

Tarakan as a Tourism Gateway: Integrating Coastal and Inland Destinations in North Kalimantan

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Abstract. Tarakan is a small island city whose tourism potential combines mangrove conservation, Tidung cultural heritage, colonial and World War II history, coastal festivals, and distinctive gastronomy, while complementary ecological and cultural resources are dispersed across inland North Kalimantan. The principal planning problem is the weak integration of these assets into a coherent regional destination system. This study aims to develop and assess a Tarakan-centered tourism gateway model that links coastal and inland destinations through the 4A dimensions of Attractions, Accessibility, Amenities, and Ancillary services. A strategic destination-synthesis approach was used to examine a structured indicator matrix, spatial and thematic destination characteristics, cultural-event timing, and a phased regional roadmap. The assessment shows that conservation and cultural attractions provide a strong foundation for regional integration, whereas accommodation, gastronomy-related quality assurance, institutional capacity, creative-economy support, selected access functions, and destination digitalization remain comparatively less mature. The integrated model positions Tarakan as an interpretive and service gateway connecting heritage, ecotourism, community tourism, festivals, gastronomy, and inland adventure products. The proposed roadmap prioritizes event-calendar coordination, guide and community capacity, service and digital strengthening, and proportionate visitor-risk management. The findings imply that destination competitiveness in a peripheral island-border setting depends less on adding isolated attractions than on coordinating complementary products, support services, local institutions, and community benefits across the regional tourism system.

Keywords: Tarakan, Tourism Gateway, Destination Integration, Sustainable Tourism, North Kalimantan

1 Introduction

Island and border-region tourism requires planning frameworks that connect differentiated resources within a single destination system. Small islands are not defined only by attractions because competitiveness is also shaped by governance, community participation, service capacity, resilience, and links between local identity and wider regional tourism networks [1]. Comparative evidence from island destinations indicates that competitiveness is multidimensional and perceived differently by tourists and tourism practitioners [2]. Destination image is also formed through interconnected brand elements rather than isolated attributes [3]. Tarakan is strategically important because it concentrates coastal ecology, Tidung cultural heritage, colonial and wartime history, cultural events, and gastronomy within one island setting, while functioning as a gateway to wider North Kalimantan. This logic is consistent with research showing that meaningful tourism experiences are strengthened when destination attributes are organized as an engagement system rather than disconnected products [4].

North Kalimantan contains coastal settlements, mangrove ecosystems, conservation areas, historical sites, indigenous cultural landscapes, community-based destinations, and extensive inland forests. A national mapping study of Indonesian natural-tourism potential demonstrates the importance of classifying regional resources before setting development priorities [5], while mapping of 172 Indonesian ecotourism sites shows that protected landscapes and ecotourism products operate at different territorial scales [6]. Protected-area studies indicate that conservation value, visitor preference, and local economic benefit should be considered together [7], [8]. In coastal contexts, ecotourism also intersects with livelihood vulnerability and conservation perceptions [9], while mangrove-ecotourism research highlights the importance of combining ecosystem protection, visitor use, and local socioeconomic functions [10]. These considerations are relevant to Tarakan because its urban conservation assets can be linked with much larger community and protected landscapes in surrounding districts.

The principal problem is that Tarakan's tourism assets and those of the surrounding districts remain fragmented when treated as stand-alone attractions. Regional integration research shows that one city can benefit from complementary resources and functional relationships with neighboring destinations [11]. In border and island settings, this relationship is also institutional. The Bintan case demonstrates that subnational co-operation and informal institutional relations can shape tourism development across administrative boundaries [12]. Indonesian destination-development experience further shows that tourism-led livelihood opportunities can be constrained when human-capital development and local participation are weaker than physical investment [13]. A Tarakan-centered strategy therefore requires more than a catalogue of sites. It requires a system connecting ecological attractions, historical-cultural resources, gastronomy, events, amenities, destination access, institutions, community enterprises, and visitor-risk management toward 2035.

A general solution is a multidimensional framework that allows strengths and gaps to be considered simultaneously. Research on six Indonesian super-priority destinations confirms that sustainable destination competitiveness arises from interacting supply- and demand-side dimensions rather than from a single flagship resource [14]. This logic

is compatible with the 4A framework used here, in which Attractions, Accessibility, Amenities, and Ancillary services are interdependent components of destination readiness. Community perspectives must also be incorporated because local attitudes toward ecotourism can change over time [15]. Tourism development in sensitive landscapes requires explicit attention to hazards and carrying capacity, particularly for remote adventure products [16], while protected-area research emphasizes that public use must remain compatible with conservation objectives [17]. The planning challenge is therefore to strengthen visitor experience and economic opportunity without separating these goals from ecological integrity, community capability, and safety.

Heritage and gastronomy provide specific mechanisms for integration. Heritage destinations become more competitive when authenticity, visitor engagement, and destination image are translated into memorable experiences [18]. This is relevant to Tarakan's World War II sites, colonial structures, old settlements, and Tidung heritage, which can be interpreted as connected narratives rather than individual monuments. Gastronomy offers a comparable opportunity. Destination food competitiveness depends on the visibility and consistency of local food attributes in official and visitor communication [19]. A study of 680 tourists in Jeonju found that 17.20% identified food as their principal travel motivation [20] and that local-food satisfaction and destination-image variables significantly influenced overall tourism experience [21]. North Kalimantan foods based on marine resources, mangrove products, rice, tubers, and forest ingredients can therefore function as an identity-bearing tourism layer rather than only as an amenity.

Cultural events can connect these product layers across time and place. Gastronomy festivals can link local food, cultural expression, and event tourism [22], while evidence on festivals and destination branding indicates that events contribute to destination image when aligned with place identity [23]. For North Kalimantan, Iraw Tengkeyu, Irau Malinau, Birau Bulungan, and other events can be synchronized without erasing distinct meanings. Such coordination can distribute visitation across the year and combine festivals with heritage interpretation, community enterprises, and local gastronomy. The strategic value of Tarakan is therefore not merely its concentration of attractions, but its potential to organize sequences of experiences extending from the island gateway to inland destinations while retaining community benefit as a central development principle [13].

A gap remains in applying these research strands to an integrated tourism model for a small island gateway in a peripheral Indonesian border region. Existing studies provide evidence on island competitiveness, ecotourism, protected areas, heritage, food tourism, events, and regional integration, but these domains are commonly examined separately. Tourism planning for remote areas must also incorporate visitor health and safety. A Kalimantan study based on 67,155 respondents confirms that malaria prevention remains a relevant public-health issue in the region [24]. The present problem therefore requires a model that combines product development with institutional readiness and risk management. Rather than estimating causal relationships from a tourist survey, this study uses a strategic indicator-based synthesis to identify how Tarakan and surrounding districts can be configured as a coherent coastal–inland tourism system.

This study develops and assesses a Tarakan-centered model for integrated tourism development in North Kalimantan using the 4A framework and a 2026–2035 planning horizon. The revision treats the 12 percentage scores in the supplementary matrix as provisional planning benchmarks rather than validated measurements because the source does not document an empirical score-derivation protocol. The analysis therefore asks four questions: which ecological, heritage, cultural, gastronomic, and service assets support the Tarakan gateway proposition; where the main 4A benchmark gaps occur; whether the principal priorities remain stable under transparent alternative weighting scenarios; and what additional stakeholder, community, digital-governance, and risk evidence is required before operational implementation. Accordingly, the gateway model is presented as a strategic planning proposition to be tested with future visitor-flow and stakeholder data, not as an already verified tourism-flow model.

2 Methods

2.1 Study Design and Scope

This study employed a strategic destination-synthesis design rather than a visitor survey, experiment, or inferential statistical study. The analytical unit was the regional tourism system centered on Tarakan and extending to Tana Tidung, Bulungan, Malinau, and Nunukan. The study examined ecological attractions, conservation areas, colonial and wartime heritage, Tidung and Dayak cultural assets, gastronomy, community-based tourism, amenities, ancillary services, cultural-event scheduling, and visitor-risk management. No human participants or respondents were recruited; consequently, demographic characteristics, respondent sampling, and human-subject procedures are not applicable to the present design. The main monograph defined the study as a non-transportation-oriented tourism analysis. Accessibility indicators from the supplementary matrix were retained only as contextual enabling conditions within the 4A model, not as a model of daily commercial transport operations.

This design is consistent with multidimensional destination assessment, which requires indicator systems that capture interacting tourism functions rather than one isolated measure [25], [1]. Indicator systems also require transparent definitions, territorial adaptation, and stakeholder relevance, particularly in peripheral destinations [26], [27].

2.2 Data Sources and 4A Indicator Construction

The analysis used two supplied planning artifacts: the strategic monograph on integrated tourism development in Tarakan and North Kalimantan and its supplementary indicator workbook. The workbook organizes four factors Attraction, Accessibility, Amenities, and Ancillary into 12 indicators and provides an existing-condition narrative, a target percentage, an actual planning percentage, and a formula-based status for each indicator. Inspection of the workbook shows that the target and actual percentage cells are editable inputs, whereas the status and aggregate ratio are calculated automatically. No unreported observations were added and no missing values were imputed.

The use of a structured indicator matrix follows tourism-competitiveness research showing that multidimensional metrics can support destination comparison when indicator selection and aggregation are explicit [28], [29]. The present analysis deliberately avoids assigning new weights because no empirically validated weighting scheme was supplied. Multi-criteria decision methods could be introduced in future validation if stakeholder priorities are formally elicited [30].

2.3 Indicator Provenance, Validity, and Scope

The source materials do not document a respondent sample, survey instrument, expert-elicitation protocol, AHP/Delphi weighting exercise, normalization rule, uncertainty interval, or external calibration procedure used to generate the target and actual percentages. Consequently, the numerical values are not claimed as empirically validated measures of destination readiness. Their validity is limited to conceptual correspondence: each indicator is mapped to a 4A domain and accompanied by a grounded existing-condition statement.

For this reason, the revised manuscript uses the terms planning benchmark, benchmark gap, and benchmark-attainment ratio rather than treating the percentages as direct estimates of effectiveness. The matrix is used for strategic screening and robustness testing only. Future empirical validation must link each indicator to observable administrative or survey data, document how benchmarks are set, and quantify uncertainty before the scores are used as operational performance measures.

Table 1. 4A Tourism Planning Indicators and Benchmark Scores.

No.	Factor	Indicator	Target	Actual	Gap	Status
1	Tourist Attraction	Number of Preserved Heritage Sites	85%	80%	-5 pp	Needs improvement
2	Tourist Attraction	Density of Mangrove Forests and Proboscis Monkey Population	90%	90%	+0 pp	Met
3	Tourist Attraction	Length of Developed Coastal Area	80%	75%	-5 pp	Needs improvement
4	Tourist Attraction	Frequency of Traditional Festival Events	100%	100%	+0 pp	Met
5	Accessibility	Number of Active Pioneer Flights	95%	95%	+0 pp	Met
6	Accessibility	Frequency of Regular Speedboat Departures	95%	95%	+0 pp	Met
7	Accessibility	Connectivity of Bus Stops / Pioneer Terminals	80%	75%	-5 pp	Needs improvement
8	Amenities	Occupancy Rate of Star-Rated Hotels	80%	70%	-10 pp	Needs improvement

9	Amenities	Certification of Hygiene and Halal Local Culinary Products	90%	85%	-5 pp	Needs improvement
10	Institutional & Creative Economy (Ancillary)	Number of Active Tourism Awareness Groups (Pokdarwis)	85%	80%	-5 pp	Needs improvement
11	Institutional & Creative Economy (Ancillary)	Growth in the Number of Creative Economy Exhibition Booths	90%	85%	-5 pp	Needs improvement
12	Institutional & Creative Economy (Ancillary)	Level of Smart Mobility and Smart Economy Implementation	85%	80%	-5 pp	Needs improvement

Note. Target and actual percentages are source-supplied editable planning inputs. They are used as provisional benchmarks for gap screening and are not survey estimates or empirically validated readiness scores. pp = percentage points.

2.4 Scoring and Comparative Analysis

Each indicator was classified as meeting its benchmark when the actual planning score was equal to or greater than the target; otherwise, it was classified as requiring improvement. The baseline calculation gives each of the 12 indicators equal weight because the supplied material contains no empirical weighting evidence. This equal-indicator treatment is a deliberately non-preferential baseline and should not be interpreted as a claim that all indicators have equal causal importance. The aggregate benchmark-attainment ratio is the weighted mean of actual scores divided by the weighted mean of target scores, multiplied by 100.

Because an aggregate ratio can mask bottlenecks, it is reported only together with the disaggregated indicator gaps and factor-level results. The analysis therefore gives priority to the magnitude and location of shortfalls rather than interpreting the aggregate value as a stand-alone readiness score. This distinction is consistent with destination-assessment research that cautions against reading a single composite score as a complete representation of tourism performance [28], [31].

2.5 Weighting and Sensitivity Analysis

To test whether the conclusions depend on equal indicator weights, three transparent scenario weights were added. The first assigns equal weight to the four 4A factors (25% each). The second emphasizes support services by assigning 20% to Attraction, 20% to Accessibility, 30% to Amenities, and 30% to Ancillary. The third emphasizes attraction and access by assigning 30%, 30%, 20%, and 20%, respectively. Within each factor, its weight is divided equally among its indicators. These scenarios are analytic stress tests rather than stakeholder-derived weights; they partially assess robustness while leaving Delphi, AHP, and survey-based weighting for future validation.

2.6 Roadmap and Risk-Management Analysis

The strategic roadmap was analyzed in three planning phases: 2026–2029 for regional cultural-calendar coordination, 2030–2032 for guide certification and community ecotourism, and 2033–2035 for visitor-health and emergency preparedness. Event timing was compared across the source calendar only to identify potential overlap; no econometric demand model or ethnographic rule was used to determine culturally appropriate dates. The source also contains detailed medical and financial parameters. In the revised analysis these values are treated only as prompts for destination-system preparedness and are not endorsed as clinical prescriptions or universal visitor thresholds.

Tourism planning recommendations are therefore limited to system-level readiness: pre-travel health referral, trained guides, first-aid capability, emergency communication, referral and evacuation pathways, and backup payment capacity. Any prophylactic drug regimen, repellent concentration, or other clinical recommendation must be determined by current public-health guidance and qualified clinicians rather than by this tourism-planning model. The broader inclusion of health risk remains consistent with research showing that epidemiological susceptibility, environmental safety, communications, and governance can shape tourism vulnerability [32].

3 Results And Discussion

3.1 Socio-Historical Assets and Tarakan's Gateway Function

The socio-historical assessment identified a chronological heritage layer that can be traced through Tarakan's old settlements. Djoeata Laoet/Juata Laut was recorded from 1879, Lingkas developed as an important port settlement from 1896, Goenoeng Tjakoei was associated with Chinese traders from 1918, and Kampung Baroe was developed by the Dutch colonial administration in 1930 as a new commercial center. The source also records a 1933 Dutch military acquisition related to the Juata Laut area and identifies 1945 as the period when Australian forces used Rumah Bundar in the post-war recovery of Tarakan. Figure 1 presents the settlement timeline derived from the source material. These dates show that the historical tourism layer spans pre-colonial local settlement, colonial commercial expansion, wartime transformation, and post-war recovery.

The principal wartime and colonial assets identified in Tarakan include the Peningki Lama Dutch cannon site, defense bunkers, the World War II History Museum in Kampung Empat, and Rumah Bundar on Jalan Danau Jempang. The latter is described as a former Dutch civil-service residence that later became part of the post-war recovery landscape. The regional heritage portfolio extends beyond Tarakan to the Bulungan Sultanate Museum in Tanjung Palas, the sacred grave at Tanah Kuning, and prehistoric stone-burial sites around Long Berini in Kayan Mentarang. Heritage-tourism literature indicates that the tourism value of such resources is strengthened when authenticity, visitor engagement, and destination image are combined in coherent experiences [18].

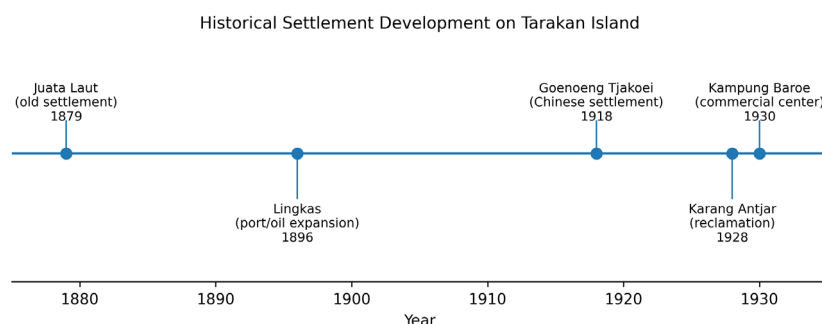


Fig. 1. Historical development of selected old settlements on Tarakan Island, 1879–1930.

The results indicate that Tarakan’s strategic advantage is not derived from a single attraction but from the concentration of several tourism narratives within one island city. Mangrove conservation, endemic fauna, World War II heritage, Tidung identity, coastal festivals, and gastronomy provide a compact interpretive base from which visitors can be directed toward Bulungan, Tana Tidung, Malinau, and Nunukan. This configuration corresponds with the broader island-tourism literature, which emphasizes that small-island performance depends on governance, community, adaptation, and inter-destination relationships as much as on physical attractions [33]. Regional integration research likewise demonstrates that complementary resources can influence the development trajectory of connected cities and destinations [11]. In a border setting, institutional cooperation becomes particularly important because subnational and informal relationships can determine whether tourism products are coordinated or remain fragmented [12]. Tarakan should therefore be interpreted as a regional service and narrative hub rather than as an isolated destination.

The gateway concept also has a destination-branding implication. Tourists tend to process island brands through combinations of attributes rather than through a single feature [3]. Tarakan’s role can therefore be strengthened by designing visitor sequences that move from urban heritage and mangrove experiences to inland culture, protected landscapes, and community enterprises. Such sequences may also support tourist well-being when engagement is deliberately structured across activities and places [4]. However, Indonesian experience shows that regional tourism expansion can generate unequal outcomes when human-capital development and community participation do not keep pace with investment [13]. The gateway model consequently requires local training, institutional coordination, and mechanisms that keep economic benefits within participating communities rather than concentrating value only at the point of entry.

3.2 Ecotourism and Conservation Portfolio

The conservation assessment shows a wide range of management scales. KKMB Karang Rejo, which protects proboscis-monkey habitat, is represented in the source comparison as approximately 22 ha. Juwata Crocodile Breeding Center covers 5 ha and has

operated since 1991, maintaining saltwater crocodiles, false gharials, freshwater crocodiles, and Papua crocodiles for conservation, research, and education. Outside Tarakan, Kujau Ecotourism is represented at approximately 45 ha, Setulang tourism village at 120 ha, and Tane Olen protected forest at 500 ha. Kayan Mentarang National Park is described narratively as exceeding one million hectares. Figure 2 summarizes the comparative management areas supplied in the source.

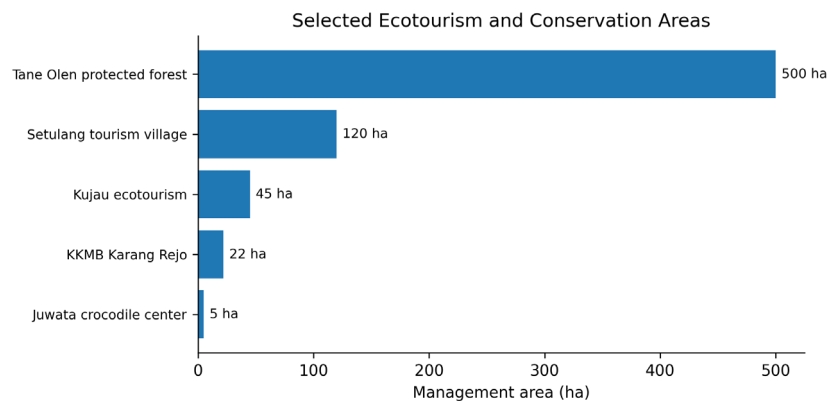


Fig. 2. Management areas of selected ecotourism and conservation destinations in North Kalimantan.

The portfolio therefore ranges from compact urban conservation sites to large community and protected landscapes. This scale diversity is consistent with national evidence showing that Indonesian ecotourism is spatially distributed across different protected landscapes and ecoregions [6]. The source also assigns specific visitor-management rules to conservation sites, including controlled wildlife interaction and behavior restrictions. Evidence from protected-area tourism shows that economic value and visitor preference should be considered together with conservation objectives[8], while livelihood-oriented research indicates that ecotourism outcomes are connected to local vulnerability and conservation perceptions [9].

The conservation portfolio supports a deliberately differentiated product structure. Small urban sites such as the 5-ha crocodile center and the approximately 22-ha KKMB can provide accessible conservation experiences, while 45-ha, 120-ha, 500-ha, and million-hectare-scale landscapes support progressively more immersive community and expedition products. Mapping research confirms that Indonesia's ecotourism resources occur across highly varied protected landscapes [6], and systematic evidence shows that protected-area tourism carries ecological, cultural, educational, and livelihood values simultaneously [7]. The management challenge is therefore to prevent increased visitation from weakening the conservation asset itself. Research on protected-area public use supports the need for visitor rules and monitoring [17], while community ecotourism studies indicate that local support and conservation perceptions must be monitored over time rather than assumed to be stable [15].

3.3 Cultural Heritage, Adventure, Events, and Gastronomy

The cross-district product inventory also contains special-interest and adventure activities. The source assigns a physical-challenge index of 45% to forest trekking, 75% to cliff climbing in Mamburungan, 60% to mountain cycling, 85% to Bahau River rafting, and 95% to a Kayan Mentarang savanna expedition. These values are descriptive planning indices rather than physiological measurements, but they distinguish relatively accessible activities from products requiring greater physical preparedness. Figure 3 reproduces the source comparison. The remote nature of several products confirms the relevance of hazard and carrying-capacity management, which is consistent with evidence from Indonesian geotourism sites where visitor safety and resource protection must be addressed simultaneously [16].

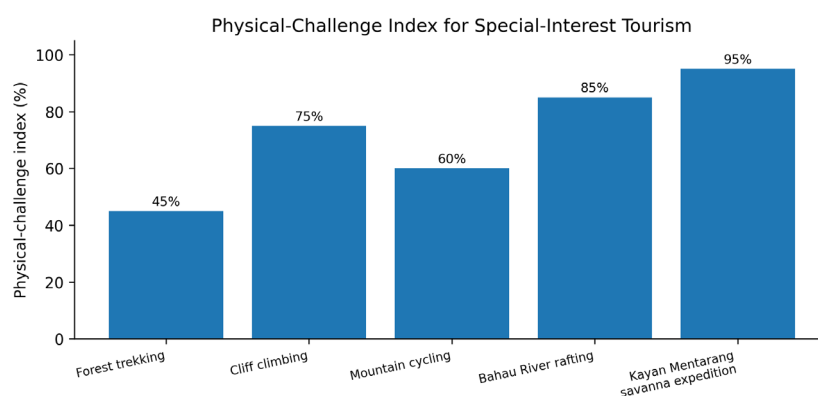


Fig. 3. Physical-challenge index for selected special-interest and adventure tourism activities.

Cultural assets are distributed across coastal and inland districts. In Tarakan, Tidung cultural identity is represented by Iraw Tengkeyu and by the symbolic Padaw Tuju Dulung. The ritual structure uses seven bows to represent seven days, a three-level central bow, two-level side bows, and five poles signifying five daily prayers. The dominant colors are interpreted in the source as red for courage, green for openness, and yellow for honor and divine unity. In Malinau, Iraw Malinau is reported to have used 20,000 woven Dayak Lundayeh hats and generated Rp44.8 billion in creative-economy value. Other identified cultural products include Pasa Hwal, Jugit Demaring, and Jepen. Event-tourism literature shows that festivals can support destination image and brand equity when they remain aligned with identifiable place meanings [23].

The gastronomy inventory includes Lawa, Nasi Subut, Sate Temburung, Tudai, Tumis Kapah, Paluon, Luba Laya, and other foods associated with coastal, riverine, agricultural, and forest environments. The products differ in ingredients and cultural functions: Lawa combines seaweed or cucumber with roasted coconut and prawn; Nasi Subut combines rice, purple sweet potato, and sweet corn; Sate Temburung uses mangrove-associated shellfish; and Luba Laya is based on Adan rice wrapped in leaves. These items are positioned in the model as experiential connectors between ecological

resources and cultural identity. Food-tourism research indicates that gastronomy contributes most strongly when it is visible in destination communication and linked to the overall visitor experience [19], [20].

The proposed coastal–inland model differs conceptually from a conventional transport hub-and-spoke system. In a hub-and-spoke network, centrality is primarily defined by routing flows through a transport hub; here, gateway status refers to an integrative tourism function in which Tarakan concentrates arrival and service functions, interpretation, accommodation, events, gastronomy, and product bundling, while surrounding districts retain distinct attractions and local ownership. The supplementary matrix provides functional-enabling evidence rather than proof of tourism redistribution: it records Juwata Airport as serving commercial and pioneer connections, Tenggayu 1 as linking Tarakan by regular speedboat with Tanjung Selor, Malinau, Nunukan, and Tana Tidung, and a regional pioneer-bus connection through Tanjung Selor–Tana Tidung–Malinau. These connections make the gateway proposition operationally plausible, but they do not demonstrate that visitors currently redistribute through Tarakan. Figure 4 is therefore interpreted as a testable planning model, and future origin–destination, itinerary, length-of-stay, and visitor-spending data are required to verify gateway performance.

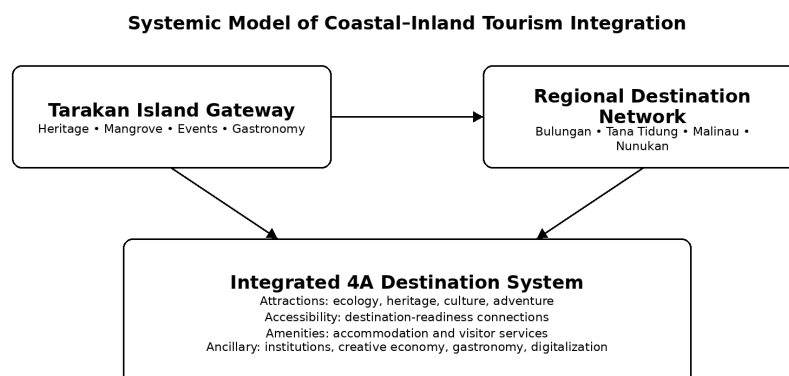


Fig. 4. Proposed systemic model of coastal–inland tourism integration centered on Tarakan as a gateway rather than a transport hub.

Heritage, events, and food provide the narrative continuity needed to connect these ecological scales. Memorable heritage experiences are strengthened by authenticity and engagement [18], suggesting that Tarakan’s wartime and Tidung resources should be presented through coherent interpretation rather than as static objects. The symbolic architecture of Padaw Tuju Dulung and the reported scale of Irau Malinau offer strong cultural anchors, but calendar coordination should not standardize distinct traditions into interchangeable festivals. Event-branding research supports maintaining place identity as the basis of festival value [23]. Gastronomy provides an additional connector because foods based on marine, mangrove, agricultural, and forest resources can link

landscape to cultural identity. Food-tourism evidence shows that destination competitiveness is weakened when gastronomy is inconsistently represented [19], while gastronomy festivals can reinforce visitor experience and local economic participation [22].

3.4 A Performance and Destination-System Gaps

The 12-indicator matrix produced an arithmetic mean target of 87.92% and a mean actual planning score of 84.17%, yielding an unweighted benchmark-attainment ratio of 95.73%. This value is a descriptive ratio of source-supplied planning scores; it is not a probability, efficiency estimate, or validated destination-readiness measure. Five indicators meet their benchmarks and seven fall below them. At factor level, benchmark-attainment ratios are 97.18% for Attraction, 98.15% for Accessibility, 91.18% for Amenities, and 94.23% for Ancillary. The lower Amenities and Ancillary values show why the aggregate ratio must not be used to obscure support-service bottlenecks.

Accommodation remains the largest individual benchmark gap, at 70% against an 80% target. However, the source only states that starred hotels are available and concentrated in the city center; it does not provide a Tarakan-specific room inventory, occupancy time series, accommodation-class distribution, service-quality audit, peak-event capacity analysis, or a documented causal basis for the 70% score. The gap therefore cannot be interpreted as demonstrated room shortage. It is a priority flag requiring validation. A measurable accommodation work program should first establish room supply by class, monthly and event-period occupancy, average length of stay, service and certification compliance, digital booking availability, and spatial coverage. Intervention should then target the observed bottleneck quality, utilization, distribution, or capacity rather than assuming that additional rooms are automatically required.

The underlying indicator descriptions provide additional quantitative context for several benchmark scores. Pantai Amal development is recorded in two stages, with approximately 500 m in the first stage and 700 m in the second. The accessibility matrix identifies 17 pioneer passenger air routes and five pioneer cargo routes serving regional destinations, while the sea-connectivity description records regular departures to Tanjung Selor at approximately 25-minute intervals with a travel time of about one hour and a longer connection to Malinau of approximately three hours. The cultural-attraction parameter describes Iraw Tengkeyu as a biennial event. These operational descriptions explain why air and sea connectivity and cultural festivals were assigned target-matching scores, whereas beach development remained five percentage points below its benchmark. They are contextual parameters within the planning matrix and were not independently audited in this study.

The relatively high aggregate ratio must therefore be interpreted as proximity to the arithmetic benchmark, not as evidence that the destination system is already highly ready or effective. For decision-making, the seven below-target indicators and the factor-level gaps take precedence over the aggregate number. This interpretation prevents the strong performance of conservation, festivals, and major access indicators from compensating analytically for weaker accommodation, gastronomy certification, institutional capacity, creative-economy support, land/regional access, and digitalization.

3.5 Weighting Sensitivity and Priority Stability

The sensitivity analysis shows that the aggregate conclusion is numerically stable across the tested assumptions but that the composition of priority shortfalls changes. The equal-indicator baseline produces a 95.73% benchmark-attainment ratio; equal weighting of the four 4A factors produces 95.24%; a support-service emphasis produces 94.75%; and an attraction-access emphasis produces 95.74%. The full range is less than one percentage point. Accommodation remains the largest weighted shortfall in every scenario, while gastronomy certification, institutional capacity, creative-economy support, and digitalization become more prominent when Amenities and Ancillary receive greater weight. The result supports the robustness of the accommodation/support-service priority but does not substitute for stakeholder-derived weighting.

Table 2. Sensitivity of aggregate 4A benchmark attainment to alternative factor weights.

Scenario	4A factor weights (A/Ac/Am/An)	Ratio	Highest weighted shortfalls
Equal-indicator baseline	33.3/25.0/16.7/25.0	95.73%	Accommodation; heritage; land/regional access; beach tourism
Equal 4A factors	25/25/25/25	95.24%	Accommodation; gastronomy; institutions; land/regional access
Support-service emphasis	20/20/30/30	94.75%	Accommodation; gastronomy; institutions; creative-economy MSMEs
Attraction-access emphasis	30/30/20/20	95.74%	Accommodation; gastronomy; land/regional access; heritage

Note. A = Attraction; Ac = Accessibility; Am = Amenities; An = Ancillary. Scenario weights are transparent analytical stress tests, not stakeholder-derived preferences.

The digitalization gap should be operationalized as a governance-and-service problem rather than as a generic call for more technology. A practical regional architecture would include a shared destination registry with unique identifiers and geospatial coordinates for attractions, events, accommodation, MSMEs, and safety contacts; an interoperable, mobile-responsive visitor portal and data interface; QR-linked on-site interpretation and event updates; booking, referral, and digital-payment links; and a clearly designated provincial data steward with district focal points and published update responsibilities. Minimum governance rules should cover common metadata, update frequency, data quality, role-based access, data minimization, consent for personal data, secure transmission and storage, retention limits, anonymized analytics, and incident-response procedures. AI-supported visitor information, if adopted, should operate only on curated destination data and should not replace institutional accountability or privacy safeguards [34], [35].

3.6 Community and Smart-Destination Validation Gaps

The current 12-indicator matrix does not directly measure the community outcomes that the regional-integration argument considers central. Pokdarwis activity and creative-economy exhibition growth are useful proxies, but they do not establish whether tourism jobs, income, decision power, or benefits are locally distributed. The revised framework therefore identifies an unscored validation module for the next data-collection stage. These indicators are proposed extensions and are not retroactively assigned numerical values in the present study.

Table 3. Proposed unscored indicators for stakeholder and smart-destination validation.

Dimension	Proposed indicator	Suggested evidence
Local employment	Share of tourism jobs held by local residents	Business/payroll survey and administrative records
Local MSME participation	Share of tourism procurement, sales, or event participation attributable to local MSMEs	Business registry, event records, transaction survey
Resident support	Resident support/attitude index for tourism growth and visitor pressure	Periodic household survey
Benefit distribution	Share of tourism benefits retained by local firms/community groups and distribution across districts	Enterprise/community survey and procurement records
Community decision participation	Representation and documented influence of community/adat bodies in tourism decisions	Meeting records, decision logs, stakeholder survey
Digital governance	Completeness, update rate, interoperability, privacy/security compliance of the regional destination data system	System audit and service-level reporting

Note. These indicators are proposed for future empirical validation and are not scored in the present 12-indicator matrix.

3.7 Roadmap, Event Distribution, and Visitor Risk

The 2026–2035 roadmap translates the identified planning gaps into three implementation phases. Phase I (2026–2029) uses the source calendar to identify periods of event concentration and potential overlap. The proposed July positioning of Iraw Tengkeyu is therefore a deconfliction heuristic from the planning document, not the output of an econometric demand model or an ethnographic determination of ritual timing. The revised model does not authorize administrative rescheduling of sacred dates. Cultural custodians, adat institutions, community organizers, and relevant district governments must jointly determine whether any calendar change is permissible. Where ritual timing is non-negotiable, coordination should focus on promotional windows, adjacent non-ritual programming, itinerary packaging, and visitor-flow management rather than changing the ritual itself.

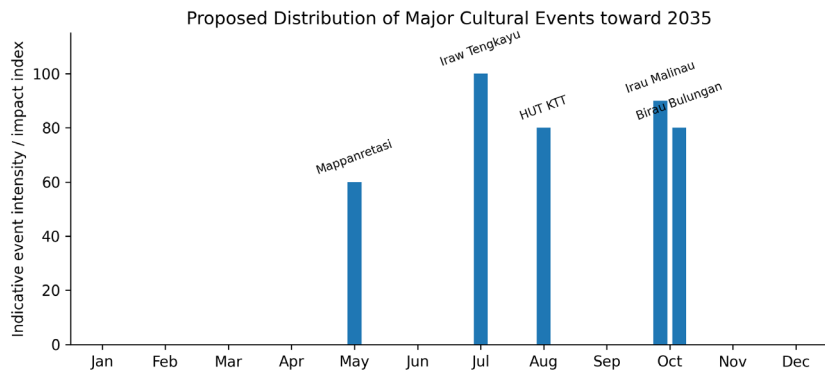


Fig. 5. Proposed monthly distribution of major North Kalimantan cultural events toward 2035.

Phase II (2030–2032) focuses on guide certification and community ecotourism, while Phase III (2033–2035) addresses destination-level health, emergency, and remote-area preparedness. Before a regional cultural calendar is adopted, the process should document cultural non-negotiables for each event, obtain explicit agreement from recognized organizers and community/adat representatives, and distinguish ritual components from flexible logistical or promotional components. This governance safeguard is intended to prevent calendar coordination from homogenizing Iraw Tengkeyu, Irau Malinau, Birau Bulungan, or other culturally distinct events.

Table 4. Phased tourism-development roadmap toward 2035.

Phase	Period	Strategic priority	2035-oriented indicator / objective
I	2026–2029	Synchronize regional cultural-event calendars	More even visitor distribution across the year
II	2030–2032	Guide certification and community ecotourism	100% BNSP verification of local guides
III	2033–2035	Visitor-health, emergency, and remote-area preparedness	Documented emergency contacts and referral protocols at participating inland destinations

Note. The entries are roadmap targets and planning objectives, not achieved outcomes.

The phased roadmap is retained as a sequencing device, but its event-calendar component is now explicitly conditional on cultural governance. The process should begin with a joint calendar forum, record the ritual dates and cultural elements that cannot be altered, identify only those logistical and promotional components that are flexible, and approve any coordination through the recognized community and event-organizer structure. This converts 'synchronization' from a top-down rescheduling exercise into a negotiated regional coordination process.

The remote-area risk component is also narrowed to tourism-system responsibilities. The source includes specific malaria prophylaxis, repellent, and emergency-cash parameters, but these values were not clinically validated within the study and should not be interpreted as medical guidance. The tourism roadmap should instead ensure pre-travel referral to current health advice, trained guides, first aid, emergency contacts, communication redundancy, evacuation/referral procedures, insurance information, and backup payment options. Clinical prevention regimens remain the responsibility of health authorities and qualified clinicians, while destination managers remain responsible for preparedness and risk communication [24], [36].

3.8 Validation Pathway

The scenario analysis strengthens the study by showing how the aggregate result and priority structure respond to alternative transparent weights, but it is not a substitute for empirical stakeholder validation. A next-stage validation should combine a Delphi process to refine indicator definitions, AHP or another documented multi-criteria method to elicit relative weights from government, community/adat, tourism-business, conservation, and visitor representatives, and visitor/community surveys to test whether the resulting priorities match experienced destination conditions. Repeated measurement across roadmap phases should then test rank stability and update benchmarks. Until that process is completed, the 12 scores should remain planning-screening values rather than definitive performance metrics.

4 Conclusion

Tarakan has a credible strategic basis to function as a tourism gateway for an integrated North Kalimantan destination system because it combines urban services, conservation, heritage, cultural events, and gastronomy while connecting conceptually and functionally with complementary inland products. The revised analysis, however, treats the gateway as a planning proposition rather than an empirically proven hub: current materials do not yet contain visitor origin destination, itinerary, spending, or redistribution data. The 4A matrix likewise functions as a provisional screening instrument. Its aggregate benchmark proximity is stable under the tested weighting scenarios, but the disaggregated results consistently point to accommodation and support-service weaknesses that should not be hidden by the aggregate ratio. The accommodation gap specifically requires diagnosis with room inventory, occupancy, service-quality, and event-period data before capacity interventions are selected. Regional implementation should also extend the matrix to direct community-benefit and participation measures, establish concrete digital-data governance and privacy safeguards, coordinate festival calendars through cultural-custodian approval rather than top-down rescheduling, and separate destination-risk preparedness from clinical advice. The principal contribution is therefore a transparent, testable coastal–inland integration framework and a validation pathway. Future Delphi/AHP and visitor/community studies are required before

the indicator weights, benchmark scores, and gateway effects are treated as operationally validated.

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