Innovation Journal for Educational Research, 2025, 2 (2), 79-91
E-ISSN: 3089-5235

Geography Education in the Study of the Impact of Land Cover Change on Surface Temperature in Mataram City

Junaidin[1*]

[1]*Faculty of Teacher Training and Education, Universitas Muhammadiyah Mataram, Mataram, Indonesia.*

* junaidingeo@gmail.com

ABSTRACT

This study examines the relationship between land cover change and surface temperature increase in Mataram City using remote sensing and quantitative analysis. As urban areas continue to grow due to population increase and development needs, land conversion—especially from vegetated land to built-up areas—has become inevitable. This study aims to analyze the extent of land cover change over a 10-year period (2013–2023) and assess its impact on land surface temperature (LST). Landsat 8 imagery was utilized to extract Normalized Difference Vegetation Index (NDVI) and calculate LST using Band 10 and Band 11. The results show a significant increase in built-up land by 1,325.35 hectares and a decrease in vegetated land by 1,122.34 hectares. The average surface temperature increased by 2.25°C, with a minimum of 25°C and a maximum of 35°C in 2023. A simple linear regression analysis was conducted to determine the influence of land cover change on LST. The analysis revealed a strong correlation, with an R-square value of 0.845, indicating that 84.5% of the increase in surface temperature is influenced by changes in land cover. These findings highlight the ecological consequences of urban expansion and underscore the importance of maintaining green spaces to mitigate urban heat effects. This research contributes to the field of geography education by demonstrating how geospatial tools can be used to understand urban environmental issues.

Keywords: *Land Cover Change; Surface Temperature; NDVI; LST; Mataram City; Geography Education.*

INTRODUCTION

In general, population growth in urban areas is accompanied by an increasing demand for land. Observing the dense activities of urban communities, it is evident that urban areas are currently experiencing rapid and diverse development in various directions. Therefore, development needs to be directed in a way that is equitable and comprehensive across urban and surrounding areas in order to create safe, comfortable, and sustainable spaces (Hirsan et al., 2022). Uncontrolled urban development can lead to ecosystem imbalances, as urban populations require land for housing and other

Citation in APA style: Junaidin,(2025). Geography Education in the Study of the Impact of Land Cover Change on Surface Temperature in Mataram City. *Innovation Journal for Educational Research, Vol. 2* (2), 79-91.

Received: 13 October, 2025; Revised: 12 Mai, 2025; Accepted 20 June, 2025

activities, which often results in congestion and slum formation in urban spaces (Purwandani et al., 2019).

The term "land" refers to the physical and biological environment related to human development and quality of life. The physical environment includes aspects such as relief, climate, soil, and air, while the biological environment encompasses animals, plants, and humans (Febrita susanti, 2023). One of the impacts of unregulated land cover change—besides issues like overcrowding and slum areas—is its contribution to accelerating climate change processes. This particularly affects average air temperature, air pressure, humidity, wind direction, rainfall, and other long-term climatic parameters, which in turn influence the reflectance of solar radiation on the Earth's surface, causing localized cooling or warming (Hamdani & Susanti, 2019).

Similar land-use change issues are occurring in Mataram City, the capital of West Nusa Tenggara Province, which covers an area of 61.30 km² and has a population of 432,024 people, with a density of 7,048 people/km² (BPS Kota Mataram, 2022). In terms of land use, 3,393 hectares are classified as built-up areas, while 2,737 hectares remain undeveloped, comprising agricultural land and Green Open Spaces (RTH). Thus, 55.35% of the city's land is built-up, while 44.65% is undeveloped. Of the undeveloped land, only 3.21% is designated as RTH, and the rest consists of agricultural land functioning as Non-Green Open Space (RTNH). According to Article 29 of Law Number 26 of 2007 on Spatial Planning, RTH is categorized by ownership: 20% should be public RTH and 10% private RTH, making it a requirement that every administrative region must have a minimum of 30% RTH (Pambudi & Tambunan, 2021). At the micro-regional scale, RTH plays an ecological role in regulating air temperature (Ferdiansyah, 2022). Changes in air temperature are believed to cause urban heat island (UHI) phenomena (Yumna & Muhamad, 2020).

The advancement of technology has greatly facilitated the study of the impact of land cover change on surface temperature, particularly through remote sensing techniques (Cahyono et al., 2019). Surface temperature distribution can be analyzed based on the radiation energy emitted from the ground surface. Therefore, urban land cover patterns have the potential to influence surface temperature (Hardianto, 2018). For this reason, it is necessary to conduct a study on the impact of land cover change on surface temperature increase in Mataram City.

LITERATURE REVIEW

The integration of geography education with environmental studies, particularly in urban spatial planning, has become increasingly essential in understanding the dynamic interaction between land use and climatic variables. Geography, as an academic discipline, plays a vital role in equipping students with the knowledge and analytical skills needed to interpret spatial patterns, land cover transformation, and their environmental implications (Cahyono et al., 2019). Through geography education, learners are introduced to various tools such as GIS (Geographic Information Systems) and remote sensing, which are crucial for monitoring and analyzing land use changes and temperature variations (Pambudi & Tambunan, 2021).

Land cover change is a critical phenomenon resulting from urbanization, deforestation, agricultural expansion, and infrastructure development. Several studies have shown that such changes significantly influence the surface energy balance, often resulting in the urban heat island (UHI) effect, which is the rise in temperature in urban areas compared to their rural surroundings (Purwandani et al., 2019). This phenomenon is typically caused by the replacement of vegetated land with impervious surfaces such as concrete and asphalt, which absorb and retain more solar radiation. The study of these transformations is central in environmental geography and urban climatology, offering a real-world application of geographic principles in climate impact assessment (Hamdani & Susanti, 2019).

In the Indonesian context, rapid urbanization, particularly in mid-sized cities like Mataram, has led to notable changes in land use and cover. Research by Na and Hipertensiva, (2021) highlighted the correlation between decreasing green open spaces and rising surface temperatures in several Indonesian cities. Similarly, studies using remote sensing in urban areas have revealed that vegetation plays a key role in mitigating temperature increases, emphasizing the importance of maintaining green spaces (Hirsan et al., 2022).

Educationally, geography provides a platform for students to engage in real-world problem solving through project-based learning, where they can collect, interpret, and map spatial data related to urban development and environmental degradation (Syahza, 2021). The use of geospatial technologies in classrooms not only enhances students' technical skills but also promotes environmental awareness and stewardship. In this regard, studying the impact of land cover change on surface temperature becomes an interdisciplinary learning process, combining elements of physical geography, urban studies, and environmental science.

Furthermore, Mataram City, as the capital of West Nusa Tenggara Province, presents a unique case study due to its ongoing urban expansion, demographic growth, and the environmental challenges that follow. According to Fawzi & Husna, (2021), Mataram's built-up area continues to increase annually, raising concerns about its long-term climate resilience. As such, the city becomes a relevant educational setting for geography students to apply theoretical knowledge to practice, especially in analyzing spatial data trends, identifying environmental risks, and proposing sustainable land use solutions.

METHODS

This study adopts a quantitative descriptive approach, integrating theoretical references through literature review and interpreting spatial data using Landsat 8 satellite imagery. The imagery is analyzed numerically within a specific natural context (Na & Hipertensiva, 2021). Given the characteristics of the research problem and the study area (Mataram City), the research design falls into the category of case study and field research (Syahza, 2021).

Data analysis was carried out by interpreting Landsat 8 satellite images, supported by a literature review on the impact of land cover change on land surface temperature. The goal of this analysis is to identify and understand the consequences of land cover change on rising surface temperatures in Mataram City. The analytical methods used in this study are as follows:

3.1. Landsat 8 Interpretation

Remote sensing is a technology used to acquire and analyze information about the Earth’s surface through electromagnetic radiation emitted by objects on the ground (Pradipta et al., 2019). One of the commonly used tools in remote sensing is Landsat 8, which includes 11 spectral bands with different spatial resolutions (Andakke & Tarya, 2022). Landsat 8 is developed through a collaboration between NASA and the U.S. Geological Survey (USGS) (Fawzi & Husna, 2021).

To perform analysis using Landsat 8 imagery, various band combinations are required depending on the analysis objectives (Novianti, 2021). The spectral bands and their wavelengths are listed below:

Table 1. Landsat 8 Spectral Bands and Wavelengths

Band Spektral	Wavelength (µm)
Band 1 - Coastal Aerosol	0,43 - 0,45
Band 2 – Blue	0,45 - 0,51
Band 3 – Green	0,53 - 0,59
Band 4 – Red	0,64 - 0,67
Band 5 - Near Infrared (NIR)	0,85 - 0,88
Band 6 - Short- Wave Infrared (SWIR) 1	1,57 - 1,65
Band 7 - Short Wave Infrared (SWIR) 2	2,11 - 2,29
Band 8 – Panchromatic	0,50 - 0,68
Band 9 – Cirrus	1,36 - 1,38
Band 10 - TIRS 1	10,60 - 11,19
Band 11 - TIRS 2	11,5 - 12,51

Source: Fawzi & Husna, 2021

Table 2. Common Landsat 8 Band Combinations

Application	Band Combination
Natural Color	4 3 2
False Color (Urban)	7 6 4
Infrared Vegetation	5 4 3
Agriculture	6 5 2
Atmospheric Penetration	7 6 5
Healthy Vegetation	5 6 2
Soil/Water	5 6 4
Natural with Atmospheric Removal	7 5 3
Shortwave Infrared	7 5 4
Vegetation Analysis	6 5 4

Table 3. NDVI Classification from Landsat 8 Interpretation

Vegetation Density	NDVI Value	Land Use Type
Dense	0.4 – 0.6	Forests, urban forests, mixed plantations
Moderately Dense	0.3 – 0.4	Rice fields, shrubs, pasture, open lands
Sparse	0.2 – 0.3	Settlements and built-up areas
Non-Vegetated	0.1 – 0.2	Non-vegetated areas
Water/Clouds	-1 – 0.1	Water bodies / Cloud-covered areas

Source: (Doni et al., 2021)

3.2. Normalized Difference Vegetation Index (NDVI)

Land use change can be analyzed periodically by comparing Landsat 8 imagery from 2023 and 2013 using the Normalized Difference Vegetation Index (NDVI), which is an analysis based on digital brightness values captured by specific sensors or bands of Landsat 8, applying the K-Means method (Niagara et al., 2020). The evaluation process fundamentally produces classifications based on the proportion of vegetation cover (Rafsenja et al., 2020). The resulting index is a formulation of the normalized difference between the absorption and reflection in the chlorophyll region, which identifies vegetated areas, non-vegetated surface areas, open water or cloud-covered areas, artificial features, and bare soil (Dwi Yanti et al., 2020). The formula used is as follows.

$$NDVI = \frac{(NIR - RED)}{(NIR + RED)}$$

The NDVI values range from -1 to 1. The assessment of NDVI is not only used for analyzing land cover changes but also serves as a preliminary step in the analysis of Land Surface Temperature (LST). However, before proceeding to that stage, it is necessary to determine the land surface emissivity. The NDVI values are derived from the multispectral bands, specifically a combination of Band 5 (Near Infrared) and Band 4 (Red), which allows for the calculation of both maximum and minimum NDVI values (Dhonanto et al., 2021). The Proportion of Vegetation (Pv) is then calculated using the following formula.

$$Pv = \left(\frac{NDVI - NDVI_{min}}{NDVI_{max} - NDVI_{min}}\right)^2$$

Based on the results of the Proportion of Vegetation (Pv), the value is then inserted into the equation to calculate the land surface emissivity.

(e) *emissivity* = 0.0004 PV+0.986

Where:

e = Emissivity

Pv = Proportion of vegetation

3.3. Land Surface Temperature (LST)

The analysis of Land Surface Temperature (LST) refers to the condition governed by the balance of surface energy, atmospheric factors, thermal properties of the surface, and subsurface media—making it a crucial phenomenon in the context of global climate change. As the concentration of greenhouse gases in the atmosphere increases, land surface temperature also tends to rise (Iqmi, 2017). In LST studies, remote sensing data—specifically Landsat 8 Bands 10 and 11—is used (Sagita et al., 2022). The value used to calculate the potential land surface temperature is determined using the following equation.

$$T=TB/(1+(\lambda*TB/C2)*\ln(e))$$

Where:

TB = Satellite brightness temperature

λ = Wavelength of emitted radiation

C2 = 14388 µm·K (second radiation constant)

e = Emissivity value

However, the Land Surface Temperature (LST) analysis process begins with the calculation of Top of Atmosphere (TOA) Spectral Radiance using the radiance rescaling factors found in the metadata file of Landsat 8. This step aims to eliminate atmospheric effects on absolute temperature values, since the object of measurement is actually located on the Earth's surface (Insan & Prasetya, 2021). The formula used to calculate TOA Spectral Radiance is as follows:

$$L\lambda = MLQcal + AL$$

Where:

Lλ : *TOA spectral radiance (Watts/(m2 * srad * µm))*

ML : *Band-specific multiplicative rescaling factor from the metadata (RADIANCE_MULT_BAND_x, where x is the band number)*

AL : *Band-specific additive rescaling factor from the metadata (RADIANCE_ADD_BAND_x, where x is the band number).*

Qcal : *Quantized and calibrated standard product pixel values (DN)*

Table 4. Radiance Rescaling Factors for Landsat 8

Description	Band 10	Band 11
Radiance Multiplier	0.0003342	0.0003342
Radiance Add	0.1	0.1

The next step is the calculation of Brightness Temperature, which determines the thermal brightness values. This yields two values: Brightness Temperature for Band 10 and Band 11 of Landsat 8 (Kurniadin et al., 2022). These are derived by converting the previously calculated TOA Spectral Radiance into Brightness Temperature using the following equation:

$$T_B = \frac{K_2}{\ln\left(\frac{K_1}{L_\lambda} + 1\right)}$$

Where:
TB = Brightness Temperature (Kelvin)
Lλ = TOA Spectral Radiance (Watts / (m²·sr·µm))
K1 = Band-specific thermal conversion constant (from metadata)
K2 = Band-specific thermal conversion constant (from metadata)

Table 5. Thermal Constants for Landsat 8 Bands

Description	K1	K2
Band 10	774.8853	1321.0789
Band 11	480.8883	1201.1442

3.4. Simple Linear Regression (SLR)

Simple Linear Regression (SLR) is a linear relationship between one independent variable (X)—which in this study refers to land cover change—and a dependent variable (Y), which is the land surface temperature level. In this analysis, the relationship between the variables is linear, meaning that a change in variable X will be consistently followed by a change in variable Y (Azra et al., 2021). The estimation model for the Simple Linear Regression (SLR) is formulated as follows:

$$Y = a + bX$$

Where:
Y = Regression line / response variable
X = Independent variable / predictor
a = Constant (intercept)
b = Regression coefficient (slope)

RESULTS AND DISCUSSIONS

4.1 Land Cover Change

The measurement of land cover change in Mataram City was conducted periodically using the Normalized Difference Vegetation Index (NDVI) analysis, based on Band 5 and Band 4 of Landsat 8 imagery from 2013 to 2023, covering a time span of 10 years.

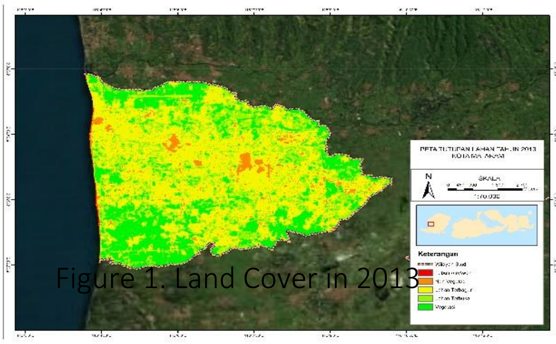

Figure 1. Land Cover in 2013

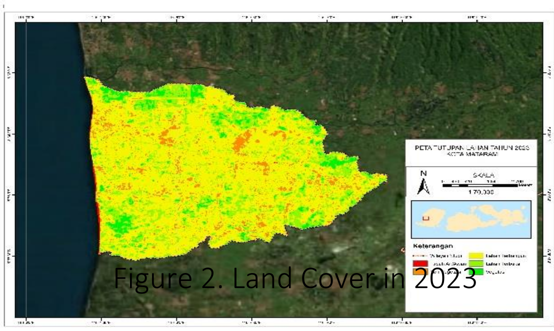

Figure 2. Land Cover in 2023

Based on Figure 1 and Figure 2, there is a noticeable change in land cover according to the vegetation index from 2013 to 2023. In 2023, built-up land dominates the landscape, while vegetated land has decreased over the 10-year period. The classification of the vegetation index based on the processed Landsat 8 data is presented in the following table.

Table 6. Vegetation Index Classification for 2013

No	Land Cover Classification		Description
	2013	2023	
1	-0.315492809 - -0.028575321	-0.269195765 - -0.032384167	Water Bodies / Cloud Cover
2	-0.028575321 - 0.092232043	-0.032384167 - 0.082539108	Non-Vegetated Area
3	0.092232043 - 0.265892628	0.082539108 - 0.246217713	Built-up Area
4	0.265892628 - 0.401800912	0.246217713 - 0.371588559	Open Land
5	0.401800912 - 0.647190869	0.371588559 - 0.618847728	Vegetation

Source: Analysis Results, 2024

The vegetation index classification values for 2013 and 2023 show both positive and negative values. The positive values are identified as various types of land cover including non-vegetated open areas, built-up areas, open land used for agriculture, and vegetated land such as forests and plantations. Meanwhile, the negative values are identified as water bodies or areas covered by clouds. The extent of land cover change for each category is illustrated in Figure 3 below.

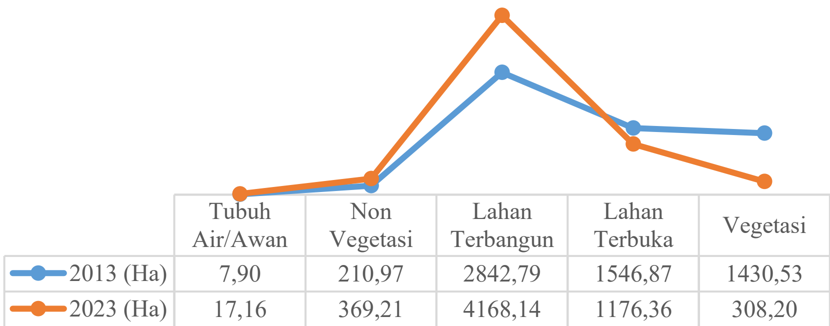

Figure 3. Land Cover Change Trend from 2013 to 2023

Figure 3 above illustrates the extent of changes in various land cover types over a 10-year period from 2013 to 2023. The area identified as water bodies or cloud cover increased by 9.25 hectares. Non-vegetated open land also expanded by 158.24 hectares. The most significant increase occurred in built-up land, which grew by 1,325.35 hectares. On the other hand, open land used for agricultural purposes decreased by 370.51

hectares, and vegetated areas, including forests and plantations, declined by 1,122.34 hectares.

4.2 Land Surface Temperature (LST)

Based on calculations from the Normalized Difference Vegetation Index (NDVI) analysis, there have been notable land cover changes over the past 10 years, which have contributed to an increase in land surface temperature in Mataram City. This impact necessitates a detailed analysis through a Land Surface Temperature (LST) study, which utilizes data processing from Band 10 and Band 11 of Landsat 8 imagery. The results of this data processing are illustrated in the following figure.

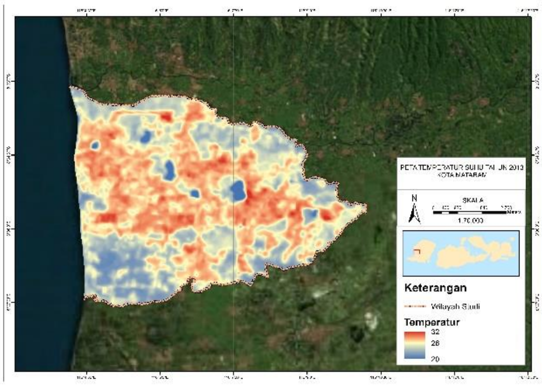

Figure 4. Land Surface Temperature (LST) in 2013

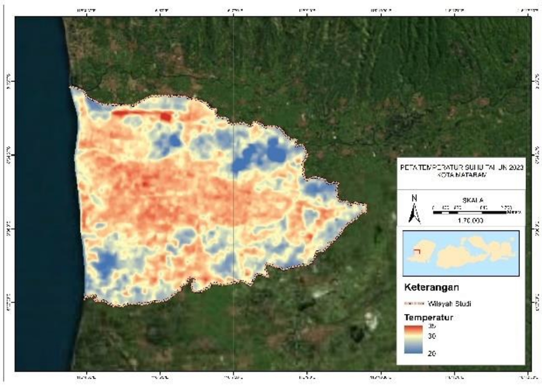

Figure 5. Land Surface Temperature (LST) in 2023

Based on the LST analysis using data from 2013 and 2023, there is a clear increase in land surface temperature in Mataram City. The dominant temperature range is between 30°C and 35°C. The distribution of land surface temperature across Mataram City for each respective year is illustrated in the following figures.

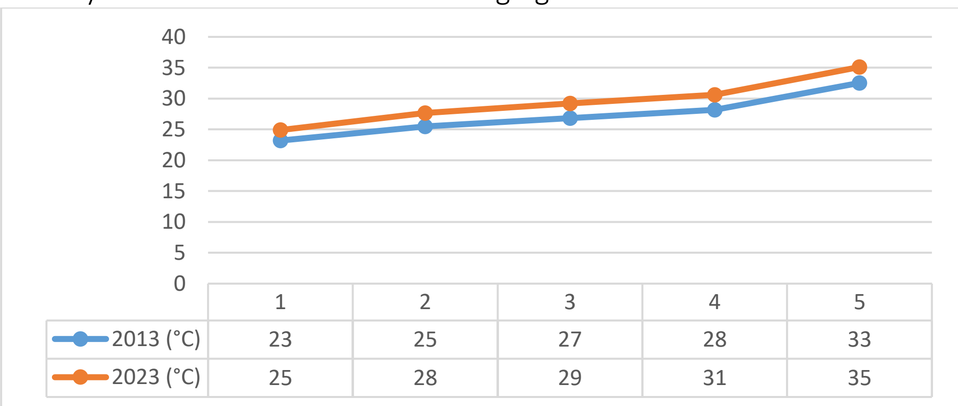

Figure 6. Land Surface Temperature (LST) Trend

Based on the data presented in Figure 6, there has been a significant increase in land surface temperature over the 10-year period. The average temperature rise is approximately 2.25°C, measured across the various LST classifications. Classification 1, representing the minimum temperature range, recorded a surface temperature of 23°C in 2013, which rose to 25°C in 2023. Meanwhile, Classification 5, representing the maximum temperature range, recorded a surface temperature increase from 34°C in 2013 to 36.5°C in 2023. This upward trend reflects the ongoing impact of land cover changes—particularly the reduction in vegetated areas and the expansion of built-up land—on the microclimate of Mataram City.

4.3 The Impact of Land Cover Change on the Increase in Land Surface Temperature

Given the observed changes in land cover and the rise in land surface temperature in Mataram City, it is necessary to conduct a study to measure the extent of the impact of land cover change on surface temperature increase. This is carried out using a simple linear regression statistical analysis, where the independent variable (X) is land cover, and the dependent variable (Y) is land surface temperature.

Table 7. Simple Linear Regression Analysis Results

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	100.224	100.224	43.891	0.000165
Residual	8	18.268	2.283		
Total	9	118.492			

Source: Analysis Results, 2024

Table 8. Effect of Land Cover on LST Increase

Regression Statistics	
Multiple R	0.919
R Square	0.845
Adjusted R Square	0.826
Standard Error	1.511
Observations	10

Source: Analysis Results, 2024

The results of the simple linear regression analysis between the independent variable (X), land cover change, and the dependent variable (Y), increase in land surface temperature, show an F-value of 43.891 with a significance level of 0.000165. Since this value is less than the alpha level of 0.05, it can be concluded that land cover change has a statistically significant effect on the increase in land surface temperature.

Referring to Table 7, the Multiple R value is 0.919, indicating a very strong correlation between the two variables. The R Square value is 0.845, meaning that approximately 84.5% of the variation in land surface temperature can be explained by changes in land cover in Mataram City. This suggests a strong relationship between land use changes—especially the reduction in vegetated areas and the expansion of built-up land—and the increase in surface temperature.

CONCLUSION

Based on the analysis using the Normalized Difference Vegetation Index (NDVI), there has been a significant change in land cover over the past 10 years, from 2013 to 2023. In 2023, built-up land increased by 1,325.35 hectares, while vegetated areas used for forests and plantations decreased by 1,122.34 hectares, and open land used for agriculture declined by 370.51 hectares. This change in land cover is directly proportional to the increase in land surface temperature in Mataram City. The Land Surface Temperature (LST) analysis indicates an average temperature increase of 2.25°C over the last decade, with minimum surface temperatures reaching 25°C and maximum temperatures up to 35°C. Furthermore, the simple linear regression analysis shows that land cover change has a significant impact on surface temperature increase, with an influence level of 84%, which falls into the category of "very influential.

Declaration of Conflicting Interests
There is no conflict of interest regarding the article publication

Acknowledgments
Thank you to the Universitas Muhammadiyah Mataram for supporting this research.

REFERENCES

Andakke, J. N., & Tarya, A. (2022). Variations of Marine Debris In Manado Bay and its environs. *Jurnal Ilmiah PLATAX*, *10*(2), 224. https://doi.org/10.35800/jip.v10i2.40841

Azra, D. A., Maharani, D., Aprilia, S., Ziqma, U., & Septiani Pontoh, R. (2021). Pengaruh Luas Kebakaran Hutan dan Lahan Terhadap Tingkat Pencemar Udara PM10. *Jurnal Ekologi, Masyarakat Dan Sains*, *2*(2), 60–65. https://doi.org/10.55448/ems.v2i2.14

BPS Kota Mataram. (2022). *Kota Mataram Dalam Angka Mataram Municipality in Figures*. 1–736.

Cahyono, B. E., Febriawan, E. B., & Nugroho, A. T. (2019). Analisis Tutupan Lahan Menggunakan Metode Klasifikasi Tidak Terbimbing Citra Landsat di Sawahlunto, Sumatera Barat. *Jurnal Teknotan*, *13*(1), 8. https://doi.org/10.24198/jt.vol13n1.2

Dhonanto, D., Palupi, N. P., & Salsabila, G. (2021). Pemanfaatan Citra Satelit Landsat 8 Untuk Memetakan Sebaran Titik Panassebagai Indikasi Peningkatan Suhu Permukaan Tanah Di Kabupaten Kutai Timur. *Ziraa'Ah Majalah Ilmiah Pertanian*, *46*(3), 383. https://doi.org/10.31602/zmip.v46i3.5250

Doni, L. R., Yuliantina, A., Dewi, R., Pahlevi, M. Z., & Kusumawardhani, N. A. (2021). Komparasi Luas Tutupan Lahan di Kota Bandar Lampung Berdasarkan Algoritma NDVI (Normalized Difference Vegetation Index) dan EVI (Enhanced Vegetation Index). *Jurnal Geosains Dan Remote Sensing (JGRS)*, *2*(1), 16–24. https://doi.org/https://doi.org/10.23960/jgrs.2021.v2i1.43

Dwi Yanti, Indri Megantara, Akbar, M., Sabila Meiwanda, Syauqi Izzul, M. Dede Sugandi, & Riki Ridwana. (2020). Analisis Kerapatan Vegetasi di Kecamatan Pangandaran melalui Citra Landsat 8. *Jurnal Geografi, Edukasi Dan Lingkungan (JGEL)*, *4*(1), 32–38. https://doi.org/10.29405/jgel.v4i1.4229

Fawzi, N. I., & Husna, V. N. (2021). Landsat 8 "Sebuah Teori dan Teknik Pemrosesan Tingkat Dasar." In *El -Markazi* (Vol. 1, Issue April). El Markazi. https://www.researchgate.net/publication/350819219

febrita susanti. (2023). Analisis Kesesuaian Lahan Pertanian dengan Program Lahan Sawah Dilindungi di Kabupaten Lombok Barat. *Jurnal Humanitas*, *1*, 118–128. https://doi.org/https://doi.org/10.29408/jhm.v10i1.24407

Ferdiansyah, E. (2022). Identifikasi Urban Heat Island dan Faktor yang Mempengaruhinya Menggunakan Google Earth Engine. *The Climate of Tropical Indonesia Maritime*

Continent Journal, *1*(1), 5–11.

Hamdani, A. F., & Susanti, N. E. (2019). Perubahan Pengunaan Lahan Dan Pengaruhnya Terhadap Perubahan Iklim Kota Malang. *JPIG (Jurnal Pendidikan Dan Ilmu Geografi)*, *2*(2). https://doi.org/10.21067/jpig.v2i2.3508

Hardianto, R. (2018). Pengaruh Perubahan Tutupan Lahan Terhadap Suhu Permukaan Di Kabupaten Sidoarjo. *Planning for Urban and Regional Environment*, *8*(3), 349–358.

Hirsan, F. P., Kurniawan, A., Ridha, R., & Yuniarman, A. (2022). Pemetaan Delineasi Kawasan Perkotaan Berbasis Partisipatif. *JMM (Jurnal Masyarakat Mandiri)*, *6*(5), 6–9. https://doi.org/10.31764/jmm.v6i5.10120

Insan, A. F. N., & Prasetya, F. V. A. S. (2021). Sebaran Land Surface Temperature Dan Indeks Vegetasi Di Wilayah Kota Semarang Pada Bulan Oktober 2019. *Buletin Poltanesa*, *22*(1), 45–52. https://doi.org/10.51967/tanesa.v22i1.471

Iqmi, M. Z. (2017). Hubungan Kerapatan Vegetasi Terhadap Suhu Permukaan (Studi Kasus : Kota Bandar Lampung , Provinsi Lampung). *Teknik Geodesi*. https://eprints.itn.ac.id/1133/1/JURNAL.pdf

Kurniadin, N., Yani, M., Nurgiantoro, N., Annafiyah, A., Prasetya, F. V. A. S., Insanu, R. K., Wumu, R., & Suryalfihra, S. I. (2022). Deteksi Perubahan Suhu Permukaan Tanah dan Hubungannya dengan Pengaruh Albedo dan NDVI Menggunakan Data Satelit Landsat-8 Multitemporal di Kota Palu Tahun 2013 - 2020. *Geoid*, *18*(1), 82. https://doi.org/10.12962/j24423998.v18i1.13157

Na, D. E. C., & Hipertensiva, C. (2021). *Metode Penelitian Kuantitatif*. Pascal Books.

Niagara, Y., Ernawati, & Purwandari, E. P. (2020). Pemanfaatan Citra Penginderaan Jauh Untuk Pemetaan Klasifikasi Tutupan Lahan Menggunakan Metode Unsupervised K-Means Berbasis Web Gis (Studi …. *Rekursif: Jurnal Informatika*, *8*(1), 100–110. https://ejournal.unib.ac.id/index.php/rekursif/article/download/8478/5706

Novianti, T. C. (2021). Klasifikasi Landsat 8 OLI Untuk Tutupan Lahan Di Kota Palembang Menggunakan Google Earth Engine. *Jurnal Swarnabhumi*, *6*(1), 75–85. http://code.earthengine.google.com/

Pambudi, B. P., & Tambunan, M. P. (2021). Evaluasi Kesesuaian Lahan Ruang Terbuka Hijau terhadap RTRW Kota Bekasi. *Media Komunikasi Geografi*, *22*(2), 183. https://doi.org/10.23887/mkg.v22i2.38729

Pradipta, I. M. D., Widyantara, I. M. O., & Hartati, R. S. (2019). Penajaman Citra Satelit Landsat 8 Menggunakan Transformasi Brovey. *Majalah Ilmiah Teknologi Elektro*, *18*(3), 353. https://doi.org/10.24843/mite.2019.v18i03.p08

Purwandani, N. P. C. D., Faradisa, I., & Khairunnisa, N. (2019). Analisis Hubungan Perubahan Suhu Udara Dengan Ketersediaan Ruang Terbuka Hijau Studi Kasus di Kota Banjarmasin, Kalimantan Selatan. *Seminar Nasional Geomatika*, *3*, 661. https://doi.org/10.24895/sng.2018.3-0.1024

Rafsenja, U., Muh, L., Jaya, G., & Rahim, S. (2020). *Analisis Perbandingan Citra Landsat 8 dan Citra Sentinel 2-A untuk Mengidentifikasi Sebaran Mangrove*. *4*(1).

Sagita, A. R., Margaliu, A. S. C., Rizal, F., & Mazzaluna, H. P. (2022). Analisis Korelasi Suhu Permukaan, NDVI, Elevasi dan Pola Perubahan Suhu Daerah Panas Bumi Rendingan-Ulubelu-Waypanas, Tanggamus Menggunakan Citra Landsat 8 OLI/TIRS. *Jurnal Geosains Dan Remote Sensing*, *3*(1), 43–51. https://doi.org/10.23960/jgrs.2022.v3i1.72

Syahza, A. (2021). *Metodologi Penelitian Edisi Revisi Tahun 2021* (Issue September). UR Press Pekanbaru. https://www.researchgate.net/publication/354697863

Yumna, P. A., & Muhamad, J. L. (2020). Analisis Perubahan Distribusi Urban Heat Island (UHI) di Kota Surabaya Menggunakan Citra Satelit Landsat Multitemporal. *Jurnal Teknik ITS*, *9*(2337–3539), 48–55.