

ANALYSIS OF RUKYATUL HILAL PLACES IN RIAU PROVINCE (Geographical, Meteorological, and Climatological Analysis Study)

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Abstrak: Provinsi Riau hingga saat ini belum mempunyai tempat rukyat yang menjadi tempat yang tetap dan permanen untuk pengamatan hilal, sehingga Kannwil Kemenag dan THR masih melakukan kerja sama dengan berbagai pihak-pihak Kemenag Kabupaten yang sekiranya dianggap layak untuk dijadikan sebagai tempat pelaksanaan rukyatul hilal. Metode penelitian yang digunakan adalah kualitatif, dengan pengumpulan data berupa observasi, wawancara, dan dokumentasi. Kemudian data dianalisis menggunakan teknik analisis deskriptif. Hasil penelitian ditemukan bahwa Lokasi pengamatan di Kota Pekanbaru dianggap tidak layak karena beberapa aspek primer tidak terpenuhi, sama halnya, tempat-tempat pengamatan di Kota Dumai juga dianggap kurang layak dengan alasan serupa seperti polusi udara, polusi cahaya, dan adanya kabut tipis. Sedangkan di Kabupaten Bengkalis, lokasi Pantai Selat Baru dianggap kurang layak karena seringnya kondisi mendung dan berawan, menghalangi visibilitas hilal. Sebaliknya, Pulau Rupat dianggap cukup layak karena memiliki pandangan langsung ke laut dan pandangan yang bebas ke arah barat. Meskipun cuaca kadang-kadang mendung, bulan Juli sampai Oktober dianggap waktu yang tepat untuk rukyatul hilal. Akses ke lokasi ini sulit, memerlukan waktu lama, dan jalanan rusak akibat abrasi. Kriteria-kriteria yang harus terpenuhi untuk pengamatan di Pantai Tanjung Jaya mencakup pandangan bebas pada azimuth 240°-300°, bebas polusi udara dan cahaya, serta koneksi listrik dan internet yang stabil.

Kata Kunci: Tempat Rukyatul Hilal, Provinsi Riau, Hilal.

Abstract: Riau Province does not have a rukyat place that is a fixed and permanent place for hilal observation, so the Regional Office of the Ministry of Religion and THR still cooperates with various parties of the Regency Ministry of Religion which are considered feasible to be used as a place for rukyatul hilal implementation. The research method used is qualitative, with data collection in the form of observation, interviews, and documentation. Then the data was analyzed using descriptive analysis techniques. The results of the study found that the observation location in Pekanbaru City was considered unfit because some primary aspects were not met, similarly, the observation sites in Dumai City were also considered unfit for similar reasons such as air pollution, light pollution, and the presence of light fog. While in Bengkalis Regency, the Selat Baru Beach

location is considered less feasible due to frequent cloudy and cloudy conditions, hindering hilal visibility. In contrast, Rupert Island is considered quite feasible as it has a direct view of the sea and a free view to the west. Despite the occasional cloudy weather, July to October is considered a good time for rukyatul hilal. Access to this location is difficult, takes a long time, and the roads are damaged by abrasion. Criteria that must be met for observing at Tanjung Jaya Beach include a free view at an azimuth of 240°-300°, no air and light pollution, and a stable electricity and internet connection.

Keywords: Rukyatul Hilal Place, Riau Province, Hilal.

A. Introduction

Rukyatul Hilal activity¹ is carried out at the time before the sunset of the Sun for the first time after *ijtima'* (at this time, the position of the Moon is on the western horizon, and the Moon sets shortly after the setting of the Sun).² Rukyat can be done with the naked eye³ or optical aids such as telescopes⁴ that are carried out at sunset at sunset, if Hilal is visible then at Maghreb time local time has entered the 1st.⁵ The success rate in the implementation of rukyatul Hilal depends largely on the condition of the sky and the view towards the earth's horizon (horizon).⁶ In addition to his data that shows the possibility of Hilal being seen, there are other factors that must be considered in rukyatul Hilal, such as, dirty air, clouds or fog and light that can interfere with the view towards the horizon making the observation process difficult to do.⁷ Then too short an opportunity to see Hilal makes Hilal difficult to observe, because Hilal moves to sink on the horizon in a relatively short time according to its height from the horizon.⁸

¹ Muhyiddin Khazin, *Kamus Ilmu Falak* (Yogyakarta: Buana Pustaka, 2005), p. 69.

² Muhyiddin Khazin, *99 Tanya Utara Masalah Khat & Rukyat*, CET I (Able: Ramadhan Press, 2009), p. 143.

³ Ahmad Izzuddin, *Ilmu Falak Praktik*, (Semarang: Pustaka Rizki Putra, 2012), p. 96.

⁴ Watni Marpaung, *Pengantar Ilmu Falak*, Cet I, (Jakarta: Prenadamedia Group, 2015), p. 38.

⁵ Muhyiddin Khazin, *99 Tanya Jawab Masalah Hisab & Rukyat*, p. 143.

⁶ Directorate General of Islamic Community Guidance of the Ministry of Religious Affairs of the Republic of Indonesia, *Almanac Hisab Rukyat*, Cet III, (Jakarta: Ministry of Religious Affairs, 2010), p. 21.

⁷ Directorate General of Islamic Community Guidance Directorate of Islamic Religious Affairs and Sharia Development, *Rukyat Technical Guidelines* (Jakarta: Director General of Bimas Islam and Hajj Implementation, 2009), p. 26.

⁸ Tono Saksono, *Compromising Rukyah and Hisab* (Jakarta: Jakarta: Amythas Publicita, 2007), p. 98.

In the practice of rukyatul hilal, before holding hilal observations steps must be taken to meet and know the factors that affect success in rukyatul hilal, one of these important factors is the place of rukyatul hilal and the⁹ climate around the observation site. Basically a good place is around the place where the sun sets, with the view in the direction of the horizon will look straight at azimuth 240o to 300o.¹⁰ The area is necessary especially if lunar observations are made throughout the seasons taking into account the shifts of the sun and moon over time.¹¹

The problem that occurs in the field is that often the implementation of hilal observations (rukya) fails because of rukya field conditions that must meet several criteria, namely criteria that also pay attention to atmospheric conditions, be it from weather conditions, rain intensity, sea water evaporation, light and dust pollution.¹² Thus, the report of Hilal's observations can be accepted scientifically in accordance with the conditions in the field.

Indonesia has 88 rukyatul hilal location points throughout Indonesia. In the implementation of rukyatul hilal, it is carried out by the Regional Office of the Ministry of Religious Affairs and the Regency / City Ministry of Religion in collaboration with the Religious Court and Islamic CSOs and other agencies in the local area,¹³ will later report the results of the rukya to the Central Ministry of Religious Affairs for the purposes of the isbat session. Regarding this, the Regional Office of the Ministry of Religious Affairs of Riau Province also conducts rukyatul hilal located in the area of Riau Province, with the location of the rukyatul hilal implementation point that is always moving and does not yet have a permanent place that can be used for rukyatul hilal.¹⁴

⁹ Muhammad Nurkhanif and Alamsyah, "Implementasi Parameter Kelayakan Tempat Rukyat Al Hilal Di Pantai Alam Indah Tegal." *Al-Afaq*, vol. 1, no. 2 (2019), pp. 117–138.

¹⁰ Machzumi, "Effect of Geographical Environment on Success Rate of Rukyat Hilal at Observatorium CASA Assalam," *Al-Marsbad: Jurnal Astronomi Islam dan Ilmu-Ilmu Berkaitan*, vol. 5, no. 2 (2019), pp. 177–191.

¹¹ Directorate General of Islamic Community Guidance of the Ministry of Religious Affairs of the Republic of Indonesia, *Almanac Hisab Rukyat*, p. 205.

¹² Machzumi, "Kriteria Ideal Lokasi Rukyat (Studi Analisis Observatorium Tgk. Chiek Kutakarang)" *Jurnal At-Tafkir*, vol. 11, no. 2 (2018), pp. 71-98.

¹³ Contributor, "Rukyatul Hilal, Ministry of Religion Lowers Falak Experts in 88 Points," 2021, <https://kemenag.go.id/nasional/rukayatul-hilal-kemenag-turunkan-ahli-falak-di-88-titik-hp6s3b>, accessed January 18, 2024.

¹⁴ Results of an interview with Khairunnas as an expert staff for rukya tools at the Regional Office of the Ministry of Religion of Riau Province in 2021.

In the implementation of this rukyatul hilal, Riau Province itself handles hilal observations under the auspices of the Regional Office of the Ministry of Religious Affairs of Riau Province (Kanwil Kemenag Riau Province). The Regional Office of the Ministry of Religion of Riau Province has a team that handles this hilal observation, namely with the Hisab Rukyat Team (THR), this team is under the authority of Islamic Religious Affairs and Sharia Development (UR AIS).¹⁵ The implementation of rukyatul hilal in Riau Province is carried out 3 times a year, namely at the beginning of Ramadan, the beginning of the month of Shawwal, and the beginning of the month of Dhul-Hijjah. At the beginning of the first implementation of rukyatul hilal in Riau Province, namely at the old Airport Tower of Sultan Syarif Qasim II, but due to the construction and expansion of the area, the old Bandar Tower SSQ-II could not be used, so the implementation of rukyatul hilal was carried out at the Premiere Hotel, and then moved around.

Riau Province until now does not have a rukyat place that is a permanent and permanent place for hilal observation, so the Regional Office of the Ministry of Religion and THR are still collaborating with various parties of the District Ministry of Religion which if considered worthy to be used as a place for the implementation of rukyatul hilal. From the information obtained that hilal observations always move depending on the conditions of hotels and other places that have collaborated with THR. The Regional Office and THR are still looking for a decent place and in accordance with the standardization of the feasibility of rukyat places to be used, but the team itself found several obstacles both from internal and external. Until now, the place used by THR has never seen hilal.

From the description above regarding the determination of rukyat places, the author found several obstacles that occurred in the selection of rukyatul hilal places used by the Riau Provincial Regional Office and Riau province THR and could not find a solution in determining the right permanent rukyatul hilal place to perform rukyatul hilal. Then the author will see in terms of geographical, meteorological, and climatological locations in the areas where rukyat is carried out. Here the author uses four locations, namely Pekanbaru City, Dumai City, and Bengkalis Regency. Because this location is used to get results that match the feasibility parameters of the rukyatul hilal place, both primary and secondary.

Research research on the location of rukyat hilal has been quite a lot, but the research is limited to analyzing case studies in various regions

¹⁵ Results of Interview with Zufadli as Head of Hisab Rukyat Mosque and Binsyar in the Field of Urais Regional Office of the Ministry of Religion of Riau Province in 2021

in Indonesia and discussing the criteria for the location of rukyat hilal according to BMKG. Several articles focus on due diligence and apply criteria, but there has been no research that discusses the place of rukyatul Hilal in Riau Province and provides solutions to the local Regional Office to conceptualize a good rukyat place and its optimization in Riau Province. In fact, there has been no study that includes comparisons between all observation sites in one area of the province. Most research on the location of rukyatul hilal is focused on discussing due diligence by considering parameters. Several other studies examined criteria such as altitude and sky conditions from the Lunar Observation Post (POB). For example, a journal that discusses the feasibility test of Bukit Cermin in Tanjung Pinang City, Riau Islands Province, as a place for rukyatul hilal. Hail from this study evaluates the viewpoint, location access, and topography of the rukyatul hilal location. Since 2015, Bukit Cermin has been used as a place where rukyatul hilal has an azimuth of 240° - 300° , easy location access, and the topography of Tanjung Pinang is mostly sea or water, which makes it difficult to see hilal on the western horizon at sunset.¹⁶

Then other studies such as the influence of the atmosphere on rukyatul hilal (case study of rukyatul hilal in Banyu Urip Senori Tuban), the results of this study found atmospheric conditions in the Banyu Urip Senori Tuban rukyatul hilal tower are very high because they are in the hills so that there is a lot of water vapor content. The influence of the atmosphere in observing Hilal has an impact on Hilal light, because particles or molecules contained in the atmosphere refract Hilal light so that it will reduce the brightness of Hilal light and observers will have difficulty in observation.¹⁷ Most studies only tested one location where rukyat was, while in this study tested four places by making one of them a recommended place as a permanent place for Hilal observation in Riau Province.

The research method used is qualitative, with data collection used, namely observation, interviews, and documentation. Then the data is analyzed using descriptive analysis techniques, namely by synchronizing the theory of the feasibility test of rukyat places with things that happened in the field at the time of observation and describing the history of the use of rukyat places, the places used to describe geographical, meteorological, and climatological data poured in the form of narratives.

¹⁶ Nofran Hermuzi and M Arbisora Angkat, "Uji Kelayakan Bukit Cermin Kota Tanjungpinang Provinsi Kepulauan Riau Sebagai Lokasi Rukyatul Hilal." *Al-Marshad: Journal of Islamic Astronomy and Related Sciences*, vol. 7, no. 2 (2021), pp. 104–125.

¹⁷ Siti Rohmah Sakohwati, "The Influence of Atmosphere on Rukyatul Hilal (Case Study of Rukyatul Hilal in Banyu Urip Senori Tuban)," Thesis (Semarang: UIN Walisongo Semarang, 2019), p. 89.

B. Discussion

1. History of Rukyatul Hilal Implementation at the Ministry of Religious Affairs of Riau Province

Rukyatul hilal was first held in Riau Province during the determination of the beginning of Ramadan in 1984. The rukyat place used is in Bandar Sultan Syarif Qasim Tower.¹⁸ The implementation of rukyatul hilal in the old Airport Tower because the place is high (18 meters) and the view towards the western horizon is free from obstructions.¹⁹ In 1996, Riau Province already had a Hisab Rukyat Agency, at that time the authority was the Riau High Religious Court, but the expert staff came from various agencies selected according to their respective experts. In the implementation of rukyatul hilal at the beginning of Ramadan in 1996 at the Tower of An-Nur Mosque Pekanbaru chaired by Mr. Drs. Abdur Rahman who at that time was the Chairman of PA Pekanbaru.

In 2004, the Ministry of Religious Affairs of Riau Province conducted a search for rukyatul hilal observation sites. The hisab rukyat team and several members of the Riau Provincial Ministry of Religious Affairs also searched for places to do rukyatul hilal, namely in several hotels and tall buildings in Pekanbaru City and outside the city of Pekanbaru. Efforts to find a decent rukyatul hilal place are still being carried out, according to Mr. Khairunnas, after doing rukyatul hilal in the old Airport Tower, THR also carried out rukyatul hilal in the highest hotels in Pekanbaru City as a place of observation.²⁰ In the city of Pekanbaru itself, in determining the location of the rukyatul hilal, we chose tall buildings, and the view was loose, there were no obstacles or buildings in front of it, but still the hilal remained invisible.²¹

In this case, THR has done rukyatul hilal at Hotels, namely Premiere Hotels, Grand Sentral Hotels, and Bono Hotels in Pekanbaru City.²² For the use of rukyatul hilal places in the old Airport Tower Sultan Syarif Kasim II is no longer used, because the Tower is physically the old

¹⁸ Results of Interview with Hajar as a senior member of THR Riau Province in 2021

¹⁹ Results of Interview with Hajar as a senior member of THR Riau Province in 2021

²⁰ Results of an interview with Khairunnas as an expert staff for rukyat tools at the Regional Office of the Ministry of Religion of Riau Province in 2021.

²¹ Results of an Interview with Zulfadli as Head of the Hisab Rukyat Mosque and Binsyar in the Field of Urais of the Regional Office of the Ministry of Religion of Riau Province in 2021.

²² Results of Interview with Hajar as a senior member of THR Riau Province in 2021

Airport Tower building is quite old and old, besides that the small room is only 4x5 square meters, and visibility for monitoring is not free of view. In 2016 the old Airport Tower was no longer operational and was torn down because the location of the old Tower was exposed to the apron expansion area.

Since 2010, observations have been carried out at the Hotel, namely the Premiere Hotel on the 9th floor of the Premiere Hotel, in addition to using the THR team hotel and others, they have also used the Dumai Solar Building on Jalan Sudirman, Pekanbaru City. In 2013 in determining the beginning of the month of Ramadan was carried out at the Premiere Hotel on the 15th floor of the Premiere Hotel, due to the addition of floors from last year, it was expected that the potential to look large hilal, but the monitoring of the hilal hilal has not been seen.²³ From 2010-2015 hilal observations were carried out at Premiere Hotel and Dumai Solar Building Pekanbaru. With the most hotel usage frequency in Premiere Hotel. And in its history, Mr. Hajar as a senior THR team of Riau Province explained that as long as he followed rukyatul hilal from the beginning of the implementation of rukyatul hilal in Riau Province, only 2 times the hilal would be seen, namely in 1998, and at that time the hilal height reached 60, so that the visibility of the hilal was clearer.²⁴

In 2016, the THR team and the Ministry of Religion conducted rukyatul hilal outside Pekanbaru City, namely in the Teluk Rhu Beach area, North Rupal District, located at the coordinates of North Latitude 02o 07' 36.14" and West Longitude 101o 39' 24.54".²⁵ The selection of this location is based on the results of observations and surveys conducted by THR and several teams from the Ministry of Religion of Bengkalis Regency before, this location is geographically located by the sea. Its position is very possible for the appearance of the hilal.²⁶ Before conducting rukyatul hilal on Teluk

²³ Regional Office of the Ministry of Religious Affairs of Riau Province, "*Team Hisab Rukyat Regional Office of the Ministry of Religious Affairs of Riau Province Monitor Hilal from Premier Hotel*", (July 9, 2013), <https://riau.kemenag.go.id/berita/150511/Tim-Hisab-Rukyat-Kanwil-Kemenag-Provinsi-Riau-Pantau-Hilal-dari-Hotel-Premier>, accessed Januari 18, 2024..

²⁴ Results of Interview with Hajar as a senior member of THR Riau Province in 2021

²⁵ "Regional Office of the Ministry of Religious Affairs of Riau Province," *Urais and Binsyar Conduct Moon Observation on Teluk Rhu Beach North Rupal District*, (April 13, 2016), <https://riau.kemenag.go.id/berita/352736/Bidang-Urais-dan-Binsyar-Lakukan-Observasi-Bulan-di-Pantai-Teluk-Rhu-Kec-Rupal-Utara>, accessed January 18, 2024.

²⁶ Regional Office of the Ministry of Religious Affairs of Riau Province, "*Rukyatul Hilal Awal Ramadhan 1437 H in North Rupal*", (June 2,

Rhu Beach, THR and several members of the URAIS field of the Regional Office of the Ministry of Religion of Riau Province made observations first, based on the trial of hilal observations at the beginning of the month of Rajab 1437 H conducted by BHR yesterday for 2 days, namely the 29th and 30th of Jumadil Akhir 1437 H (07-08 April 2016), the location is very possible for a lunar observation location because the true west point (Azimuth 270o) and the surrounding area have no obstructions with horizontal point (sky line).

The search for the location of rukyatulhilal outside Pekanbaru City is because the rukyatulhilal place in Pekanbaru City is not suitable for observation because of the many pollution, such as factory smoke and also conditions that often occur smog and others. So that it becomes the most important trigger for the search for the hilal observation and observation place. In the following year, THR and others are still looking for locations and doing rukyatul hilal in a year at least doing rukyatul hilal outside Pekanbaru City, and it also depends on the available budget.²⁷ In 2017 the BHR team and the Regional Office of the Ministry of Religion of Riau Province conducted rukyatul hilal at the Premiere Hotel until in 2018 rukyatul hilal was only carried out outside Pekanbaru City, namely at Prapat Tunggal Beach, Bengkalis District. At the beginning of Ramadan 1439 H, located on Prapat Tunggal Beach, this location was chosen because the western horizon was unobstructed, and free of view. But in the implementation of this rukyatul hilal, the hilal is not visible because the position of the hilal is still below the horizon and thick clouds when the sun begins to set. So that the implementation of rukyatul hilal does not produce results of hilal visibility.

This is also reinforced by the data on the implementation of rukyatul hilal in 1998-2021, that the implementation during that period has never been seen again. According to the source who organized this rukyatul hilal activity, only visible or invisible data of hilal has archives, while the calculation data is only part of it. The calculation data used in determining the beginning of the Hijri month used is by epimeris calculations and from the calendar that has been listed made by the Central Ministry of Religious Affairs of the Republic of Indonesia, this is the reference in the calculation.²⁸

2016)<http://riau.kemenag.go.id/berita/373185/Asmuni-Rukyatul-Hilal-Awal-Ramadhan-1437-H-di-Rupat-Utara>, accessed January 18, 2024.

²⁷ Results of an interview with Khairunnas as an expert staff for rukyat tools at the Regional Office of the Ministry of Religion of Riau Province in 2021.

²⁸ Results of an interview with Khairunnas as an expert staff for rukyat tools at the Regional Office of the Ministry of Religion of Riau Province in 2021.

Until the implementation of rukyatul hilal at the beginning of Ramadan 1442 H, THR and others conducted rukyatul hilal outside the city of Pekanbaru, namely at The Zuri Dumai Hotel, at the time of the implementation of rukyatul hilal at the beginning of Shawwal 1442 H for hilal observation was not carried out due to rainy conditions and hilal was still below the horizon, only a meeting was held at the Premiere Hotel,²⁹ and in the implementation of the initial rukyatul hilal Dzulhijjah 1442 H located at the Bono Hotel where this Hotel was first used for the implementation of rukyatul hilal, because the Premiere Hotel was used for Covid-19 Vaccination.

In this case, there are several observations in Pekanbaru City that have several factors among them, namely:

1. In choosing the location, the Hisab Rukyat Team of Riau Province and the Regional Office of the Ministry of Religious Affairs of Riau Province are in Pekanbaru City so that if observations or observations are made located in Pekanbaru City it will facilitate access to the location,
2. The tools used to perform rukyatul hilal such as Theodolite, Location Wicket, Binoculars, and others are only available in the Regional Office of the Ministry of Religion of Riau Province, and if hilal observations are carried out outside the city of Pekanbaru, these tools must be carried and they are loaded large,
3. To conduct rukyatul hilal outside the city of Pekanbaru using large enough funds, this causes limited operational funds for conducting rukyatul hilal so that there is no funds to survey the observation location of the new rukyat place, and
4. Lack of experts involved in the implementation of this rukyatul hilal.³⁰

2. Location of Rukyatul Hilal in Riau Province

In conducting hilal observations, the Riau Hisab Rukyat Team first determines the location for the hilal rukyatul with several aspects that have been referenced. Here are some places or locations that have been carried out rukyatul hilal, and become some recommended places to be used as

²⁹ Results of an interview with Khairunnas as an expert staff for rukyat tools at the Regional Office of the Ministry of Religion of Riau Province in 2021.

³⁰ Results of an interview with Hajar as a senior member of THR Riau Province in 2021.

permanent rukyatul hilal places based on the results of observations and interviews between Him as follows:

a) Hotel Premiere Pekanbaru

Premiere Hotel is one of the four-star hotels located in the middle of Pekanbaru, which is located at Jalan. Sudirman No. 389, Simpang Empat Village, Pekanbaru City, Riau Province.³¹ Of the several hotels that have been done rukyatul hilal in Pekanbaru City, this Premiere Hotel is the hotel with the most frequency of using rukyatul hilal. Since 2010, observations have been carried out at the Hotel, namely the Premiere Hotel on the 9th floor of the Premiere Hotel, in addition to using the THR team hotel and others, they have also used the Dumai Solar Building on Jalan Sudirman. In 2013 in determining the beginning of the month of Ramadan was carried out at the Premiere Hotel on the 15th floor of the Premiere Hotel, due to the addition of floors from last year, it was expected that the potential to look large hilal, but the monitoring of the hilal hilal has not been seen at this location. The reason for using Premiere Hotel as a place for rukyatul hilal is that this Premiere Hotel is a tall building and has the top floor whose wide view is unobstructed.

In the implementation of rukyatul hilal to determine the beginning of Ramadan 1441 H, the BHR team and the Regional Office of the Ministry of Religion of Riau Province conducted rukyatul hilal at the Premiere Hotel. The implementation of this rukyatulhilal, adjusting to health protocol procedures and always carrying out Physical Distancing because at that time it was the Covid-19 Pandemic. At the time of the rukyatul hilal determination in the beginning of 1442 H, the location of the Premiere Hotel was not used because the Premiere Hotel was used for Covid-19 vaccination.



³¹Pekanbaru Tourism, "*Pekanbaru Tourism*", <http://pariwisata.pekanbaru.go.id/bdetail/akomodasi/QTZ3Qm1qK1d4VklL1RuSIz5N2xBdz09>, accessed on January 12, 2024.

Figure 1: Implementation of rukyatul hilal at the beginning of Ramadan 1441 H at Premiere Hotel.

b) Hotel The Zuri Dumai

The Zuri Dumai Hotel was officially opened in September 2019, located in the heart of Dumai. The hotel is ideally located in the center of Dumai. Only 10 minutes from Pinang Kampai Airport, close to Government Offices, and Business Center. Located on the Street. General Sudirman, No. 108, Dumai City. This hotel is one of the four-star hotels in Dumai city, has 12 floors with 111 rooms owned. At the beginning of Ramadan 1442 H, the Riau Province THR team used The Zuri Hotel as a place for rukyatul hilal. Geographically, the hotel is located at latitude 1o 40' 12.4" N, and longitude 101o 26' 56.5" E. The Zuri Hotel with an altitude of 120 meters above sea level is a place in the implementation of rukyatul hilal at the beginning of Ramadan because it is considered geographically feasible to be used as a hilal observation place because of its height.

The author conducted a survey to the field and conducted rukyatul hilal for the beginning of Ramadan 1442H/April 12, 2021. For his observation, the hilal was carried out on the *top roof top* at The Zuri Hotel. From above you can see all the scenery of Dumai city, the factory smoke in Dumai City, the state of view where there is a lot of factory smoke causes a little fog on the western horizon. Based on the monitoring results until at 18:18 WIB the interval of 17 minutes hilal was not visible due to natural conditions that were slightly cloudy and foggy, the sun set at 18:19:49 WIB, but before sunset, the sun was no longer visible because it was covered by clouds and factory smoke. Meanwhile, based on the results of calculations that have been carried out, hilal is already at 3 degrees.



Figure 2: Observation Location at The Zuri Hotel with Hisab Rukyat Team

The observation of hilal began at 18:00 WIB until 18:39 WIB because based on the calculation of hisab calculated by THR hilal was on the horizon for approximately 17 minutes, namely from 18:16 WIB to 18:38

WIB, but the conditions and natural conditions at that time were thick clouds and fog caused by factory smoke so until 18:18 WIB the hilal had not been seen and only reddish light splashes from the sun were covered by visible clouds. In the horizon area, it is very difficult to predict and the visibility of the hilal. Here is what the horizon looks like when the sun is about to set.



Figure 3: The appearance of the horizon as the sun begins to set is covered by thick, slightly misty clouds.

The choice of this hotel is because The Zuri Hotel is a tall building. Regardless of the height of the observation place, in doing rukyatul hilal the location chosen is not only based on its height, but there are other supporting aspects such as the condition of the horizon clean from obstructions both natural (such as: hills, trees, and others) and non-natural (such as: tall buildings, air pollution, light pollution, and others). So, with this, in doing rukyat, you can more freely see celestial objects such as hilal at sunset if the weather is supportive. Places with high levels of pollution will increase the level of difficulty observing the moon because of the thickness of pollution fumes.³²

c) Pantai Selat Baru Bengkalis

The name of the New Strait is taken based on the location of the beach which is in the New Strait Village. This beach is directly facing the Strait of Malacca.³³ The location of Selat Baru Beach is in the area of Selat Baru Village, Bantan District, Bengkalis Regency, Riau Province. New Strait Beach is located at 1o 33' 41.7" N, 102o 14' 42.5" E. The location of this

³² Arwin Juli Rakhmadi, *Problematika Penentuan Awal Bulan* (Malang: Madani, 2014), p. 62.

³³ Sumatra Tourism, "*New Strait Beach, Beautiful Beach Pride of Bengkalis Riau*", <https://wisatasumatera.com/pantai-selat-baru-bengkalis/>, accessed January 18, 2024.

beach is 30 km north of the capital city of Bengkalis Regency.³⁴ Selat Baru Beach in Bengkalis is used by the Hisab Rukyat Team of Riau Province to conduct hilal observations. In 2020, in determining the beginning of the month of Dhul-Hijjah, THR made observations on this New Strait Beach, but in 2021 in the early determination of Ramadan and Shawwal did not make observations on this beach, due to the budget.

Then the author made observations of hilal observations on 29 Zulqaidah 1442 H to coincide on July 10, 2021, the author made observations on the New Strait Beach. The calculation used is the calculation obtained by the author from THR. The hilal observation point on Selat Baru Beach which is used to perform rukyatul hilal by THR is on land that protrudes into the sea. The location of rukyatul hilal is in the form of land that protrudes slightly into the sea and in the form of a terrace that is cemented and has a good view of the horizon. This location is usually used by THR and the Regional Office of the Ministry of Religion of Riau Province to conduct hilal observations.



Figure 4: Location of rukyatul hilal in Selat Baru Beach.

In the implementation of this observation on July 10, 2021, with a height of $04^{\circ} 03' 46''$ could not be seen because the weather at sunset on the horizon area was covered by thick clouds, which initially at sunset had sunny weather. Based on the results of monitoring at 17:56 WIB the sun was still visible on the horizon until at 18:00 WIB when the sun was about to set, the state of the horizon began to be covered by clouds. Here is a picture of the state of the western horizon.

³⁴ Bengkalis Regency Government, "*New Strait Beach*", (February 10, 2023), <https://www.bengkalis.kab.go.id/view/wisata/detail/pantai-selat-baru>, accessed January 18, 2024.



Figure 5: The state of the horizon when the sun will set at 18:12 WIB.

At 18:08 WIB, the sun was no longer visible, only a red beam of light was visible on the western horizon. At 18:20 WIB the western horizon is getting dark, the sun is no longer visible on the western horizon, and the possibility for hilal visibility is very unlikely to see the condition of the horizon that has been covered by clouds.



Figure 6: The state of the western horizon at 18:22 WIB.

The observation of hilal starts at 17:50 WIB until 18:30 WIB because based on the calculation of hisab calculated by the THR team, hilal is on the horizon for approximately 19 minutes, but the current state and natural conditions are cloudy so that when the sun has not set, the sun is covered by clouds. Until 18:26 WIB it was dark, and the moon could not be seen. At intervals of 11 minutes the moon is not visible, the sun sets at 18:26:22 WIB, but before sunset, the sun is no longer visible because it is covered by clouds around the horizon. Meanwhile, based on the results of calculations that have been carried out, hilal is already at 4 degrees. The author also made observations at this location to determine the area of view from the point of making observations towards the western horizon. Azimuth view of the New Strait Coast on the black line is azimuth 240°, the green line is azimuth 270°, the yellow line is azimuth 280°, the blue line is azimuth 300°. But at sunset the horizon conditions are covered by clouds that are thick enough so that the possibility of seeing the moon is very difficult.

d) Pantai Tanjung Jaya Desa Teluk Rhu Kecamatan Rupert Utara Kabupaten Bengkalis

Tanjung Jaya Beach Teluk Rhu Village located in North Rupert is one of the beaches that has a long coastline. Tanjung Jaya Beach in Teluk Rhu also has a Lighthouse and a Radar Tower. The lighthouse which has 12 levels, from above the height of the 360-degree view at the top of the tower, will be seen Tanjung Rusa in Port Dickson Malacca, because this beach is directly facing the Strait of Melaka. While the Radar Tower is used for navigation systems.³⁵Physically this lighthouse is worthy to be used as a facility where rukyatul hilal is carried out, because based on the physical structure of this lighthouse is a sturdy building whose frame is made of a mixture of iron and steel and also requires energy to get to the top of the lighthouse.



Figure 7: Lighthouse (right) and Radar Tower (left)

In addition to being one of the tourist attractions of Tanjung Jaya Beach in North Rupert District, it is also used as a place for rukyatul hilal organized by the Regional Office of the Ministry of Religion of Riau Province. In the implementation of the initial determination of the month of Ramadan 1437, the Riau Province BHR team conducted rukyatul hilal which took place at Tanjung Jaya Beach, Teluk Rhu Village, North Rupert District, Bengkalis Regency, Riau Province which coincided on June 5, 2016 A.D.

The selection of this location is based on the results of observations made previously. This location is at the coordinate point 02O 07' 36.14" LU and 101O 39' 24.54" BT which is geographically located by the sea. This

³⁵Results of an interview with Rozali as an officer to guard the lighthouse and radar tower in Teluk Rhu Village, North Rupert District in 2021.

position is very likely to involve the hilal.³⁶ Based on the results of rukyatul hilal conducted on June 5, 2016, hilal is not visible because conditions at sunset are followed by rather thick clouds. While the condition of the horizon is not obstructed. According to the Chairman of the Riau Province Hisab Rukyat Agency, Mr. Hajar said that the location of rukyatul hilal on this beach is very strategic and believes that if it is not covered by clouds, the hilal will be visible.³⁷

According to several interviewees interviewed by the author, the obstacles faced are that there must be funds or a budget that is really sufficient in the implementation of this rukyat, and also sometimes natural obstacles such as cloudy, as well as limited facilities and equipment for observation. According to Mr. Hajar he said that if only the implementation of rukyatul hilal is carried out at this location (Tanjung Jaya Beach) continuously, then the possibility of opportunities for the sight of the hilal can be seen because indeed this location or place is very suitable and strategic for hilal observation or observation, it's just that the budget becomes an obstacle and the district government must cooperate in this matter.³⁸

The author made observations on 30 zulhijjah 1442 H to coincide on August 9, 2021 AD, the author used data calculations from the Hilal Calc Android application. The point used by the author when making observations is dotted at the lighthouse. The second observation at the location of Tanjung Jaya Beach, Teluk Rhu Village, North Rupal District, with a height of 4 degrees was not visible, because it was slightly covered by clouds but the weather at that time was quite sunny. The location of the rukyatul hilal at azimuth 270o has no obstructions. If you make observations at the top level, it is likely that the moon will be larger, and the view towards the western horizon is freer and wider.

³⁶ Regional Office of the Ministry of Religious Affairs of Riau Province, "*Rukyatul Hilal Awal Ramadhan 1437 H in North Rupal*", (June 2, 2016), <http://riau.kemenag.go.id/berita/373185/Asmuni-Rukyatul-Hilal-Awal-Ramadhan-1437-H-di-Rupal-Utara>, accessed January 14, 2024.

³⁷ Regional Office of the Ministry of Religious Affairs of Riau Province, "*Results of Rukyat Riau, Hilal not Visible*", (June 5, 2016), <https://riau.kemenag.go.id/berita/373928/Hasil-Rukyat-RiauHilal-tidak-terlihat>, accessed January 15, 2024.

³⁸ Results of an interview with Hajar as a senior member of THR Riau Province in 2021.



Figure 8: The appearance of the sun at 18:20 WIB

According to Rozali, a lighthouse and radar tower keeper in Teluk Rhu Village that this lighthouse can be used for observation or hilal observation. If the lighthouse is used to observe the moon, it certainly has the potential to be clearly visible to the celestial body, but no one has done that, if a device such as binoculars is brought up, it can be stored in the upper room of the lighthouse, only to go up must require energy and the load accommodated is at most 10 people, if there is really a party who wants to cooperate to use this lighthouse, it is okay and can later cooperate with the navigation party Dumai Class I.³⁹

According to the author during observations in several places that the author thinks are worthy of doing rukyat, the author found that the location of rukyatul hilal on Tanjung Jaya Beach, Teluk Rhu Village, North Rupert District, is that the clouds around the horizon when the sun will set are very few when compared to other locations, besides that in this location based on the results of air pollution checks, This location is very low in pollution because it is still very beautiful. As expressed by Mr. Hajar according to him that "This location has the potential to be seen hilal if carried out routinely the rukyat, and is strategic for the implementation of rukyatul hilal, but from THR itself difficulties in the budget and others."⁴⁰

3. Analysis of the Feasibility of Rukyatul Hilal Place in Riau Province Based on Geographical, Meteorological and Climatological Aspects

a) Geographically Analysis

- Western Horizon and Visibility Horizon Azimuth 240° - 300° Unobstructed.

³⁹ Results of an interview with Rozali as an officer to guard the lighthouse and radar tower in Teluk Rhu Village, North Rupert District in 2021.

⁴⁰ Results of Interview with Hajar as a senior member of THR Riau Province in 2021

A good place to observe the beginning of the Moon is a place that allows observers to make observations around the place where the Sun sets. The view in that direction should not be disturbed by natural or artificial objects, so that the horizon will look straight in areas that have an azimuth of 240° to 300° . All rukyatul hilal locations have a horizon condition, there is nothing to obstruct the observer's view in the sense that there is no obstruction when making rukyat towards the western horizon.

According to Ramlan Hotel Pekanbaru it is difficult to look hilal like in rukyatulhilal at Bono Hotel, then to the Horizon region itself which borders between heaven and earth is also still closed, in addition to cloud or weather conditions in the Riau region right if we head west, it is usually more if the West is raining more often, because the western region of Riau is the border of West Sumatra with Riau and usually it is the border with Riau through Bukit Barisan which is very influential with orography, so that in the afternoon to night even though the weather conditions are in dry season conditions but there is still frequent air lifting and often enough supervision to be a barrier to view.⁴¹

- Accessibility, communication, and facilities of rukyatul hilal place

Accessibility of the place is one of the important factors in supporting good criteria for a rukyat place. Rukyat places that are easily accessible will affect the sustainability of rukyat activities going forward. Ease of access to rukyat premises is an additional criterion or secondary criterion. For the implementation of rukyatul hilal in Pekanbaru City is very affordable because of its location where rukyat is carried out in Pekanbaru City is in the city so that using any vehicle can be reached to the location and even the distance between the hotels used for the implementation of rukyatul hilal in Pekanbaru City, the distance between the Regional Office and the Ministry of Religious Affairs of Riau Province is close. Meanwhile, if rukyatul hilal is carried out outside Pekanbaru City such as Dumai City, and Bengkalis Regency, it takes time to reach the destination of the hilal observation location.

Apart from access to the location of the rukyatul hilal implementation, there are several other factors that need to be considered, such as a good communication network and electricity,

⁴¹ Results of an interview with Ramlan as Chairman of BMKG Riau Province in 2021.

because when the network for communication is disrupted and difficult to access, it will have an impact when reporting the results of rukyat to the Central Ministry of Religious Affairs in Jakarta which is needed in the isbat session, Because there are several incidents that occur, namely sometimes there is a strategic location in the implementation of rukyatul hilal but the communication network does not support so that this makes it difficult for perukyat to report to the Central Ministry of Religious Affairs in conducting isbat trials.

b) Meteorological and Climatological Analysis

- Atmospheric disturbances caused by air pollution and light pollution.

The city of Pekanbaru is carried out in hotels in the middle of the city, as in the implementation of rukyatul hilal at the Premiere Hotel. The rukyat location located at the Premiere Hotel is in the Pekanbaru District of this city, precisely in Simpang Empat Village. Pekanbaru Kota District is a prima donna area for the world of trade because of its location in the city center and is the economic center of Pekanbaru City, ranging from micro, small to medium entrepreneurs in Pekanbaru Kota District. In this case it can contribute air pollution due to exhaust fumes, factory fumes, and others generated by vehicles, factory industries and others.

Dumai City the implementation of rukyatul hilal is carried out at the Hotel, namely at The Zuri Hotel. Similar to Pekanbaru City, Dumai City itself is an industrial area with many factory activities, so there is often fog caused by factory smoke. In addition, Dumai is an international trade route. Which is an access point for ships from various countries.

Bengkalis New Strait Beach and Tanjung Jaya Rukat Utara Beach, the location of this beach is located in a really beautiful countryside and far from the crowds like in urban areas. There is no pollution from motor vehicles and factory fumes. For Tanjung Jaya Beach itself is located at the end of North Rukat island, so this beach is still far from air pollution such as pollution and others.

Light pollution is the improper use of artificial light that causes adverse effects on the environment. Excess artificial light emitted upward, is scattered by aerosols such as clouds and fog or small particles such as pollutants in the atmosphere. This scattering produces a glow of light that can be seen from afar. Based on the application Light Pollution Map v5.1.0. There are levels of color on the map. The colors on the map show the level of light pollution in different areas. Black or no color for dark skies, followed by green

for skies that glow from yellow light, yellow for natural light loss, and red for increased light pollution, while white on the map represents "active cones", or cities with the most severe levels of light pollution.

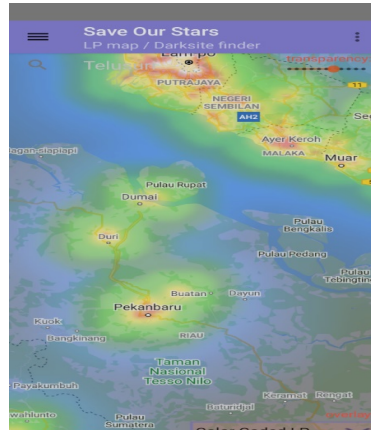


Figure 9: Light pollution map based on Light Pollution Map v5.1.0 App

Based on the results obtained that in the center of Pekanbaru City has a red dot, and around the area is yellow to greenish, this shows that Pekanbaru City has an increase in light pollution, so this situation makes it difficult to see celestial objects including hilal one of them. Next Dumai City has red, yellowish, to greenish dots, but the colors obtained are not as many as in Pekanbaru City, meaning that Dumai City experiences light pollution but not as severe as in Pekanbaru City. While on Bengkalis Island and Rupert Island does not have color or black, indicating that this region has a dark sky so that this situation can support the chances of hilal visibility in this region.

- The amount of water vapor content

Riau Province is an area where most of the area is sea waters, thus making this region has a large enough water vapor content, thus helping in the condensation process. Pekanbaru City the highest temperature reaches 33.4oC with an average temperature of 27.5oC at an average temperature of 27.5oC conditions and conditions in Pekanbaru City are sunny with quite thick clouds. While in Dumai City the air temperature in this city is not much different from the air temperature in Pekanbaru City. Based on the results, the air temperature in Pekanbaru and Dumai is not much different. According to the Head of BMKG for the Rupert and Bengkalis regions, the air temperature is with Dumai. And it can be concluded

that the air temperature in the cities of Pekanbaru, Dumai and Bengkalis is part of the area of these waters, so the average shows normal results for temperatures in tropical Indonesia, which is in the range of 26-36 degrees Celsius.⁴²

- High air humidity

The condition of an area that has high air humidity is an area or area with a wet tropical climate. Proven for the Pekanbaru City and Dumai City areas with a high level of air humidity with an average from 2016-2021 ranging from 75-89%. While the ideal air humidity for a place in doing rukyatul hilal is below 80%, because if it exceeds 80% of the air humidity in the area it will be very difficult and saturated then it will form thick water vapor so that it becomes blurred or cloudy which will cause rain. Although the humidity in the Dumai City and Pekanbaru areas is high, but in certain months the air humidity in the region is stable with below 80%, it can be concluded that the air humidity owned by the rukyatul hilal implementation areas in Riau Province is high and in certain months it is also standard.

Cloud or weather conditions in the Riau region are if we head west, it is usually more if the West is raining more often, because the western region of Riau is the border of West Sumatra with Riau and usually it is the border with Riau through Bukit Barisan which is very influential with orography, so that in the afternoon to night even though weather conditions are in dry season conditions but there is still frequent air lifting and frequent supervision is enough to be a barrier to view.⁴³

- High rainfall

Rainfall is said to be high when >150 mm, if it reaches >150 mm then the month has entered the rainy season and if it is <150 mm then the month has entered the dry season. Looking at the data above, the rainfall above is calculated per month within 5 years Pekanbaru City has high rainfall. From June to September, rainfall < 150 mm then the 4 months have entered the dry season. Rainfall in Pekanbaru City is quite high, this is evidenced by monthly data per 2016-2021. While in Dumai City the rainfall that occurs is less low

⁴² Results of an interview with Ramlan as Chairman of BMKG Riau Province in 2021.

⁴³ Results of an interview with Ramlan as Chairman of BMKG Riau Province in 2021.

than in Pekanbaru City. For Bengkalis Regency and North Rupat District, rainfall in this region is higher than in Pekanbaru City and Dumai City.

According to one of the THR of Riau Province, that every time you will do rukyatul hilal, most of the rain will only be short, after the rain stops before sunset, the atmospheric state at that time is in the cloudy horizon area which is quite thick and covers the hilal and also the sun.⁴⁴ In making ideal observations must pay attention to the meteorological aspect, namely rainfall. Because if it rains, of course, hilal cannot be observed. The next meteorological aspect to pay attention to is virginity. However, the author does not include virginity data, because the meteorological phenomenon that occurs in the cities of Pekanbaru and Dumai is the presence of air blur (haze) although clouds also cannot be denied being an obstacle rukyatul hilal.

C. Conclusion

The use of rukyat premises in Riau Province is based on eligibility criteria, including free views at 240°-300° azimuth, observation altitude, accessibility, and availability of funds. The location in Pekanbaru City is considered less feasible because some primary aspects are not met, such as meteorological conditions affected by haze and lack of climatological changes for 10 years. In Dumai City, it is also considered less feasible due to air and light pollution, as well as meteorological conditions like Pekanbaru City. In Bengkalis Regency, Selat Baru Beach is considered less feasible because it is often cloudy and cloudy, while Rupat Island is considered quite feasible even though it is difficult to access.

To increase its effectiveness, it is necessary to recap the calculation data and results of rukyat hilal activities so that they can be neatly arranged and become a source of information for the wider community. Tanjung Jaya Beach in Teluk Rhu Village, North Rupat District, is considered quite feasible as a permanent place of rukyatul hilal activities in Riau Province, with a record of accessibility improvements needed. In addition, it is necessary to optimize the search for a decent rukyatul hilal location and increase human resources for maximum rukyat results.

⁴⁴ Results of an interview with Khairunnas as an expert staff for rukyat tools at the Regional Office of the Ministry of Religion of Riau Province in 2021.

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