



# Identification of Potential Private Green Open Space (GOS) in the Ngantru Urban Area using the Supervised Land Classification Method

Rita Parmawati<sup>1</sup>, Indra Purnama Putra<sup>1\*</sup>, Deni Agus Setyono<sup>2</sup>, Reni Sri Hapsari<sup>3</sup>, Ahmad Ibnu Riza<sup>3</sup>, Annisa Nurul Hakim<sup>3</sup>

<sup>1</sup>Postgraduate School, Brawijaya University, Malang, Indonesia.

<sup>2</sup>Department of Urban and Regional Planning, Faculty of Engineering, Brawijaya University, Malang, Indonesia.

<sup>3</sup>Regional Research and Innovation Agency of Tulungagung Regency, Tulungagung, Indonesia.

Received: February 22, 2026

Revised: April 21, 2026

Accepted: May 25, 2026

Published: May 31, 2026

Corresponding Author:

Indra Purnama Putra

[indrapp8585@student.ub.ac.id](mailto:indrapp8585@student.ub.ac.id)

DOI: [10.29303/jppipa.v12i5.11446](https://doi.org/10.29303/jppipa.v12i5.11446)

 Open Access

© 2026 The Authors. This article is distributed under a (CC-BY License)



**Abstract:** Population growth and urban activities have caused land conversion and decreased environmental carrying capacity. The existence of Green Open Space (GOS) is crucial in improving environmental quality and increasing community welfare. In Ngantru Urban Area, data collection on private GOS is still incomplete, although this is important to increase the Land Quality Index in Tulungagung Regency. Using the Supervised Land Classification method allows for more accurate identification and mapping of private GOS potential through remote sensing data analysis. Based on the results of the analysis, private GOS in Ngantru Urban Area consists of agricultural land covering an area of 1,694.35 hectares. Padangan Sub-district has the largest area, namely 321.04 hectares or 18.95% of the total area of private GOS, followed by Pojok Sub-district with 287.09 hectares or 16.94%. The difference in the area of private GOS between Sub-districts reflects the diverse development potential in each region. This data is an important basis for formulating more effective and sustainable spatial planning policies, as well as supporting targeted environmental conservation efforts to improve the quality of life of the community.

**Keywords:** Green open space potential; Private GOS; Supervised Land Classification

## Introduction

Population growth and urban activities have increased the demand for space to accommodate various functions, leading to land conversion, environmental degradation, and a reduction in the ecosystem's carrying capacity (Witra & Umar, 2020). To address these challenges, it is crucial to maintain, preserve, balance, and enhance the quality of the environment through the establishment of adequate Green Open Spaces (GOS). GOS refers to an elongated area or group of areas designed primarily for open use, serving as habitats for both naturally occurring and intentionally planted vegetation. In developing these spaces, it is essential to

consider aspects such as ecological function, water absorption, economic viability, social and cultural significance, and aesthetic appeal (Mahendra, 2022; Permen ATR/BPN No. 14, 2022).

GOS serves four primary functions: ecological, socio-cultural, economic, and aesthetic (Febriarto, 2019; Putra et al., 2024). It plays a vital role in delivering environmental services, such as enhancing environmental quality, improving the quality of life for individuals and communities, and creating a healthier, more comfortable environment for residents. The effective maintenance and development of accessible GOS can also contribute to disaster prevention, given their environmental and social functions (Feng et al.,

## How to Cite:

Parmawati, R., Putra, I. P., Setyono, D. A., Hapsari, R. S., Riza, A. I., & Hakim, A. N. (2026). Identification of Potential Private Green Open Space (GOS) in the Ngantru Urban Area using the Supervised Land Classification Method. *Jurnal Penelitian Pendidikan IPA*, 12(5), 646-652. <https://doi.org/10.29303/jppipa.v12i5.11446>

2016; Rey Gozalo et al., 2019). Furthermore, these spaces provide significant ecological and public health benefits, including reducing air pollution, mitigating surface water runoff, and lowering temperatures in a 300-meter radius (Corbane et al., 2020; Davtalab et al., 2020; Feng et al., 2016; Knight et al., 2022; Liou & Ho, 2021; Wu & Chen, 2023). Socially, GOS serve as venues for interaction and recreation, while also enhancing aesthetic and economic value, as areas with greenery tend to be more appealing and comfortable for residents (Arismayuda et al., 2022). From the perspective of ownership, GOS can be classified into two categories: public and private GOS (Armijon, 2019; Permen ATR/BPN No. 14, 2022; Vilcins et al., 2024). Types of public and private GOS are detailed in Table 1.

**Table 1.** Division of Types of Public GOS and Private GOS

Types of GOS	Public	Private
GOS in Yard:		√
Home Yard; Office Yard; Shop; Business Place; Rooftop Garden		
GOS Parks and City Forests:	√	
Neighbourhood Park; Sub-district Park; District Park; City Park, City Forest, Green Belt		
GOS Road Green Line:	√	
Road islands and road medians; Pedestrian paths; Space under the flyover		
GOS Specific Functions:	√	
Railway border; Green line of high voltage electricity network; River border; Coastal border; Protection of raw water source/spring		

Source: (Armijon, 2019; Vilcins et al., 2024)

The mandate of Law No. 26 of 2007 regarding Spatial Planning clearly stipulates that 30% of the city or district area must be designated as GOS, comprised of 20% Public GOS and 10% Private GOS. The necessity for GOS in Tulungagung Regency is further articulated in Regional Regulation Number 4 of 2023, which outlines the 2023-2043 Regional Spatial Plan. This regulation establishes that public GOS in urban areas should account for 20% and private GOS for 10%. Currently, data on Private GOS in the Ngantru Urban Area is lacking. Thus, it is essential to conduct data collection on Private GOS to enhance the Land Quality Index of Tulungagung Regency. Consequently, activities aimed at identifying the potential for Private GOS in Ngantru Urban Area must be undertaken to ascertain the actual area of GOS and to monitor potential changes in land use.

In this context, utilizing the Supervised Land Classification method is essential for assessing the

potential of private GOS (Syifa et al., 2020). This approach employs remote sensing data and geographic information systems (GIS) to classify land cover based on controlled observations (Danoedoro, 2012; Nizma et al., 2015). By applying this method, a more accurate mapping of the private GOS potential in Ngantru Urban Area can be achieved, providing detailed insights into the location, area, and types of existing green land, as well as its potential for development. Ngantru Urban Area is positioned as a strategic area undergoing rapid growth, with various development activities currently in progress. The identification and mapping of private GOS potential in this region are anticipated to aid in formulating improved policies that balance development with environmental preservation.

This study seeks to explore the potential of private green open spaces in Ngantru Urban Area through the Supervised Land Classification method. The findings are anticipated to contribute significantly to sustainable spatial planning and serve as a foundation for decision-making aimed at optimizing land use to promote environmental sustainability in urban areas. By doing so, we can help maintain ecological balance even amidst rapid urban development, thereby enhancing the quality of life for the community in the region.

## Method

### Research Location

The research was conducted in the Ngantru Urban Area of Tulungagung Regency, which comprises eight Sub-districts: Bendosari, Kepuhrejo, Ngantru, Padangan, Pinggirsari, Pojok, Pulerejo, and Srikaton. The total area of the Ngantru Urban Area, according to Tulungagung Regency Regional Regulation Number 9 of 2016, spans 2,411 hectares. Geographically, the Ngantru Urban Area is situated between 111° 55' - 111° 59' East Longitude and 7° 58' - 8° 04' South Latitude. It is bordered to the north by Kediri and Blitar Regencies, to the east by Blitar Regency, to the south by Kedungwaru, Sumbergempol, and Ngunut Districts, and to the west by Karangrejo District.

**Table 2.** Area of Ngantru Urban Area per Sub-district

Sub-district	Area (Ha)
Bendosari	264.19
Kepuhrejo	231.96
Ngantru	286.43
Padangan	493.69
Pinggirsari	386.42
Pojok	431.95
Pulerejo	214.59
Srikaton	380.18
Total	2,411.00

Source: Author, 2025

According to the data presented in the table, the Ngantru Urban Area encompasses a total area of 2,411 hectares, distributed across eight Sub-districts. Padangan Sub-district holds the largest portion, covering 493.69 hectares, which accounts for approximately 20% of the overall area. Following closely is Pojok Sub-district, with an area of 431.95 hectares, and

Srikaton Sub-district with 380.18 hectares. In contrast, Pulerrejo Sub-district has the smallest area at 214.59 hectares. This variation in area distribution among the Sub-districts may significantly influence regional planning and development strategies within the Ngantru Urban Area, highlighting the distinct needs and potentials of each Sub-district.

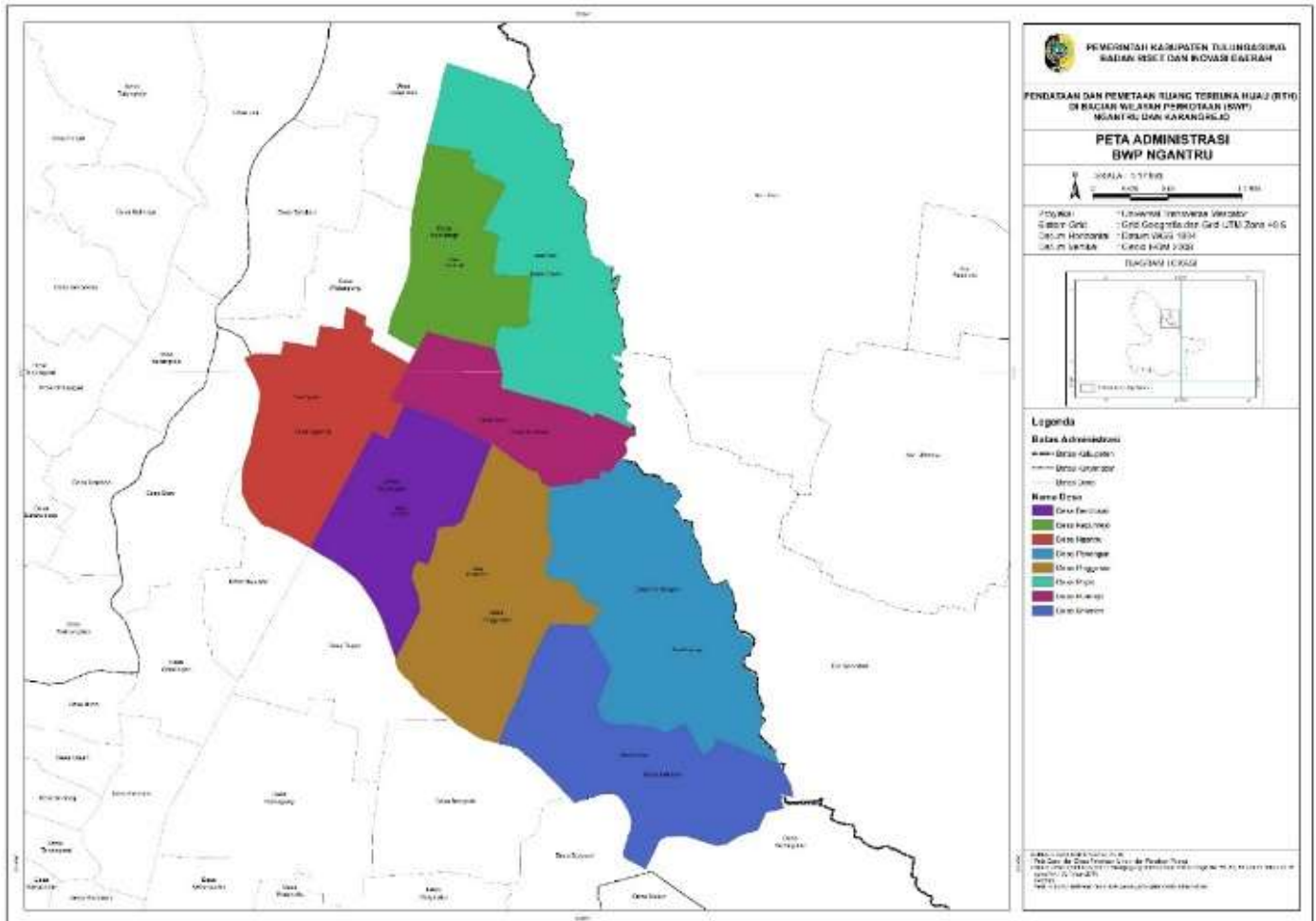


Figure 1 Ngantru Urban Area Administrative Map

*Method of Collecting Data*

Data collection methods encompass a range of techniques or approaches utilized to gather the necessary information for a study or project. In this research, data collection was conducted through both primary and secondary survey techniques. The primary survey is a vital first step in assessing the potential of Private GOS in Ngantru Urban Area. During this phase, the research team directly visited the survey location to gather field data. In contrast, secondary surveys focus on acquiring secondary data. These activities involved reaching out to various government and private agencies/institutions through written requests for data, including documents and maps (Ananda et al., 2023). During this phase, the research team collected

information from existing sources by submitting written requests to these agencies (Ziliwu et al., 2017). Below are the data requirements utilized in this study.

**Table 3.** Research Dataset

Data	Data Types	Source
Base Map	Spatial	Dinas Pekerjaan Umum dan Penataan Ruang of Tulungagung Regency
Satellite Imagery	Picture	Google Maps
Ground Check	Picture	Field survey
Private GOS		

Source: Author, 2025

*Data Analyst Methods*

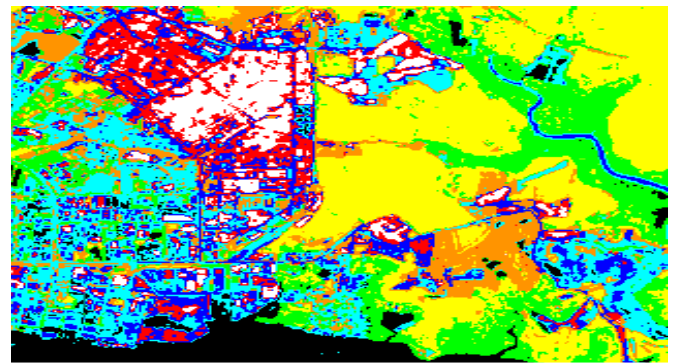
This study seeks to identify the potential for private GOS in Ngantru Urban Area through the Supervised Land Classification method (Syifa et al., 2020). Data processing and analysis were carried out using ArcMap 10.4.1, facilitating the appropriate spatial analysis processes. The Supervised Land Classification method, also known as image classification, involves an operator selecting specific objects as examples to categorize other objects with similar characteristics. The selection of sample objects at pixel locations in a geographic area is referred to as the training area (Danoedoro, 2012; Jensen, 2005; Syifa et al., 2020; Zaki et al., 2022). This approach aligns that image classification categorizes all pixels in remote sensing satellite images or data, resulting in a defined set of land cover labels (Lillesand et al., 2015).

Remote sensing imagery can be utilized to predict a wide range of properties on the Earth's surface, such as land cover (Atkinson, 2004). Additionally, changes in these properties can be monitored through multitemporal analysis. Remotely sensed imagery also plays a crucial role in calibrating and assessing the accuracy of process models, enabling the extension of spatial predictions over time (Liu et al., 2001; Peterson et al., 2002). In the interpretation of Google Map images, supervised classification is employed, categorizing the landscape into seven distinct classes: water bodies, agricultural land, trees, shrubs, grass, open land, and built-up areas (Fatahillah et al., 2022; Purba et al., 2022; Ruliyansyah et al., 2013).



**Figure 2.** Stages of Supervised Land Classification

The image classification process is conducted in several stages. The first stage involves examining the image classification scheme, typically categorized into information classes such as urban areas, agriculture, forests, and more (Al-doski et al., 2013; Gong & Howarth, 1990). Field surveys are conducted to gather additional information and data relevant to the planning area. In the second stage, image processing takes place, which includes radiometric, atmospheric, geometric, and topographic corrections, as well as initial image grouping. The third stage involves selecting representative areas from the images and analyzing the results of the initial grouping. During the fourth stage, geometric filtering and classification are reviewed and refined. The final stage consists of comparing the classification results with field studies to assess accuracy.



**Figure 3.** Image Classification Example

The advantage of supervised land classification lies in its capacity to maintain control over the classification of information through the use of training samples, thereby enhancing classification accuracy (Al-doski et al., 2013; Lillesand et al., 2015). However, this method does have its limitations. It can sometimes lead to forced interpretations of the data, and the training samples may not accurately represent the entire dataset. Additionally, there may be unidentified spectral classes present (Safitri, 2023; Septiani et al., 2019). Furthermore a significant drawback of this approach is that the classification process must be repeated whenever new data becomes available (Langley et al., 2001).

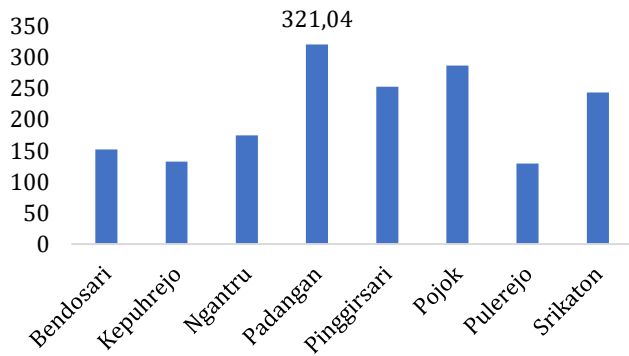
**Result and Discussion**

Private GOS encompasses various types of green areas owned by individuals or specific communities, including residential yards, private gardens, and other designated spaces. These areas contribute to a green ecosystem and are maintained under private ownership or by certain institutions for a range of purposes, such as aesthetic appeal, agriculture, and environmental conservation. They play a vital role in functions like rainwater absorption, providing green space, and enhancing air quality. Below is the distribution of Private GOS in Ngantru Urban Area.

**Table 4.** Area of Private GOS BWP Ngantru per Sub-district

Sub-district	Area (Ha)	Percentage
Bendosari	152.06	8.97%
Kepuhrejo	132.81	7.84%
Ngantru	174.78	10.32%
Padangan	321.04	18.95%
Pinggirsari	253.11	14.94%
Pojok	287.09	16.94%
Pulerejo	129.58	7.65%
Srikaton	243.88	14.39%
Total	1,694.35	100.00%

Source: Author, 2025



**Figure 4.** Private GOS Area Diagram of Ngantru Urban Area

The analysis indicates that the private GOS in Ngantru Urban Area comprises agricultural land distributed throughout all Sub-districts. This green space plays a vital role in maintaining environmental balance and supporting the agrarian activities of the local community. As privately owned agricultural land, it serves not only as a source of food resources but also as an essential component of the Ngantru region's ecosystem. Most of the access points to this GOS are conveniently located along roads that can be easily reached by motorbike.

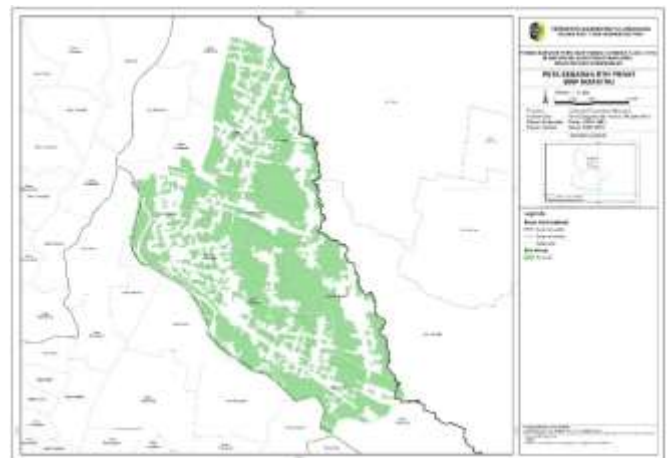
In terms of area, the private GOS in Ngantru Urban Area spans several Sub-districts, covering a total of 1,694.35 hectares. Padangan Sub-district boasts the largest expanse, with 321.04 hectares, accounting for approximately 18.95% of the total private GOS in the region. Following Padangan, Pojok Sub-district holds the second-largest area at 287.09 hectares, representing 16.94%. Srikaton Sub-district comes next with 243.88 hectares, which is 14.39% of the total, while Pinggirsari Sub-district also has a significant share, covering 253.11 hectares or 14.94%.

Pulorejo Sub-district has the smallest private GOS area, encompassing just 129.58 hectares, which accounts for 7.65% of the total land. This proportion reflects the limited availability of privately owned green space in the area compared to other Sub-districts within the Ngantru Urban Area. In contrast, Ngantru and Kepuhrejo Sub-districts have slightly larger green spaces, measuring 174.78 hectares (10.32%) and 132.81 hectares (7.84%), respectively. This variation indicates that while some Sub-districts may struggle with private GOS, others possess enough to support ecological functions and promote environmental sustainability at the local level. Additionally, Bendosari Sub-district contributes significantly with an area of 152.06 hectares, or 8.97%. These figures highlight the diverse distribution of private GOS across various Sub-districts in the Ngantru Urban Area, serving as important data for spatial planning and environmental conservation efforts.



**Figure 5.** Ngantru Urban Area Private GOS Documentation

The distribution of agricultural land in Ngantru Urban Area reveals a strong correlation between road infrastructure accessibility and the presence of private GOS. Easily accessible agricultural land not only provides economic advantages but also fosters environmental sustainability. Therefore, private green open spaces in Ngantru Urban Area play a crucial role in enhancing community welfare and preserving ecological balance.



**Figure 6.** Ngantru Urban Area Private GOS

## Conclusion

The conclusion of the study on the Identification of Potential Private GOS in the Ngantru Urban Area using the Supervised Land Classification Method demonstrates the effectiveness of this method in identifying and mapping these green spaces. Analysis of remote sensing data reveals that private GOS are primarily composed of agricultural land, encompassing a total area of 1,694.35 hectares. Among the Sub-districts in Ngantru Urban Area, Padangan Sub-district has the largest area of private GOS, measuring 321.04 hectares, which accounts for approximately 18.95% of the total.

This is followed by Pojok Sub-district, which covers an area of 287.09 hectares (16.94%). This concentration of agricultural land is significant, contributing positively to local food security and the well-being of the community. The findings from this study can serve as a foundation for stakeholders to develop more strategic policies for managing private GOS. By providing precise information on the potential of these spaces, environmental conservation efforts can be implemented in a more focused manner, ensuring a balance between urbanization and community needs. This approach is crucial for enhancing the Land Quality Index in Tulungagung Regency and preserving environmental sustainability, particularly in light of increasing urbanization challenges. This study significantly contributes to the creation of a strategy for sustainable regional development that is attentive to the needs of the community.

#### Author Contributions

All authors have made a major contribution to the completion of this manuscript.

#### Funding

This research received no external funding.

#### Conflicts of Interest

The authors declare no conflict of interest.

#### References

- Al-doski, J., Mansor, S. B., & Shafri, H. Z. M. (2013). Image Classification in Remote Sensing. *Journal of Environment and Earth Science*, 3(10). Retrieved from <https://www.iiste.org/Journals/index.php/JEES/article/view/7807>
- Ananda, N., Bimo, R., Malik, E., & Reza, M. (2023). Rencana Tata Bangunan Dan Lingkungan (RTBL) Studi Kasus Koridor Jalan Jayeng Kusuma. *Prosiding Semnas*. Retrieved from <https://ejournal.itn.ac.id/semsina/article/view/8093>
- Arismayuda, I. M., Dewi, A. A. S. L., & Suryani, L. P. (2022). Penegakan Hukum Pelanggaran Ruang Terbuka Hijau Di Kota Denpasar. *Jurnal Preferensi Hukum*, 3(3), 564-571. <https://doi.org/10.55637/jph.3.3.5584.564-571>.
- Armijon. (2019). Analisis dan Identifikasi Ketersediaan Ruang Terbuka Hijau (RTH Non Alami di Perkotaan Kabupaten/Kota). *Jurnal Rekayasa*, 23(1).
- Atkinson, P. M. (2004). Spatially Weighted Supervised Classification for Remote Sensing. *International Journal of Applied Earth Observation and Geoinformation*, 5(4), 277-291. <https://doi.org/10.1016/j.jag.2004.07.006>.
- Corbane, C., Martino, P., Panagiotis, P., Aneta, F. J., Michele, M., Sergio, F., Marcello, S., Daniele, E., Gustavo, N., & Thomas, K. (2020). The grey-green divide: Multi-temporal analysis of greenness across 10,000 urban centres derived from the Global Human Settlement Layer (GHSL). *International Journal of Digital Earth*, 13(1), 101-118. <https://doi.org/10.1080/17538947.2018.1530311>
- Danoedoro, P. (2012). *Pengantar Pengindraan Jauh Digital*. Penerbit ANDI.
- Davtalab, J., Deyhimi, S. P., Dessi, V., Hafezi, M. R., & Adib, M. (2020). The impact of green space structure on physiological equivalent temperature index in open space. *Urban Climate*, 31, 100574. <https://doi.org/10.1016/j.uclim.2019.100574>
- Fatahillah, A., Arifin, A., & Jati, D. R. (2022). Analisis Perubahan Tutupan Lahan Di Kota Pontianak dengan Metode Penginderaan Jauh. *Jurnal Teknologi Lingkungan Lahan Basah*, 10(2). <https://doi.org/10.26418/jtlb.v10i2.56311>.
- Febriarto, P. (2019). Kualitas Fungsi Sosial Terhadap Keberadaan Taman Kota Publik Di Kota Surakarta. *Sustainable, Planning and Culture (SPACE): Jurnal Perencanaan Wilayah dan Kota*, 1(1), 10-15. <https://doi.org/10.32795/space.v1i1.259>.
- Feng, Y., Zhang, L., Shao, M., & Meng, Q. (2016). Discussion on the construction of disaster prevention green infrastructure network planning. *Proceedings of the 2015 4th National Conference on Electrical, Electronics and Computer Engineering*. 2015 4th National Conference on Electrical, Electronics and Computer Engineering. <https://doi.org/10.2991/ncece-15.2016.215>
- Gong, P., & Howarth, P. J. (1990). An Assessment of Some Factors Influencing Multispectral Land-Cover Classification. *Photogrammetric Engineering*.
- Jensen, J. R. (2005). *Introductory Digital Image Processing, 3rd*.
- Knight, S. J., McClean, C. J., & White, P. C. L. (2022). The importance of ecological quality of public green and blue spaces for subjective well-being. *Landscape and Urban Planning*, 226, 104510. <https://doi.org/10.1016/j.landurbplan.2022.104510>
- Langley, S. K., Cheshire, H. M., & Humes, K. S. (2001). A Comparison of Single Date and Multitemporal Satellite Image Classifications in a Semi-Arid Grassland. *Journal of Arid Environments*, 49(2), 401-411. <https://doi.org/10.1006/jare.2000.0771>.
- Lillesand, T. M., Kiefer, R. W., & Chipman, J. W. (2015). *Remote sensing and image interpretation* (7. ed). Wiley.
- Liou, K. A. N., & Ho, L. T. (2021). Altering Urban Green-Space Patterns and Heat Stress Risk in Hanoi City during Master Plan 2030 Implementation. *Land Use Policy*, 105. <https://doi.org/doi>

- Liu, J. G., Black, A., Lee, H., Hanaizumi, H., & Moore, J. M. (2001). Land Surface Change Detection in a Desert Area in Algeria Using Multi-Temporal ERS SAR Coherence Images. *International Journal of Remote Sensing*, 22(13), 2463–2477. <https://doi.org/10.1080/01431160119991>.
- Mahendra, I. M. A. (2022). Analisis Ruang Terbuka Hijau Dalam Perspektif Pembangunan Kota Berkelanjutan (Studi kasus Kawasan pusat Kota Denpasar, Bali). *Jurnal Ilmiah Vastuwidya*, 5(1), 41–49. <https://doi.org/10.47532/jiv.v5i1.408>.
- Nizma, H., Sudarsono, B., & Prasetyo, Y. (2015). Analisis Perbandingan Kepadatan Pemukiman Menggunakan Klasifikasi Supervised Dan Segmentasi (Studi Kasus: Kota Bandung). *Jurnal Geodesi Undip*, 4(4), 73–80.
- Permen ATR/BPN No. 14, 14 Tahun 2022 Permen ATR/BPN (2022).
- Peterson, D. L., Price, K. P., & Martinko, E. A. (2002). Discriminating between Cool Season and Warm Season Grassland Cover Types in Northeastern Kansas. *International Journal of Remote Sensing*, 23(23), 5015–5030. <https://doi.org/10.1080/01431160210142833>.
- Purba, T. P., Dewi, I. K., & Hidayat, T. (2022). Identifikasi Tipologi dan Kebutuhan Ruang Terbuka Hijau Publik serta Pemetaan Area Terbangun di Kota Tangerang Selatan. *Syntax Literate; Jurnal Ilmiah Indonesia*, 7(4).
- Putra, I. P., Leksono, A. S., Parmawati, R., & Li, T. (2024). The best scenario for the development of public green open space zones in Malang, Indonesia. *Jurnal Pendidikan Geografi: Kajian, Teori, Dan Praktek Dalam Bidang Pendidikan Dan Ilmu Geografi*, 29(2). <https://doi.org/10.17977/um017v29i22024p240-256>
- Rey Gozalo, G., Barrigón Morillas, J. M., & Montes González, D. (2019). Perceptions and use of urban green spaces on the basis of size. *Urban Forestry & Urban Greening*, 46, 126470. <https://doi.org/10.1016/j.ufug.2019.126470>
- Ruliyansyah, A., Fitriyaningsih, Y., & Velayati, L. H. (2013). Analisis Kebutuhan Ruang Terbuka Hijau (Rth) Berdasarkan Serapan Gas Co2 Di Kota Pontianak. *Jurnal Teknologi Lingkungan Lahan Basah*, 1(1). <https://doi.org/10.26418/jtlb.v1i1.2105>.
- Safitri, D. (2023). Analisa Ketersediaan Lahan Sawah Dan Ruang Terbuka Hijau Di Kecamatan Cibitung Dengan Menggunakan Metode Sistem Informasi Geografis.
- Septiani, R., Citra, I. P. A., & Nugraha, A. S. A. (2019). Perbandingan Metode Supervised Classification dan Unsupervised Classification terhadap Penutup Lahan di Kabupaten Buleleng. *Jurnal Geografi*. December (2010). <https://doi.org/10.15294/jg.v16i2.19777>
- Syifa, A. F., Subiyanto, S., & Amarrohman, F. J. (2020). Analisis Perkembangan Ruang Terbuka Hijau Terhadap Cakupan Air Tanah di Kota Semarang. *Jurnal Geodesi Undip*.
- Vilcins, D., Sly, P. D., Scarth, P., & Mavoia, S. (2024). Green Space in Health Research: An Overview of Common Indicators of Greenness. *Reviews on Environmental Health*, 39(2), 221–231. <https://doi.org/10.1515/reveh-2022-0083>.
- Witra, Y., & Umar, I. (2020). Dampak Negatif Pertumbuhan Penduduk Terhadap Lingkungan Dan Upaya Mengatasinya. *Jurnal Kependudukan dan Pembangunan Lingkungan (JKPL)*. 1(3). Retrieved from <http://jkpl.pjj.unp.ac.id/index.php/JKPL/article/view/82>
- Wu, L., & Chen, C. (2023). Does Pattern Matter? Exploring the Pathways and Effects of Urban Green Space on Promoting Life Satisfaction through Reducing Air Pollution. *Urban Forestry and Urban Greening*.
- Zaki, A., Buchori, I., Sejati, A. W., & Liu, Y. (2022). An Object-Based Image Analysis in QGIS for Image Classification and Assessment of Coastal Spatial Planning. *The Egyptian Journal of Remote Sensing and Space Science*, 25(2), 349–359. <https://doi.org/10.1016/j.ejrs.2022.03.002>.
- Ziliwu, O. R. D., Witjaksono, A., & Imaduddin, A. H. (2017). Penentuan Skala Pelayanan Pada Kawasan Perdagangan Bagian Kota Malang Barat.