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Analysis of Environmental Management Policy Strategies Due to Increased Land Built in Pekanbaru City

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ABSTRACT

The increase in built-up land in Pekanbaru City is a complex phenomenon that has a broad impact on the urban environment. This study aims to analyze the formulation of appropriate environmental management strategies in response to this trend. Using the Analytical Hierarchy Process (AHP) method, the study identified land changes between 2010 and 2022. Data from the Ministry of ATR/BPN shows a significant decrease in forest area or thickets, while built-up areas have increased, especially in Tampan and Tenayan Raya Districts. The results of the analysis show that effective policy strategies in managing the environment related to developed land must pay attention to environmental stewardship, economic collaboration, ecological citizenship movements, and community participation. Policy strategy recommendations should focus on effective policy implementation, strengthening economic collaboration, biodiversity conservation, and community empowerment in environmental decision-making. It is hoped that these strategies can improve the quality of the built land environment and overall improve the welfare of the people of Pekanbaru City.

Introduction

(Heryanti, 2022) defines land degradation as the loss or diminishment of the use or potential use of land to support life. (Anisyaturrobiah, 2021) stated that the higher the growth or life, the higher the demand for shelter. The loss or change in appearance causes its function cannot be replaced by others (Abdillah Munawir, Kusmana, & Setiawan, 2021).

Pekanbaru City is the capital of Riau Province since its establishment on January 20, 1959 according to Decree Dec52/1/44-25, initially Pekanbaru was only a city with an area of 62.96 Km² equivalent to 6,296 hectares, with 2 sub-districts namely Senapelan and Limapuluh sub-districts. Furthermore, in 1965 it increased to 6 sub-districts and in 1987 to 8 sub-districts with an area of 446,50 km2 equivalent to 44.650 hectares which was later determined to be 632,26 km² or equivalent to 63.226 hectares in the

measurement data of the National Slow Board of Riau Province (Latief, Barkey, & Suhaeb, 2021).

With the increasing dynamics of very rapid regional development in a short period of time, Pekanbaru now has 15 sub-districts with 83 sub-districts in accordance with Pekanbaru City Regional Regulation Number 2 of 2020 concerning District Determination (Eryani, 2020). With the development of the region that occurred, it is certain that Pekanbaru City has also experienced development in various aspects of rapid development. (Saputra, Nugraha, Agus, & Hidayah, 2022) said that the results of the Cellular Automata modeling analysis showed that built-up land in the city of Pekanbaru in 2040 had increased. The area of built-up land in 2040 is predicted to reach 20.388.867 Ha. In his journal Anjulian (2015) stated that the direction of land change in Pekanbaru City leads to trade and hospitality development, meaning that the development and urbanization that occur in Pekanbaru can cause changes in land use patterns from patterns oriented to natural resource preservation to patterns that are more oriented towards increasing economic income. This can come at the expense of the sustainability of natural resources and the environment in the region (Abdillah Munawir et al., 2021).

Changes in land use patterns that lead to an unplanned and inappropriate increase in built-up land can cause serious impacts on the environment and public health (Munawir, Rusdiyanto, Fathar, & Mierzwa, 2023). The added in the statement of (Angraini, Selpiyanti, & Walid, 2020) that environmental degradation can harm humans if it occurs in the long term. (Wirosoedarmo, Haji, & Zulfikar, 2018), also stated that changes in land use have an impact on environmental quality and human health, especially related to water and air pollution. This research is in line with the opinion of (Abdillah Munawir et al., 2021) who explain the impact of water pollution greatly affects the sustainability of natural resources and the environment. Therefore, this study also shows that water and air pollution in the study area exceeds the quality standards set by the government.

The increase in built-up land that occurs in Pekanbaru City also has an impact on the environment, so a policy strategy will be needed for the affected land due to the increase in built-up land in Pekanbaru City. The purpose of this writing is to analyze appropriate environmental management policy strategies due to the increase in built-up land in Pekanbaru City. Taking the brief description above, the author thinks he wants to take a study on "Analysis of Appropriate Environmental Management Policy Strategies Due to the Increase in Developed Land in Pekanbaru City".

Research Methods

This study uses a qualitative and qualitative descriptive approach to analyze appropriate environmental management strategies on increasing built-up land in Pekanbaru City. Data collection and relevant sources of information related to the improvement of developed land are carried out to formulate policy strategies that are analyzed with AHP (Analytical Hierarchy Process) so as to obtain alternative strategies related to environmental management to support sustainable development.

Data sources in this study consist of primary data and secondary data. Primary data were obtained through observation, interviews, and questionnaires. Meanwhile, secondary data includes a map of the land use balance 2010-2022 as well as policies related to environmental management in Pekanbaru City.

Results and Discussion

Pekanbaru City, as a research object, has an area of around 63.730,71 hectares, in accordance with the area in primary land use data obtained from the Ministry of ATR/BPN, Riau Province. Data on the Land Use Balance Map of the Ministry of ATR/BPN of Riau Province provides a broad picture of land use classification in Pekanbaru City, thus enabling researchers to conduct in-depth research regarding the increase in built-up land that is occurring in Pekanbaru City.

Data has illustrated changes in land use in recent years, namely in 2010-2022. The area of built-up area has increased from 16.019,68 hectares in 2010 to 24.075,58 hectares in 2022. There was a significant increase in the development and development of built-up areas during this period. The total area of Non-Built Land into Built-up Land in the period 2010-2022 is 8.055,90 hectares. The following is an overview of the increase in built-up land in Pekanbaru City:

Table 1
Land Use Change 2010 and 2022

Year 2010		Year 2022	
Land Use	Luas Hektar	Land Use	Luas Hektar
Forest or Shrub	11.495,44	Forest or Shrub	2.743,84
Built-up Area	16,019,68	Built-up Area	24.075,58
Waters	801,51	Waters	790,27
Plantation or Agriculture	35.414,08	Plantation or Agriculture	36.121,02
Grand Total	63.730,71	Grand Total	63.730,71

The data in table 1, above has illustrated a graph of land use change in Pekanbaru City from 2010 to 2022 showing a significant trend in land allocation on the increase in built-up land. In (Almegi & Eizlan, 2023) strengthening the development of Pekanbaru City built-up land in 1990-2020 shows an increasing trend of built-up land, especially in the south and southwest directions from the city center to the periphery.

AHP (Analytical Hierarchy Process) Analysis Results

Build a Hierarchy Analysis Hierarchy Process (AHP) Model with a structure used to organize the elements summarized in the decision-making process into a structured hierarchy. Here are the results of AHP Hierarchy Modeling from several levels, ranging from the main objectives to criteria and strategy alternatives.

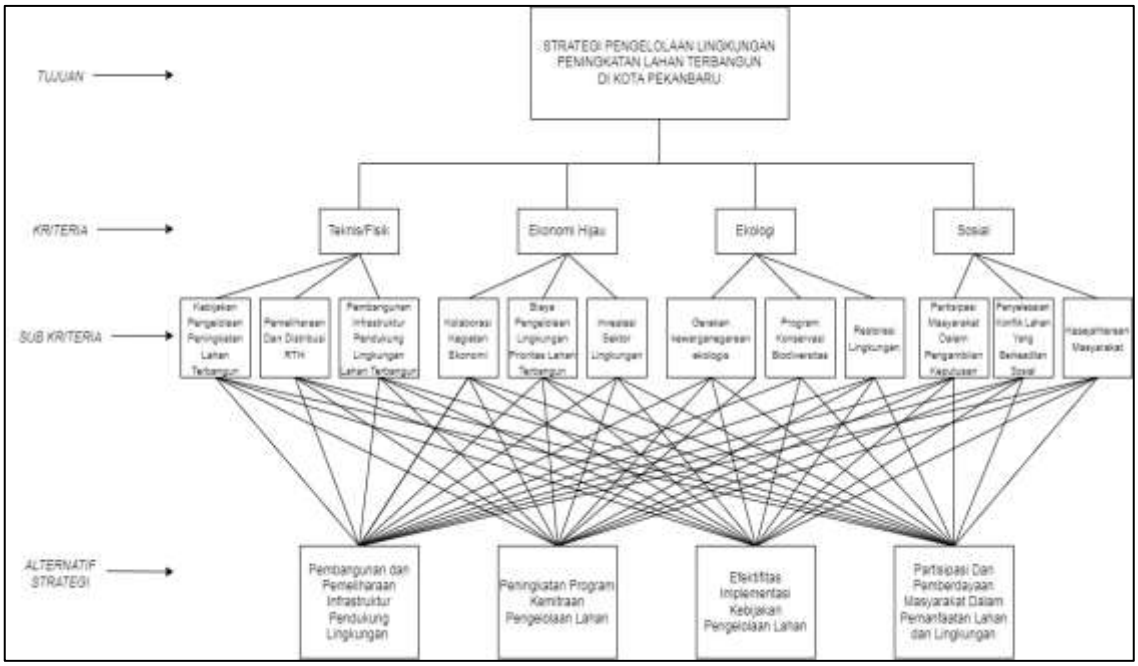

Figure 1. Hierarchical Model

Hierarchy Process Analysis (AHP) is a multi-criteria decision-making method developed by Thomas Saaty. In AHP, pairwise comparison is an important stage for assessing the relative preferences between two different elements in the decision hierarchy.

Responses or opinions from 3 (three) experts in this study answer questions or statements submitted to these experts from the ultimate goal of environmental management strategies to increase built land in Pekanbaru City with various criteria including Ecological, Social, Green Economy, Engineering / Physical. The various Sub-Criteria consist of 12 important items and the achievement of Alternative Strategies.

Weight and consistency of the ratio of the results of the calculation of expert answers

In the criteria analysis, four criteria are evaluated, namely Technical/Physical, Green Economy, Ecological, and Social. In the weighted assessment, the Technical/Physical criteria ranked highest with a weight of 0.287, followed by Green Economy (0.270), Ecology (0.236), and Social (0.207). Ratio consistency analysis shows that the CR (Consistency Ratio) value is 0.071, which indicates consistency in the relative assessment of criteria.

Then in the analysis of sub-criteria that are evaluated to provide deeper insights for the purpose of environmental management strategies to increase built land in Pekanbaru City. The Technical/Physical Sub-criteria consist of Management Policy for Built-up Land Improvement, RTH Maintenance and Distribution, and Development of Infrastructure Supporting the Built-up Land Environment. The analysis shows that RTH Maintenance and Distribution has the highest weight among the sub-criteria, with a weight of 0.477. With a CR (Consistency Ratio) of 0.083.

The Green Economy sub-criteria consist of Economic Activity Collaboration, Environmental Management Costs, Built-up Land Priorities, and Environmental Sector Investment. Economic Activity Collaboration ranked highest with a weighting of 0.407. With a CR (Consistency Ratio) of 0.043.

The Ecology sub-criteria consist of the Ecological Citizenship Movement, the Biodiversity Conservation Program, and Environmental Restoration. The Ecological Citizenship Movement got the highest weight with 0.392. With a CR (Consistency Ratio) of 0.056. Social sub-criteria consist of Community Participation in Decision Making, Social Justice Land Conflict Resolution, and Community Welfare. Community Participation in Decision Making gets the highest weighting with 0.436. With a CR (Consistency Ratio) of 0.067.

In strategy selection, different alternatives are considered for each sub-criterion. The analysis shows that the Effectiveness of Land Management Policy Implementation ranks highest with an average CR (Consistency Ratio) of < 0.1 in most sub-criteria. Demonstrate the importance of effective policy implementation in environmental management on built-up land in Pekanbaru City.

Based on the results of the analysis, it can be concluded that in the development of environmental policies related to built-up land, aspects such as environmental maintenance, economic collaboration, ecological citizenship movements, and community participation have a very important role. Therefore, policy strategy recommendations should emphasize effective policy implementation, strong economic collaboration, biodiversity conservation efforts, and community empowerment in environmental decision-making. The implementation of these strategies is expected to improve the quality of the built-up land environment and improve the overall welfare of the community.

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Conclusion

In the Hierarchy Process Analysis (AHP) for environmental management related to the improvement of built-up land in Pekanbaru City, four main criteria are evaluated: Technical/Physical, Green Economy, Ecological, and Social. In the weight assessment, Technical/Physical criteria ranked highest, followed by Green, Ecological, and Social Economy. The sub-criteria in each key criterion are also evaluated to provide deeper insights. The results showed that the maintenance and distribution of green open space

and the effectiveness of land management policy implementation ranked highest in their respective sub-criteria.

In strategy selection, the analysis shows that the effectiveness of land management policy implementation is a priority in most sub-criteria, indicating the importance of effective policy implementation in environmental management on built-up land in Pekanbaru City. Policy strategy recommendations emphasize environmental stewardship, strong economic collaboration, biodiversity conservation, and community empowerment in environmental decision-making. The implementation of this strategy is expected to improve the quality of the built land environment and improve the welfare of the community as a whole, in accordance with sustainable development goals.

Overall, the AHP analysis provides comprehensive insight into priorities and strategies that can be taken in environmental management related to the improvement of built-up land in Pekanbaru City. By emphasizing effective policy implementation, environmental conservation, economic collaboration, and community participation, it is hoped that this effort can bring positive changes in maintaining a balance between urban growth and environmental preservation and improving the welfare of society as a whole.

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