Algorithm, Competitive Landscape & Vision

India's First Native Sunrise Quality Forecast Starting from Chennai & ECR South

Seaside Beacon
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THE PROBLEM

Every morning, thousands of photographers, surfers, and early risers along Chennai's coastline face the same question: will tomorrow's sunrise be worth waking up for? The answer has traditionally been a coin flip. Check the weather app for cloud cover, maybe glance at humidity, and hope for the best. There has never been a reliable, science backed way to predict sunrise quality in India.

Seaside Beacon was built to solve this. Launched in February 2026, it is India's first platform dedicated entirely to forecasting sunrise quality using a multi factor atmospheric scoring algorithm, real time weather data, and generative AI, purpose built for the unique meteorological conditions of the Bay of Bengal coastline.

> *I built this because I kept showing up at the beach at 6 AM only to be greeted by a flat grey sky. After the third time in a row, I thought, there has to be a better way. Turns out there wasn't, at least not for India.*
>
> *So I made one.*

THE SCORING ALGORITHM

At the heart of Seaside Beacon is a proprietary 9 factor scoring model (v5.6, with multi-region architecture, physics corrections, and MOS auto-calibration) that produces a sunrise quality score from 0 to 100. The algorithm draws from atmospheric physics research, particularly Corfidi's work on sunset coloration and NOAA's observational studies, adapted and calibrated specifically for the tropical maritime climate of southeastern India.

Each factor is scored independently and then combined, with synergy adjustments that reward or penalize based on how atmospheric conditions interact with each other. The model is not a simple weighted average; it accounts for non linear relationships between aerosol scattering, cloud layer distribution, and humidity in ways that reflect real atmospheric optics.

The Nine Factors

The scoring model evaluates nine atmospheric variables, each chosen for its demonstrated correlation with sunrise color quality.

While the exact weights are proprietary, the factors, ranked by their influence on the final score, are as follows:

FACTOR	WHAT IT MEASURES	WHY IT MATTERS
Multi Level Clouds	Cloud distribution across high, mid, and low altitude layers	Where clouds sit determines which ones catch and scatter light versus block it
Cloud Cover	Total sky coverage percentage	The optimal range is partial coverage, enough canvas for color, enough gaps for light
Aerosol Optical Depth	Particle density in the atmosphere (dust, pollution, sea salt)	The single strongest predictor of color intensity via Mie scattering physics
Humidity	Atmospheric moisture content	Drier air produces more vivid colors; Chennai's baseline of 85 to 92% makes this critical
Pressure Trend	Barometric change from midnight to sunrise	Falling pressure after a clearing front often precedes dramatic skies
Visibility	Ground level atmospheric clarity	Confirms whether aerosol levels are in the sweet spot or have tipped into haze
Wind Speed	Surface wind velocity	Moderate winds create dynamic cloud movement; calm or excessive wind both reduce quality
Weather Conditions	Active precipitation or storms	Acts as a go or no go gate; active rain overrides all other factors
Solar Angle	Seasonal sun position at 13°N latitude	Lower winter angles increase the atmosphere's color filtering path length

Intelligent Adjustments

Beyond individual factor scores, the algorithm applies two key adjustments. The first is a synergy bonus (or penalty) that fires when humidity, cloud structure, and visibility align in ways that amplify color, or conflict in ways that suppress it, such as fog conditions. The second is a post rain bonus that detects overnight rainfall, which washes aerosols from the atmosphere and often sets the stage for exceptionally clean, vivid sunrises the following morning.

The Verdicts

The final score maps to a six tier verdict system designed to give users an immediate, actionable recommendation: Excellent (set that alarm), Very Good (worth the wake up), Good (pleasant but not dramatic), Fair (mostly flat sky), Poor (washed out and grey), or Unfavorable (save your sleep). Each verdict comes with a clear go, maybe, or skip recommendation.

Calibration & Validation

The algorithm is continuously calibrated against real world observations. A comprehensive test suite of 240 assertions validates every scoring pathway, edge case, and degradation scenario. For non-Chennai beaches, a MOS (Model Output Statistics) auto-calibration system collects predicted-vs-observed weather deltas daily, computes rolling bias corrections after 14+ days of data, and applies them automatically before scoring runs. Seven safeguards protect correction quality: minimum data thresholds, per-variable correction caps, confidence ramp-in, IQR-based outlier exclusion, exponential recency weighting, regime shift detection, and staleness checks. Ground truth calibration also uses actual sunrise photographs submitted by the community, compared against predicted scores to identify systematic biases. When a user reports "that was an incredible sunrise but you gave it a 55," we investigate, and the model gets smarter.

> *The hardest part wasn't building the algorithm; it was calibrating it. Chennai's coastal humidity makes it behave differently from anything built for temperate climates. Every Western model I studied assumed dry baselines. I had to rethink the humidity curve from scratch for a city where 88% humidity is a normal Tuesday.*

DATA INFRASTRUCTURE

Accurate predictions require accurate data. Seaside Beacon ingests weather information from two independent sources, each selected for specific strengths, with an intelligent failover system that ensures predictions are always available even when a data source goes down.

The primary data pipeline uses satellite derived atmospheric models for cloud layer distribution, pressure trends, and aerosol measurements. These are variables that require volumetric atmospheric data rather than surface observations. A secondary pipeline provides high resolution hourly surface forecasts for wind, visibility, precipitation, and sunrise timing. When the two sources disagree, the system uses whichever has higher resolution for that particular measurement.

Aggressive caching ensures the platform remains responsive while minimizing API costs. Prediction level caching eliminates duplicate computations, and a stale cache fallback means users always see a result, even during upstream outages. The entire data infrastructure runs on a monthly operational cost of approximately INR 275, a testament to efficient architecture.

> *I spent more time on the caching layer than I'd like to admit. When you're running on free tiers and bootstrapping every rupee, you learn to make every API call count. The stale cache fallback was born from a 3 AM outage where Open Meteo went down and I had nothing to show users.*
>
> *Never again.*

THE AI LAYER

While the scoring algorithm produces the numerical forecast, Seaside Beacon's generative AI layer transforms those numbers into rich, human readable narratives. Every prediction includes a natural language atmospheric analysis, a visual description of what the sky will look like, a personalized recommendation on whether it's worth the early alarm, and for premium users, detailed photography guidance with camera settings.

The AI system uses a three tier failover architecture across multiple language model providers, ensuring that narrative generation never fails. If the primary model is rate limited or unavailable, the system cascades to a secondary and then tertiary provider seamlessly. As a final safety net, a deterministic rule based generator produces structured content from weather conditions alone, no AI required. This guarantees 100% uptime on content generation regardless of external provider availability.

Premium subscribers also get access to a Telegram based AI chatbot that answers sunrise and photography questions in real time, maintaining conversational context for a natural back and forth experience.

COMPETITIVE LANDSCAPE

The sunrise and sunset quality prediction space is small but established, dominated by a handful of Western built tools. Understanding where each competitor sits, and where the gaps are, informed every design decision in Seaside Beacon.

PLATFORM	ORIGIN	COVERAGE	MODEL	PRICING
SunsetWx	USA	Global (4km NAM US, 13km GFS intl)	3 core factors (moisture, pressure, clouds)	Free API / B2B licensing
Alpenglow	USA	Global (own evolving model)	Own evolving model (formerly SunsetWx), 4 day forecast	Free app, Pro $2.99/mo or ~$20/yr
Skyfire / TPE	Canada	US lower 48, S. Canada, Europe	Proprietary cloud color overlay	~INR 2,500/yr ($29.99 USD)
SkyCandy	USA	Global (own evolving model)	SunsetWx API + local weather	~INR 250/mo ($2.99 USD)
Sunsethue	Netherlands	Global	Ray based light reach model	Free (premium alerts planned)
VIEWFINDR	Germany	Europe focused	DWD model, 3D cloud analysis	€2.99–3.99/mo or €34.99–44.99/yr
Seaside Beacon	India	Chennai & ECR South (5 beaches, expanding)	9 factor + synergy + MOS auto-calibration + AI narrative	Free tier + INR 49/mo premium

Key Observations

Several patterns emerge from this landscape. First, nearly every existing solution is built in and for Western markets. SunsetWx's NAM model covers the US at 4km resolution, but drops to 13km GFS for everything else, including India. Skyfire doesn't cover South or Southeast Asia at all. VIEWFINDR is essentially a European product. There is no dedicated sunrise prediction service operating in India, Southeast Asia, or the broader tropical maritime climate zone.

Second, most competitors focus on a single output: a color coded map or a percentage score. They tell you how vivid the sunset might be, but not what the sky will actually look like, when to arrive, what camera settings to use, or whether the drive to the coast is worth your time. The experience begins and ends with a number.

Third, the ecosystem's independence is mixed. SkyCandy still relies on SunsetWx's Sunburst API, making its prediction accuracy fundamentally identical to SunsetWx. Alpenglow, which was originally powered by SunsetWx for nearly a decade, now claims its own "continuously evolving forecast model" and no longer credits SunsetWx in its App Store listing — though the degree of true independence is unclear. Seaside Beacon and VIEWFINDR are the only platforms in this space with fully transparent, independently developed scoring models.

Fourth, pricing is skewed toward Western purchasing power. Skyfire runs $29.99/yr (and has pulled web subscriptions as of February 2025, signaling a possible wind-down), SkyCandy $2.99/mo, and VIEWFINDR €2.99–3.99/mo or €34.99–44.99/yr. Alpenglow Pro is $2.99/mo or ~$20/yr. None of these products are priced or designed for the Indian market.

> *When I started researching competitors, I expected to find at least one service covering Indian beaches. I found zero. Not one. That's when I knew this wasn't just a side project; it was filling an actual gap.*

COMPETITIVE RANKING

To place Seaside Beacon in context, the following ranking evaluates every major sunrise and sunset prediction platform across six dimensions that matter most to end users. Each dimension is scored on a scale of 1 to 10. The ranking is transparent about methodology, and scores are based on publicly verifiable facts.

Important context: SkyCandy still sources prediction data from SunsetWx's Sunburst API. Alpenglow historically relied on SunsetWx but now claims its own evolving model — it lists aerosol concentration, multi-altitude clouds, humidity, and pressure as factors, and no longer credits SunsetWx. Additionally, Skyfire has pulled web subscriptions as of February 2025 and is only available as an iOS in-app purchase, suggesting a gradual wind-down. All platforms are ranked separately because their user experience, pricing, and feature sets differ meaningfully.

#	PLATFORM	ALGO	COVERAGE	OUTPUT	UX	ACCURACY	VALUE
1	**Seaside Beacon**	9	5	10	8	7	10
2	**VIEWFINDR**	9	5	8	7	8	6
3	**SunsetWx**	7	9	4	5	7	8
4	**Skyfire / TPE**	7	6	6	7	7	5
5	**Alpenglow**	8	8	5	8	7	7
6	**Sunsethue**	5	9	5	7	5	9
7	**SkyCandy**	7	6	5	6	7	4

Ranking Methodology

Algorithm Sophistication (ALGO) measures the number of independent atmospheric factors, handling of non linear interactions, and regional calibration. Seaside Beacon earns a 9 for its 9 factor model with synergy adjustments, tropical calibration, and MOS auto-calibration that self-tunes new beaches using predicted-vs-observed ERA5 verification — the only model built for maritime tropical conditions and the only one with automated bias correction. VIEWFINDR also earns a 9 for its 3D volumetric cloud analysis using high resolution DWD data, which is the most technically advanced visual approach in the space. Alpenglow scores 8: it has transitioned from SunsetWx dependency to its own evolving model that now lists aerosol concentration, multi-altitude clouds, humidity, and pressure as factors, though the model's inner workings remain opaque. SunsetWx and SkyCandy score 7: SunsetWx's model uses three core factors (moisture, pressure, clouds) with data from all tropospheric levels, and SkyCandy inherits this via the Sunburst API. Skyfire scores 7 with its proprietary cloud color overlay, though its future is uncertain after pulling web subscriptions in February 2025. Sunsethue's ray based approach is simpler, scoring a 5, as its whitepaper confirms cloud cover is the main variable with only humidity and sunset duration as post-processing adjustments.

Geographic Coverage (COVERAGE) reflects where the platform delivers usable predictions. SunsetWx and Sunsethue offer the widest reach, both scoring 9, with global coverage (though SunsetWx's resolution drops from 4km NAM to 13km GFS outside the US). Alpenglow scores 8 with global coverage via GFS data in its own model. Skyfire and SkyCandy score 6, covering US, southern Canada, and Europe (Skyfire, though web subscriptions were pulled in February 2025) or relying on SunsetWx's variable global quality (SkyCandy). VIEWFINDR scores 5, focused primarily on Europe with DWD data. Seaside Beacon scores 5 with five beaches across two regions (Chennai and ECR South), with multi-region expansion underway and MOS auto-calibration eliminating the manual tuning bottleneck for new cities.

Output Richness (OUTPUT) evaluates what the user receives beyond a score. Seaside Beacon earns a 10 as the only platform combining a numerical score with AI generated atmospheric narratives, sky descriptions, go or skip verdicts, photography guidance, DSLR and mobile camera settings, and beach specific composition advice. VIEWFINDR scores 8 with rich photographer metadata including fog layers, water reflections, aurora forecasts, and drone conditions. Skyfire scores 6 with color overlays on TPE's ephemeris maps. SunsetWx (4), Alpenglow (5), SkyCandy (5), and Sunsethue (5) primarily deliver a score or color map with limited context.

User Experience (UX) considers interface quality, notification systems, and platform accessibility. Alpenglow scores 8 for its polished native app with AR sun path visualization and automatic alarm scheduling. Seaside Beacon scores 8 with daily emails, push notifications, Telegram assistant, and responsive web dashboard. Sunsethue scores 7 with a clean, minimal web interface. VIEWFINDR and Skyfire score 7 for functional but photographer oriented interfaces. SkyCandy scores 6 with reported stability issues in recent app updates. SunsetWx scores 5 as its map based web interface is functional but dated.

Accuracy Validation (ACCURACY) assesses published accuracy metrics and validation methodology. SunsetWx claims 87% accuracy, which propagates to Alpenglow and SkyCandy since they use identical prediction data; all three score 7 (the claim is self reported and methodology is not publicly detailed). VIEWFINDR reports 80% forecast accuracy against DWD model verification, scoring 8 for using an independent, well documented weather service as its benchmark. Seaside Beacon scores 7 with 240 test assertions, community photo based ground truth calibration, and an automated MOS verification pipeline that compares daily predictions against ERA5 observed weather, though as a newer platform its validation dataset is still growing. Skyfire scores 7 based on user reported reliability. Sunsethue scores 5 as it publishes no formal accuracy metrics and is still in beta (v0.10.2), though it transparently provides an uncertainty indicator with each forecast.

Value (VALUE) considers features received relative to price. Seaside Beacon earns a 10: the free tier includes full scoring, AI narratives, atmospheric analysis, and daily emails, while premium at INR 49/mo adds 7 day forecasts, photography guidance, and AI assistant. Sunsethue scores 9 as a fully free global service. SunsetWx scores 8 with free API access. Alpenglow scores 7 (free app, Pro at $2.99/mo or ~$20/yr with family sharing). VIEWFINDR scores 6, now priced at €2.99–3.99/mo or €34.99–44.99/yr — reasonable for the depth of photographer-specific data it provides.

Skyfire scores 5 at $29.99/yr, though its future is uncertain with web subscriptions discontinued. SkyCandy scores 4 at $2.99/mo with limited free tier (3 forecasts/day).

Where Seaside Beacon Stands

Seaside Beacon ranks the best overall, now tied with VIEWFINDR at 9 for algorithm sophistication. This is an honest assessment: VIEWFINDR's 3D volumetric cloud modeling using DWD's high resolution data remains the most technically advanced visual approach in the market, and their accuracy validation against a national weather service gives them an edge in credibility. Seaside Beacon's MOS auto-calibration — the only automated bias correction system in the space — closes the algorithm gap by giving it a self-improving capability that no competitor offers.

However, Seaside Beacon leads the field decisively in output richness and value. No other platform combines a multi factor algorithm with AI generated narratives, camera settings, beach specific advice, and community validation in a single product. And no other platform delivers this much at INR 49 per month. The tropical climate calibration gives it a scientific edge that no Western built model can match for its target geography.

Where Seaside Beacon Trails

The most significant gap is geographic coverage. With five beaches across two regions today, the platform has begun its multi-region expansion but cannot yet compete with SunsetWx's or Sunsethue's global reach. This is the primary focus of the Phase 2 and Phase 3 roadmap. As coverage expands to Pondicherry, Visakhapatnam, Puri, and eventually all major Indian coastal cities, the coverage score will improve substantially. The dynamic single-source architecture introduced in v5.4 and enhanced with MOS auto-calibration in v5.6 makes adding new beaches trivial — a single config entry automatically propagates to all models, routes, API endpoints, and frontend components. The second gap is accuracy validation maturity. As the community photo dataset grows and formal accuracy tracking launches in Phase 1, this score will also strengthen.

> *I'm not going to claim we're the best at everything. VIEWFINDR's 3D cloud tech is genuinely impressive, and SunsetWx has years of data behind them. But within our coverage area, I'm confident we deliver the best sunrise prediction experience available anywhere. The plan is to take that depth and scale it.*

WHAT MAKES SEASIDE BEACON DIFFERENT

1. Tropical Climate Calibration

Every competitor's model was built for temperate, mid latitude climates where 60% humidity is considered "high." Chennai and the ECR South coast sit at 12–13°N with a baseline humidity of 85 to 92% and coastal aerosol dynamics driven by the Bay of Bengal. Seaside Beacon's scoring curves, optimal ranges, and synergy conditions are calibrated specifically for this environment.

The v5.6 multi-region architecture fetches independent weather data per beach coordinates, so Mahabalipuram (60 km south) receives its own GFS grid cell data rather than sharing Chennai's. In v5.6, non-Chennai beaches also benefit from MOS (Model Output Statistics) auto-calibration, which collects predicted-vs-observed weather deltas daily and applies rolling bias corrections automatically after 14+ days of data, eliminating the need for months of manual tuning per location. The humidity scoring alone required a complete rethink of the relationship between moisture and color saturation at tropical baselines.

2. Full Experience Narratives, Not Just Numbers

A score of 72 is meaningless without context. Seaside Beacon wraps every prediction in an AI generated narrative that describes what the sky will look like, what colors to expect, when to arrive, and whether it's worth the effort, in plain, friendly language. Premium users get photography specific guidance: optimal camera settings, composition suggestions tailored to each beach's geography, and post processing recommendations based on atmospheric conditions. No other platform does this.

3. Beach Specific Intelligence

Each of Seaside Beacon's five beaches has distinct geographical features: Marina's lighthouse and fishing boats, Covelong's rock formations and surf break, Elliot's quieter urban shoreline, Thiruvanmiyur's tidal pools, and Mahabalipuram's UNESCO World Heritage Shore Temple with ancient boulder formations. The platform understands these differences and tailors both its descriptions and photography advice to the specific terrain, not just the weather overhead. Each beach has its own coordinates feeding into independent GFS grid cells, so forecasts reflect genuinely local atmospheric conditions rather than a single city-wide prediction.

4. Accessibility First Pricing

The free tier includes full sunrise scoring, atmospheric analysis, community photo gallery, and daily email forecasts, features that competitors charge for. Premium unlocks 7 day forecasts, photography guidance, evening previews, and special alerts at INR 49 per month or INR 399 per year. This is 5 to 10x more affordable than Western alternatives, intentionally priced for the Indian market while remaining sustainable on razor thin infrastructure costs.

5. Community Driven Accuracy

Users submit sunrise photographs that are compared against the algorithm's predictions, creating a continuous feedback loop. This ground truth validation is unique to Seaside Beacon. Most competitors rely on satellite derived accuracy metrics rather than actual human experience of the sunrise. When the algorithm says "78, Very Good" and community photos show a flat grey sky, the model learns.

> *The community aspect wasn't planned; it emerged. Early users started sending me their sunrise photos on Telegram, saying "hey, your score was spot on today" or "you missed this one." That feedback became the most valuable calibration data I have. It's now a core feature.*

TECHNOLOGY & ARCHITECTURE

Seaside Beacon is built for reliability and cost efficiency, with a dynamic multi-region architecture introduced in v5.4 and enhanced in v5.6. All beach definitions — names, coordinates, AccuWeather location keys, GFS grid cells, region assignments, and photography context — are derived from a single source of truth (the BEACHES configuration object). Adding a new beach requires only one config entry; all database models, API routes, frontend dropdowns, and admin dashboards dynamically adapt with zero code changes. The backend runs on Node.js with Express, hosted on Render's free tier. The frontend is vanilla JavaScript served through Vercel's CDN for global edge delivery. MongoDB Atlas handles persistence, Razorpay processes payments in INR, and Firebase Cloud Messaging powers push notifications. The Telegram bot provides real time AI chat for premium subscribers.

Email delivery uses a dual provider failover system (Brevo primary, SendGrid backup) to ensure morning forecasts always reach subscribers. The AI narrative layer cascades across three model providers plus a deterministic fallback, guaranteeing content generation regardless of external service availability. A daily MOS verification pipeline at 7:30 AM IST fetches ERA5 reanalysis data from Open-Meteo's Archive API, compares it against the morning's predictions, and feeds the deltas into a rolling correction engine that auto-calibrates non-Chennai beaches.

The entire platform operates at approximately INR 275 per month in infrastructure costs, with the majority allocated to a single paid weather data subscription. Every architectural decision was made with bootstrapped sustainability in mind: free tiers where possible, intelligent caching to minimize API calls, and graceful degradation at every layer.

EARLY TRACTION

Seaside Beacon launched in February 2026. Despite being in its earliest phase with zero marketing spend, the platform has demonstrated promising organic traction and recently completed its first geographic expansion with the addition of Mahabalipuram Beach (ECR South region) in March 2026:

Daily active engagement from Chennai based photographers and beachgoers. A growing community photo gallery with user submitted sunrise images. Premium conversions driven entirely by word of mouth. Positive user feedback on prediction accuracy, with several users reporting the algorithm "nailed" their sunrise experience. An engaged Telegram community of premium subscribers actively providing feedback.

The current focus remains on proving accuracy and building trust with the Chennai photography community before investing in marketing.

VISION & ROADMAP

Seaside Beacon's vision is to become the definitive sunrise and sunset quality platform for India and Southeast Asia, a region with over 7,500 kilometers of coastline, a massive photography community, and zero dedicated prediction services.

Phase 1: Marketing & Accuracy (Q2 2026)

With the core product stable and the algorithm validated against real world conditions, the next step is building awareness. This phase focuses on Instagram content strategy, Reddit community engagement in photography and Chennai focused subreddits, SEO targeting sunrise forecasting keywords, and formal accuracy tracking to build public confidence in the predictions.

Phase 2: Geographic Expansion (Q3 2026)

The platform expands to new coastal cities: Pondicherry, Visakhapatnam, and Puri. The v5.6 multi-region architecture has already proven this path with the successful addition of Mahabalipuram (ECR South region) as the first beach outside the original Chennai cluster, with its own independent AccuWeather location key and unique GFS grid cell. Each new city requires only a config entry per beach plus region-specific AccuWeather key verification. The MOS auto-calibration system means new beaches self-tune their forecast accuracy within 14 to 28 days of data collection, eliminating the months of manual calibration that Chennai required. The scoring model, AI layer, and notification systems are fully region-agnostic by design.

Phase 3: Multi City Platform (Q4 2026)

A redesigned frontend supporting multiple cities, and early development of a React Native mobile app. The web platform transitions from a Chennai specific tool to a broader Indian coastal forecast network.

Phase 4: Scale (2027+)

Coverage expands to all major Indian coastal cities, followed by Southeast Asian markets (Sri Lanka, Thailand, Indonesia, Vietnam). API licensing enables third party integrations with travel apps, hotel booking platforms, and photography tour operators. The long term play is becoming the weather data layer for sunrise dependent experiences across the tropics.

> *I think about this a lot: the global sunrise prediction space was built by people in North America and Europe, for North America and Europe. There are hundreds of millions of people living along tropical coastlines who have never had a tool like this. Seaside Beacon is starting in Chennai because that's my home. But the ambition is much bigger.*

WHY THIS MATTERS

Seaside Beacon sits at the intersection of atmospheric science, artificial intelligence, and the deeply human experience of watching a sunrise. It's a product that takes something millions of people care about, "will tomorrow's sunrise be beautiful?", and answers it with rigorous science, delivered through warm, accessible technology.

The market opportunity is real: an underserved region, a proven product category with established Western precedent, a unique technical approach calibrated for tropical climates, and a pricing model designed for accessibility. The foundation is built. The algorithm works. The community is growing.

What comes next is scale.

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