International Journal on Advanced Science Engineering Information Technology

Vol.13 (2023) No. 4
ISSN: 2088-5334

Environmental Quality Deterioration in the Mamminasata Metropolitan New City Area, South Sulawesi, Indonesia

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***Abstract*—Excessive urbanization in the development dynamics of Makassar City in its position as the main city in the Mamminasata Metropolitan urban system has an impact on the expansion of the area towards suburban areas for the needs of new city development. The development of new cities through the development of socio-economic activities contributes positively to the quality of the environment. Increased housing development and socio-economic activities mark this condition, and urban infrastructure is allocated for new urban areas. The development of the new city area of Moncongloe-Pattalasang impacts changes in spatial attributes, spatial dynamics, and urban transportation systems based on patterns of origin and travel destinations towards the complexity of space utilization and environmental degradation from the suburbs. This study analyzes the direct and indirect effects of land cover change, land elevation, and agricultural land conversion on environmental degradation. This study uses a quantitative survey approach, and data was obtained through observation, survey, and documentation. The study results show that the development of new urban areas has positively contributed to the spatial dynamics and socio-economic system of the Mamminasata urban community. Furthermore, the difference in land elevation has positively affected changes in spatial activity patterns, environmental quality degradation, and the potential risk of urban flooding in the new city area of Moncongloe-Pattalassang. This study recommends restoring the environmental quality of new urban areas in formulating policies to support the sustainability of the Mamminasata Metropolitan urban development.**

***Keywords*— Social change; environmental degradation; space utility; urban activities; new city area.**

Manuscript received 31 Dec. 2021; revised 20 Jul. 2022; accepted 12 Sep. 2022. Date of publication 31 Aug. 2023.

I. INTRODUCTION

Globalization and urbanization cause the expansion of the main city to the peripheral urban area, as seen in the case of big cities and metropolitan in Indonesia. Moreover, global economic activity is not only formed in urban centers but also extends and ultimately impacts the surrounding suburbs [1], influencing the potential for expansion in agricultural and vacant land [2]. The establishment of the Mamminasata Metropolitan urban peripheral area, which is developed as a new city, directly affects the environmental quality and degradation. Hence, growth manifests in the urban forms and spatial structures and the nature of ecological impacts, which eventually ensues [3]. Furthermore, the new city construction area is characterized by productive agricultural land conversion, which contributes positively to reducing cover terrains and its differentiation and advancement.

This development causes a population increase, positively associated with expanding housing and settlement necessities, urban facilities and infrastructure, and the current building investment. Furthermore, uneven development is the procedural geographic manifestation of internal structural contradictions related to capital or housing prices [4]. The Moncongloe–Pattalassang peripheral area impacts the space utility alteration. Also, it contributes positively to economic and social activities of system integration and urban agglomeration, which comprises the central city and its suburban areas, forming a functional unit [5]. However, the building intensity tends to endanger the new area and the sustainability of the urban system of Mamminasata Metropolitan in the future. This has to be managed by small regional centers, as a focal point, from the perspective of urbanization [6].

The building plan of the new city area includes the development of some municipal functions, which encompasses the expansion of the width of settlement, trading,

and education to about 1,119.55 ha, 372.74 ha, and 172.86 ha, respectively. This fact shows that land use change has become a determining factor for morphological changes, either concentric or linear, along the main road of corridor areas. Three elements are responsible for this: land utility, road pattern, and building characteristics [7]. Therefore, the improvement of Moncongloe–Pattalassang's new city building activity is in line with the productive land conversion, which is dynamic towards the growth center of the urban area. This settlement area is planned to create relatively independent city slides through the basic economic provision for the residents [8]. Furthermore, the urban growth process encompasses the sustainable conversion of undeveloped, often agricultural land into housing and other rebuilding procedures in the city [9].

The results from field observations showed that the new city of Moncongloe–the construction of roads supported Pattalassang through the Mamminasata Metropolitan route, which spans up to 15.8 km, towards the Hasanuddin Mandai International Airport in Maros Regency. Moreover, the concept of intelligent infrastructure in environmental sustainability applies to promoting sustainable environmental development and reducing sprawl expansion, which was identified to promote environmental damage [10]. This road network directly impacts the direction of spatial and physical advancement in association with morphological alteration and rural typology of the surrounding. Therefore, urban industrial models influence the structure, morphology, and function changes in the peripheral space [11].

Moncongloe–Pattalassang urban exterior area development affects the modification of space utility, which is geared towards urban agglomeration, encompassing a complex, dynamic, and large system [12]. The plot utility alteration, in line with productive farmland conversion, affects the environmental quality degradation. Hence, the developed new city area requires building a sustainability evaluation. This is further related to the growing environmental awareness of the population, thus enhancing the necessity to evaluate current management systems for urban centers [13]. The quality degradation of the new city area Moncongloe–Pattalassang is measured and assessed based on some indicators, which include: (i) agricultural land conversion, (ii) land cover reduction, (iii) plot elevation distinction, (iv) environmental pollution, (v) degradation of groundwater quality, (vi) urban activity improvement, (vii) typology and morphology alteration, (viii) infrastructure building, (ix) society behavior, (x) space structure, and (xi) spread pattern.

Regarding the study above, the following hypotheses were deduced; (i) The significance of land utility alteration, and (ii) the direct and indirect influence of improving the pattern of urban activities towards the quality degradation of the Moncongloe–Pattalasang new city area. Meanwhile, the objectives of this study include: (a) examining the significance of space utility alteration and (b) reviewing and analyzing the direct and indirect influence of improving urban activity patterns on the qualitative degradation of the studied area.

II. Material and Method

A. A Case Study Using Quantitative Approach

Some basic considerations to be noted while using the quantitative approach are as follows:

- The decision on problems beforehand.
- The research characteristics to examine inter-variable relationships.
- The reality of developing the common study objective.

This method is in line with this Figure 1 as follows.

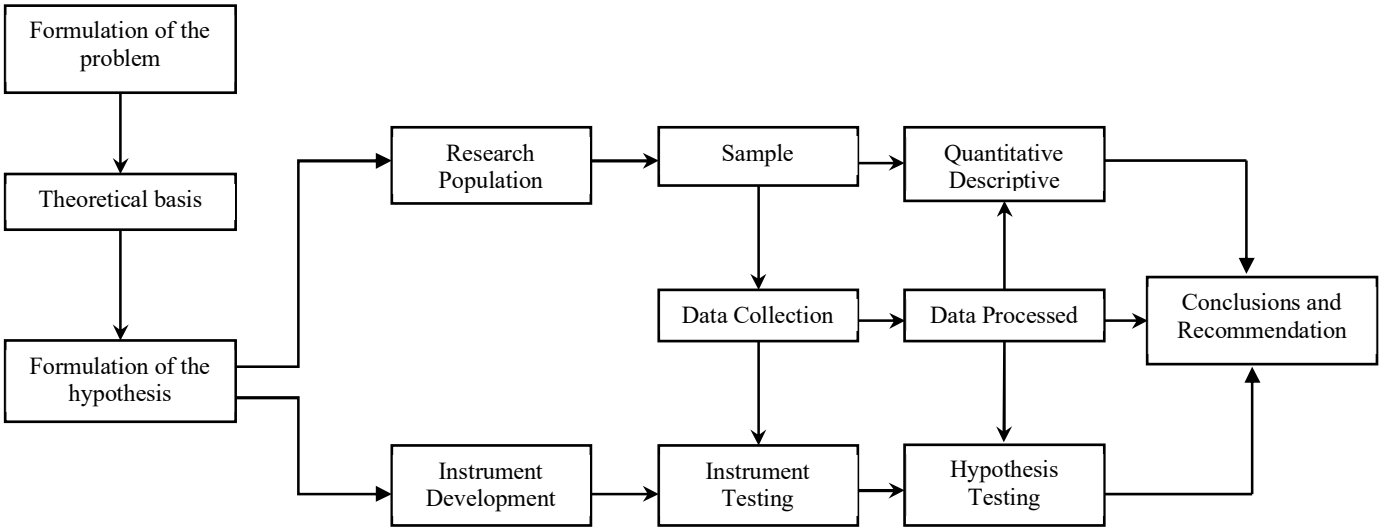

Fig. 1 Stage of quantitative research in the new city area of Moncongloe-Pattalassang. Source: Adapted from Sugiyono, [14]

Therefore, this study aims to assess the cause-effect relationship and shows the influence of space utility variable alteration on the dependent environmental quality degradation. This is further characterized based on real-time reality development [14]. However, some ontology assumptions built into this research are as follows:

- The intensity of space utility alteration is the cause of spatial attribute modification of the new city area of Moncongloe–Pantalassang.
- The land elevation distinction is the effect of the building, which significantly influences the quality of environmental degradation.

- The intensity and pattern of urban activity, directly and indirectly, affect the specific characteristics of the location under study (See Fig. 1).

The method of collecting data are as follows:

- Observation, in order to assess the characteristics and space utility intensity, morphology, typology, and conversion of productive farmlands.
- The survey assesses the population characteristics based on economic and social conditions and societal behavior toward environmental quality degradation.
- Documentation to review the conducted study, in the direction of developmental planning, for the new municipal zone of Moncongloe–Pattalassang.

The analysis method is divided into three categories as follows:

- Quantitative descriptive to analyze the frequency value and the survey percentages related to economic and social conditions and social behavior.
- The assessment of influence, using correlation and double regression test, to understand the significance of land utility alteration towards environmental quality degradation.
- Path examination to test the direct and indirect influence of urban activity patterns.

The purpose and characteristics of this feature are to analyze the inter–variable relationship observed based on the problems and variables implemented. Therefore, the model in this study is divided into two categories:

- Double regression was used to assess the significance of the correlation.
- Way construction test applied to examine the empirical result. In addition, analysis is also carried out to find direct and indirect influences, utilizing intervening variables.

B. Study Area

Mamminasata Metropolitan is the new city, studied in Moncongloe–Pattalassang urban peripheral area, and the following were considered:

- The zone under deliberation has significant space utility changes.
- The presence of complex and other influences on the surrounding rural area, characterized by building allocations of the new city.
- The occurrence of construction on productive farmland, followed by urban environmental quality dilapidation.

This research was conducted between June and December 2020. Furthermore, the location of the research is presented in Figure 2 below.

Fig. 2 New city area of the Moncongloe–Pattalassang as the research object

III. Results and Discussion

This development conferred a direct effect on spatial attribute alteration, which also affects agricultural land conversion (see Fig.2). This effect causes the space structure to change into the pattern of a new municipal zone. This causes intensive land use conversion and affects the appearance and morphology of the peripheral region on a small and large scale [15]. Therefore, the facts gathered from the fields show that suburban and agricultural land transition possesses the characteristics of improving settlement buildings, trading, services, and economic and social activities, which contributes positively to population improvement and the susceptibility regarding the risk of cataclysm.

Meanwhile, these extensive conversions into residential and commercial land use tend to be more vulnerable to natural disasters [16]. Changes in Space Utilization of the new city Moncongloe-Pattalassang area are presented in Figure 3 below.

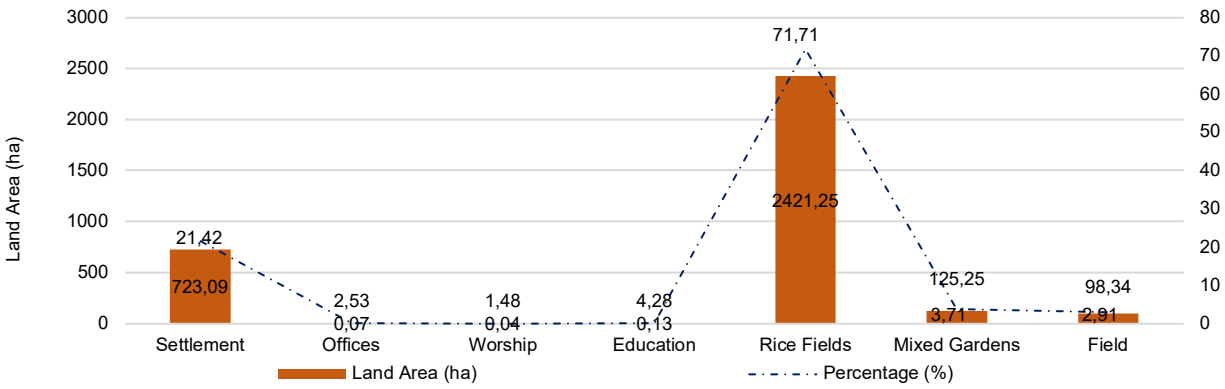

Fig. 3 Changes in the spatial utilization of the new city area Moncongloe-Pattalassang. Source: Field observation, 2021.

Figure 3 shows that up to early 2021, the new settlement development increased in size up to 723,09 ha. This confirms that the spatial attribute syndrome and the characteristic of Moncongloe–Pattalassang peripheral area had changed, which in this case involves the transition from rural to urban characteristics, indicated by the complex space utility alteration. However, the side effects of large–scale sustainable urban expansion include the consumption of agricultural and ecological land [17]. Therefore, there is a prediction that these conversions would change significantly through the development of morphological and suburban alteration in the Moncongloe–Pattalassang new city. This is exhibited through specific morphology, population density, and ways of conducting economics, which no longer breeds certain social types of relationships by at least eliminating primordial gravity [18].

Furthermore, this studied area tends to develop as the new growth center in the urban system. This also means that urban development's economic and infrastructural aspects are more critical in developing countries [19]. The productive farmland conversion tends to increase because the construction step is associated positively with spatial transformation. Urban expansion causes pressure on natural terrain resources, thus promoting its propensity to remain high in the future [20]. The spatial transformation directly supports urban activities in linear or concentric developments. Therefore, there is a direct favorable implication on the space structure alteration, its pattern improvement, and its impact on the surrounding rural areas [21].

These were predicted to emerge in the Moncongloe–Pattalassang new city area, altering the region's transportation system. However, it also possesses the feature of hyphen improvement within inter-urban areas, which influences the urban system of Maros and Gowa Regency, whose network has become an essential form of regional development [22]. Furthermore, the government is vital in infrastructure co-creative partnerships [23]. Subsequently, the following impacts emerge besides the space pattern, complex enough and directly influencing the environmental ecosystem's alteration. This happens due to land cover vegetation reduction, aquatic absorption utility region, and surface water quality profanation. Moreover, a significant challenge in resource management is addressed, and a trade-off between economic growth and ecosystem restoration and conservation is perceived [24].

The increase in population causes the necessary upgrade of guesthouses, creativity, district delight facilities, infrastructure, and the change in orientation of societal occupation. Therefore, the ability to be mobile and its role in mediating the levels of resilience to livelihood is further associated with changing environmental conditions [25]. The facts gathered in the field show that developing the population is related to the biotic and abiotic environmental profanation expense, which influences the surrounding connective area of the ecological system. Moreover, the results of conservatory governance depend on how effectively the patterns of interaction between actors are in harmony with that of organic connectivity [26]. The population of the new city area is shown in Figure 4 as follows.

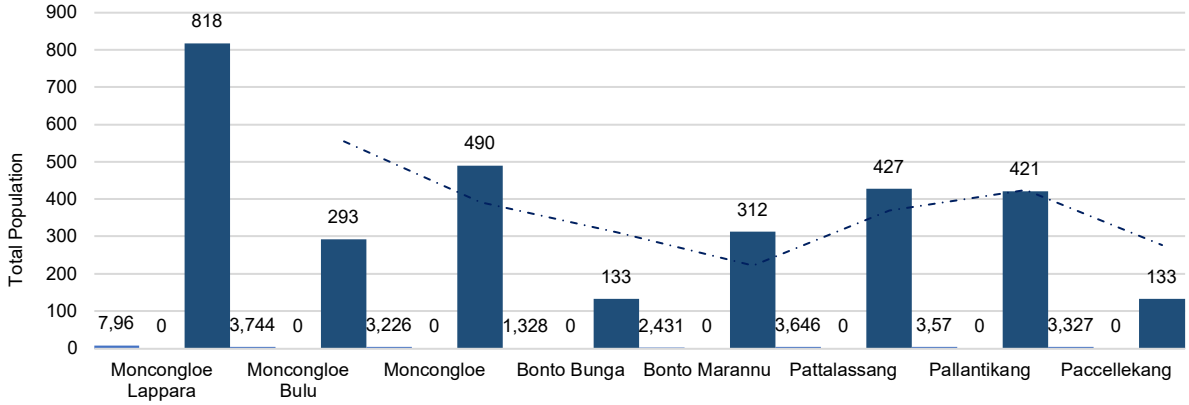

Fig. 4 Population density of the new city area Moncongloe-Pattalassang. Source: Moncongloe-Pattalassang district in Figures, 2021.

Figure 4 shows the population in the new city area of Moncongloe-Pattallassang, encompassing 29,232 people, where the highest population density was in Moncongloe Lappara village, with about 818 people/Km². Conversely, the lowest was recorded in Paccelakkang and Binto Bunga villages, with about 133 people/Km². These numbers show the propensity of obtaining population improvement that is in line with rapid urbanization, affecting the potential supporting environment, the potency of space patches, and the endurance and susceptibility of cataclysm. Therefore, there is a need to implement transformative approaches to resilience, including concerns about social and environmental justice and conservative approaches driven by interests in infrastructure and security [27].

A. Socio-Economic Characteristics of New City Region Communities

The characteristic of the economic society is related to typology, and the constructed urban environmental characteristic, which means that the typical new city of Moncongloe-Pattalasang closely correlates with the conservative condition. Therefore, communities face complex challenges while negotiating the concepts of social sustainability, encompassing inclusion, and nurturing a sense of belonging [28]. In addition, the building dynamics affect the formation of communal typology and societal behavior toward ecosystem continuity. Therefore, there is hope that the framework, through the combination of the general categories developed (including social equity, health safety, participation and control, environmental education, cultural value, social cohesion, accessibility, and satisfaction, as well as physical resilience), further helps to narrow the gaps identified [29].

The incoming infiltration and expansion of new arrivals and local communities within the new city cause communal interaction and an adaptive response regarding the constructed environment conditions [30]. However, the different approach to collaboration and its adaptation leads to societal behavior distinction towards rural environmental conditions. Therefore, the spatial properties of the drive, thus, cater to specific ethnic needs and, therefore, promotes certain types of interaction between its users, particularly those in minority ethnic background [31]. Furthermore, the rising temperatures subsequently exacerbate urban systems, which are already highly vulnerable, especially within informal settlements, and small towns, where most municipal residents live and experience unregulated and bad services [32]. Meanwhile, housing seems to be an area of concern that deserves more attention, especially considering the potential risks of gentrification through the polarization of lifestyle facilities [33].

In this study, the community's social and economic characteristics are assessed based on educational background and fiscal ventures, which develop the relationship with prosperity, income level, and lifestyle distinction in the new city area of the Moncongloe-Pattalassang. Therefore, transformation opportunities are identified in governance, infrastructure, and everyday life [34]. The population-based on educational background in the new city area of Moncongloe–Pattalassang is presented in Figure 5 below.

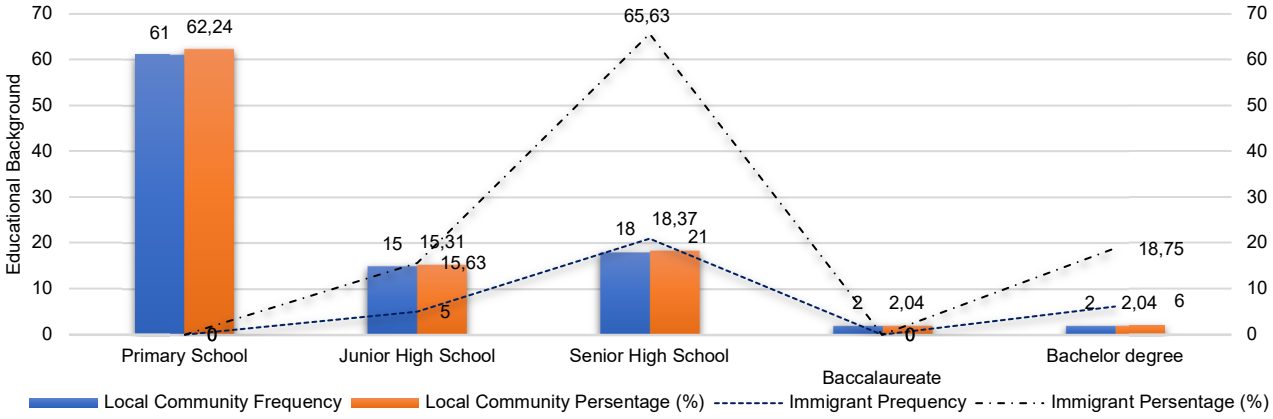

Fig. 5 Population based on educational background in the new city area Moncongloe-Pattalassang area..

Figure 5 shows the educational background of the area under consideration, and three-level educational categories were identified. These include the following schools; (i) senior high (65,63%), dominated by the arrival population, (ii) junior high (15,63%), consisting of the advent and local community, (iii) primary education (62,24%), encompassing the local indigenes. These numbers further describe the very different abilities and skills between both communities, in response to the changing environmental situation, based on educational background. Hence, local transformation processes are complex and context-dependent [35]. Meanwhile, these differences, in combination with societal culture, associate positively with the behavior and culture towards the conservatory conditions of the residents. Furthermore, the principal characteristic of the scenario, in the form of culture, shows the provision of space for collective, improvised, and reflexive modes to act and think following an uncertain future [36]. Hence, it is concluded that a positive correlation exists between educational background and the extent of environmental degradation.

The building dynamics of Moncongloe–Pattalassang new city area tends to be directed towards rural development on a dominant large scale**,** meaning its occurrence is only oriented to support housing necessities for the new arrival based on income and economic levels. However, location, distance, revenue, population density, congestion, and education significantly explain the formation of housing types and other important factors, with minor convergence between separate, semi-detached, and multilevel designs [37]. The fact in the field showed that the ability of different owners of the

residence facilities and the economic and social activity pattern affect the distinction of infrastructural service characteristics and the fulfillment of rural facilities. Meanwhile, higher housing prices in specific communities reflect better public services and amenities through a greater willingness to pay for home purchases or rent [38]. This means that an intensive farmland conversion is one of the factors that cause the drift of local community economic activity to urban industrialization, and friction of this pattern affects ownership segregation of the residence facility. Hence, the small area measurements of imputed rent and housing wealth highlight the dis-equalizing impact on inequality, as the rich can consume more accommodation [39].

The creation of an urban industrial society, based on residence facility ownership at the Moncongloe–Pattalassang new city area, shows fundamental societal distinction regarding skill, ability, prosperity, and educational background. Meanwhile, proximity, spatial autocorrelation, and its heterogeneity confer an essential effect in understanding the housing market and the dynamics of society [40]. Subsequently, those fundamental distinctions develop into physical, economic, and social segregation [41]. Furthermore, the facts obtained from the field showed that most local communities tend to develop store ventures and informal activities at the housing location developed due to farmland conversion and natural environmental destruction. Therefore, all efforts to restore the biological habitats and compensate the harmed citizens further mitigated the spill's effects and may have resulted in improvements of some community amenities in the affected areas [42].

The intensity of the new city area Moncongloe-Pattalassang occurred very fast. It also affected land value modification and cost, meaning that agricultural land productivity does not measure the community's prosperity. Still, abilities, related skills, and income level were achieved. Furthermore, the economic benefits of the possible conversion (which was significantly more straightforward than anticipated), and the social consequences of the poor's ability to gain access to terrain, may be quite significant [43]. Hence, it is concluded that modifying productive farmland into the new settlement development and other urban activities in the new city area contributes positively to income and subsequent communal prosperity [44]. The comparison of community income before constructing the new city area of Moncongloe-Pattalassang is presented in Figure 6 below.

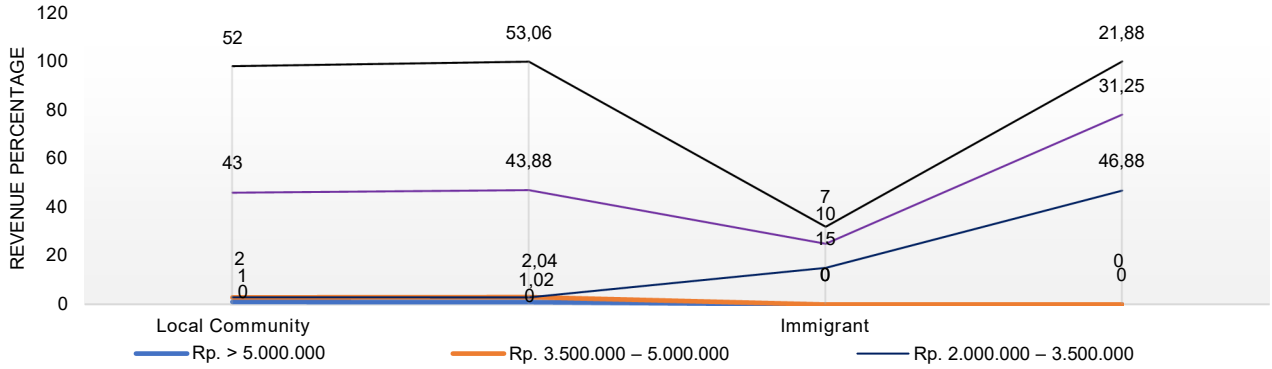

Fig. 6 Average income of respondents before construction of the new city area Moncongloe-Pattalassang. Source: Primary data, 2021.

Figure 6 shows the community's average income before the new city was built. Interpretations that can be put forward regarding these results include: (i) the highest income of 2,000,000 rupiahs and (ii) the dominant average income is 1,000,000 rupiah or 53.06% of the total population. These have been confirmed from field observation, describing that the indigenes were principally oriented toward farming and were further categorized as low-income or structurally poor before the construction. Furthermore, the prosperity of a society is based on its revenue, which associates positively with the residential facility and land ownership. Hence, the movement from urban to more suburban settings was linked with increased odds of elevated centricity of activity spaces [45]. The average income of respondents after the development of the new city area Moncongloe–Pattalassang Area is presented in Figure 7 below.

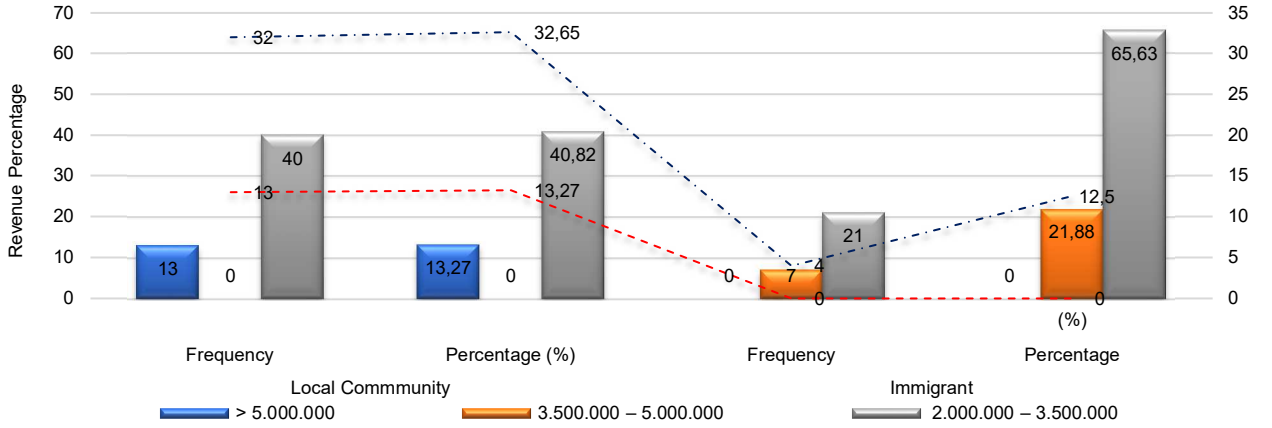

Fig. 7 The average income of respondents after the development of the new city area Moncongloe-Pattalassang

Figure 7 shows the average society income after constructing the new city area of Moncongloe-Pattalasssang. The interpretations related to social prosperity are as follows: (1) the dominant income was between 2,000,000 - 3,500,000, Rupiah or 40,82%. (2) The local community could adapt, as the economic venture shows while developing with a mean revenue of 5,000,000 Rupiah/month. This was further confirmed in the field that the local community has venture ability to increase domestic prosperity with more adequate residence facilities, although it is constrained. Hence, demographic changes cause heterogeneous responses from different housing attributes [46].

B. Changes in the Utilization of the New City Area

The space utility modification causes an increase in urbanization because it makes the extent of environmental degradation predisposed to profanation. This evolution of land use was due to rapid development and faced the problem of persistent illegal disposal, which poses serious adverse effects [47]. However, the statistical analysis was carried out using double linear regression based on the change of space utility at the new city area Moncongloe-Pattalassang, which was conducted by two simultaneous testing steps (X_1, X_2, and X_3 to the urban activity = Y').

TABLE I
THE RELATIONSHIP BETWEEN CHANGES IN LAND COVER, AGRICULTURAL LAND CONVERSION, LAND ALTITUDE AND URBAN ACTIVITY PATTERNS

Model Summary

Model	R	R Square	Adjusted R Square	Std. error of the estimate
1	.470[a]	.221	.074	5.152

a. Predictors: (constant), Land Cover, Conversion of Agricultural land, Land Elevation.

Anova

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	120.220	3	40.073	1.510	.250[b]
	Residual	424.730	16	26.546		
	Total	544.950	19			

a. Dependent Variable: Urban Activity Pattern
b. Predictors: (Constant), Land Cover, Conversion of Agricultural Land, Land Elevation

Coefficients[a]

Model	Unstandardized Cofficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	31.858	17.391		1.832	.086
Land Elevation	.038	.065	.130	.590	.564
conversion of agricultural land	.268	.171	.347	1.569	.136
Land Cover	-.324	.248	-.289	-1.306	.210

a. Dependent Variable: Urban Activity Pattern

Based on table 1, the deductions were as follows: (a) the simultaneous analysis indicates that variables X_1, X_2, and X_3 contribute positively towards the urban activity pattern by about 0.221 (22,10%), and the others contributed by about 0.779 or 77.90%. (b) the ANOVA describes that the significant value of about 0.250 > 0.05, meaning that X_1, X_2, and X_3 inversely varied simultaneously toward the pattern of improving urban activities (Y'), and (c) the coefficient value obtains the linear equation of $Y = 31.858 + 0.038\ X_1 + 0.268\ X_2 - 0.324\ X_3$, $R^2 = 0.221$. However, the partial test (X1→ Y'; X2→ Y'; X3→ Y') → is indicated in the Table 2 below.

TABLE II
RELATIONSHIP BETWEEN LAND COVER, CONVERSION OF AGRICULTURAL LAND, LAND ELEVATION AGAINST URBAN ACTIVITY PATTERN

Model Summary

Variable	R	R square	Adjusted R Square	Std. Error of the Estimate
X_1 (Conversion of Agricultural Land)	.144	.021	-.034	5.077
X_2 (Land Cover)	.293	.086	.035	5.260
X_3 (Land Elevation)	.108	.012	-.043	5.470

Anova

Model	Sum of Squares	Df	Mean Square	F	Sig.
X_1	67.340	1	67.340	2.538	.129
	477.610	18	26.534		
	544.950	19			
X_2	46.894	1	46.894	1.695	.209
	498.056	18	27.670		
	544.950	19			
X_3	6.364	1	6.364	.213	.650
	538.586	18	29.921		
	544.950	19			

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constanta	22.714	8.140		2.791	.012
X_1	.272	.171	.352	1.593	.129
Constanta	50.786	11.762		4.318	.000
X_2	-.330	.253	-.293	-1.302	.209
Constanta	30.555	10.899		2.803	.012
X_3	.032	.068	.108	.461	.650

The following interpretations were proffered from Table 2; (a) Model Summary shows that the land cover variable (X_2) provided the most significant contribution of about 0.086 or 8.60%, in comparison with the others (X_1 and X_3). (b) ANOVA table showed the independent variables did not positively influence urban activity pattern (Y'), meaning the values reviewed and analyzed were above > 0.05. This concludes that the farmland conversion variable, land cover degradation, and terrain elevation do not significantly improve the urban activity pattern. Still, they contribute positively to the environmental degradation of the new city Moncongloe-Pattalassang area. The tendency to improve construction activities causes a characteristic modification and typology, from the agriculture-based rural to urban, oriented with large-scale settlement development. Furthermore, the statistical analyses result of the simultaneous test (X_1, X_2 and X_3 to the utility alteration = Y") is shown Table 3 below.

The interpretation deduced from table 3 include; (i) Model summary in the simultaneous variables (X_1, X_2, and X_3), contributing positively to space utility modification of Moncongloe-Pattalassang new city area by about 0.306 or 30,6%. The remaining 0.694 or 69.40% are influenced by other variables, not in the scope of this study (ii) ANOVA Table showed the significant value to be about 0.110, which was > 0.05, meaning the variables do not contribute positively to changes in space utility, simultaneously (Y'). (iii) The

coefficient Table obtained from the regression equality Y = 4,726 + (- 0,091 X_1) + 0,105 X_2 + 0,142 X_3, provided the value R^2 = 0.306.

TABLE III
RELATIONSHIP BETWEEN LAND COVER, CONVERSION OF AGRICULTURAL LAND, LAND ELEVATION AGAINST CHANGES IN SPATIAL USE

Model Summary

Model	R	R Square	Adjusted R Square	Std. error of the estimate
1	.553[a]	.306	.176	4.532

a. Predictors: (constant), Land Cover, Conversion of Agricultural Land, Land Elevation.
b. Dependent Variable: Changes in Spatial Use

Anova

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	145.128	3	48.376	2.355	.110[b]
	Residual	328.622	16	20.539		
	Total	473.750	19			

a. Dependent Variable: Changes in Spatial Use
b. Predictors: (Constant), Land Cover, Conversion of Agricultural Land, Land Elevation

Coefficients[a]

Model	Unstandardized Cofficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	4.726	15.297		.309	.761
Land Elevation	.142	.057	.521	2.499	.024
Agricultural Land Conversion	-.142	.150	-.126	-.604	.555
Land Cover	.105	.219	.100	.480	.637

a. Dependent Variable: Changes in Spatial Use

Therefore, only land elevation impacted this consideration, as shown in the partial test of Table 4 below.

TABLE IV
RELATIONSHIP BETWEEN LAND COVER, CONVERSION OF AGRICULTURAL LAND, LAND ELEVATION AGAINST CHANGES IN SPATIAL USE

Model Summary

Variable	R	R square	Adjusted R Square	Std. Error of the Estimate
X_1 (Agricultural Land Conversion)	.144	.021	-.034	5.077
X_2 (Land Cover)	.126	.016	-.039	5.089
X_3 (Land Elevation)	.529	.280	.240	4.354

Anova

Model		Sum of Squares	df	Mean Square	F	Sig.
X_1		9.777	1	9.777	.379	.546
		463.973	18	25.776		
		473.750	19			
X_2		7.535	1	7.535	.291	.596
		466.215	18	25.901		
		473.750	19			
X_3		132.555	1	132.555	6.993	.016
		341.195	18	18.955		
		473.750	19			

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constanta	32.641	8.023		4.069	.001
X1	-.104	.168	-.144	-.616	.546
Constanta	21.643	11.380		1.902	.073
X2	.132	.245	.126	.539	.596
Constanta	4.954	8.675		.571	.575
X3	.144	.054	.529	2.644	.016

The proffered interpretation related to the ANOVA test indicated that land elevation (X_3) only influences the Dependent Variable of modification of space utility (Y"), which was recorded to be u0.016 → < 0.05, and the linear quality derived was Y = 4.954 + 0.144 X_3, R^2 = 0.280 (28.0%). Therefore, land elevation distinction has a relationship with building activity. This further significantly influences the morphology and typology, which tends to vary, as well as the enhanced risk of flood in the urban area. Furthermore, sustained rainfall's characteristics and intensity further reduce the network's transport capacity and increase its overflow frequency and volume [48].

C. The Effect of Increasing Urban Activities on Decreasing Environmental Quality in the New City Area.

Due to building activity improvement of Moncongloe-Pattalassang new city area, other impacts include its influence on the urban system integration into Mamminasata Metropolitan. Furthermore, the results obtained from the analysis showed the influence of both direct and indirect urban activity patterns on the scope of environmental quality degradation, as seen in Table 5.

TABLE V
VALUE OF COEFFICIENTS

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1(Constant)	252.119	84.151		2.996	.017
X_1	.097	.313	.125	.310	.765
X_2	-.162	.453	-.144	-.358	.730
X_3	.020	.092	.070	.222	.830
X_4	-.169	.155	-.431	-1.091	.307
X_5	-.071	.133	-.203	-.536	.607
X_6	.152	.127	.326	1.197	.266
X_7	.082	.136	.231	.604	.562
X_8	.048	.108	.133	.448	.666
X_9	-.299	.225	-.520	-1.328	.221
X_{10}	-.147	.215	-.212	-.683	.514
X_{11}	-.265	.364	-.262	-.728	.487

a. Dependent Variable: Y
Structural equality, Y = 0,125X_1 - 0,144X_2 + 0,070X_3 - 0,431X_4 - 0,203X_5 + 0,326X_6 + 0,231X_7 + 0,133X_8 - 0,520X_9 - 0,212X_{10} - 262X_{11} + Ɛ

Therefore, the conclusion is that farmland conversion, advancement of urban activity, infrastructure building, morphology, and typology modification, directly influences environmental quality degradation of the new city area of Moncongloe–Pattalassang. However, the difference in location was not one of the factors, but it pinpoints the sequence of this impact and the highly significant correlation coefficient. Therefore, various ecological and socio-economic forces influence the direction, intensity, and magnitude of changes in land use [49]. The direct impact scheme of environmental degradation in the new city area of Moncongloe–Pattalassang is described in Figure.

Three perspectives related to the results (see Fig.8) are as follows:

- The advancement of construction activity, which directly influences agricultural land conversion and terrain cover reduction, further causes environmental quality degradation.
- These subsequently influence the improvement of profanation expenses and the reduction of groundwater characteristics.

- The influence of improving urban activities, followed by infrastructure erection, on the alteration of morphology, typology, space structure, and pattern of Moncongloe–Pattalassang's new city area.
- The societal behavior, followed by the low level of care and environmental awareness, causes an upgrade in environmental profanation expense.

Therefore, all independent variables that were reviewed and analyzed exhibited a degree of relationship.

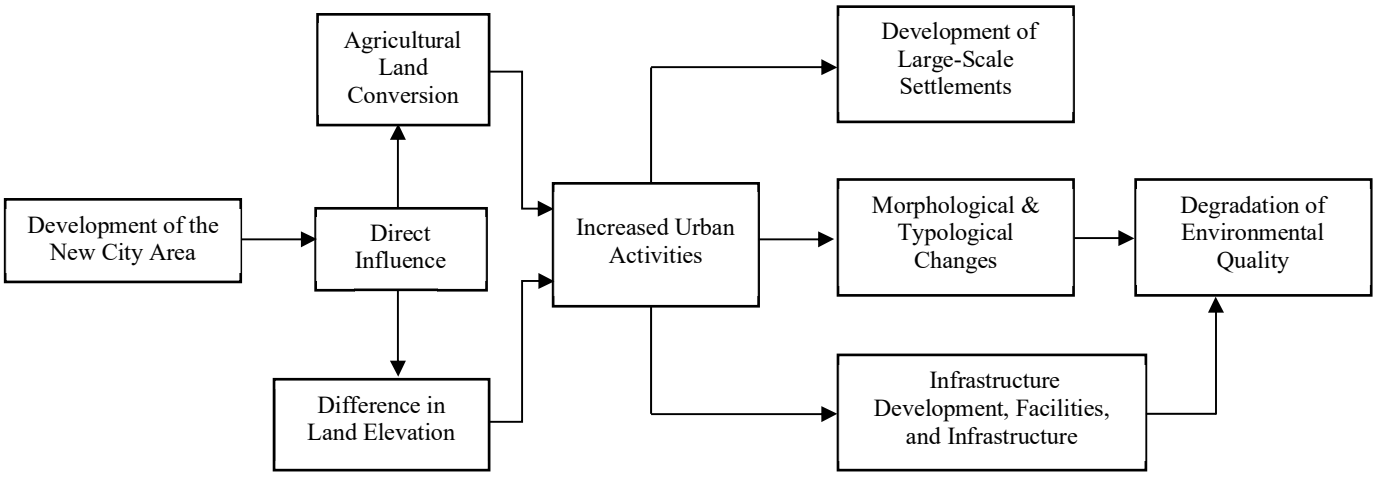

Fig. 8 Schematic of the direct impact of environmental degradation in the new city area of Moncongloe-Pattalassang.

IV. Conclusion

The construction dynamics of the new city Moncongloe–Patalasang area are indicated by an increase in urban activities, which causes space utility modification designated by land elevation distinction, further influencing environmental quality degradation. This advancement tends to guide the distinction of residential facility ownership between new arrivals and the local community to form spatial segregation, causing characteristic changes, especially from agriculture-based rural to urban typology. Furthermore, this also shows the social interaction discrepancy and adaptation toward the environmental alteration stimulus.

Meanwhile, urban activity improvement causes alteration in physical spatial characteristics, both economic and social, to associate positively with changes in morphology, typology, and space pattern. In addition to societal behavior, a low level of care and awareness directly affects the dilapidating quality of groundwater and environmental profanation improvement. Therefore, the factors of farmland conversion, urban activity improvement, infrastructure building, typology, and morphology alteration, directly influence the degradation of environmental quality. However, the distinction of location is not one of the factors considered, but it pinpoints the sequence of the impacts of environmental quality degradation and its correlation coefficient.

In addition, this study recommends evaluating the mechanisms and procedure of construction of the new city Moncongloe–Pattalassang area as a united urban system of Mamminasata Metropolitan. Furthermore, evaluating the continuity of these projects, considering the economic, sociocultural, and physical-environmental aspects, is also required. These three attributes may necessitate governmental policies that accustom capacity improvement in city construction management. Furthermore, the activities are guided by the concept of society's economic productivity advancement and the creation of communal cohesion as a part of sustainable development goals achievement (SDGs) within the big cities and metropolitan areas in developing countries, specifically in Indonesia.

Acknowledgment

The Ministry of Research, Technology, and Higher Education of the Republic of Indonesia funded this study through the Research Funds Assistance Program for Higher Education.

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