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Identifying Agricultural Distribution Patterns in Loa Janan Subdistrict Using a Spatial Analysis Approach with Google My Maps

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Abstrak

Kecamatan Loa Janan merupakan wilayah strategis di Kabupaten Kutai Kartanegara yang mengalami tekanan spasial akibat perkembangan kawasan perkotaan dan pembangunan Ibu Kota Nusantara (IKN). Kondisi tersebut meningkatkan potensi alih fungsi lahan pertanian sehingga diperlukan identifikasi pola sebaran pertanian sebagai dasar pengelolaan tata ruang berkelanjutan. Penelitian ini bertujuan untuk mengidentifikasi pola sebaran lahan pertanian di Kecamatan Loa Janan melalui pendekatan spasial berbasis Google My Maps. Penelitian menggunakan metode kualitatif deskriptif dengan pendekatan analisis spasial. Pengumpulan data dilakukan melalui observasi visual, dokumentasi lokasi pertanian menggunakan tangkapan layar (screenshot), serta studi literatur dan dokumen tata ruang wilayah. Data yang diperoleh kemudian dipetakan menggunakan Google My Maps dan dianalisis melalui tahapan reduksi data, visualisasi spasial, interpretasi pola persebaran, dan penarikan kesimpulan secara deskriptif. Hasil penelitian menunjukkan bahwa pola sebaran pertanian di Kecamatan Loa Janan membentuk pola linear mengikuti koridor Jalan Raya Samarinda–Balikpapan dan pola mengelompok pada wilayah tengah kecamatan. Sebagian besar lahan pertanian masih sesuai dengan arahan RTRW Kabupaten Kutai Kartanegara, namun beberapa wilayah bagian timur mulai mengalami tekanan alih fungsi lahan akibat perkembangan permukiman dan infrastruktur pendukung IKN. Penggunaan Google My Maps terbukti efektif sebagai media pemetaan spasial yang mudah diakses dan mampu memberikan gambaran distribusi pertanian pada tingkat kecamatan. Dengan demikian, hasil penelitian ini dapat menjadi dasar pendukung dalam upaya perlindungan Lahan Pertanian Pangan Berkelanjutan (LP2B) dan pengelolaan tata ruang berbasis data spasial.

Kata kunci: Sebaran Pertanian, Analisis Spasial, Google My Maps, Alih Fungsi Lahan, Loa Janan

Abstract

Loa Janan is a strategic area in Kutai Kartanegara Regency experiencing increasing spatial pressure due to urban expansion and the development of the Nusantara Capital City (IKN). This condition increases the potential for agricultural land conversion, making the identification of agricultural distribution patterns important for sustainable spatial planning. This study aims to identify the distribution patterns of agricultural land in Loa Janan Subdistrict through a spatial approach using Google My Maps. The research employed a descriptive qualitative method with a spatial analysis approach. Data collection was conducted through visual observation, documentation of agricultural locations using screenshots, and literature studies related to regional spatial planning. The collected data were mapped using Google My Maps and analyzed through stages of data reduction, spatial visualization, distribution pattern interpretation, and descriptive conclusion drawing. The results show that agricultural land distribution in Loa Janan forms two dominant patterns, namely a linear pattern following the Samarinda–Balikpapan Highway corridor and a clustered pattern in the central part of the subdistrict. Most agricultural areas are still aligned with the Kutai Kartanegara Regional Spatial Plan (RTRW), although several eastern areas have begun experiencing land conversion pressure due to settlement expansion and supporting infrastructure development for the IKN. The use of Google My Maps proved effective as an accessible spatial mapping alternative capable of presenting agricultural distribution patterns at the subdistrict level. Therefore, the findings of this study can support efforts to protect Sustainable Food Agricultural Land (LP2B) and strengthen spatial planning management based on spatial data.

Keywords: Agricultural Distribution, Spatial Analysis, Google My Maps, Land Conversion, Loa Janan

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INTRODUCTION

East Kalimantan is undergoing a massive spatial transformation following the designation of the region as the site of the Nusantara Capital City (IKN) under Law No. 3 of 2022. The relocation of the national government center to East Kalimantan is projected to bring approximately 1.9 million people to the IKN area and its surroundings by 2045, thereby causing pressure on land—including agricultural land to increase exponentially (Adriani et al., 2023) In this context, Kutai Kartanegara Regency and its border area with Samarinda City, including Loa Janan Subdistrict, are at the forefront of the most dynamic spatial changes in Indonesia today. This situation necessitates an accurate spatial understanding of the distribution and patterns of agricultural land that still remain in the area.

Loa Janan Subdistrict is one of the subdistricts in Kutai Kartanegara Regency that holds a strategic position, situated between the three major cities of East Kalimantan Balikpapan, Samarinda, and Tenggarong and traversed by the main distribution route of the Samarinda Balikpapan Highway and the Mahakam River as an inland transportation corridor (BPS Kukar, 2025) .This subdistrict covers an area of 644.2 km² with eight villages/neighborhoods and a population of 67,471 people based on the 2020 Population Census. With high accessibility and still-productive agricultural areas, Loa Janan plays a crucial role as a food security buffer for the city of Samarinda. However, it is precisely this strategic position that makes the area vulnerable to the conversion of agricultural land into residential, industrial, and supporting infrastructure zones for the National Capital City (IKN).

The threat of agricultural land conversion in East Kalimantan and surrounding areas is not a new issue, but rather a concerning and ongoing trend. (Pratomo & Eka Satya Wijayanti, 2023)in their study in Kutai Kartanegara Regency, found that changes in agricultural land cover during the 2010–2020 period were significant, with land conversion proving difficult to control amid development pressures. Nationally, Sawit Watch notes that the conversion of food-producing land into oil palm plantations during the 2013–2023 period reached alarming levels, with the highest rate of oil palm plantation expansion occurring in the Kalimantan region (Maulana, 2024). This situation underscores that East Kalimantan, including the Loa Janan area, requires a strategy for protecting agricultural land based on valid spatial data. Medium-term projections for East Kalimantan’s food

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security also indicate a serious deficit. (Muh et al., 2025) in the Nusantara Innovation Journal project that without significant policy intervention.

Identifying patterns of agricultural land distribution plays a fundamental role in sustainable land-use planning. Without accurate spatial maps of the location and distribution patterns of agricultural land, spatial planning cannot be carried out effectively because the resulting policies will be merely sectoral and will not fully reflect the reality on the ground. (Erlita Nur'aini Widiastuti, 2024) emphasize that the spatial patterns of agricultural land use are key information required to determine zones for the protection of sustainable food agricultural land (LP2B) within Regional Spatial Planning Documents (RTRW). Meanwhile, a study in the Sarbagita Metropolitan Area (Bali) shows that rice fields not spatially mapped are proven to be more vulnerable to land conversion compared to those already included in official zoning maps, with rice field shrinkage reaching 3–6% of the total area between 2018 and 2023 (Ramadhan et al., 2024).

Given the limited capacity and budgets of local government agencies and academics at the local level, Google My Maps serves as a practical, affordable, and accessible alternative for spatial mapping that does not require advanced GIS technical expertise. Unlike paid GIS software such as ArcGIS from Esri, which requires very high licensing fees, Google My Maps is free and web-based, allowing it to be used immediately without the need for special software installation (Putra, I. G. N, 2022). Participatory mapping research in Pasinan Village, Lekok Subdistrict, demonstrated that Google Maps and Google-based applications can effectively support community-led mapping of regional potential (Faedah: Journal of Indonesian Community Service Activities, 2024). The use of Google My Maps in the context of academic research and regional planning is a form of democratization of geospatial technology that is relevant for regions that do not yet have adequate GIS infrastructure.

Although GIS-based research and agricultural mapping have developed rapidly in Indonesia, there remains a significant research gap, particularly in East Kalimantan. (Pratomo & Eka Satya Wijayanti, 2023) did conduct a spatial analysis of agricultural land conversion in Kutai Kartanegara using Landsat satellite imagery; however, their study was limited to the regency level and did not focus on the detailed distribution patterns of agriculture at the subdistrict level. QGIS-based agricultural land mapping has been conducted in Mojorembun Village, East Java (IPB PIM Journal, 2024), but a similar approach using Google My Maps as a more accessible and collaborative mapping medium

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has not yet been widely applied in the context of East Kalimantan. Furthermore, no research has specifically mapped agricultural distribution patterns in Loa Janan Subdistrict using a Google My Maps-based mapping approach, even though this subdistrict faces significant spatial planning pressures due to the development of the IKN and the urban expansion of Samarinda.

Based on the urgency and research gaps outlined above, this study aims to identify and map the distribution patterns of agricultural land in Loa Janan Subdistrict through a spatial approach using Google My Maps. Academically, this study contributes to the development of agricultural mapping methods based on open geospatial platforms that can be replicated by researchers or local agencies with limited resources. Practically, the research results in the form of spatially visualized agricultural distribution maps can serve as a foundation for local governments, particularly the Agriculture Department and the Regional Development Planning Agency, in formulating policies for the protection of sustainable food agricultural land (LP2B), spatially-based land-use planning, and more targeted land conversion mitigation strategies in Loa Janan Subdistrict and its surrounding areas. Thus, this mapping is expected to serve as a bridge between the availability of geospatial data and the need for evidence-based spatial decision-making in the era of IKN development.

METHOD

This study employs a descriptive qualitative method with a spatial approach based on Google My Maps to identify patterns of agricultural distribution in Loa Janan Subdistrict. The descriptive qualitative method aims to systematically describe phenomena based on factual conditions in the field (Sugiyono, 2024). A spatial approach was chosen to map and visualize the geographical distribution of agricultural land so that its spatial patterns could be systematically identified. Data collection was conducted by determining the research theme, then documenting each agricultural land location via screenshots as visual evidence. All of this data was entered into the Google My Maps application to be mapped and analyzed descriptively to produce a comprehensive picture of agricultural distribution patterns in the study area.

The data analysis technique used in this study adopts a qualitative spatial content analysis approach involving three main stages: data reduction through the grouping of agricultural land distribution patterns (clusters, linear, scattered) based on proximity to major infrastructure such as the Samarinda-Balikpapan Highway and the Mahakam River;

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data presentation through thematic visualization on Google My Maps using color layers and descriptive labels; and verification and conclusion-drawing through visual triangulation to interpret spatial vulnerability to land conversion resulting from IKN development (Creswell & Poth, 2018; Ratcliffe, 2015). This approach allows for the in-depth identification of spatial patterns without requiring complex statistical computations, making it suitable for descriptive research with limited resources at the local level.

RESULTS AND DISCUSSION

Mapping results using Google My Maps show that Loa Janan Subdistrict has agricultural land distributed across several strategic locations, particularly in the central and southern parts of the subdistrict near the Samarinda-Balikpapan Highway. Based on the data points entered into Google My Maps, at least six active agricultural sites (Farm 1 through Farm 6) were identified, distributed along the main road corridor and the Mahakam River watershed. This distribution pattern exhibits a linear trend following road infrastructure, reflecting farmers' reliance on transportation accessibility for managing and marketing their agricultural products. This finding aligns with the results of (Erlita Nur'aini Widiastuti, 2024) , who emphasize that the spatial patterns of agricultural land use are significantly influenced by proximity to road networks, which serve as the lifeline for agricultural product distribution. Thus, the linear pattern observed in Loa Janan is not random but reflects the economic rationality of farmers in selecting land locations connected to markets.

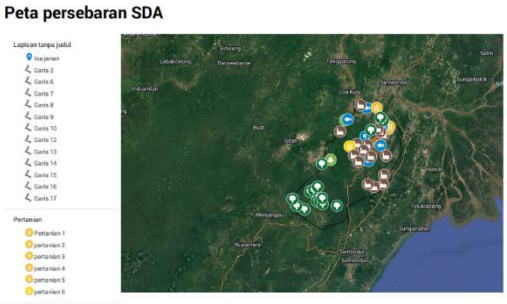

Figure 1. Map of Natural Resource Distribution in Loa Janan

In addition to linear patterns, the mapping also identified cluster patterns at several agricultural sites located close to one another, particularly in the central part of Loa Janan Subdistrict bordering Loa Kulu Subdistrict. This clustering may indicate similar land conditions, such as the availability of irrigation water, gentle slopes, and relatively uniform soil fertility in the area. This finding aligns with the research by (Pratomo & Eka Satya Wijayanti, 2023), who found that the concentration of agricultural land in Kutai

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Kartanegara Regency has historically formed in the transition zone between flat alluvial land and low-lying hilly terrain—a dominant topographic characteristic of the Loa Janan Subdistrict. The identified cluster patterns are significant for planning purposes because these concentrated agricultural areas hold higher strategic value as candidates for Sustainable Food Agricultural Land (LP2B) that must be protected from the threat of land conversion.

When the results of agricultural distribution mapping on Google My Maps are compared with the Kutai Kartanegara Regency Spatial Planning Map (2021 RTRW) at a scale of 1:595,000, there are both significant similarities and discrepancies. The agricultural points identified in the central part of Loa Janan are largely located within zones designated in the RTRW as Food Crop Agricultural Zones and Plantation Zones, marked in light green and yellow on the RTRW map. This alignment indicates that most agricultural activities in Loa Janan are still proceeding in accordance with the guidelines of the current spatial plan. However, several agricultural sites located in the eastern part of the sub-district, which directly borders the city of Samarinda, are situated in zones that the RTRW is beginning to designate as Urban Residential Areas and Industrial Zones, indicating significant pressure for land conversion in these agricultural areas.

The discrepancy between the actual on-the-ground agricultural conditions and the RTRW guidelines in the eastern part of Loa Janan Subdistrict is a common phenomenon in peri-urban areas experiencing high urbanization pressure. (Muh et al., 2025), in their study of the IKN buffer zone, demonstrated that without significant policy intervention, food security in East Kalimantan will face a serious deficit due to uncontrolled agricultural land conversion. This is relevant to the situation in Loa Janan, which lies on a strategic corridor between Samarinda and Balikpapan and within the direct influence radius of the IKN Nusantara development (Luthfi Ahmad Hawali, Evi Lina Sutrisno, M.A., n.d.). Areas designated in the RTRW as non-agricultural cultivation zones but still used as active agricultural land indicate a lag between formal planning and the reality of land use on the ground; if not managed properly, this can lead to conflicts of interest between the agricultural sector and infrastructure development.

The significant presence of plantation land in Loa Janan Subdistrict, as identified on the natural resource distribution map via Google My Maps—which shows numerous oil palm, cocoa, orange, and banana plantations—needs to be examined in the context of compliance with the RTRW. In the 2021 Kutai Kartanegara RTRW spatial pattern map

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(Perda Kukar No. 07/2023), part of the Loa Janan area is indeed designated as a Plantation Allocation Zone (P2), which allows for the development of smallholder plantation commodities (Perda Kukar No. 09/2024). However, the expansion of oil palm plantations identified at several locations warrants caution if situated in areas overlapping with Protected Forest Zones or Water Catchment Areas, which are also depicted in the RTRW. This situation aligns with a warning from Sawit Watch (cited in Mongabay, 2024) that oil palm plantation expansion in Kalimantan over the past decade has reached an alarming level, including encroachment into areas that should be protected. The spatial identification using Google My Maps in this study serves as an important initial step to detect indications of such land-use overlaps.

From a methodological perspective, the use of Google My Maps as a spatial mapping platform has proven effective in generating an adequate overview of agricultural distribution at the sub-district level, despite limitations in large-scale accuracy. Putra (2022) emphasizes that Google My Maps, as a free web-based application, offers ease of accessibility. A study (Jurnal Faedah, 2024) demonstrates that Google Maps-based applications can effectively support the mapping of regional potential. Cross-validation between the Google My Maps mapping results in this study and the Kutai Kartanegara RTRW Map visually demonstrates fairly good consistency at the regional scale; thus, this method can be recommended as an efficient initial approach before conducting a survey using Google My Maps for more detailed planning purposes.

Overall, the results of this study indicate that the distribution pattern of agriculture in Loa Janan Subdistrict is a mix of linear patterns along the main road corridors and cluster patterns in the central area of the subdistrict, with most locations still aligning with the 2021 Kutai Kartanegara Regency RTRW guidelines (Perda Kutai Kartanegara No. 07/2023). However, land conversion pressures stemming from Samarinda's urban expansion and the development of the Nusantara National Capital Area (IKN) threaten the sustainability of agricultural land, particularly in the sub-district's eastern transition zone (Pemkot Samarinda, 2025). These findings underscore the urgency of formally designating Sustainable Food Agricultural Land (LP2B) in a spatially-based manner within Loa Janan Subdistrict, as mandated by Law No. 41 of 2009 on the Protection of Sustainable Food Agricultural Land. Further research with higher spatial resolution using satellite imagery or drone surveys is recommended to confirm the boundaries of the agricultural land identified in this study, thereby providing a more accurate policy basis for the Kutai

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Kartanegara Regency Government in drafting future revisions to the RTRW and LP2B documents.

CONCLUSION

This study shows that the distribution pattern of agriculture in Loa Janan Subdistrict follows two main patterns: a linear pattern along the Samarinda–Balikpapan Highway corridor, and a clustered pattern in the central part of the subdistrict, where land conditions are more conducive to agricultural activities. Mapping results using Google My Maps confirm that the majority of agricultural land remains within zones compliant with the Kutai Kartanegara Regency Spatial Plan (RTRW), although some areas are beginning to face land-use conversion pressures due to the expansion of the Samarinda urban area and the development of the Nusantara Capital City (IKN). The use of Google My Maps in this study is considered effective as an accessible, cost-effective alternative for spatial mapping that can provide descriptive visualizations of agricultural distribution at the sub-district level. Therefore, the results of this study can serve as a foundation for local governments in their efforts to protect Sustainable Food Agricultural Land (LP2B), control land conversion, and formulate spatial planning policies based on spatial data in the Loa Janan area and its surroundings.

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