Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Activity-Specific Weather Suitability for Short-Duration Tourism: A Sunset-Viewing Index for Coastal Thailand

Xi Liang

p6619380@au.edu

Assumption University

Shih-tse Lo

Assumption University

Sumridh Sudhibrabha

Thai Meteorological Department

Research Article

Keywords: Sunset-viewing suitability index, observed sunset visibility, criterion assessment, tourism weather, business revenue, coastal tourism

Posted Date: October 28th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11049147/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Activity-Specific Weather Suitability for Short-Duration Tourism: A Sunset-Viewing Index for Coastal Thailand

Xi Liang[1]
Assumption University, Thailand
P6619380@au.edu; kilous.liang@gmail.com

and

Shih-tse Lo[2]
Assumption University, Thailand
shihtselo@msme.au.edu

and

Sumridh Sudhibrabha
Thai Meteorological Department, Thailand
sumridhs@gmail.com

Abstract

Operational meteorological information often prioritizes hazardous or unfavorable conditions, while many established tourism weather indices assess broad destination-level suitability over daily or longer time scales. Although recent research has moved toward more activity-specific and higher-frequency assessment, short-duration tourism activities still require weather measures that are aligned with the narrow periods in which they occur. This study addresses this issue by developing the Sunset-Viewing Suitability Index (SVSI) for a specific tourism activity and an activity-relevant late-afternoon-to-evening window. The index integrates visibility, cloud conditions, weather phenomena, wind speed, fog risk, and thermal comfort using observations at 16:00 and 19:00 and changes between the two times. Daily SVSI values were calculated from 2025 meteorological data for Koh Samui and Krabi, Thailand, and matched with photo-based records of observed sunset visibility and dinner-period revenue from six sampled sunset bars. The dataset contains 730 destination–date observations, of which 68.4% had an observable sunset. Logistic regression showed that the SVSI was positively associated with observed sunset visibility; after destination differences were controlled for, a 10-point increase in the SVSI was associated with 1.38 times higher odds of observing a visible sunset. In contrast, the SVSI was not statistically significant in any multivariate revenue model. The findings provide preliminary criterion-related evidence for the SVSI and show that activity-specific weather suitability does not necessarily translate directly into business revenue. More broadly, the study demonstrates how general meteorological information can be reorganized around the requirements and timing of a specific tourism activity, extending weather suitability assessment beyond broad daily or destination-level conditions.

Keywords: Sunset-viewing suitability index; observed sunset visibility; criterion assessment; tourism weather; business revenue; coastal tourism

JEL: L83; C43; Q50

Contribution: This study introduces an activity-specific, temporally aligned weather-suitability framework for short-duration tourism and validates it against observed

[1] Corresponding author.
[2] Corresponding author.

sunset visibility, extending tourism weather assessment beyond broad daily or destination-level conditions.

Declaration of conflicting interest
The authors declared no potential conflicts of interest regarding the research, authorship, and/or publication of this article.

Declaration of use of AI technology
The authors declare that artificial intelligence was solely utilized for language refinement and grammatical revision during the preparation and finalization of this article.

Funding statement
No funding was received for this research.

Ethical approval / IRB statement
Not applicable. This study uses publicly available city-level statistical data and does not involve any human participants.

Data availability statement
Meteorological data were obtained from the Thai Meteorological Department. Sunset-visibility records and business revenue data were obtained from third-party sources and are not publicly available. Derived data may be available from the corresponding author upon reasonable request, subject to relevant permissions.

Transparency statement
The authors affirm that the manuscript is an honest, accurate, and transparent account of the study. No important aspects of the study have been omitted, and the limitations of the research have been clearly stated.

Author contributions
Xi Liang (ORCID: 0000-0001-6128-5503): Conceptualization, research design, data collection, model validation, and writing—original draft. Shih-tse Lo (ORCID: 0000-0001-7147-2898): Writing—review and editing, research supervision, and verification of model results. Sumridh Sudhibrabha (ORCID: 0009-0009-8884-6310): Data provision, coordination with local third-party data sources, and support for data access. All authors reviewed and approved the final manuscript.

1 Introduction

1.1 Background and Research Problem

Weather information is commonly used to identify hazardous conditions, support risk management, and describe the general suitability of outdoor environments. In tourism research, climate indices have extended this approach by combining multiple meteorological variables to assess whether destinations offer favorable conditions for tourism activities. These approaches have improved the interpretation of weather and climate information, but they generally operate at broad spatial or temporal scales.

Tourism activities, however, do not all respond to weather in the same way. Some activities take place throughout much of the day, whereas others depend on conditions within a narrow period. Sunset viewing is a clear example. Its success depends strongly on visibility, cloud conditions, rainfall, fog, and other atmospheric conditions immediately before and around sunset. Weather may change substantially within only a few hours, meaning that daily averages or general daytime conditions may not represent the conditions experienced during the activity itself.

Existing tourism climate indices provide useful measures of general tourism suitability. The Tourism Climate Index (TCI), for example, combines temperature, humidity, precipitation, sunshine, and wind speed to compare climatic conditions across destinations and periods (Mieczkowski, 1985). Subsequent approaches such as the Climate Index for Tourism and the Holiday Climate Index incorporated additional dimensions of tourism comfort and adjusted component weights to reflect different tourism settings (de Freitas et al., 2008; Scott et al., 2016). More recent work has further emphasized activity-specific and higher-frequency weather assessment (Matthews et al., 2021; Nourmohammadi & Gómez-Martín, 2024).

Despite these advances, activity-specific weather assessment remains relatively limited, particularly for short-duration tourism activities whose suitability depends on conditions within a narrow part of the day. Higher temporal resolution can provide more detailed weather information, but it does not necessarily ensure that the assessment period corresponds to when a particular activity actually occurs. A remaining challenge is therefore to define weather suitability around both the meteorological requirements and the temporal structure of the activity itself.

This study addresses this gap through sunset viewing in Koh Samui and Krabi, Thailand. It develops the Sunset-Viewing Suitability Index (SVSI), which integrates visibility, cloud conditions, weather phenomena, wind speed, fog risk, and thermal comfort. Rather than representing the day as a whole, the index uses observations at 16:00 and 19:00 and incorporates changes between the two times. The study therefore extends weather-index applications in two respects: from broad weather or tourism suitability to the requirements of a specific tourism activity, and from general daily conditions to an activity-relevant time window.

1.2 Research Questions and Contributions

The central purpose of the study is to examine how meteorological information can be translated into an activity-specific suitability measure at a temporal scale that corresponds more closely to the activity itself. Sunset viewing provides an appropriate case because it is both highly weather-sensitive and concentrated within a short late-afternoon-to-evening period.

Observed sunset visibility is used as an external criterion because it is closely aligned with the visual requirements of the activity. Dinner-period revenue is examined separately as a downstream business outcome. The two outcomes serve different purposes: sunset visibility provides evidence on whether the SVSI captures the conditions it is intended to represent, whereas revenue indicates whether favorable activity conditions are also reflected in commercial performance.

The study addresses three research questions:

1. How can weather suitability for sunset viewing be measured within an activity-specific time window?
2. Is the SVSI associated with observed sunset visibility in Koh Samui and Krabi?
3. Is sunset-viewing suitability associated with dinner-period revenue in the sampled establishments?

The study makes two primary contributions. First, it extends activity-specific tourism weather assessment to a short-duration activity with clearly defined meteorological requirements. Rather than treating weather suitability as a general property of a destination, the SVSI defines suitability in relation to the visual, atmospheric, and comfort conditions relevant to sunset viewing.

Second, the study advances the temporal alignment of tourism weather assessment. Building on recent moves toward higher-frequency analysis, the SVSI focuses on an activity-relevant late-afternoon-to-evening window and incorporates short-term changes within that period. The contribution therefore lies not in higher temporal resolution alone, but in aligning the assessment window more closely with the period in which the activity occurs.

A further empirical contribution is provided by assessing the index against photo-based records of observed sunset visibility and then examining its downstream association with business revenue. This distinction separates the measurement of activity-specific weather conditions from their possible commercial consequences.

2 Literature Review

2.1 Weather Conditions and Tourism Demand

Weather shapes tourism experiences through thermal comfort, landscape perception, and activity feasibility. Objective conditions, however, do not determine tourist behavior on their own. Travel motives, prior expectations, destination perceptions, and available alternatives also influence how visitors respond to weather (Denstadli et al., 2011; Gómez-Martín, 2005; Gössling et al., 2016).

Weather sensitivity varies across activities and visitor groups. Beach tourists differ in their tolerance of temperature, rainfall, wind, and cloud cover, while mountain visitors tend to be more sensitive to rainfall and sky conditions (Rutty & Scott, 2016; Steiger et al., 2016). General weather standards may therefore be poorly suited to activity-specific settings such as hiking, skiing, or scenic viewing. Temporal scale also matters: daily or monthly averages may conceal short-term changes during the period in which an activity occurs.

From a tourism economics perspective, weather is a short-term environmental condition that may affect the utility of outdoor participation and, in turn, visitation, length of stay, and expenditure. These effects depend on the activity, destination, visitor profile, and available substitutes. This activity-level perspective is consistent with the need for weather and climate information tailored to tourism planning and decision-making (Matzarakis, 2006). Non-intrusive observational approaches have also been used to examine relationships between atmospheric conditions and realized tourism demand (Gómez-Martín & Martínez-Ibarra, 2012). Weather-related demand should therefore be examined at the spatial and temporal scale of the activity concerned.

2.2 Tourism Climate Indices and the Requirements of Sunset Viewing

Tourism climate indices have moved from broad climate assessment toward more context- and activity-specific evaluation. The Tourism Climate Index supports comparison across destinations and months but is less sensitive to the requirements of particular activities (Mieczkowski, 1985). The Holiday Climate Index adjusted component weights for settings such as beach and urban tourism (Scott et al., 2016), while more recent approaches have calibrated indices against observed visitation (Matthews et al., 2021).

These developments raise an important measurement issue: visitation, satisfaction, landscape quality, and physical activity conditions are related but distinct outcomes. An index should therefore be designed around a clearly defined construct and assessed against an external measure that is close to that construct.

Sunset viewing combines visual conditions with outdoor comfort. Visibility, fog, haze, rainfall, and cloud structure affect whether the sun and horizon can be seen. Thin or scattered clouds may still permit sunlight to pass through, whereas dense low cloud is more likely to obscure the view (Matuszko, 2012). Wind speed and temperature do not determine visibility directly but may affect the comfort of waiting outdoors.

The activity is also highly time-specific. Hourly data show that generally favorable days may contain unsuitable periods, while poor days may include brief windows suitable for outdoor activities (Nourmohammadi & Gómez-Martín, 2024). Sunset assessment must therefore consider both conditions near the viewing period and changes between observation times. Higher temporal resolution, however, is not equivalent to activity-specific temporal alignment. For short-duration activities, the assessment window should correspond not only to available observation frequency but also to the period in which the activity actually occurs.

2.3 Observed Sunset Visibility as a Criterion Measure

An activity-specific weather index should be assessed against the conditions it is intended to represent. Previous indices have been compared with tourist preferences, visitation records, or observed activity patterns, although these measures capture different aspects of suitability (Becken, 2013; de Freitas et al., 2008; Matthews et al., 2021).

For sunset viewing, dated photographic records provide a relatively direct criterion because they show whether the sun, horizon, or an identifiable sunset scene was visible. This evidence is more closely aligned with the visual purpose of the SVSI than downstream outcomes such as expenditure or revenue.

A binary visible/non-visible measure nevertheless captures only part of the construct. It does not indicate aesthetic quality, duration, or outdoor comfort. It should therefore be treated as a

criterion-related assessment of observed sunset visibility rather than a complete validation of all SVSI components.

2.4 Weather, Tourism Demand, and Business Outcomes

Weather may influence tourism businesses through visitation, activity participation, length of stay, and spending. Zoo attendance, ski-lift sales, and beach-park visitation have been associated with temperature, precipitation, wind, and thermal comfort (Aylen et al., 2014; Matthews et al., 2021; Shih et al., 2009). Tourism expenditure, however, does not respond uniformly across seasons, regions, or market settings (Wilkins et al., 2018).

At the firm level, rainfall can create financial risk for hospitality businesses (Franzoni & Pelizzari, 2019). Weather may also affect tourism businesses indirectly through visitor movements, destination conditions, and relationships among firms (Rauken & Kelman, 2012). Revenue is therefore shaped not only by weather but also by prices, capacity, bookings, brand appeal, promotion, customer composition, and operating strategy. Differences across price categories may consequently reflect establishment-specific characteristics rather than price level alone.

Revenue is a downstream outcome jointly determined by tourism demand and firm-level conditions. Favorable weather may increase the utility of sunset viewing, but its effect must pass through attendance, time spent on-site, and expenditure before appearing in revenue. Market and operating factors may weaken, amplify, or offset this transmission.

The SVSI – revenue relationship should therefore be interpreted as an empirical association between a short-term environmental amenity and a business outcome. Observed sunset visibility provides the closer criterion for assessing the index, while revenue analysis examines whether favorable viewing conditions are also reflected in commercial performance.

3 Research Design

3.1 Overall Research Framework

This study develops the Sunset-Viewing Suitability Index (SVSI) and assesses it through two empirical applications. The research consists of four stages: index construction, compilation of observed sunset visibility, criterion assessment, and revenue analysis. Daily SVSI values are calculated from meteorological observations around the sunset-viewing period and matched with a binary record of observed sunset visibility and dinner-period revenue. Logistic regression examines the association between the SVSI and sunset visibility, while log-linear models assess its association with business revenue. Figure 1 summarizes the research framework.

[Insert Figure 1 here]

The study covers Koh Samui and Krabi, Thailand, from January 1 to December 31, 2025. Koh Samui lies in the Gulf of Thailand, while Krabi is located on the Andaman coast. Including both destinations allows the SVSI to be assessed across two coastal settings with different weather patterns and rainfall seasonality. Destination differences are represented by a categorical indicator in the empirical models.

Sunset bars were classified as low-, medium-, or high-price establishments according to per-person spending ranges reported on Google Maps. One bar from each category was selected in each destination, producing a sample of six establishments. All sampled bars offered sunset-viewing conditions, operated throughout the study period, and maintained continuous dinner-period revenue records.

Meteorological data were obtained from the Koh Samui and Krabi stations operated by Thailand's national meteorological authority. Observed sunset visibility was compiled from a pooled archive of dated photographs accessed through local photographer associations. The archive combined photographic series produced by multiple photographers who had regularly documented sunsets over extended periods. The daily record was therefore constructed at the association level rather than from any single contributor. Combining these series provided complete destination – date coverage for 2025 and reduced the risk that a missing observation reflected one photographer's temporary absence. Business data came from the operating records of the sampled bars, with revenue measured in Thai baht and organized by destination and date.

The unit of analysis is the destination – date. Each observation includes the daily SVSI, observed sunset visibility, combined and price-level bar revenue, weekend status, and public-holiday status. The final dataset contains 730 observations, with 365 for each destination. The original destination variable was coded 1 for Koh Samui and 2 for Krabi. In the regression models, destination was treated as categorical, with Koh Samui as the reference category; the reported Krabi coefficient therefore represents the difference between Krabi and Koh Samui.

3.2 Construction of the Sunset-Viewing Suitability Index

The SVSI measures weather suitability for sunset viewing within a defined late-afternoon-to-evening activity window. It comprises six components: visibility, cloud conditions, weather phenomena, wind speed, fog risk, and thermal comfort. Scores range from 0 to 100, with higher values indicating more suitable conditions; no categorical suitability levels are assigned.

Visibility, cloud conditions, and weather phenomena represent the visual clarity and feasibility of sunset viewing, while wind speed and thermal comfort reflect the experience of remaining outdoors. Fog risk is assessed using the difference between air temperature and dew-point temperature.

The index follows a knowledge-driven weighting approach. Visibility and cloud conditions receive the largest weights because they most directly affect whether the sun and horizon can be seen. Weather phenomena receive a moderate weight, while wind speed, fog risk, and thermal comfort receive smaller weights. The maximum component scores are 25, 30, 20, 10, 10, and 5 points, respectively:

$$S_{it\tau} = V_{it\tau} + C_{it\tau} + P_{it\tau} + W_{it\tau} + F_{it\tau} + T_{it\tau}$$

Where i denotes the destination, t the date, and τ the observation time. V, C, P, W, F and Trepresent the scores for visibility, cloud conditions, weather phenomena, wind speed, fog risk, and thermal comfort, respectively.

For each day, the observations closest to 16:00 and 19:00 local time were selected. Conditions at 16:00 may influence visitors' plans for the evening, while the 19:00 observation is closer to the sunset-viewing and dinner period. Based on this temporal proximity, the two observations receive weights of 35% and 65%:

$$TS_{it} = 0.35S_{it,16} + 0.65S_{it,19}$$

These weights summarize weather conditions from late afternoon into the sunset period. They should not be interpreted as precise marginal contributions of the two observation times to the viewing experience.

To retain information about changes within the day, the index also includes a trend-adjustment term, A_{it} The adjustment is positive when visibility improves, cloud conditions become more favorable, rainfall stops, or wind speed declines. It is negative when conditions deteriorate, rainfall begins, humidity rises substantially, or wind speed increases. The final index is calculated as follows:

$$SVSI_{it} = \max[\,0, \min(100, TS_{it} + A_{it})]$$

To ensure transparency and reproducibility, Appendix A reports the measurement methods, scoring thresholds, missing-value treatment, and severe-weather caps for all six components. Appendix B specifies the criteria and point adjustments used to identify weather trends, the permitted range of the cumulative adjustment, and the procedures applied when only one observation time is available. Appendix C presents selected raw meteorological records at 16:00 and 19:00, together with the corresponding reported daily SVSI values, allowing readers to reproduce the selected calculations by applying the rules in Appendices A and B. The same scoring, weighting, and adjustment procedures were applied to all observations in the dataset. The resulting SVSI therefore captures both weather conditions at the two observation times and the direction of change between them. The assigned weights express the relative importance of the components and observation times; they should not be interpreted as estimates of precise marginal effects.

3.3 Observed Sunset Visibility and Criterion Assessment

Observed sunset visibility was compiled from pooled series of dated photographs accessed through local photographer associations. For each destination, the archive combined records from multiple long-term contributors who regularly monitored sunset conditions. This collective approach provided complete destination–date coverage throughout 2025 and reduced the risk that missing records reflected the temporary absence of an individual photographer.

For each destination–date, the pooled photographs were coded as 1 when they showed an observable sunset and as 0 when they showed that the sunset was obscured by cloud, rainfall, fog, haze, or other conditions. The absence of photographs from any one contributor was not coded as 0. The indicator measured visibility rather than aesthetic quality, duration, photographic composition, or outdoor comfort. It therefore serves as a criterion-related measure of the visual dimension of the SVSI rather than a complete validation of all index components. Table 1 presents the variable definitions.

[Insert Table 1 here]

Two binary logistic regression models were estimated. Model 1 examines the unadjusted association between the SVSI and observed sunset visibility. Model 2 adds a destination indicator to account for stable average differences between Koh Samui and Krabi:

$$\log i\,t[P(SunsetVisible_{it} = 1)] = \alpha + \beta_1 SVSI_{it} + \beta_2 Krabi_i.$$

Here, $SunsetVisible_{it}$ equals 1 when an observable sunset was recorded in destination i on date t, and 0 otherwise. $Krabi_i$ equals 1 for Krabi and 0 for Koh Samui, which serves as the reference destination. Model 1 excludes the destination term, while Model 2 includes it. Heteroskedasticity-robust standard errors were used in both models.

The SVSI coefficient indicates whether higher index values are associated with greater odds of observing a visible sunset. The coefficient is interpreted as an association rather than as a causal effect or evidence of stand-alone predictive performance.

3.4 Revenue Association Models

The business analysis examines whether the SVSI is associated with dinner-period revenue from the sampled sunset bars. Four dependent variables are considered: the combined revenue of the three sampled bars in each destination and the separate revenues of the low-, medium-, and high-price sample bars.

Raw revenue values are retained in the descriptive statistics. For the correlation and regression analyses, revenue is transformed using the natural logarithm. This specification allows the regression coefficients to be interpreted approximately as proportional differences in revenue and reduces scale differences across the four revenue measures.

The baseline model uses the natural logarithm of combined dinner-period revenue as the dependent variable:

$$\ln(Revenue_{it}) = \alpha + \beta_1 SVSI_{it} + \beta_2 Weekend_t + \beta_3 Holiday_t + \beta_4 Krabi_i + \varepsilon_{it}.$$

Here, $\ln(Revenue_{it})$ denotes the natural logarithm of dinner-period revenue in destination i on date t. $SVSI_{it}$ is the corresponding sunset-viewing suitability score. $Weekend_t$ equals 1 on Saturdays and Sundays and 0 otherwise, while $Holiday_t$ identifies Thai public holidays. $Krabi_i$ equals 1 for Krabi and 0 for Koh Samui. The error term is denoted by ε_{it}. Three supplementary models use the natural logarithms of revenue from the low-, medium-, and high-price sample bars as separate dependent variables. All four models include the same explanatory variables and controls; only the dependent variable changes. This structure permits comparison of the SVSI – revenue association across the sampled establishments at different price levels.

All revenue models are estimated using heteroskedasticity-robust standard errors. Because revenue is jointly shaped by weather conditions, visitor demand, prices, capacity, bookings, operating strategies, and other unobserved factors, the estimates are interpreted as exploratory associations rather than causal effects. The purpose of the analysis is to examine whether sunset-viewing suitability is reflected in observed business outcomes, not to validate the SVSI as a commercial forecasting model.

4 Results

4.1 Descriptive Statistics

The final dataset contains 730 destination – date observations covering the full 2025 calendar year for Koh Samui and Krabi, with 365 observations from each destination. Table 2 presents the descriptive statistics.

[Insert Table 2 here]

The mean SVSI was 88.21, with a standard deviation of 12.15 and values ranging from 20.00 to 100.00. Observable sunsets accounted for 68.4% of the destination – date observations. The mean combined dinner-period revenue of the three sample bars in each destination was THB 81,817.53. Mean revenue was THB 17,403.35 for the low-price sample bars, THB 27,276.66 for the medium-price sample bars, and THB 37,137.52 for the high-price sample bars. Both average revenue and its dispersion increased across the three price categories. Weekends accounted for 28.5% of the observations, while public holidays represented 7.1%.

4.2 Correlation Analysis

Table 3 reports the Pearson correlation coefficients among the SVSI, observed sunset visibility, the log-transformed revenue measures, and the control variables. Correlations involving the binary variables are point-biserial equivalents.

[Insert Table 3 here]

The SVSI was weakly and positively correlated with observed sunset visibility (r=.144, p<.001). It was also positively correlated with log total revenue (r=.117, p=.002), log low-price-bar revenue (r=.084, p=.023), and log medium-price-bar revenue (r=.097, p=.009). Its correlation with log high-price-bar

revenue was not statistically significant (r=.056, p=.134).

Observed sunset visibility was not significantly correlated with any of the four revenue measures. The coefficients ranged from −.050 to .000, with all p-values above .10. This result suggests that the occurrence of an observable sunset was not, by itself, associated with higher dinner-period revenue in the sample.

The weekend indicator was not significantly correlated with the SVSI, observed sunset visibility, or any of the revenue measures. Public holidays were weakly and positively correlated with log high-price-bar revenue (r=.074, p=.046), but not with the other revenue measures.

The destination variable was negatively correlated with the SVSI and all four revenue measures, but positively correlated with observed sunset visibility. Because destination was coded 1 for Koh Samui and 2 for Krabi, these coefficients indicate that Krabi had a lower average SVSI and lower sample-bar revenue, but a higher proportion of recorded observable sunsets. The relatively strong correlations between log total revenue and the three price-level revenue measures partly reflect the fact that total revenue aggregates revenue from the same three sampled establishments.

4.3 Logistic Regression Analysis of Observed Sunset Visibility

Table 4 presents the logistic regression results for observed sunset visibility. Model 1 includes the SVSI as the only explanatory variable, while Model 2 adds the destination indicator.

[Insert Table 4 here]

In Model 1, the SVSI coefficient was positive and statistically significant (B=.0240, SE=.0066, p<.001). Expressed in 10-point units, a 10-point increase in the SVSI was associated with approximately 1.27 times higher odds of observing a visible sunset.

The association became slightly stronger after destination differences were controlled for in Model 2. The SVSI coefficient remained positive and statistically significant (B=.0321, SE=.0074, p<.001). A 10-point increase in the SVSI was associated with 1.38 times higher odds of observing a visible sunset, with an approximate 95% confidence interval of 1.19 to 1.59.

The Krabi indicator was also positive and statistically significant (B=.6499, SE=.1767, p<.001). With Koh Samui serving as the reference destination, the estimated odds of observing a visible sunset were approximately 1.92 times higher in Krabi after the SVSI was held constant. This coefficient should be interpreted as an adjusted difference between the two destination samples rather than as a causal destination effect.

Overall, the logistic regression results provide preliminary criterion-related evidence that higher SVSI values are associated with a greater likelihood of observable sunset conditions.

4.4 Regression Analysis of Log Revenue

Table 5 presents the regression results for the natural logarithm of combined dinner-period revenue and the separate revenue measures for the low-, medium-, and high-price sample bars. All models include the SVSI, weekend, public-holiday, and destination indicators and are estimated using heteroskedasticity-robust standard errors.

[Insert Table 5 here]

After calendar and destination factors were controlled for, the SVSI coefficient was not statistically significant in any of the four revenue models. The estimated coefficients were −.0002 for log total revenue, −.0001 for log low-price-bar revenue, −.0003 for log medium-price-bar revenue, and −.0002 for log high-price-bar revenue. These estimates were close to zero. A 10-point increase in the SVSI corresponded to estimated revenue differences of approximately −0.2%, −0.1%, −0.3%, and −0.2%, respectively, none of which was statistically significant.

The weekend indicator was not statistically significant in any model. Public holidays were positively associated with log total revenue (B=.0368, p<.05) and log high-price-bar revenue (B=.0662, p<.05). These coefficients correspond to approximate revenue differences of 3.7% and 6.8%, respectively. Public-holiday coefficients were not statistically significant in the low- or medium-price-bar models.

The Krabi indicator was negative and statistically significant across all four models (p<.001). Relative to Koh Samui, the estimated revenue differences were approximately −12.5% for total revenue, −12.7% for low-price-bar revenue, −16.2% for medium-price-bar revenue, and −9.9% for high-price-bar revenue. These coefficients represent average differences between the two destination samples after the included variables were controlled for; they should not be interpreted as the effect of destination alone.

The R square values ranged from .055 in the high-price-bar model to .210 in the total-revenue model.

Overall, the SVSI was associated with observed sunset visibility but showed no stable association with sample-bar revenue. Calendar conditions and persistent differences between the two destination samples were more consistently associated with revenue than daily variation in sunset-viewing suitability.

5 Discussion

5.1 Activity-Specific and Time-Specific Weather Assessment

The main contribution of this study lies in extending activity-specific weather assessment to a short-duration tourism activity. Operational meteorological information often prioritizes hazardous or unfavorable conditions, while established tourism climate indices commonly summarize broader destination-level suitability. Recent research has begun to develop more activity-specific and higher-frequency approaches, but broad assessments do not always capture the conditions experienced during a narrowly timed activity.

The SVSI builds on this development by defining weather suitability around the requirements of sunset viewing. Visibility, cloud structure, rainfall, fog, wind, and thermal conditions are evaluated according to their relevance to whether visitors can view a sunset and remain outdoors during the viewing period. The SVSI therefore operationalizes activity-specific weather suitability for sunset viewing rather than treating suitability as a general property of the destination.

Temporal alignment is equally important. Higher-frequency weather data can reveal short-term variation that is hidden by daily averages, but greater temporal resolution alone does not ensure that the assessment corresponds to the timing of a particular activity. By combining observations at 16:00 and 19:00 and incorporating changes between the two times, the SVSI defines a late-afternoon-to-evening window that is more closely aligned with sunset viewing. This is consistent with recent evidence on the value of higher-frequency tourism weather assessment (Nourmohammadi & Gómez-Martín, 2024). The contribution therefore lies not in higher temporal resolution per se, but in closer alignment between the weather measure, the requirements of the activity, and the time window in which the activity occurs.

The empirical results provide preliminary support for this activity- and time-specific approach. Higher SVSI values were associated with a greater likelihood of an observable sunset, and the relationship remained significant after destination differences were controlled for. A 10-point increase in the index was associated with 1.38 times higher odds of observing a visible sunset. Although the binary photographic outcome captures only the visual dimension of the activity, the result suggests that weather information organized around a specific activity window can identify meaningful variation in the conditions experienced during that activity.

5.2 From Activity Suitability to Tourism Business Outcomes

The revenue results also clarify the scope of an activity-specific weather index. The SVSI was not statistically significant in any of the multivariate revenue models, and observed sunset visibility was not significantly associated with revenue. These findings indicate that an index can capture activity-relevant environmental conditions without necessarily explaining downstream business performance.

This distinction is important for tourism research. Weather suitability describes whether environmental conditions are favorable for an activity, whereas revenue is determined further along the tourism process. Favorable conditions may influence participation, but their economic effect must pass through visitor attendance, time spent on-site, expenditure, pricing, capacity, bookings, and business positioning. Activity suitability and commercial performance should therefore not be treated as equivalent outcomes.

The practical role of the SVSI is consequently different from that of a revenue forecasting model. Its primary function is to translate multiple meteorological observations into activity-specific information within a relevant time window. For tourism businesses and destination organizations, such information may complement bookings, visitor flows, scheduled events, and other market indicators, but it should not be expected to predict revenue independently.

More broadly, the study suggests that weather information for tourism can be made more useful by matching both the content and the temporal resolution of an index to the activity for which it is intended. The same principle may apply to other weather-sensitive tourism activities that take place within relatively narrow periods, such as wildlife viewing, outdoor dining, short hiking excursions, beach activities, or evening events. The contribution of the SVSI therefore lies not only in sunset viewing itself, but also in demonstrating how general meteorological information can be reorganized around the requirements and timing of a specific tourism activity.

5.3 Limitations and Future Research

Several limitations should be considered when interpreting the findings. First, although the SVSI advances weather assessment toward a specific tourism activity, its current specification is designed for

sunset viewing and reflects the visual and comfort requirements of that activity. The component weights and thresholds are primarily knowledge-driven and should not be assumed to apply directly to other tourism activities. Future research could examine whether the same activity-specific framework can be adapted to activities such as wildlife viewing, outdoor dining, hiking, or beach recreation by redefining the relevant meteorological components and scoring rules.

Second, the study narrows weather assessment to a late-afternoon-to-evening window, but the fixed observations at 16:00 and 19:00 do not coincide exactly with astronomical sunset throughout the year. They provide a consistent approximation of the activity period rather than a dynamically adjusted sunset window. Future studies could use actual daily sunset times and higher-frequency meteorological observations to test whether even closer temporal alignment improves activity-specific weather assessment.

Third, station observations may not fully represent conditions at individual viewing sites. Local cloud position, coastal orientation, rainfall, and wind exposure can vary over relatively short distances. Site-level observations or higher-resolution weather data could therefore improve the spatial alignment between the index and the conditions experienced by visitors.

The photo-based criterion also captures only part of sunset-viewing suitability. Although the pooled archive of multiple long-term photographers provides complete destination – date coverage and reduces dependence on any single contributor, the binary visible/non-visible measure does not capture viewing duration, aesthetic quality, or outdoor comfort. Future research could combine standardized photographs, graded visibility measures, visitor evaluations, and on-site observations to assess a broader range of activity conditions.

Finally, the business application is based on six sampled bars in two destinations over one year. Establishment-specific characteristics cannot be fully separated from price level, and seasonality and temporal dependence are not explicitly modeled. The revenue findings should therefore be interpreted as exploratory rather than as general evidence of how weather suitability affects tourism businesses.

These limitations also indicate the broader research potential of the approach. The main contribution of the SVSI is not the claim that one fixed index can represent all tourism weather conditions, but the principle that weather suitability should be defined around the requirements of a specific activity and measured within a time window that corresponds to when that activity occurs. Future research can test the transferability of this activity- and time-specific approach across different tourism settings, activities, and temporal windows.

6 Conclusion

This study develops the Sunset-Viewing Suitability Index (SVSI) to extend weather suitability assessment to a specific tourism activity and a clearly defined activity window. Whereas operational weather information often emphasizes hazardous conditions and tourism climate indices generally assess broader destination-level suitability, the SVSI organizes meteorological information around the visual, atmospheric, and comfort requirements of sunset viewing.

The study also narrows the temporal scale of weather assessment. Rather than relying on daily or longer-period conditions, the SVSI combines observations at 16:00 and 19:00 and incorporates changes between the two times. This approach recognizes that weather suitability for short-duration tourism activities may depend on conditions within only a few hours and may therefore be obscured by broader temporal averages.

The empirical results provide preliminary criterion-related evidence for this approach. Higher SVSI values were associated with a greater likelihood of observed sunset visibility, with a 10-point increase corresponding to 1.38 times higher odds of observing a visible sunset after destination differences were controlled for. The revenue analysis, however, showed no stable association between the SVSI and dinner-period revenue, indicating that favorable activity conditions do not necessarily translate directly into business performance.

The broader contribution of the study is therefore methodological rather than commercial. Building on existing moves toward activity-specific and higher-frequency tourism weather assessment, the study shows how weather suitability can be defined around the requirements of a short-duration activity and how the assessment window can be explicitly aligned with the period in which that activity occurs. The contribution is therefore not the introduction of activity-specific or high-frequency weather assessment itself, but the integration of activity requirements and temporal alignment within a transparent suitability framework. This approach may provide a basis for developing weather suitability measures for other tourism activities whose feasibility and experience depend on conditions within narrow time windows.

Reference

Aylen, J., Albertson, K., & Cavan, G. (2014). The impact of weather and climate on tourist demand: The case of Chester Zoo. *Climatic Change*, 127, 183-197. https://doi.org/10.1007/s10584-014-1261-6

Ayscue, E. P., Curtis, S., Hao, H., & Montz, B. (2015). Forecast and weather-related information used among coastal tourism businesses. *Tourism Geographies*, 17(4), 603-626. https://doi.org/10.1080/14616688.2015.1053974

Baños-Pino, J. F., Boto-García, D., del Valle, E., & Zapico, E. (2023). Is visitors' expenditure at destination influenced by weather conditions? *Current Issues in Tourism*, 26(10), 1554-1572. https://doi.org/10.1080/13683500.2022.2058468

Becken, S. (2013). Measuring the effect of weather on tourism: A destination- and activity-based analysis. *Journal of Travel Research*, 52(2), 156-167. https://doi.org/10.1177/0047287512461569

Becken, S., & Wilson, J. (2013). The impacts of weather on tourist travel. *Tourism Geographies*, 15(4), 620-639. https://doi.org/10.1080/14616688.2012.762541

Day, J., Chin, N., Sydnor, S., & Cherkauer, K. (2013). Weather, climate, and tourism performance: A quantitative analysis. *Tourism Management Perspectives*, 5, 51-56.

de Freitas, C. R. (2003). Tourism climatology: Evaluating environmental information for decision making and business planning in the recreation and tourism sector. *International Journal of Biometeorology*, 48, 45-54. https://doi.org/10.1007/s00484-003-0177-z

de Freitas, C. R., Scott, D., & McBoyle, G. (2008). A second generation climate index for tourism (CIT): Specification and verification. *International Journal of Biometeorology*, 52, 399-407. https://doi.org/10.1007/s00484-007-0134-3

Denstadli, J. M., Jacobsen, J. K. S., & Lohmann, M. (2011). Tourist perceptions of summer weather in Scandinavia. *Annals of Tourism Research*, 38(3), 920-940. https://www.sciencedirect.com/science/article/pii/S0160738311000077

Franzoni, S., & Pelizzari, C. (2019). Rainfall financial risk assessment in the hospitality industry. *International Journal of Contemporary Hospitality Management*, 31(3), 1104-1121. https://www.emerald.com/ijchm/article/31/3/1104/122171

Gómez-Martín, M. B. (2005). Weather, climate and tourism: A geographical perspective. *Annals of Tourism Research*, 32(3), 571-591. https://doi.org/10.1016/j.annals.2004.08.004

Gómez-Martín, M. B., & Martínez-Ibarra, E. (2012). Tourism demand and atmospheric parameters: Non-intrusive observation techniques. *Climate Research*, 51, 135-145. https://doi.org/10.3354/cr01068

Gössling, S., Abegg, B., & Steiger, R. (2016). "It was raining all the time!": Ex post tourist weather perceptions. *Atmosphere*, 7(1), Article 10. https://doi.org/10.3390/atmos7010010

Hewer, M., Scott, D., & Fenech, A. (2016). Seasonal weather sensitivity, temperature thresholds, and climate change impacts for park visitation. *Tourism Geographies*, 18(3), 297-321. https://doi.org/10.1080/14616688.2016.1172662

Matthews, L., Scott, D., & Andrey, J. (2021). Development of a data-driven weather index for beach parks tourism. *International Journal of Biometeorology*, 65, 749-762. https://doi.org/10.1007/s00484-019-01799-7

Matuszko, D. (2012). Influence of cloudiness on sunshine duration. *International Journal of Climatology*, 32(10), 1527-1536. https://doi.org/10.1002/joc.2370

Matzarakis, A. (2006). Weather- and climate-related information for tourism. *Tourism and Hospitality Planning & Development*, 3(2), 99-115. https://doi.org/10.1080/14790530600938279

Mieczkowski, Z. (1985). The tourism climatic index: A method of evaluating world climates for tourism. *The Canadian Geographer / Le Géographe canadien*, 29(3), 220-233. https://doi.org/10.1111/j.1541-0064.1985.tb00365.x

Nourmohammadi, F., & Gómez-Martín, M. B. (2024). Benefits of applying hourly resolution in the assessment of the climate aptitude to manage tourist activities in arid regions. *International Journal of Biometeorology*, 68, 1573-1585. https://doi.org/10.1007/s00484-024-02685-7

Perkins, D. R., & Debbage, K. G. (2016). Weather and tourism: Thermal comfort and zoological park visitor attendance. *Atmosphere*, 7(3), Article 44. https://doi.org/10.3390/atmos7030044

Rauken, T., & Kelman, I. (2012). The indirect influence of weather and climate change on tourism businesses in northern Norway. *Scandinavian Journal of Hospitality and Tourism*, 12(3), 197-214. https://doi.org/10.1080/15022250.2012.724924

Rutty, M., & Scott, D. (2016). Comparison of climate preferences for domestic and international beach holidays: A case study of Canadian travelers. *Atmosphere*, 7(2), Article 30. https://doi.org/10.3390/atmos7020030

Scott, D., Rutty, M., Amelung, B., & Tang, M. (2016). An inter-comparison of the Holiday Climate Index (HCI) and the Tourism Climate Index (TCI) in Europe. *Atmosphere*, 7(6), Article 80. https://doi.org/10.3390/atmos7060080

Shih, C., Nicholls, S., & Holecek, D. F. (2009). Impact of weather on downhill ski lift ticket sales. *Journal of Travel Research*, 47(3), 359-372.

Steiger, R., Abegg, B., & Jänicke, L. (2016). Rain, rain, go away, come again another day: Weather preferences of summer tourists in mountain environments. *Atmosphere*, 7(5), Article 63. https://doi.org/10.3390/atmos7050063

Wilkins, E., de Urioste-Stone, S., Weiskittel, A., & Gabe, T. (2018). Effects of weather conditions on tourism spending: Implications for future trends under climate change. *Journal of Travel Research*, 57(8), 1042-1053. https://doi.org/10.1177/0047287517728591

Table 1 Variable Definitions

Variable	**Definition**	**Unit**
SVSI	Sunset Viewing Suitability Index (0-100)	Score
Revenue_total	Total dinner-period revenue	THB
Revenue_bar1	Dinner-period revenue of low-price bar	THB
Revenue_bar2	Dinner-period revenue of medium-price bar	THB
Revenue_bar3	Dinner-period revenue of high-price bar	THB
Weekend	Saturday or Sunday = 1	Dummy
Holiday	Thai public holiday = 1	Dummy
Destination	1 = Koh Samui; 2 = Krabi	Categorical
Sunset_visible	Observable sunset = 1; non-observable sunset = 0	Binary

Note. Sunset visibility was coded from pooled dated photographic series contributed by multiple long-term photographers. A value of 0 represents photographic evidence of non-observable conditions rather than the absence of photographs from an individual photographer.

Table 2 Descriptive Statistics

Variable	**N**	**Mean**	**SD**	**Minimum**	**Maximum**
SVSI	730	88.21	12.15	20.00	100.00
Sunset visible	730	0.684	0.465	0	1
Total revenue (THB)	730	81,817.53	11,743.41	51,941	114,233
Low-price bar revenue (THB)	730	17,403.35	3,785.16	10,029	25,000
Medium-price bar revenue (THB)	730	27,276.66	6,079.97	16,000	39,969
High-price bar revenue (THB)	730	37,137.52	8,353.16	22,155	54,915
Weekend	730	0.285	0.452	0	1
Public holiday	730	0.071	0.257	0	1
Destination	730	1.500	0.500	1	2

Note. Revenue is measured in Thai baht (THB). Sunset visible is coded 1 for an observable sunset and 0 for a non-observable sunset. Destination is coded 1 = Koh Samui and 2 = Krabi.

Table 3 Pearson Correlation Matrix

Variable	1	2	3	4	5	6	7	8	9
SVSI	1.000								
Sunset visible	.144***	1.000							
Log total revenue	.117**	−.032	1.000						
Log low-price revenue	.084*	−.024	.397***	1.000					
Log medium-price revenue	.097**	−.050	.619***	.098**	1.000				
Log high-price revenue	.056	.000	.770***	.031	.100**	1.000			
Weekend	−.030	−.021	.009	.014	.016	−.007	1.000		
Public holiday	.012	−.041	.064	.013	.024	.074*	−.057	1.000	
Destination	−.291***	.091*	−.453***	−.299***	−.383***	−.222***	.000	.000	1.000

Note. N = 730. Lower-triangular Pearson correlations are reported. Correlations involving binary variables are point-biserial equivalents. Sunset visible is coded 1 = observable and 0 = non-observable; destination is coded 1 = Koh Samui and 2 = Krabi. * p < .05, ** p < .01, *** p < .001.

Table 4 Logistic Regression Results for Observed Sunset Visibility

Variable	Model 1	Model 2
SVSI	0.0240*** (0.0066)	0.0321*** (0.0074)
Krabi	—	0.6499*** (0.1767)
Constant	−1.3325* (0.5807)	−2.3561*** (0.6872)
Observations	730	730
Destination indicator	No	Yes

Note. The dependent variable is sunset visibility (1 = observable, 0 = non-observable). Coefficients are reported with robust standard errors in parentheses. Koh Samui is the reference destination. * p < .05, ** p < .01, *** p < .001.

Table 5 Regression Results for Log Dinner-Period Revenue

Variable	Total revenue	Low-price bar	Medium-price bar	High-price bar
SVSI	−0.0002 (0.0004)	−0.0001 (0.0007)	−0.0003 (0.0007)	−0.0002 (0.0007)
Weekend	0.0040 (0.0102)	0.0076 (0.0173)	0.0084 (0.0174)	−0.0017 (0.0183)
Public holiday	0.0368* (0.0187)	0.0121 (0.0302)	0.0224 (0.0289)	0.0662* (0.0297)
Krabi	−0.1333*** (0.0099)	−0.1357*** (0.0171)	−0.1764*** (0.0164)	−0.1040*** (0.0171)
Constant	11.3823*** (0.0381)	9.8091*** (0.0620)	10.2989*** (0.0646)	10.5624*** (0.0658)
Observations	730	730	730	730
R^2	0.2100	0.0896	0.1478	0.0548

Note. The dependent variables are natural-log transformations of dinner-period revenue. Coefficients are reported with robust standard errors in parentheses. All models include weekend, public-holiday, and destination indicators. Koh Samui is the reference destination. * p < .05, ** p < .01, *** p < .001.

Appendix A. Complete SVSI Scoring Rules

Component	Measurement	Scoring rule	Maximum score
Visibility	Visibility in km	≥10: 25; 8-<10: 22; 5-<8: 16; 3-<5: 8; <3: 0	25
Cloud conditions	METAR cloud codes	FEW/SCT: 30; CLR/SKC/NSC/CAVOK: 24; BKN: 12; OVC: 3; VV: 0; other or missing: 15	30
Weather phenomena	METAR weather codes	No adverse weather: 20; BR/HZ: 10; −RA: 9; SHRA/−SHRA: 6; RA: 4; thunderstorm, heavy rain, or FG: 0; missing: 10	20
Wind speed	Wind speed in m/s	≤3: 10; >3-5: 9; >5-8: 6; >8-12: 3; >12: 0	10
Fog risk	(T-T_d) in °C	≥5: 10; 3-<5: 8; 2-<3: 5; 1-<2: 2; <1: 0	10
Thermal comfort	Air temperature in °C	23-30: 5; 20-<23 or >30-32: 4; 18-<20 or >32-34: 2; <18 or >34: 0	5

Notes: When the temperature-dew point spread was unavailable, relative humidity was used to estimate fog risk: <70% = 10; 70-<80% = 8; 80-<90% = 5; 90-<95% = 2; and ≥95% = 0. Missing visibility, wind-speed, fog-risk, and temperature observations received 12.5, 5, 5, and 3 points, respectively. Thunderstorms, heavy rain, fog, vertical visibility, visibility below 3 km, or wind speed above 12 m/s capped the single-time score at 30.

Appendix B. Trend-Adjustment Rules

Rule	Trigger condition	Adjustment
Visibility improvement	Visibility increases by at least 3 km	+4
Visibility deterioration	Visibility decreases by at least 3 km	−5
Cloud improvement	Cloud-condition score increases by at least 10 points	+4
Cloud deterioration	Cloud-condition score decreases by at least 10 points	−5
Humidity increase	Relative humidity increases by at least 15 percentage points	−3
Humidity decrease	Relative humidity decreases by at least 10 percentage points	+2
Wind-speed increase	Wind speed increases by at least 4 m/s	−3
Wind-speed decrease	Wind speed decreases by at least 3 m/s	+2
Rain cessation	Rain is present at 16:00 but absent at 19:00	+5
Rain onset	Rain is absent at 16:00 but present at 19:00	−6

Notes: When both observations were available, the daily base score was calculated as $TS_{it} = 0.35S_{it,16} + 0.65S_{it,19}$. Applicable trend adjustments were added together and restricted to the range of −15 to +15 points. The resulting SVSI was bounded between 0 and 100. If severe weather occurred at 19:00, the final daily score was capped at 30. When only the 19:00 observation was available, its score was multiplied by 0.85; when only the 16:00 observation was available, its score was multiplied by 0.65.

Appendix C. Selected Raw Meteorological Records for Reproducing the SVSI

Table C1. Meteorological observations at 16:00 and 19:00

Date	Destination	Station	Local time	Air temperature (°C)	Dew point (°C)	Relative humidity (%)	Wind speed (m/s)	Visibility (km)	Cloud conditions	Weather phenomena	Raw METAR
2025-01-01	Krabi	VTSG	16:00	32	22	55.53	2.058	≥10	FEW at 4,000 ft	None	VTSG 010900Z 04004KT 010V100 9999 FEW040 32/22 Q1008 NOSIG
2025-01-01	Krabi	VTSG	19:00	27	23	78.76	1.543	≥10	FEW at 4,000 ft	None	VTSG 011200Z 03003KT 010V070 9999 FEW040 27/23 Q1009 NOSIG
2025-01-01	Koh Samui	VTSM	16:00	30	23	66.15	4.116	≥10	FEW at 2,000 ft	None	VTSM 010900Z 05008KT 010V080 9999 FEW020 30/23 Q1009 NOSIG
2025-01-01	Koh Samui	VTSM	19:00	28	23	74.28	2.572	≥10	FEW at 2,000 ft	None	VTSM 011200Z 02005KT 9999 FEW020 28/23 Q1010 NOSIG
2025-01-02	Krabi	VTSG	16:00	33	22	52.48	2.058	≥10	FEW at 4,000 ft	None	VTSG 020900Z 06004KT 340V130

Date	Destination	Station	Local time	Air temperature (°C)	Dew point (°C)	Relative humidity (%)	Wind speed (m/s)	Visibility (km)	Cloud conditions	Weather phenomena	Raw METAR
2025-01-02	Krabi	VTSG	19:00	28	23	74.28	3.087	≥10	FEW at 4,000 ft	None	9999 FEW040 33/22 Q1007 NOSIG
2025-01-02	Koh Samui	VTSM	16:00	31	23	62.47	4.630	≥10	FEW at 2,000 ft	None	VTSG 021200Z 02006KT 340V070 9999 FEW040 28/23 Q1009 NOSIG
2025-01-02	Koh Samui	VTSM	19:00	28	23	74.28	2.572	≥10	FEW at 2,000 ft	None	VTSM 020900Z 05009KT 9999 FEW020 31/23 Q1009 NOSIG
2025-01-03	Krabi	VTSG	16:00	34	23	52.73	2.572	≥10	FEW at 3,000 ft	None	VTSM 021200Z 04005KT 9999 FEW020 28/23 Q1010 NOSIG
2025-01-03	Krabi	VTSG	19:00	28	23	74.28	3.601	≥10	FEW at 3,000 ft;	None	VTSG 030900Z 01005KT 320V040 9999 FEW030 34/23 Q1008 NOSIG
											VTSG 031200Z

Date	Destination	Station	Local time	Air temperature (°C)	Dew point (°C)	Relative humidity (%)	Wind speed (m/s)	Visibility (km)	Cloud conditions	Weather phenomena	Raw METAR
									BKN at 4,000 ft		01007KT 9999 FEW030 BKN040 28/23 Q1009 NOSIG
2025-01-03	Koh Samui	VTSM	16:00	30	23	66.15	5.659	≥10	FEW at 2,000 ft	None	VTSM 030900Z 01011KT 9999 FEW020 30/23 Q1010 NOSIG
2025-01-03	Koh Samui	VTSM	19:00	28	23	74.28	4.116	≥10	FEW at 2,000 ft	None	VTSM 031200Z 01008KT 9999 FEW020 28/23 Q1011 NOSIG

Table C2. Reported daily SVSI values for comparison

Date	Destination	Station	Reported SVSI
2025-01-01	Krabi	VTSG	95.4
2025-01-01	Koh Samui	VTSM	99.6
2025-01-02	Krabi	VTSG	95.3
2025-01-02	Koh Samui	VTSM	99.3
2025-01-03	Krabi	VTSG	78.6
2025-01-03	Koh Samui	VTSM	98.0

Notes: All times are reported in Thailand local time (UTC+7), whereas the time groups in the raw METAR reports are given in UTC. For all observations presented, the actual observation time coincided with the target time, resulting in a time difference of zero minutes. The METAR visibility code 9999 denotes visibility of at least 10 km. Relative humidity was calculated from the reported air temperature and dew-point temperature, and wind speed was converted from knots to metres per second. No adverse present-weather codes were reported for the selected observations. When multiple cloud layers were present, the cloud-condition score was based on the most restrictive layer, defined as the layer receiving the lowest applicable score. The reported daily SVSI values can be reproduced using the component scoring rules in Appendix A, the time

weights of 0.35 and 0.65, and the trend-adjustment rules in Appendix B.

