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Factors of Land Use Change in Bandung Regency, West Java for 2 Decades

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ABSTRACT
The research investigates the land use patterns that have developed in Bandung Regency, located in West Java, over the past twenty years. The region has undergone a significant transformation due to rapid urbanization caused by population growth and economic development. This transformation has led to the conversion of agricultural land and forests into residential, commercial, and industrial areas. This transition provides economic benefits, but it also brings difficulties such as reduced arable land, environmental damage, and concerns about food security. The research focuses on the socio-economic factors driving these changes, the environmental impacts they cause, and the actions taken by local and regional governments through policy and planning initiatives. Descriptive qualitative research methods are very suitable for investigating complex phenomena such as patterns of land use change. The results emphasize the need to implement a comprehensive and sustainable land use strategy that effectively manages the competition for development and environmental conservation interests. This will ensure the region's long-term ability to survive and adapt to challenges while maintaining its sustainability.

1. Introduction

Bandung Regency, located in West Java, Indonesia, has undergone significant changes in land use in recent decades. This region, which consists of both urban and rural areas, provides a real picture of how socioeconomic progress, population expansion, and urbanization can transform land use in the region. Understanding these changes is essential for strategizing and overseeing sustainable development in the region (Rahmad, 2019). Throughout history, Bandung Regency has been famous for its agricultural dominance, with a large expanse of land devoted to rice fields, plantations, and horticulture. The fertile soil and supportive climate make this region an agricultural hub, thus making a great contribution to the local and regional food supply. In the late 20th and early 21st centuries, West Java experienced significant urbanization and economic growth, which led to land use changes in Bandung Regency.

Bandung Regency has experienced a substantial increase in urban and suburban development in recent years. The expansion of the city of Bandung, driven by population growth and economic prospects, has extended to the district area, resulting in the transformation of agricultural land into residential, commercial, and industrial areas (Wijaya, 2015). The expansion of urban areas is evident through the rapid increase in the number of new residential areas, commercial complexes, and industrial areas, especially along major transportation routes and close to city centers. The transformation of agricultural land into urban is a major change in land use in Bandung Regency. A large number of farmers are choosing to sell their land for development as a result of the increase in land value and the economic incentives provided by urban expansion. This shift has reduced the land area suitable for conventional farming methods, raising concerns about food security and the long-term sustainability of agricultural livelihoods (Cahyono et al., 2021).

As a result, there is an incentive to implement more intensive and efficient agricultural practices on the remaining farmland to meet the growing food needs of the growing population. Land use change also has a significant environmental impact. The reduction of agricultural and forest areas has resulted in difficulties such as soil erosion, reduced biodiversity, and water management problems (Gunawan et al., 2015).

Illegal logging and land clearing for development have exacerbated environmental degradation and led to deforestation. These changes pose a threat to the ecological balance and require a collective effort towards reforestation and the implementation of sustainable land management practices (Dako et al., 2019; Sitorus et al., 2012). Local governments have implemented a series of policies and regulations to address these challenges, with the aim of effectively managing land-use change and promoting sustainable development (Leontinus, 2022).

This includes zoning regulations, land use blueprints, and environmental conservation efforts. However, the effectiveness of these measures often depends on law enforcement, inter-agency coordination, and careful consideration of economic and environmental issues. From the background of the above research, the author decided on the appropriate problem formulation, namely how the development of the Bandung Regency area and what affects the change in land use in Bandung Regency.

The purpose of the research is to analyze the complex relationship between rapid urbanization, economic growth, and environmental challenges in Bandung Regency. It involves understanding how these factors affect land-use change. Assessing the impact of land use change on various aspects. These include the decline of agricultural land, environmental concerns, and the effectiveness of policies implemented. Preparing steps towards sustainable development in the region. It focuses on finding ways to balance economic growth with environmental protection and social well-being.

2. Materials and Methods

Descriptive qualitative research methods are very suitable for investigating complex phenomena such as patterns of land use change. In Bandung Regency, these approaches can provide a detailed understanding of the causes and mechanisms behind land-use change. It effectively encompasses the socio-economic, environmental, and policy elements that influence this transformation. The research methodology used to study the pattern of land use change in Bandung Regency uses a multifaceted approach to collect extensive and situational data. The main emphasis

is on qualitative methodologies that allow for a thorough investigation of patterns and factors influencing land-use change. Data collection is carried out through fieldwork reports and secondary data analysis.

The data collection technique uses observation and direct interviews in the field. Collect rich qualitative data on patterns and factors influencing land-use change. Collect and analyze existing data, such as statistical data, land use maps, and white papers. The data analysis used is narrative analysis, discourse analysis, and data triangulation can be used to strengthen the analysis and increase the validity of the findings.

3. Result and Discussion

Regional Land Use Policy in Bandung Regency is regulated by several regional regulations. One of the main regulations is Regional Regulation No. 1 of 2019 concerning the Protection of Sustainable Food Agricultural Land. The purpose of this regulation is to preserve agricultural land and prevent the transformation into non-agricultural land so that it can maintain food security in the region. The regulation was stipulated in accordance with the central government law No. 41 of 2009 concerning the Protection of Sustainable Food Agricultural Land. This law highlights the importance of maintaining sustainable agricultural land throughout the region, including Bandung Regency. Another important regulation is the Regional Regulation on the Regional Spatial Plan (RTRW) of Kuningan Regency for 2011-2031. This regulation provides the framework of the Long-Term Development Plan (RPJP) and the Medium-Term Development Plan (RPJM) in Kuningan Regency.

The main goal is to support the area to become a Conservation District that emphasizes Agriculture and Tourism. This regional regulation is very important in the implementation of the Regional Land Use Policy in Bandung Regency. They built a land use monitoring system, ensuring the optimization of agricultural capacity in the region while upholding environmental sustainability (Widiatmaka et al., 2015). The regulation also addresses issues such as land conversion, spatial planning, and the social function of land rights, all of which are essential for the effective management of land resources in the region.

The spatial distribution of land use in Bandung Regency is depicted on the land use map of Bandung Regency. Land use in Bandung Regency is analyzed based on the interpretation of the Citra Landsat group. The analysis identified six types of land use: forests, plantations, dryland agricultural crops (TPLK), wetland agricultural crops (TPLB), built land, and water bodies. Land use in Bandung Regency undergoes considerable changes every year (Wibowo & Suharyadi, 2012). The land area has increased on built-up land, while there has been a decrease in the area occupied by TPLB, TPLK, forests, and plantations. There is no change in the use of water bodies. In 2002, the dominant land use in Bandung Regency was TPLK which reached an area of 61,782.22 hectares. TPLK (Tropical Leaf Kratom) was quickly disseminated throughout Bandung Regency (Nuraeni et al., 2017).

In 2012, the area of TPLB, TPLK, plantations, and forests decreased by 1,971.03 ha, TPLK decreased by 1,119.67 ha, plantations decreased by 45.46 ha, and forests decreased by 6.56 ha. This study analyzes the pattern of land use change by considering the initial land use and the direction of subsequent changes towards a certain land use (Christian et al., 2021). There are five common patterns of land use change. These patterns include the transformation of TPLB (Permanent Land Transition) into built land, the conversion of TPLK (Permanent Land Cover Transition) into built

land, the conversion of TPLB into TPLK, and the conversion of plantation land into built land. land, and the transformation of forests into built land. The most significant pattern of land use change occurred in the conversion of TPLB land into built land and TPLK land into built land, with the area of change of 1,884.34 ha and 1,206.36 ha, respectively (Wijaya, 2015). The conversion of land into built-up areas mainly occurs in Pasirjambu, Margaasih, and Cicalengka Districts following the TPLB pattern.

The conversion of land into built-up areas mainly occurs in Cimenyan, Kertasari, and Cilengkrang Districts with a TPLK pattern. In addition, there is a trend of land use transformation in various small areas in Ciwidey Regency, where plantations have been replaced by developed land. Similarly, in the Pangelinan District, there was a transition from plantations to built-up areas, while in Cilengkrang District, forest land changed its function to built land (Dan Lutfi Muta'ali, 2015). In the field of land resource development, the transformation of agricultural land into non-agricultural land is a permanent and irreversible process. This means that the conversion of agricultural land will result in irreversible changes in the economic, cultural, and political aspects of the community.

Reasons for Land Use Change.

Over the past twenty years, the physical characteristics of Bandung Regency have undergone considerable changes. Land use patterns and environmental conditions in this region are greatly influenced by changes caused by urbanization, industrialization, and population growth (Susetyaningsih, 2012). The most prominent transformation in Bandung Regency is the rapid urbanization process and the growth of residential areas. The increasing population and urban expansion of the city of Bandung have resulted in the development of new housing projects significantly, especially in suburban areas. The amount of residential land has increased significantly, often resulting in a reduction in agricultural land. The expansion of urban areas has brought the introduction of contemporary conveniences and infrastructure upgrades. However, this also results in traffic congestion, an increasing need for public services, and a depletion of open space (Wijaya, 2015).

Agricultural land in Bandung Regency has experienced a considerable reduction due to urban and industrial expansion. Rice fields, vegetable plantations, and tea plantations that were once dominant have been transformed into residential areas, commercial enterprises, and industrial areas. The conversion is motivated by the increasing price of land and the economic attractiveness of the sale or use of land for non-agricultural activities. Reduced farmland presents a danger to local food production and farmers' livelihoods, necessitating a shift to more concentrated and effective farming methods on remaining farmland (Christian et al., 2021).

Industrialization has made a significant contribution to land use conversion. The development of areas and industrial areas, especially in the northern and western regions of the district, has resulted in major changes in land use. Areas that were once agricultural or undeveloped are now lively with the presence of factories, warehouses, and logistics centres. The expansion of the industrial sector has resulted in economic benefits, such as job creation and increased economic activity. However, it also raises concerns about the environment, including air and water contamination, as well as increased waste production (Parmawati et al., 2022).

Land use change also has an impact on forest areas in Bandung Regency. Although certain areas have made efforts to restore and protect forests, large amounts of forests have been cleared

for urbanization or experienced illegal logging and encroachment, resulting in degradation. Deforestation has a significant impact on biodiversity, causing disruption to ecosystems and affecting watershed management (Rahmad, 2019). This in turn creates problems such as soil erosion and deterioration of water quality.

Local governments have worked to address these changes by implementing a series of policies and regulations, such as zoning laws, land use planning, and conservation initiatives. However, the implementation of these regulations often encounters obstacles due to lack of resources, lack of coordination between institutions, and economic conflicts of interest. Ensuring development and environmental sustainability is a major challenge faced by policymakers in Bandung Regency (Widiatmaka et al., 2015).

4. Conclusion

Land-use changes in Bandung Regency in recent decades show a broader example of rapid urbanization, economic expansion, and environmental difficulties. Throughout its history, the county has been a significant agricultural hub Widiatmaka et al. (2015). However, the region has undergone significant changes in land use as a result of increasing population needs and the expansion of urban areas (2021). The transformation of agricultural land into residential, commercial, and industrial areas highlights the dynamic socio-economic environment of the region. While these changes have boosted economic growth and improved infrastructure, they have also raised major concerns regarding food security, environmental sustainability, and social justice. The decline of agricultural land, triggered by increased land values and economic incentives, poses risks to conventional farming methods and local food production. Environmental consequences, such as forest degradation, soil degradation, and biodiversity decline, emphasize the need to implement sustainable land management methods. The complexity of aligning development with environmental conservation is exacerbated by challenges related to policy enforcement and inter-agency coordination. Local governments have implemented a variety of policy measures to deal with these changes effectively. Establishing zoning laws, implementing land use planning, and undertaking conservation initiatives are positive steps. But its success depends on strong execution and active community involvement. To achieve sustainable development in Bandung Regency, a comprehensive approach is needed that takes into account economic, social, and environmental factors. In the future, it is critical to implement integrated land use planning that prioritizes the achievement of sustainable development goals. This includes the promotion of sustainable agricultural techniques, the preservation of natural habitats, and the promotion of urban planning that minimizes environmental impact. To achieve these goals, it is important to involve local communities in decision-making processes and improve regulatory frameworks.

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