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The Influence Of Light Pollution On The Determining Of Early Fajr From The Perspective Of Astronomy In Tebing Mattoanging Bulukumba

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Abstract

This study aims to analyze the impact of light pollution on the observation of fajr shadiq in determining the beginning of the Subuh prayer time based on the perspective of Islamic astronomy (‘ilm al-falak), with a case study at Tebing Mattoanging, Bulukumba. The research focuses on two primary issues: (1) the level and characteristics of light pollution at Tebing Mattoanging, and (2) the influence of light pollution on the accuracy of fajr shadiq observation. This research adopts a qualitative methodology with a field research approach, integrating both Islamic jurisprudential (shar'i) and astronomical perspectives. Data were obtained through direct observation at the site and review of relevant scientific literature. Data collection techniques included observation and documentation, while data analysis was carried out through stages of reduction, presentation, and conclusion drawing. The findings indicate that Tebing Mattoanging has experienced a considerable degree of light pollution, with sky brightness averaging 19.36 mpdbp, nearing the threshold for natural dark sky classification (<19.0 mpdbp), though the location remains viable for astronomical observation. The appearance of fajr shadiq at this site shows a significant discrepancy compared to the Ministry of Religious Affairs’ Subuh prayer schedule. The phenomenon was only detectable when the sun was at an average altitude of –11° 37’ 25.9” below the horizon, at around 04:49 WITA, which was approximately 22 minutes later than the official schedule. These findings demonstrate that light pollution not only diminishes night sky quality but also affects the precise detection of fajr shadiq, with implications for accurate prayer time determination. The study highlights the importance of regulating light pollution through the use of warm LEDs, downward-directed lighting, scheduling control, and the implementation of dark sky reserve concepts to balance tourism development and night sky conservation.

Keywords:
Light Pollution, Fajr Shadiq, Subuh Prayer Time, Astronomical Observation, Sky Bright

Abstrak

Penelitian ini bertujuan untuk menganalisis pengaruh polusi cahaya terhadap pengamatan fajar shadiq dalam penentuan awal waktu salat subuh berdasarkan perspektif ilmu falak dengan studi lokasi di Tebing Mattoanging, Bulukumba. Permasalahan utama penelitian ini difokuskan pada dua hal: (1) kondisi tingkat dan karakteristik polusi cahaya di Tebing Mattoanging, dan (2) dampak polusi cahaya terhadap akurasi pengamatan fajar shadiq. Penelitian ini merupakan penelitian kualitatif dengan pendekatan lapangan (field research), menggunakan pendekatan syar'i dan astronomis. Data diperoleh dari observasi langsung di lokasi dan kajian literatur ilmiah terkait. Teknik pengumpulan data meliputi observasi dan dokumentasi, dengan analisis data melalui tahapan reduksi, penyajian, dan penarikan kesimpulan. Penelitian menunjukkan bahwa Tebing Mattoanging mengalami polusi cahaya cukup signifikan, dengan kecerahan langit rata-rata 19,36 mpdbp mendekati batas langit gelap alami (<19,0 mpdbp) tetapi masih layak untuk observasi astronomi. Kemunculan fajar shadiq di lokasi ini terlambat sekitar 22 menit dibanding jadwal Subuh versi Kementerian Agama, terdeteksi saat matahari berada pada ketinggian –11° 37’ 25,9” sekitar pukul 04.49 WITA. Hal ini menunjukkan polusi cahaya tidak hanya mengurangi kualitas langit malam, tetapi juga memengaruhi akurasi deteksi fajar shadiq. Temuan ini menegaskan pentingnya pengendalian polusi cahaya melalui regulasi pencahayaan seperti penggunaan lampu LED hangat, arah cahaya ke bawah, penjadwalan waktu, dan konsep *dark sky reserve* untuk menjaga keseimbangan antara kebutuhan wisata dan konservasi langit malam.

Kata kunci:
Polusi Cahaya, Fajar Shadiq, Waktu Salat Subuh, Observasi Astronomi, Kecerahan Langit.

A. Introduction

Determining prayer times is one of the fundamental aspects of the lives of Muslims that requires high precision and accuracy. In the context of astronomy, determining the start time of the Fajr prayer has its own complexities because it depends on an astronomical phenomenon called fajar shadiq (true dawn) or fajar hakiki.[1] Fajar shadiq is the white light that appears on the eastern horizon before sunrise, which astronomically occurs when the sun is positioned 18° to 20° below the horizon.[2]

Traditionally, the observation of fajar shadiq is conducted thru direct observation (rukyah) of the eastern sky to determine when the light of dawn begins to appear. However, in modern times, especially in the era of rapid

[1]Ahmad Izzuddin, *Ilmu Falak Praktis: Metode Hisab-Rukyah dan Solusi Permasalahannya*. (Semarang: Pustaka Rizki Putra, 2012) h. 89.

[2]Thomas Djamaluddin, "Astronomi Memberi Solusi Penyatuan Umat." *Jurnal Astronomi Indonesia*, 2.1, (2011), h. 37.

industrialization and urbanization, a new challenge has emerged in the form of light pollution, which can disrupt the visibility of astronomical phenomena, including the observation of fajar shadiq.[3]

Excessive artificial light pollution from city lights, street lamps, and other light sources can brighten the nite sky and obscure the appearance of fajar shadiq, which is the dawn light on the eastern horizon that marks the beginning of the Subuh prayer time. This condition not only reduces the accuracy of visual observations but also affects the determination of prayer times, both manually and technologically, potentially causing delays or advancements in the timing of Fajr. Therefore, precise observations are crucial, and the use of aids such as photometers or light sensors is necessary to ensure more objective and accurate dawn detection.

In addition, understanding the impact of light pollution encourages the development of observation standards and procedures that take into account the surrounding environmental conditions. The use of modern technology can reduce reliance on direct visual observations, allowing the time for Fajr prayer to be determined more consistently and accurately, even in less than ideal environmental conditions.

Overall, the influence of light pollution on the observation of fajar shadiq is an important factor that must be considered in determining the time for the subuh prayer. Mitigation efforts and the use of appropriate technology can help ensure that the performance of prayers is conducted at the designated time, maintaining the validity and blessings of the worship.

The existence of Astronomy in (Islamic) law holds immense value, significance, and position because its existence is inseparable from a large part of Islamic law. This means that there are legal aspects in (Islamic) law that are directly

[3]Falchi, Fabio, et al. "The New World Atlas of Artificial Night Sky Brightness." *Science Advances*, 2.6 (2016), h. 72.

related to Astronomy.[4] Based on the perspective of modern astronomy, there is a need to integrate traditional observational methods with contemporary scientific approaches in addressing the challenge of light pollution.[5] The Integration of Religion and Science states that astronomy studies the paths of celestial bodies, particularly the Earth, Sun, Moon, and stars, in their respective orbits to determine their directions and positions, especially in Islam for the purpose of determining prayer times.[6]

This geocentric theory was widely known and followed by astronomers of its time, including several prominent figures in the Islamic world, such as Abu Abdullah bin Jabir Sanan Al-Hirany, Abdur Rahman bin Yunus Al-Misry, Abul Wafa' Al-Buzaji, and Ulugh Beg. Until the 15th century, this theory was still in use. However, with further research, a new theory known as the heliocentric theory was later developed.[7]

B. Methods

The type of research used in this study is qualitative field research.[8] The research method is practical and does not require in-depth knowledge of literature or special skills from the researcher, so the researcher themselves acts as the main instrument. The research was conducted using a Sharia and astronomical approach at Tebing Mattoanging Bulukumba. Data were collected thru observation and documentation, then analyzed using the Miles and Huberman method with the stages of data reduction, data verification, and conclusion drawing.

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[4]Sippah Chotban. "Membaca Ulang Relasi Sains dan Agama dalam Persfektif Nalar Ilmu Falak." *ELFALAKY: Jurnal Ilmu Falak* 4.2 (2020), h. 225

[5]Slamet Hambali, *Ilmu Falak 1: Penentuan Awal Waktu Shalat & Arah Kiblat Seluruh Dunia*. Semarang: Program Pascasarjana UIN Walisongo, (2011), h. 234.

[6]Muh Rasywan Syarif, *Ilmu Falak Integrasi Agama dan Sains* (Gowa; Alauddin University Press, 2020), h. 1

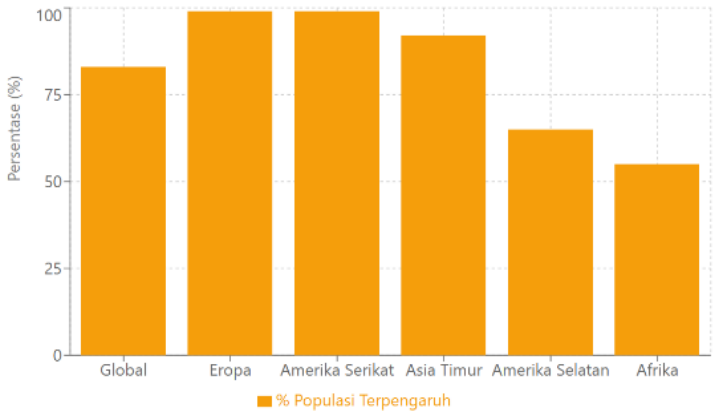
[7]Isyvina Unai Zahroya, and Muh Rasywan Syarif. "Kodifikasi historis ilmu falak pada abad pertengahan." *ELFALAKY: Jurnal Ilmu Falak* 5.2, (2021), h. 17

[8]Muljono Damapolii, dkk, *Pedoman Penulisan Karya Tulis Ilmiah: Makalah, Risalah Tesis, Disertasi, Dan Laporan Penelitian*, Gowa: Alauddin University Press, (2023), h. 14

C. Result and Discussion

1. The Condition of Light Pollution Levels in the Mattoanging Cliff Bulukumba and Its Characteristic

a. Global Condition of Light Pollution Levels



Grafik 4.1 percentage of the population affected by light pollution

The latest global statistics show that the current state of light pollution is very concerning. About 83% of the world's population lives under a sky that has been polluted by light, with higher numbers occurring in Europe and the United States, where 99% of the population is exposed to light pollution.[9] Overall, more than 80% of regions worldwide experience similar conditions.[10] As a result, about one-third of the world's population can no longer see the Milky Way from their homes, indicating a significant and widespread level of light pollution globally.

[9]Falchi, F., et al. "The new world atlas of artificial night sky brightness." *Science Advances*, (2016), h. 6.

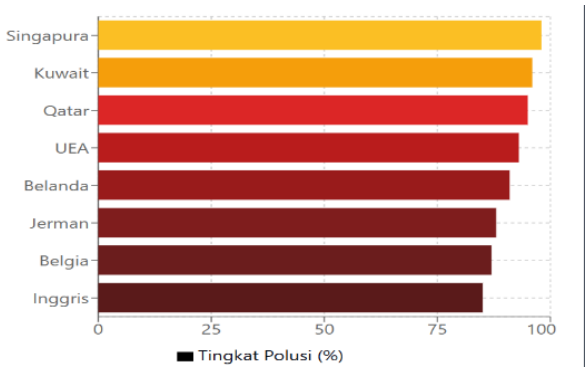
[10]Cinzano, P., Falchi, F., & Elvidge, C. D. "The first World Atlas of the artificial night sky brightness." *Monthly Notices of the Royal Astronomical Society,* (2001), h. 689



Grafik 4.2 The growth of light pollution

The growth of light pollution continues to show a worrying trend in various regions of the world. Outdoor artificial lighting increases by about 2–6% each year, depending on the geographical location. Data shows that between 2012 and 2016, the area on Earth illuminated by artificial light increased by 2.2% per year.[11] In addition, the brightness of the nite sky globally has also seen a significant increase, with an average rise of 9.6% per year, indicating the expanding and intensifying impact of light pollution.

1) The most polluted region



Grafik 4.3 Country with the highest pollution levels

[11]Kyba, C. C. M., et al. "Artificially lit surface of Earth at night increasing in radiance and extent." *Science Advances*, (2017), h. 11

Areas with the highest levels of light pollution include:

a) Singapore - a country with the worst light pollution in the world
b) Kuwait and Qatar - Middle Eastern regions with high urbanization
c) Western Europe - especially the Netherlands, Belgium, and Germany
d) East Coast of the USA - the Boston-Washington DC corridor
e) East Asia - Japan, South Korea, and most of coastal China

b. The Impact of Ligth Pollution

Light pollution not only affects the beauty of the nite sky but also brings various negative impacts in different aspects of life. Here are some of the main impacts of light pollution that need to be addressed:

1) Ecological Impact

Light pollution disrupts the circadian rhythms of various species, affects the migration of birds and insects, disturbs the reproduction of nocturnal animals, and hinders plant growth and ecosystem balance. It even disrupts the navigation orientation of sea turtles and fish larvae, which heavily rely on natural light, thereby threatening their survival.

2) Impact on Human Health

Excessive exposure to light at nite can disrupt the production of melatonin, which regulates the sleep cycle, thereby increasing the risk of sleep disorders and long-term circadian rhythm imbalances. This can trigger various health problems, including an increased risk of several types of cancer related to hormonal disturbances and the cell regeneration process during sleep.

3) Astronomical Impact

Light pollution is very detrimental to astronomical activities because artificial lighting can reduce the visibility of celestial objects by up to 90%, thereby hindering the observation of stars, planets, and astronomical phenomena. This condition has forced many observatories to be relocated to darker, more remote locations, while also reducing public access to the

natural nite sky, which is an important part of human natural and cultural heritage.

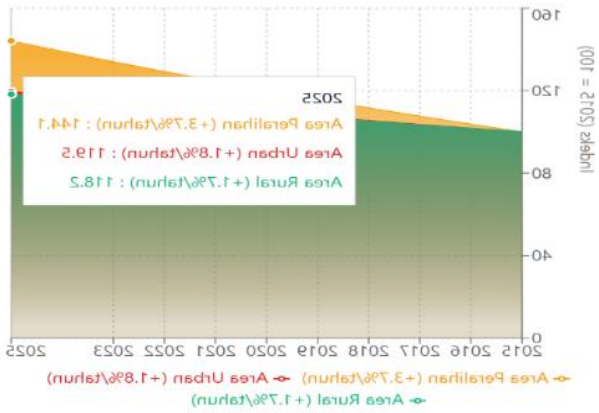
4) Economic Impact

Light pollution has a significant economic impact due to inefficient lighting use, where a lot of electrical energy is wasted illuminating unnecessary areas, including light scattered into the sky; this waste is estimated to cost billions of dollars each year that could be saved or redirected to more productive and environmentally friendly needs.

c. Solutions and Mitigation

Various steps can be taken to reduce light pollution, including using efficient LED lights with warm color temperatures, implementing lighting designs that direct light downward, setting timers for lights to be turned off or dimmed when not needed, enforcing stricter outdoor lighting regulations, and raising public awareness thru education about the impact of light pollution.

2. The Condition of Light Pollution Levels at Tebing Mattoangin



Grafik 4.4 The growth of lght pollution based on location typer

Transitional areas experience the fastest growth rate of light pollution, at +3.7% per year due to rapid urbanization and increasing lighting infrastructure, while urban and rural areas show more stable increases of +1.8% and +1.7% per year, respectively, but still reflect a consistent upward trend in light pollution in both regions.



Gambar 4.1 2015 light pollution map from light pollution Map[12]

The data in this study were collected directly from the research location conducted in 2025. In addition, this study also uses data from the Light Pollution Map that depicts the light pollution conditions in Tebing Mattoanging, Bulukumba, in 2015. The map displays the level of light pollution thru variations in color: black and blue indicate low pollution levels, green and yellow indicate moderate levels, while orange and red signify high pollution levels. Meanwhile, pink represents areas with very high light pollution levels.[13]



Gambar 4.2 The condition of light pollution at Mattoanging cliff in 2015[14]

[12]*Light Pollution Map*, https://apps.apple.com/app/id1530464858, diakses 7 September 2025

[13]Bustari, Ahdian Azri, Rahma Bintang Pratama, and Churun Jauharoh Al-Aryachiyah. "Analisis Tingkat Polusi Cahaya Berdasarkan Light Pollution Map Dan Implikasinya Terhadap Pengamatan Astronomi Indonesia." *KIST UIN SUKA* Vol. 1, No.1 (2022), h. 45.

[14]Light Pollution Map, https://apps.apple.com/app/id1530464858, diakses 7 September 2025

Based on the 2015 Light Pollution Map data, Tebing Mattoanging in Bulukumba has a sky brightness level of 21.99 mag/arcsec², a value that indicates a very dark sky and low light pollution, marked in blue on the map. This condition makes the area ideal for astronomical observations due to minimal light interference and supports the preservation of natural ecosystems. The findings underscore the importance of sustainable management and control of light pollution to maintain optimal sky quality, while also highlighting the great potential of Tebing Mattoanging as an excellent location for sky observation.

Data from the Dark Sky Meter application shows that the average sky brightness in Tebing Mattoanging, Bulukumba, measured between 03:30 and 05:25, reached 19.36 mpdbp, a value still above the threshold of <19.0 mpdbp, indicating that light pollution is not classified as severe. However, the sky appears brighter due to various light sources in the vicinity, such as residential lights, accommodation lighting, LED decorative lights, and streetlights, which contribute to the increased brightness level in the area.

Here is the analysis table for the Tebing Mattoanging Bulukumba data on August 17, 2025, included in table 4.1.

Location	Date	Sky Brightness (mpdbp)
Tebing Mattoanging, Lembanna Village, Bulukumba Regency	August 16, 2025	19.74
	August 17, 2025	19.37
	August 18, 2025	18.97
Average Sky Brightness		19.36

Tabel 4.1 Average sky brightness at Tebing Mattoanging

The data in Table 4.1 shows that the average sky brightness in Tebing Mattoanging, Bulukumba over three days of observation reached 19.36 mpdbp,

indicating that the area is beginning to be affected by light pollution as its value approaches the threshold of <19.0 mpdbp.

The brightness of the nite sky is primarily caused by residential lights, decorative lights, and street lighting, reflecting the development of urbanization and infrastructure. However, it also increases light pollution, which can diminish the beauty of the nite sky, disrupt ecosystems and sleep patterns, and hinder astronomical observations. Although the presence of lighting provides benefits for security, comfort, and tourist attraction, efficient light management is still necessary thru policies on the use of energy-saving lamps, environmentally friendly lighting technology, and public education to maintain the balance between lighting needs and environmental preservation.

3. Characteristic of Light Pollution Levels

a. Characteristics of the Mattoanging Cliff Location

Tebing Mattoanging is a natural tourist destination in Bulukumba that offers a sea view from a height, located in Lembanna/Ara Village, Bonto Bahari District, Bulukumba Regency, South Sulawesi.

b. Prediction of light Pollution Levels

Based on its geographical characteristics, Tebing Mattoanging was initially estimated to have low light pollution levels due to its remote coastal location, low population density, limited lighting infrastructure, and considerable distance from urban centers. However, this condition has now changed significantly. The development as a popular tourist destination, the construction of villas and accommodations with bright LED decorative lights, and the presence of streetlights have increased nighttime lighting. As a result, areas that were previously dark are now brighter, which can affect the observation of the nite sky and the natural beauty in this region.

c. Potential for Astronomical Observation

Although light pollution poses a significant challenge, there are still several locations with great potential for astronomical observation activities.

These locations offer relatively dark nite sky conditions and minimal artificial light interference, making them very ideal for sky observation. Some of the potentials that support astronomical observations include:

1) Sky Conditions

The sky at this location is very ideal for nighttime observation due to minimal light pollution because of its distance from the city center. Situated in an open coastal area, this place offers an unobstructed wide view, making the starlight more visible and the nite sky remain naturally dark, providing an optimal observation experience.

2) Observation of the Milky Way

The location situated on the southern coast of Sulawesi offers an optimal viewpoint toward the south, making it ideal for observing the Milky Way galaxy. During the best season from April to October, the core of the galaxy appears the brightest, allowing direct observation of the beauty of the galaxy's structure both with the naked eye and optical instruments.

3) Astrofotography

This location is very suitable for astrophotography thanks to its natural foregrounds such as cliffs, the sea, and a wide horizon that create a unique composition between the coastal landscape and the starry sky. The minimal light pollution makes the photos clearer and more contrasted, ideal for capturing phenomena like the Milky Way arc. All of this makes the location highly potential for nite photographers and sky enthusiasts.

4) Astronomy Tourism

This location has strong potential as an astronomy tourism destination, offering activities such as star gazing parties under a dark sky free from light pollution. This place is also ideal for astrophotography workshops and educational activities for students. With these advantages, this area is highly worthy of being promoted as an attractive dark sky tourism destination for both local and international tourists.

5) Observable Objects

In this location, various celestial objects are clearly visible, ranging from typical southern constellations like Crux, Centaurus, and Scorpius to bright planets like Jupiter, Saturn, Mars, and Venus. Meteor showers often enhance the beauty of the nite, while telescopes allow for the observation of nebulae and star clusters. This place is ideal for stargazers of all experience levels.

4. Analysis of Pollution in Mattoanging Cliff, Bulukumba, Affecting the Accuracy of Fajr Shadiq Observaton in Determining the Start of Fajr Prayer Time form the Perspective of Islamic Astronomy



Gambar 4.3 The Fajar Shadiq Phenomenon at Tebing Mattoanging, August 17, at 05:14[15]

The phenomenon of fajar shadiq, or the second dawn, marks the beginning of the Subuh prayer time, which appears after fajar kazib. This dawn is marked by a light spreading across the eastern horizon, white in color, and it continues to increase until sunrise. The main emphasis in their study is on the natural characteristics of fajar shadiq as the basis for determining prayer times.[16] Fajr ṣādiq appears due to the apparent movement of the sun around the earth within a day and nite cycle, during which the sun is at a certain position below the eastern

[15]Koleksi Pribadi, diambil pada 17 Agustus 2025

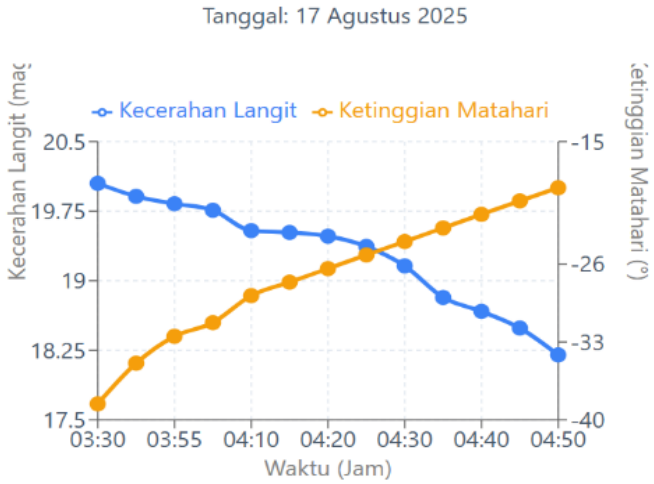
[16]Nurhijriah Ria, and Sippah Chotban. "Problematika Syafaq dan Fajar." *ELFALAKY: Jurnal Ilmu Falak* 6.1 (2022), 68.

horizon. Light pollution from artificial sources around the observation location can reduce the darkness of the sky and disrupt the visibility of fajr ṣādiq. Therefore, it is important to analyze the impact of light pollution at locations such as Tebing Mattoanging, Bulukumba, on the accuracy of observing fajar shadiq as the basis for determining the time of Subuh.

Here is the analysis table for the data in Tebing Mattoanging Bulukumba on August 17, 2020, as included in table 4.2.

Date	Time	Average Brightness of the Sky (MPDBP)	Height of the Sun
17 August 2025	03.30	20.05 mag/arcsec²	-38° 33’ 25,6”
	03.45	19.91 mag/arcsec²	-34° 54’ 51,8”
	03.55	19.83 mag/arcsec²	-32° 29’ 06,6”
	04.00	19.76 mag/arcsec²	-31° 16’ 14,6”
	04.10	19.54 mag/arcsec²	-28° 50’ 17,5”
	04.15	19.52 mag/arcsec²	-27° 37’ 26,7”
	04.20	19.48 mag/arcsec²	-26° 24’ 26,9”
	04.25	19.37 mag/arcsec²	-25° 11’ 28,1”
	04.30	19.16 mag/arcsec²	-23° 58’ 37,8”
	04.35	18.93 mag/arcsec²	-22° 45’ 32,5”
	04.40	18.82 mag/arcsec²	-21° 32’ 38,9”
	04.45	18.67 mag/arcsec²	-20° 19’ 43,4”
	04.50	18.49 mag/arcsec²	-19° 09’ 11,0”
	05.00	18.20 mag/arcsec²	-16° 40’ 51,2”
	05.14	18.13 mag/arcsec²	-13° 16’ 44,5”
	05.25	17.90 mag/arcsec²	-10° 36’ 30,5”

a. Tabel 4.2 Observation results at Tebing Mattoanging



b. Graphic 4.5 the Brightness of the sky and the height of the sun

The data in table 4.2 and graph 4.5 are the results of observations conducted on August 17, 2025, at Tebing Mattoanging, Bulukumba. The data shows changes in time, sky brightness levels, and the height of the sun during the research process. Data collection began when the sun's position was at -38° 33' 25.6" until it reached -20° 19' 43.4".



Gambar 4.4 Sky Brightness Level at Mattoanging Cliff on August 17, 2025, at 04:35[17]

[17]*Dark Sky Meter*, https://apps.apple.com diakses pada 17 Agustus 2025

The decrease in sky brightness values began to be detected when the sun was at the position of -22° 45’ 32.5” with a brightness level of 18.93 mpdbp. This condition indicates that the sky brightness in Tebing Mattoanging is starting to increase. As a marker for the start of the Fajr prayer time, the Fajr Shadiq is indicated by the appearance of light in the eastern horizon that gradually brightens until sunrise. Thus, there is a noticeable change in the level of sky brightness from the appearance of the Fajr Shadiq, which continues to increase until the sun rises in the eastern horizon.

The prayer times are determined based on the position of the sun and calculated using the hisab method to determine the beginning and end of the five prayer times: Fajr, Dhuhr, Asr, Maghrib, and Isha. Hisab also helps to know the times when prayer is prohibited according to Hanafi scholars and some Shafi'i scholars, which are at sunrise, at noon, and at sunset.[18]

Preliminary calculation results for the Fajr prayer time in Tebing Mattoanging, Bulukumba Regency on August 17, 2025.

Date :

a. Latitude location = 5°33’ s
   Longitude Location = 119°12’
   Longitude Region = 120° Wita
   Declination = 13°07’15”
   Mean Time (e) = -0°03’57”
   h subuh = 20°

b. The angle of the sun at noon

   Cos t = -tan p. tan d+ sin h : cos p: cos d

   Cos t = -tan -5°33’ x tan 13°07’15” + sin 20° : cos -5°33’: Cos 13°07’15”

   = -0,3301931234448

   t = 109°16’49,79” : 15 = 07°17’07,32”

[18]Nurul Wakia & Sabriadi H. R. "Sejarah Perkembangan Dan Ruang Lingkup Kurikulum Ilmu Falak." *HISABUNA: Jurnal Ilmu Falak* 2.3 (2021), h. 203.

c. Dhuhr Formula

12’ – e —12’- (-0°03’57”) = 12°03’57” +
04°46’49,68”

d. Adjustment with Wita

120° - 119° 27’ = 0°33’: 15 = 0°00’48”+
04°47’37,68”

e. Caution/rounding (2’) = 0°01’22,32’+
04°49’00”

Som the beginning of the Fajr prayer time is at 04.49.

Based on the calculations conducted for the Tebing Mattoanging area, Bulukumba, the start time for the Fajr prayer on August 17, 2025, falls at 04:49 WITA. The results of these calculations yield the Fajr start time data for Tebing Mattoanging, Bulukumba Regency, which is then presented in Table 4.3.

Location	Date	Average-Average Bright-ness Sky	The Beginning of Fajr Time		
			Method Calculation	Field Observation	
				Time	Hight Sun
Mattoangin g Cliff, Bulukumba	16 August 2025	19.74 mpdbp	04.49 WITA	05.22 WITA	-09° 56’ 50,6”
	17 August 2025	19.37 mpdbp	04.49 WITA	05.14 WITA	-13° 16’ 44,5”
	18 August 2025	18.97 mpdbp	04.49 WITA	05.28 WITA	-09° 56’ 50,6”

Based on Table 4.3, the shadiq dawn light in locations with not too much light pollution begins to be detected when the sun's position is at an average of

−11° 37’ 25.9” at around 04:49 WITA, while field observations in Tebing Mattoanging show a delay of about 22 minutes compared to the standard method calculations.

This data supports the hypothesis that light pollution affects the appearance of fajar shadiq, as artificial light increases sky brightness and delays fajar visibility. The findings underscore the importance of considering light pollution factors in determining the time of Subuh and in environmental planning to maintain the quality of the nite sky.

D. Conclusion

Light pollution in Tebing Mattoanging, Bulukumba is classified as mild with a sky brightness of 19.36 mpdbp, decreasing from 21.99 mag/arcsec² in 2015 due to tourism and lighting growth. However, this location remains potential for Milky Way observation, especially from April to October. Light pollution has been proven to affect the visibility of shadiq dawn; in relatively dark areas, dawn is detected when the sun is at an average position of -11° 37’ 25.9” below the horizon, with an average time of 05:22, 05:14, 05:28 WITA, and a difference of 22 minutes from the Ministry of Religious Affairs' schedule. This confirms that artificial light delays the appearance of dawn, making light pollution a significant factor in determining the time of Fajr and environmental planning.

References

Book:

Ahmad Izzuddin, Practical Astronomy: The Method of Calculation and Observation and Its Problem Solutions. (Semarang: Pustaka Rizki Putra, 2012).

Cinzano, P., Falchi, F., & Elvidge, C. D. "The first World Atlas of the artificial nite sky brightness." Monthly Notices of the Royal Astronomical Society, (2001).

Muljono Damapolii, et al., Guidelines for Writing Scientific Papers: Articles, Thesis Proposals, Dissertations, and Research Reports, (Gowa: Alauddin University Press, 2023).

Slamet Hambali, Astronomy 1: Determining the Start of Prayer Times & Qibla Direction Worldwide. Semarang: UIN Walisongo Postgraduate Program, (2011).

Syarif, Muh Rasywan, Astronomy: Integrating Religion and Science (Gowa; Alauddin University Press, 2020).

Journal:

Akhyar, Andi Muhammad, et al. "Analysis of the Determination of Fajr Prayer Schedule by Wahdah Islamiyah." 9.1, (2022).

Bustari, Ahdian Azri, Rahma Bintang Pratama, and Churun Jauharoh Al-Aryachiyah. "Analysis of Light Pollution Levels Based on the Light Pollution Map and Its Implications for Astronomy Observations in Indonesia." KIST UIN SUKA, 1.1 (2022).

Chotban, Sippah. "Rethinking the Relationship Between Science and Religion from the Perspective of Islamic Astronomy." ELFALAKY: Journal of Astronomy Science 4.2, 2020.

Falchi, F., et al. "El nuevo atlas mundial de la luminosidad artificial del cielo nocturno." Science Advances, (2016). Gaston, Kevin J., et al. "Los impactos ecológicos de la contaminación lumínica nocturna: una evaluación mecanicista." Biological Reviews, 88. 4 (2013).

Kyba, C. C. M., et al. "Artificially lit surface of Earth at nite increasing in radiance and extent." Science Advances, (2017).

Ria, Nurhijriah, and Sippah Chotban. "The Problematic of Syafaq and Fajr." ELFALAKY: Journal of Astronomy Science 6.1 (2022).

Thomas Djamaluddin, "Astronomy Provides Solutions for the Unity of the Ummah." Indonesian Astronomy Journal, 2.1, (2011).

Wakia, Nurul & Sabriadi H. R. "The History of Development and Scope of the Curriculum of Astronomy." HISABUNA: Journal of Astronomy 2.3 (2021).

Zahroya, Isyvina Unai, and Muh Rasywan Syarif. "Historical Codification of Astronomy in the Middle Ages." ELFALAKY: Journal of Astronomy 5.2, 2021.

Image:

Dark Sky Meter, https://apps.apple.com Accessed on August 17, 2025 Private Collection, taken on August 17, 2025.

Light Pollution Map, https://apps.apple.com/app/id1530464858, Accessed September 7, 2025.

Light Pollution Map, https://apps.apple.com/app/id1530464858, Accessed September 7, 2025.