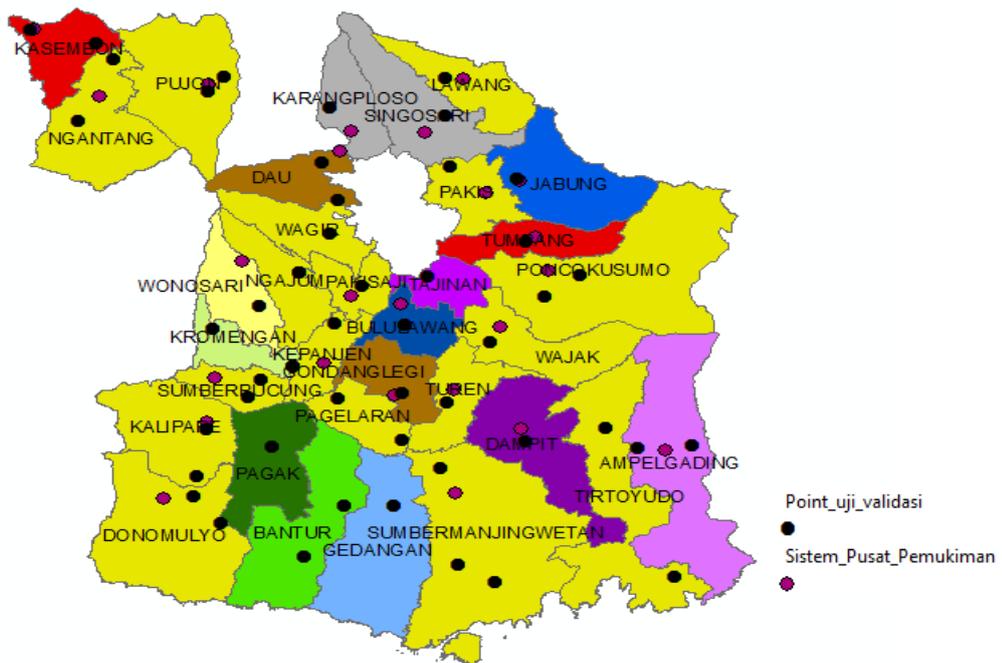


Figure 7Result of Validation Test for Every Sub District

4.4 Analysis of Causal Factors to Violation of Spatial Utilization in Residential Areas

Violations of spatial use in residential areas in Malang Regency arise from the interaction of several factors of economic, social, and institutional. The analysis was conducted by assessing the relative weight of each factor to determine which factor is the most influential on violation patterns.

The weighting results indicate that social factors have the greatest influence (0.06), although the economic factor has a smaller weight (0.03). Social factor consists of population growth, urbanization, settlement patterns, and the community's level of understanding of spatial planning regulations while economic factor relates to land values, housing demand, and land conversion. Institutional factor determines the extent to which violations can be controlled.

Table 5. Weight of Violation Causal Factor

Weight	Parameter	Formula	Result
0,4	Faktor Ekonomi	$\bar{X} = \frac{\sum X_i}{n}$	0,03
0,6	Faktor Sosial	$\bar{X} = \frac{\sum X_i}{n}$	0,06

a. Economy Factor

Economy factor is the driver factor for residential development in type of locations that do not comply with RTRW or the Regional Spatial Plan. In particular for areas with high land value and has easy accessibility. Subdistricts such as Wajak and Kasembon show high level of violations including permanent settlements and conversion of plantations land to residential areas. While other subdistricts such as Tirtoyudo, Sumberpucung, Turen and Tumpang have experienced gradual residential development in response to housing needs.

Table 6. Violation According to Economy Factor

Subdistricts	Violation Level	Economy Factor
Wajak	Major	Permanent residential, land value increase
Kasembon	Major	Conversion from plantation land into residential areas
Tirtoyudo	Moderate-Major	Housing needs in non-residential areas
Sumberpucung	Moderate-Major	Urban area and accessibility factors
Turen	Moderate-Major	Increased housing
Tumpang	Moderate	Gradual settlement expansion
Singosari	Moderate	Development of urban areas
Karangploso	Moderate	Clustered settlements
Other subdistricts (Donomulyo, Gedangan, Pagak, Dampit, Pagelaran, Kalipare, Gondanglegi, Kromengan, Wonosari, Poncokusumo, Tanjinan, Wagir, Dau, Ngantang)	Minor	Economy factor relative low

b. Social Factor

Social factor is the primary driver of violations, including inherited settlement patterns, the use of family land, social tolerance for development outside the RTRW (Regional Spatial Plan), and urbanization. Subdistricts such as Wajak and Tirtoyudo exhibit kinship-based settlements, while Singosari, Karangploso, and Sumberpucung are impacted by lifestyle changes and urbanization.

Table 7. Violation According to Social Factor

Subdistricts	Violation Level	Social Factor
Wajak	Major	Heredity settlement pattern, high social tolerance
Kasembon	Major	Family land use, low compliance
Tirtoyudo	Moderate-Major	Kinship-based settlement
Sumberpucung	Moderate-Major	Population growth and immigration
Turen	Moderate-Major	Residential needs of local community
Tumpang	Moderate	Expansion of community settlements
Singosari	Moderate	Urbanization and lifestyle changes
Karangploso	Moderate	Clustered settlements

Subdistricts	Violation Level	Social Factor
Other subdistricts (Donomulyo, Gedangan, Pagak, Dampit, Pagelaran, Kalipare, Gondanglegi, Kromengan, Wonosari, Poncokusumo, Tanjinan, Wagir, Dau, Ngantang)	Minor	Social control is relative effective

c. Institutional factor

Institutional factor determines the effectiveness of violation control. Subdistricts with major and moderate-major violations, such as Wajak, Kasembon, Tirtoyudo, Turen, and Sumberpucung, have limited oversight, inconsistent sanctions implementation, and weak inter-agency coordination. While subdistricts with low violations demonstrate better control, resulting in limited violations.

Table 8. Violation According to Institutional Factor

Subdistricts	Violation Level	Institutional Factor
Wajak	Major	Weak oversight and enforcement
Kasembon	Major	Limited control over function transfer
Tirtoyudo	Moderate-Major	Supervision is not optimal
Sumberpucung	Moderate-Major	Development factor > control capacity
Turen	Moderate-Major	Low licencing consistency
Tumpang	Moderate	Control relatively exists
Singosari	Moderate	Limited institutions coordination
Karangploso	Moderate	Limited supervision
Other subdistricts (Donomulyo, Gedangan, Pagak, Dampit, Pagelaran, Kalipare, Gondanglegi, Kromengan, Wonosari, Poncokusumo, Tanjinan, Wagir, Dau, Ngantang)	Minor	Control function is more effective

In overall perspective, many violations of spatial use in Malang Regency occur due to social factor as the primary trigger, this factor accelerates violation occurrences and institutional factor becomes the factor that plays a role in controlling or curbing the violations made. A better understanding about how these factors interacting is crucial for designing settlement control and planning policies.

4.5 Implication of Findings of Spatial Utilization Violations on Control of Residential Areas

Spatial use violations in residential areas in Malang Regency influence the spatial use control strategies. Result of the study indicate violations are not solely caused by zoning inconsistency, but are also influenced by economy factor, socio dynamis, and limited institutional capacity. Approximately of 27 % of observation points do not conform to spatial planning plan, indicating significant violations that require a more targeted control response.

Control approach needs to be tailored to the scale and intensity of violations. For areas with major and persistent violations, especially in districts with dense residential development, it requires firm action such as enforcing sanctions, implementing regulations, and limiting new permits, meanwhile areas with moderate or minor violations can be adressed through monitoring and gradual adjustment to land use.

Economic factor, such as rising land values and housing demand are the primary drivers of violations. Control measures must be integrated with land market policies and housing provision in accordance with the Spatial Plan (RTRW) to prevent economic pressures triggering further violations.

Social factor also influences the spread of violations, particularly through population growth, urbanization, and limited public understanding of spatial planning provisions. Control strategies need to be accompanied by socialization of the RTRW, community assistance, and education regarding the function and designation of space.

While institutional aspects determine the effectiveness of control measures. Violations tend to flourish in areas with weak supervision and coordination between agencies. Strengthening human resource capacity, consistent licensing implementation, and cross-sectoral coordination are key to effectively controlling violations.

Overall, control of spatial use in residential areas needs to be implemented in stages, contextually, and based on the nature of the violation. This approach maintains consistency between plans and spatial use while at the same time ensuring the long-term sustainability of residential areas.

V. CONCLUSIONS

Violations of spatial utilization in residential areas in Malang Regency during 2020–2025 occurred due to the development of settlements in non-residential zones, land conversion, and development exceeding spatial intensity requirements, especially in areas with high development pressure. Violations were influenced by a combination of social, economic, and institutional factors with social factor plays as the primary driver. Sustainable settlement control and development need to be implemented in stages, encompassing short-term regulation and strengthening of supervision, targeted settlement development and medium-term infrastructure improvements, along with development based on environmental carrying capacity to maintain the sustainability of long-term spatial functions.

REFERENCES

- [1] Abil, "Pengendalian pemanfaatan ruang permukiman di Kabupaten Malang," *Jurnal Perencanaan Wilayah dan Kota*, vol. 18, no. 2, pp. 145–158, 2023.
- [2] Aisyah Putri Pungkas, "Implementasi rencana tata ruang wilayah di Kabupaten Malang," *Jurnal Tata Ruang*, vol. 12, no. 1, pp. 33–45, 2020.
- [3] R. Dahrendorf, *Class and class conflict in industrial society*, Stanford University Press, 2019.
- [4] A. Faludi, "The performance of spatial planning," *Planning Practice & Research*, vol. 15, no. 4, pp. 299–318, 2000, doi:10.1080/713691907.
- [5] A. Faludi, *The poverty of territorialism: A neo-medieval view of Europe and European planning*, Edward Elgar Publishing, 2018.
- [6] T. Firman, "Urban development and spatial planning in Indonesia," *Journal of Urban Affairs*, vol. 39, no. 5, pp. 699–720, 2017.
- [7] T. Firman, *Perencanaan wilayah dan kota dalam era otonomi daerah*, Bandung: ITB Press, 2020.
- [8] T. Firman, "Penegakan hukum penerapan ruang di Indonesia: Tantangan dan peluang," *Jurnal Tata Loka*, vol. 23, no. 1, pp. 1–15, 2021.
- [9] R. Fitriani, "Dampak pelanggaran pemanfaatan ruang terhadap lingkungan permukiman perkotaan," *Jurnal Lingkungan dan Pembangunan*, vol. 14, no. 2, pp. 89–102, 2022.
- [10] D. Harvey, *A brief history of neoliberalism*, Oxford University Press, 2005.
- [11] R. Hidayat, Suyono, & A. Prasetyo, "Dinamika pertumbuhan permukiman dan implikasinya terhadap tata ruang wilayah," *Jurnal Perencanaan Wilayah*, vol. 16, no. 3, pp. 211–225, 2021.
- [12] D. Hudalah, *Regional planning and governance in Indonesia*, Springer, 2018.
- [13] D. Iskandar, "Efektivitas pengendalian pemanfaatan ruang kawasan permukiman," *Jurnal Administrasi Publik*, vol. 11, no. 2, pp. 97–110, 2021.
- [14] Kementerian Agraria dan Tata Ruang/BPN, *Peraturan Menteri Agraria dan Tata Ruang/Kepala BPN Nomor 16 Tahun 2018 tentang Pedoman Penyusunan Rencana Tata Ruang Kawasan Permukiman*, Jakarta, 2018.
- [15] Kementerian Agraria dan Tata Ruang/BPN, *Peraturan Menteri Agraria dan Tata Ruang/Kepala BPN Nomor 21 Tahun 2021 tentang Pelaksanaan Pengendalian Pemanfaatan Ruang*, Jakarta, 2021a.
- [16] Kementerian Agraria dan Tata Ruang/BPN, *Pedoman penyusunan rencana detail tata ruang*, Jakarta, 2021b.
- [17] A. Nugroho, "Analisis spasial pelanggaran pemanfaatan ruang kawasan permukiman," *Jurnal Geomatika*, vol. 29, no. 1, pp. 55–68, 2023.
- [18] A. Nugroho & R. Pratama, "Pemanfaatan SIG dalam pengawasan tata ruang," *Jurnal Teknologi Informasi Spasial*, vol. 7, no. 2, pp. 101–113, 2020.
- [19] E. Purwanto, *Pembangunan berkelanjutan dan tata ruang wilayah*, Yogyakarta: Gadjah Mada University Press, 2020.
- [20] R. A. Putra, "Identifikasi pelanggaran pemanfaatan ruang berbasis citra satelit," *Jurnal Perencanaan Wilayah dan Kota*, vol. 17, no. 1, pp. 23–37, 2021.
- [21] S. R. Putri & D. Lestari, "Penegakan hukum administrasi tata ruang di Indonesia," *Jurnal Hukum dan Pembangunan*, vol. 51, no. 2, pp. 289–305, 2021.
- [22] R. Rachmawati, "Keberlanjutan sosial kawasan permukiman dalam perspektif tata ruang," *Jurnal Sosial Humaniora*, vol. 14, no. 1, pp. 45–58, 2021.
- [23] F. Ruspianda, M. Siregar, & L. Andriani, "Pengendalian pemanfaatan ruang kawasan perumahan di Kecamatan Kuantan Tengah," *Jurnal Perencanaan Wilayah*, vol. 15, no. 2, pp. 120–134, 2020.
- [24] B. Setiawan, "Ketidaksihinggaan pemanfaatan ruang dan implikasinya terhadap lingkungan perkotaan," *Jurnal Tata Ruang*, vol. 9, no. 2, pp. 67–79, 2017.
- [25] Suyono & R. W. S., "Analisis kebijakan pengaturan tata ruang di Kota Malang," *Jurnal Administrasi Publik*, vol. 10, no. 1, pp. 55–68, 2018.
- [26] Undang-Undang Republik Indonesia Nomor 41 Tahun 2009 tentang Perlindungan Lahan Pertanian Pangan Berkelanjutan.
- [27] H. Winarso, "Ketidaksihinggaan tata ruang dan pengendalian pembangunan perkotaan," *Jurnal Perencanaan Wilayah dan Kota*, 2015.
- [28] H. S. Yunus, *Dinamika wilayah peri-urban*, Yogyakarta: Pustaka Pelajar, 2008.