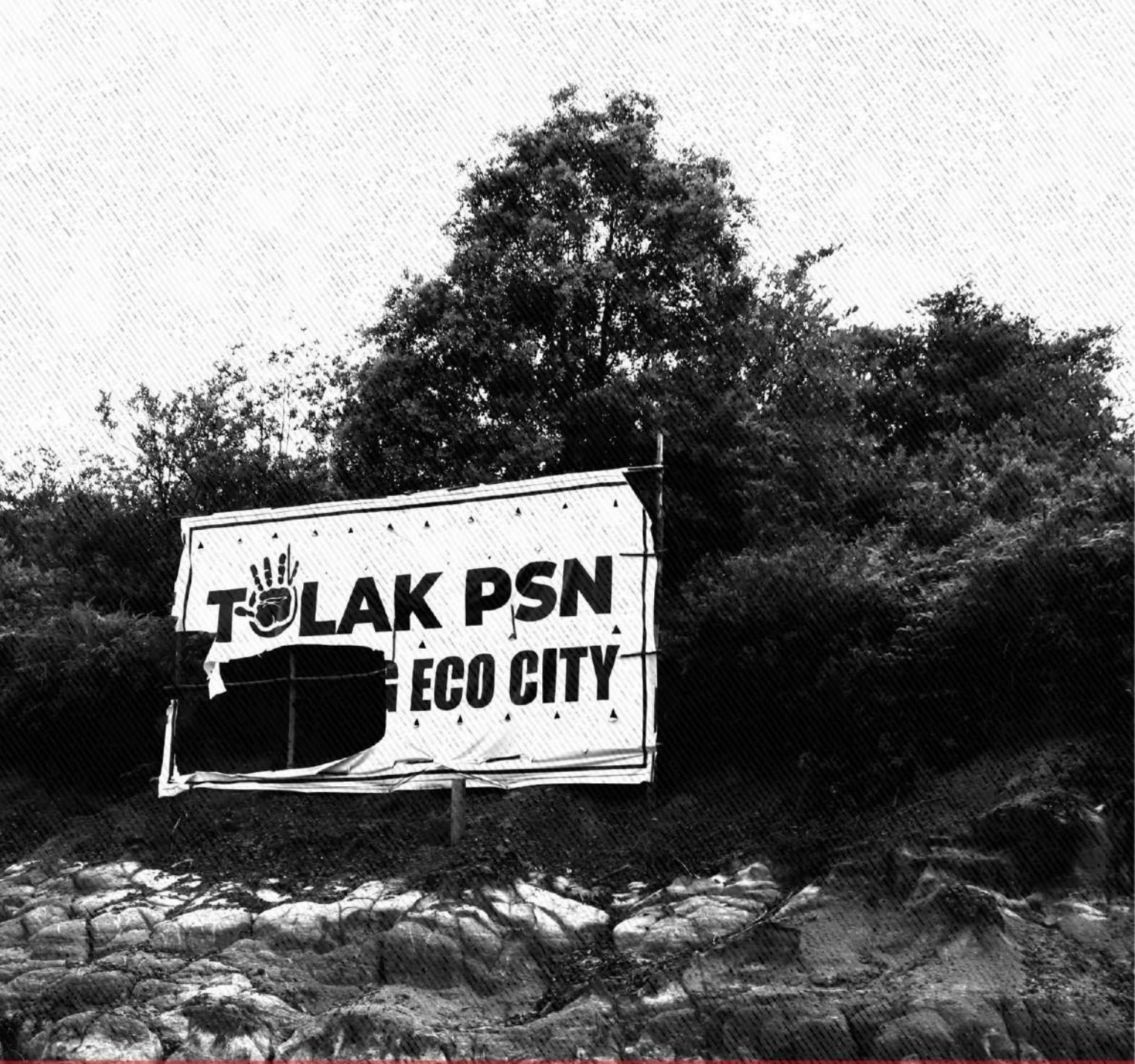

White Paper:
Valuation of Losses From The Rempang Eco City Project

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Research Team:

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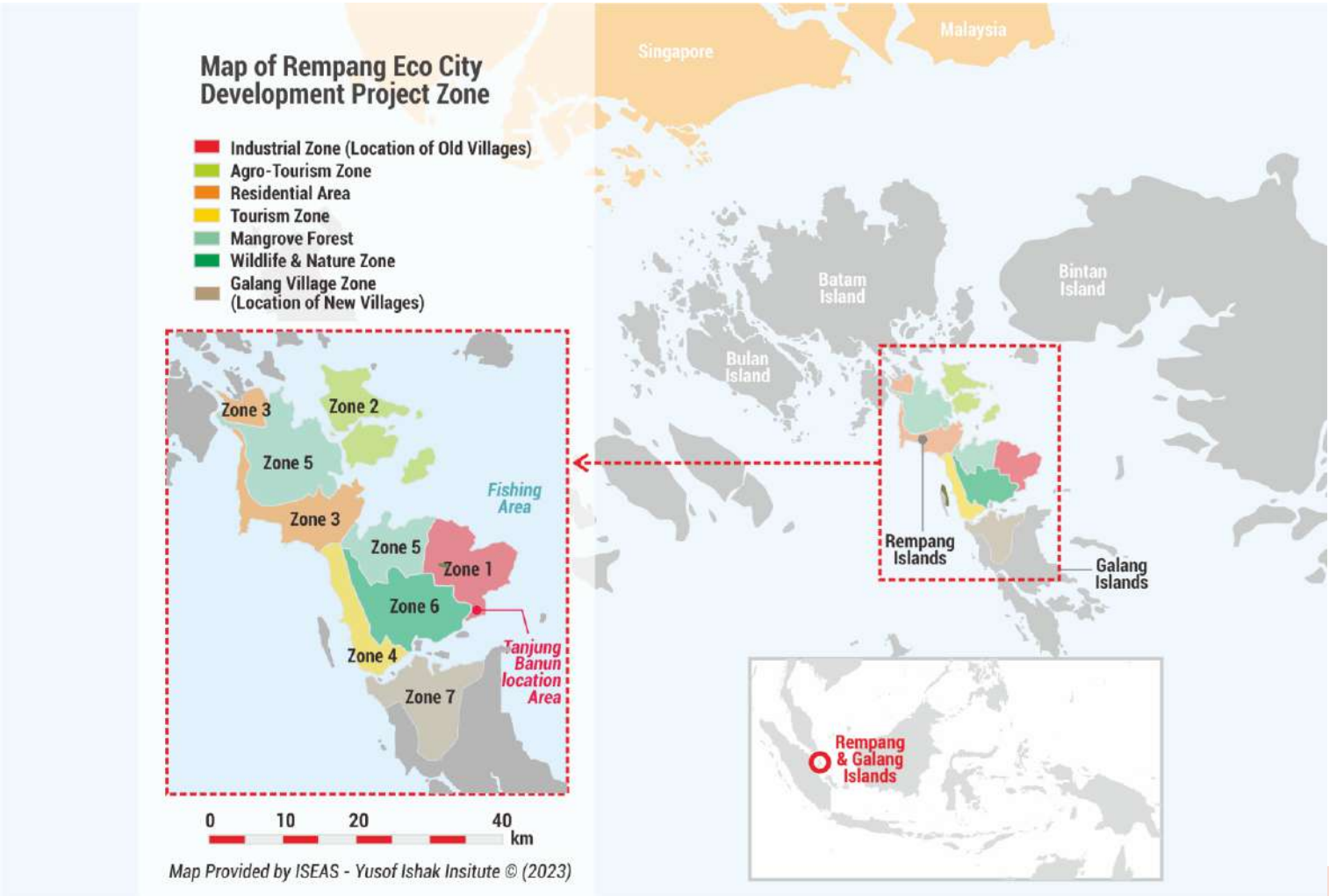
Summary of Findings

The Rempang Eco City project is touted as a symbol of transition toward a "green economy" through solar panel industry and massive-scale investment. However, behind these development promises, the lives of indigenous and local communities on Rempang Island face tremendous uncertainty. Since 2023, thousands of people have rejected forced evictions euphemistically framed as "relocation," "displacement," or "local transmigration." Their resistance is well-founded in defending and preserving their ancestral villages, which have been their living spaces for generations.



One key message for the government, developers, and investors from this research is: Rempang Island is not an "empty land," but rather a complex socio-ecological space, where mangrove ecosystems, coastal areas, fisheries, agriculture, and cultural heritage all interconnect to sustain community life.

This study is part of an ongoing effort to stand with the people and defend their rights, which will be stripped away by this project. The project places local communities in a "sacrifice zone" in the name of "green development" that the government, developers, and investors ironically glorify. Yet, in reality, the project constitutes the dispossession of living spaces, ecosystem degradation, and socio-ecological injustice for the people of Rempang.

Research on the economic valuation of Rempang people's income indicates figures far higher than the government's claims. The valuation reveals that average household income is IDR 32.77 million/household/month, while the government claims they only earn IDR 3 million per month.

The economic valuation also calculates potential environmental losses reaching Rp109 million/household/month. This is an enormous figure—three times the actual income of the people of Rempang, placing them at compounded risk if the project proceeds.

Rather than bringing prosperity, Rempang Eco City reflects a model of development that seizes living spaces and weakens ecosystems that sustain communities. Through economic valuation, this research underscores that the socio-ecological costs of the project far outweigh its economic benefits. Therefore, we recommend the complete termination and cancellation of the Rempang Eco City project to ensure the continuity of living spaces, ecosystems, and social justice for the people of Rempang Island.

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In September 2023, various layers of society—from coastal communities in the Riau Islands, both young and old alike, spanning from areas around Rempang to areas along Barelang (Rempang to Galang Baru)—mobilized en masse. For two days, on September 7 and 11, 2023, the people held protests in front of the Batam Indonesia Free Zone Authority (BP Batam) office. The trigger was a massive development project covering 8,142 hectares of land that would transform the landscape of Rempang Island into a center for modern industry, services, and tourism. One element of the project is the construction of quartz sand processing facilities to produce glass for solar panels, alongside a gigantic-scale solar power plant (PLTS).

Under the banner of the Rempang Eco City narrative, designated as a National Strategic Project (PSN) through Coordinating Minister for Economic Affairs Regulation No. 7/2023, the development of the quartz sand industrial zone is touted as a driver of the coastal economy in Batam. Unfortunately, the so-called "green" economic narrative only exists as a blueprint in the Master Plan. In fact, the document is interpreted merely as 'black ink on white paper,' without deeper consideration, critical analysis, or empathy for the massive socio-ecological changes that have unfolded since the project was signed.

Since its inception, this project has already changed the landscape of Rempang, and the transformation will only intensify once heavy machinery starts to carve through settlements, hills, and coastal areas, turning them into 'sacrifice zones'[1] for modernization projects that lack meaningful community participation. This has been evidenced by forced land seizures and agrarian conflicts, as well as the looming threat the Eco City project poses to Rempang Island's ecosystem. Ironically, people's efforts to defend their living space—seized arbitrarily under the guise of 'green,' 'sustainable,' and 'environmentally friendly' development—have been met with blatant criminalization of those who resist eviction.[2] In 2023, around 43 Rempang people who opposed the development were named as suspects.

Various social impacts have gradually been eroding island community life in Batam. In the long term, the people will lose their livelihoods. This is particularly alarming given that local communities depend on a subsistence economy, relying on surrounding natural resources, particularly in the fishing and agricultural sectors.

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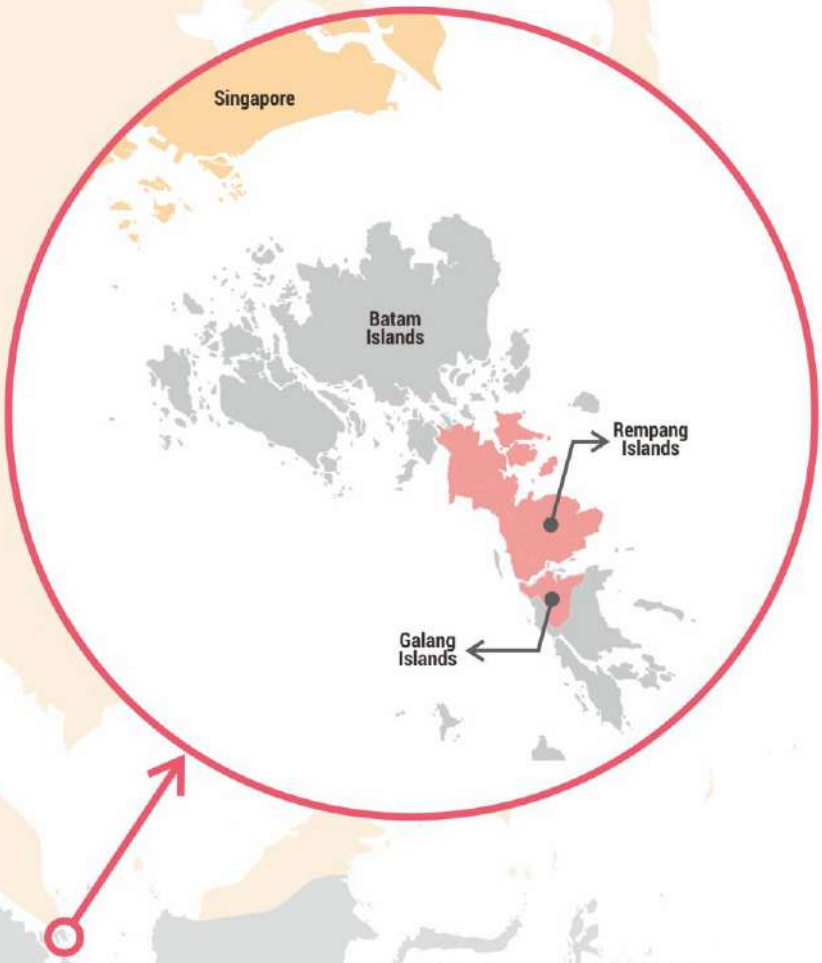
1 The term sacrifice zones was introduced by Naomi Klein (2014), and later adapted by Irmgard Emmelhainz (2016) in an article titled Decolonization as the Horizon of Political Action, published on e-flux.com, to explain areas that are sacrificed for the sake of development. She describes these sacrifice zones as "a contemporary manifestation of the colonial model; that is, when imposed development fails to modernize those considered 'primitive,' their lands are then transformed into mere zones of extraction." (Emmelhainz 2016).

2 Tempo.co. (December 26, 2023). 2023 Kaleidoscope: The Rejection of the Relocation of Rempang Island Residents Leading to the Courtroom. (Rohmawati, 2023).

Rempang is a small island, measuring less than 2,000 square kilometers. It is part of the Barelang area cluster (Batam-Rempang-Galang) in Batam, Riau Islands Province. The island covers about 16,500 hectares, or 165 square kilometers, and is home to 16 ancestral villages that have sustained indigenous and local communities for hundreds of years. Geographically, Rempang is located in the southeast of Batam, connected by the Barelang Bridge built in the 1990s. Classified as a small island, it is surrounded by the Singapore Strait, Philip Strait, and Natuna Sea. Its strategic location–situated on an international shipping route and close to Singapore and Malaysia–has made Rempang a frequent target for large-scale industrial and investment projects. However, Rempang's status as both a small island and part of an archipelagic region also makes it highly vulnerable to ecological changes caused by industrial expansion, mining, reclamation, and land-use conversion.



Through the development of Rempang Eco City, large-scale environmental changes—driven by the conversion of agricultural land and the sustainability of coastal ecosystems—are becoming increasingly difficult to contain. The uprooting of living spaces, habitats, along with the rights of indigenous and local communities, has become an unavoidable phenomenon.

Various agrarian conflicts, protests, and grassroots resistance from Rempang people that have emerged since 2023 show that from the outset, this project has done a litte—if anything—to place the voices of Rempang's grassroots communities as the primary subjects of development. Meanwhile, the local communities have sustained this cultural area for hundreds of years. This demonstrates how the Master Plan for Rempang Eco City development merely "caters" to the needs of political elites, investors, and a select few, rather than siding with grassroots interests. Therefore, it is essential to recognize that the Rempang area cannot be separated from the social, environmental, cultural, and local cosmological aspects that are interwoven to form an ecosystem of life.

The ambitious project mandated by the government to PT. Makmur Elok Graha (MEG), a subsidiary owned by businessman Tomy Winata, with an investment target of Rp381 trillion by 2080 and 30,000 job creation, actually threatens massive changes to society and the environment. Through MEG's collaboration with Xinyi Group, an investor from the People's Republic of China (PRC), to build downstream[3] quartz sand processing valued at Rp175 trillion, large-scale land clearing and exploitation on Rempang Island will be unavoidable. This situation should rightly provoke our critical questions:

How can we ensure the economic and environmental sustainability of so-called "green" economy projects like Rempang Eco City?

> How can development planning and policy evaluation processes side with the lives of indigenous and local communities, adopting a socio-ecological justice perspective?

Such questions do not culminate in ready answers; rather, they require sharp and comprehensive analysis to bring them about. Fundamentally, development is not only about economic growth figures, but about siding with grassroots communities to achieve social justice.

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[3] Downstreaming refers to a government policy aimed at optimizing the use of raw materials by processing them into higher-value commodities, thereby increasing the added value of a given product.

How can development planning and policy evaluation processes side with the lives of indigenous and local communities, adopting a socio-ecological justice perspective?

Chapter I

Imagining Rempang from the State's Perspective

Driving along the main road across Rempang Island, we recalled vividly the barren hills flanking both sides of the smooth asphalt highway—Trans Barelang—which stretches 54 kilometers from Batam Island through Rempang and ends in Galang Baru. The road appears quiet, traversed by various vehicles that reflect the dynamics of modern urban life. Trucks, cars, and motorcycles speed along, set against the backdrop of hills, coastal scenery, and the vast sea, all silently bearing witness.

In certain areas, small shops or houses stand along the roadside, though they remain few in number. What dominates the landscape are grasslands, arid hills, and expanses of ocean punctuated by wooden stilt houses, signifying the scattered coastal settlements of Rempang's communities.

At first glance, Rempang may appear like a desolate landscape, a motionless painting. It is not difficult to imagine how the state or investors might perceive Rempang as "empty land" or even *terra nullius*[4], much like European colonizers in the 14th century, who regarded cultural territories as uninhabited spaces and thus open for seizure. Seven centuries on, Indonesia—while claiming the status of an "independent nation"—nonetheless appears to reproduce colonial practices in its exploitation of Rempang Island. Ironically, such forms of dispossession are now framed in the language of "development."

[4] The Doctrine of Discovery is a fundamental principle employed by European colonizers since the 1400s to seize territories beyond the European continent. This doctrine granted them the right to claim lands deemed vacant for the establishment of new nations. A territory was considered *terra nullius* (empty land) when it was not inhabited by Christians. Such lands, regarded as "discoveries," were then claimed, leading to the erasure and dispossession of the sovereignty of nations and Indigenous peoples across various parts of the world. (Shah, n.d.)

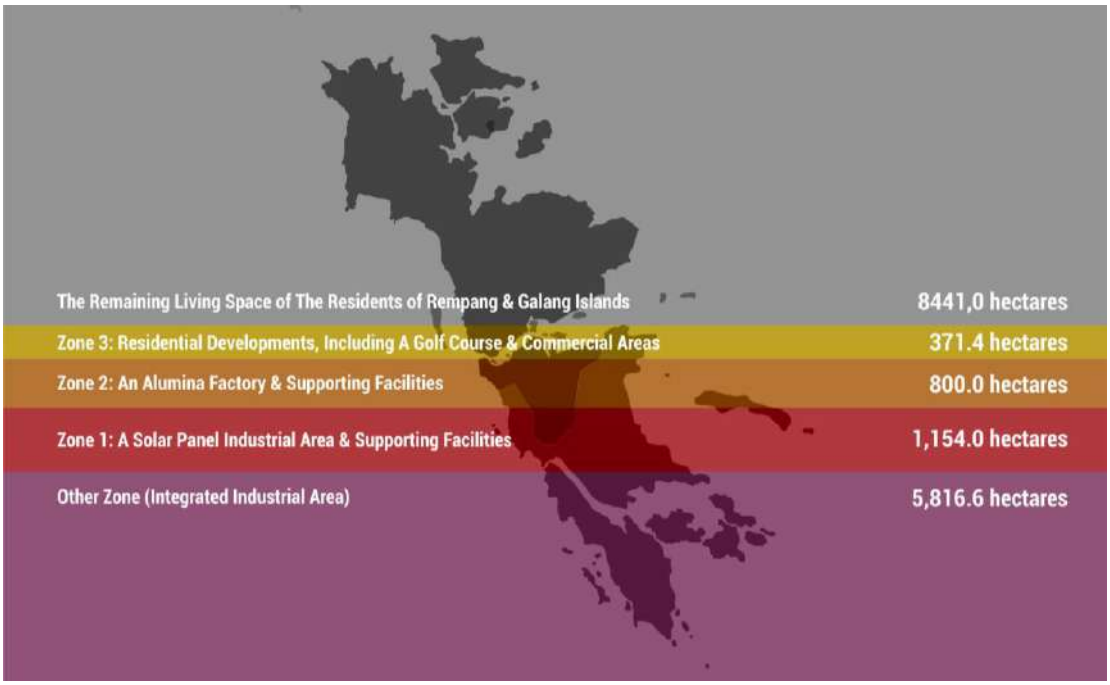
Foregrounding the socio-cultural complexities of the local community reveals that this territory should not be understood as a "static" landscape or a mere stock of "natural resources" for exploitation. Rather, Rempang constitutes a living space for diverse coastal populations[5].

Too often, exploitation is cloaked in the rhetoric of development, where the national economic lens becomes the sole metric of value. The Rempang Eco City project, for example, has been promoted as a symbol of environmentally friendly industrial innovation, expected to stimulate future national investment. It is also positioned as strategic in catalyzing energy infrastructure development to advance the green energy transition and support Indonesia's global commitment to achieve Net Zero Emissions (NZE) by 2060. Moreover, the project has been linked to strengthening renewable energy supply chains under the USD 21.6 billion Just Energy Transition Partnership (JETP).

Within Rempang's total area of 16,583 hectares, the project plans to repurpose 8,142 hectares into an integrated zone comprising:

Zone 1 : a solar panel industrial area and supporting facilities (1,154 hectares),
Zone 2 : an alumina factory and supporting facilities (800 hectares),
Zone 3 : residential developments, including a golf course and commercial areas (371.4 hectares).

Such plans inevitably mean the displacement and dispossession of local communities once construction commences.



[5] Rempang Island is inhabited by local communities consisting of the Malay, *Orang Laut*, and *Orang Darat* ethnic groups, who have resided on the island since 1834. (Wiyoga, 2023)

The designation of Rempang Eco City as a National Strategic Project (Proyek Strategis Nasional, PSN) grants it top priority within the national development agenda. However, in practice, this prioritization has neglected principles of justice and transparency in relation to community rights, environmental sustainability, and the equitable distribution of economic benefits at the grassroots level. As seen in Morowali and Halmahera, nickel extraction projects driven under the PSN framework have in fact exacerbated social and economic inequality while degrading the environment.

A similar development paradox is evident in Rempang Eco City, which threatens to sacrifice thousands of hectares of living space for approximately 7,512 Indigenous and local residents. The project also endangers terrestrial and coastal ecosystems that have long sustained Rempang's communities.

Concerns about the project's threats to community survival motivated us to conduct research estimating the economic valuation of environmental losses associated with the Rempang Eco City project.

This study adopts an environmental **economic valuation** approach as a method to calculate the economic value of lost environmental goods and services in a comprehensive manner. Such valuation provides a critical analytical tool for examining the dilemmas between economic development and environmental conservation. To date, policy approaches to development have largely focused on short-term financial returns while disregarding long-term environmental costs—including degradation, pollution, ecological decline, environmental management, restoration, and conservation.

Environmental costs are frequently dismissed as "immeasurable" and thus excluded from consideration. Yet ecological impacts are profoundly multidimensional. For instance, development will not only reduce fishery productivity, a vital livelihood for local communities, but will also degrade coastal ecosystems because land exploitation will heighten the region's vulnerability to natural disasters and undermine its ecological capacity to support the well-being of future generations.

Absent a comprehensive, interconnected, and sustainable framework for economic impact assessment, development projects are often evaluated through a narrow lens, measured only in terms of investment value (which disproportionately benefits a small elite) and job creation (which in fact increases dependency on industrial systems that erode local economies). The result is that the social and environmental burdens are borne collectively by communities as negative externalities. Yet such burdens are consistently excluded from policymaking calculations. Consequently, the PSN designation in Rempang is poised to deepen long-term inequality and environmental injustice.

Why Is It Necessary to Estimate Environmental Losses Using an Economic Perspective?

The primary objective of this study is to quantify the losses associated with the Rempang Eco City project through economic value analysis, which serves as the foundation for a comprehensive evaluation of the trade-offs between the economic benefits promised by the government versus the social costs borne by communities when ecosystem damage occurs. Strategically, this study fills a critical gap in the planning and policy evaluation process, which thus has far failed to account for environmental impacts quantitatively.

This study underscores three main points:

- First, it estimates the economic potential of Rempang Island, encompassing 'direct economic values'[6] (e.g., fisheries, agriculture, and other natural resources), as well as 'indirect economic values'[7] (e.g., the ecosystem's role in coastal wave attenuation, seawater intrusion barrier, and fish spawning grounds).

- Second, it identifies the environmental impacts caused by the Rempang Eco City project, spanning the pre-construction, construction, and operational phases.

- Third, it calculates the monetary value of potential environmental losses attributable to the project, including the degradation of natural resources, loss of ecosystem services, and the associated social and economic implications.

6 Benefits derived directly from a resource, either through the production or consumption of goods or services.

7 The value of an ecosystem or natural resource that cannot be directly measured through market transactions, yet still provides benefits to society or the environment.

By presenting empirical evidence of the economic value of impacted ecosystems, this study provides civil society with a robust instrument for negotiation in advocating for ecological justice and a just distribution of development benefits. Moreover, the findings may encourage evidence-based policymaking, ensuring that decisions regarding development projects—such as Rempang Eco City—are not solely driven by investment potentials and job creations, but also by the imperative of a just development that critically accounts for long-term social and environmental costs.

Furthermore, the application of an economic valuation approach to the Rempang Eco City project can serve as a policy reference for stakeholders—government, private sector, and environmental organizations—in formulating inclusive policy instruments, such as environmental taxation, ecological compensation schemes, and transparent, participatory frameworks for sustainable development. We expect this research to support advocacy for affected Rempang Island communities and to promote fair, sustainable environmental governance in Indonesia.

Delving into the Methodology, Reading the Context of Rempang

This study employs a mixed-methods approach by combining quantitative and qualitative methods (field surveys, interviews, and literature review). The objective is to ensure both relevance and comprehensiveness in the economic valuation analysis, which is the monetary value of environmental impacts alongside socio-cultural dimensions, which are often difficult to quantify.

The study is grounded in the paradigm of critical realism. Critical realism is a philosophical perspective in economics that emphasizes the analysis of reciprocal mechanisms and causality in every social phenomenon[8]. Through this approach, we go beyond descriptive analysis of social conditions, offering instead a comprehensive explanation of the mechanisms shaping society, ranging from measurable (objective) aspects, such as monetary value, to subjective aspects, such as social perceptions.

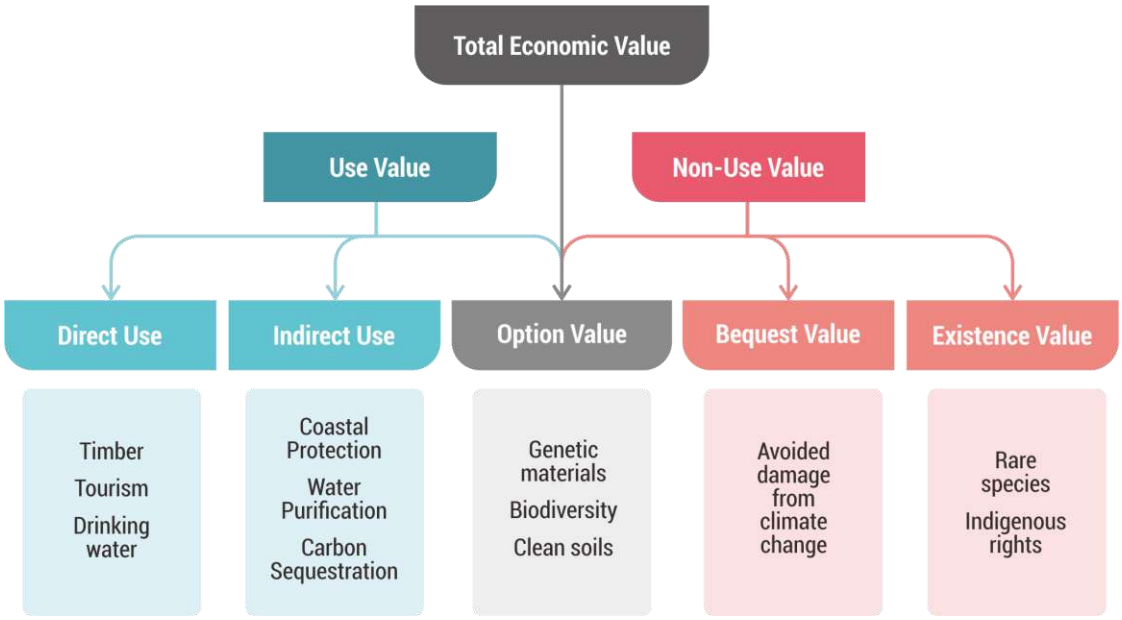
The Economic Valuation of Environmental Impacts framework proposed by Askary (2001)[9] provides the primary foundation, supported by the derivative method of Total Economic Value (TEV). TEV is useful in ensuring comprehensive economic estimation, covering both use values and non-use values of Rempang Island's ecosystems.

- Use values refer to the direct or indirect benefits humans obtain from the environment. Examples include tourism, drinking water, coastal ecosystem protection, and carbon storage.

- Non-use values refer to aspects unrelated to direct economic benefits of the ecosystem, such as the availability of habitats for endangered species or the protection of indigenous peoples' rights.

[8] For further reading, see Tony Lawson (1998), Economic Science Without Experimentation, in Critical Realism: Essential Readings, pp. 144–169.

[9] General Guidelines for the Economic Valuation of Environmental Impacts for the Preparation of Environmental Impact Assessments. Center for the Development and Application of AMDAL – BAPEDAL, Jakarta.



Total Economic Value (TEV) Framework (Van Beukering et al., 2007)

The research was conducted in Rempang Cate Village and Sembulang Village, which are the locations for the first phase of the Rempang Eco City project, projected to cover an area of approximately 2,300 hectares as an integrated industrial zone. Sampling criteria were determined by the researchers to ensure coverage of both coastal ecosystems (such as mangroves, seaweed, and capture fisheries) and terrestrial ecosystems (such as forests, agriculture, and aquaculture).

The research process was carried out over four months in sequential phases:

Month 1 : Planning phase, development of the research framework and methodology, preparation of data collection instruments (questionnaires and interview guides), and stakeholder/network mapping.

Month 2 : Data collection, gathering primary and secondary data through household surveys, in-depth interviews with key informants, and field observations, with attention to ethical considerations and data consistency (validity and reliability).

Month 3 : Data analysis, conducting economic valuation of Rempang Island and identifying environmental losses associated with the Rempang Eco City project.

Month 4 : Reporting, preparing the final report (including findings, analysis, policy impacts, and recommendations).

The results of this research are presented in a form of popular scientific narrative and disseminated through various media platforms to ensure accessibility for affected communities, the general public, policymakers, and the academic community.

Research Scope: Ecosystems, Economic Valuation, and the Impacts of the Rempang Eco City Project

This study focuses on **four aspects within the customary and local community-managed territories** of Rempang Island: mangrove ecosystems, seaweed cultivation, marine capture fisheries, and terrestrial ecosystems. The mangrove ecosystem plays a crucial role in coastal protection, serving as a habitat for fish, shrimp, and mollusks of high economic value. It also holds vital socio-cultural significance, as many people rely on these resources for their livelihoods.

Seaweed cultivation has emerged as a growing economic sector along Rempang's coast, while marine capture fisheries are vital for sustaining coastal food security and driving the local economy as one of the main sources of livelihood. Meanwhile, terrestrial ecosystems—comprising forests, agricultural lands, and freshwater aquaculture (such as ponds and fish farms)—constitute important community-managed spaces that must be included in the economic valuation of Rempang Island.

To analyze **economic valuation**, this study adopts three perspectives: direct economic values, indirect economic values, and option, existence, and bequest values.

Direct economic values refer to the tangible benefits of natural resources and ecosystem services within economic activities. These include capture fisheries and aquaculture production, agricultural and plantation outputs (coconut, corn, bananas, chili, legumes, fruits, and vegetables), revenues from tourism, and non-timber forest products[10].

Indirect economic values represent the ecosystem services that indirectly sustain the socio-economic well-being of local people. For example, mangroves function as natural wave barriers that reduce coastal infrastructure damage and the risks of erosion, while also serving as habitats for fish and marine biota—thus contributing to coastal community food security.

Option, existence, and bequest values encompass cultural heritage, biodiversity, and landscapes that shape the socio-cultural identity of Rempang's local communities.

[10] More commonly referred to as Non-Timber Forest Products (*Hutan Bukan Kayu [HHBK]*); all products derived from forests other than timber, including plants, animals, and their derivatives.

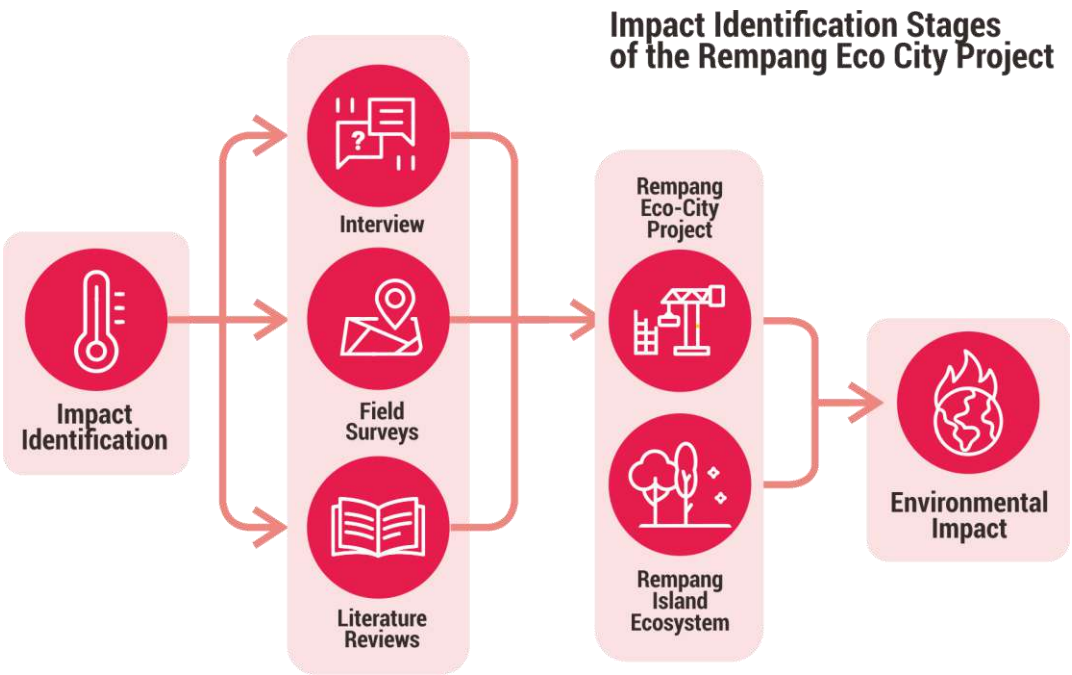
To refine the analysis, this study is limited to assessing the impacts of the first phase of the project, which covers approximately 2,300 hectares, or 28% of the total Rempang Eco City area. In summary, the Master Plan of this initial phase consists of three zones:

- **Zone 1**: An industrial zone covering 1,154 hectares, designated for the establishment of a Photovoltaic Solar Industrial Park and supporting facilities to process raw materials into final products, namely ready-to-use solar panels.

- **Zone 2**: An industrial development of an alumina refinery (intermediate product) and supporting facilities such as red mud disposal sites, a dedicated terminal, and others, across 800 hectares.

- **Zone 3**: Belongkeng/Rempang Tower zone covering 371.4 hectares, consisting of residential area (38.35 ha), golf tourism area (125.59 ha), bay commercial zone (31.79 ha), vertical tower commercial zone (43.33 ha), and a general commercial zone (201.05 ha).

The overall design of these three zones clearly demonstrates that the Rempang Eco City project prioritizes the interests of investors, political elites, and the upper-middle class, as industrial and commercial development are placed at the center, rather than promoting a model of development rooted in the preservation of coastal communities' living spaces – economically, socially, and culturally. Our preliminary zoning analysis thus provides the foundation for calculating the estimated environmental losses resulting from the Rempang Eco City project.



Population and Sample

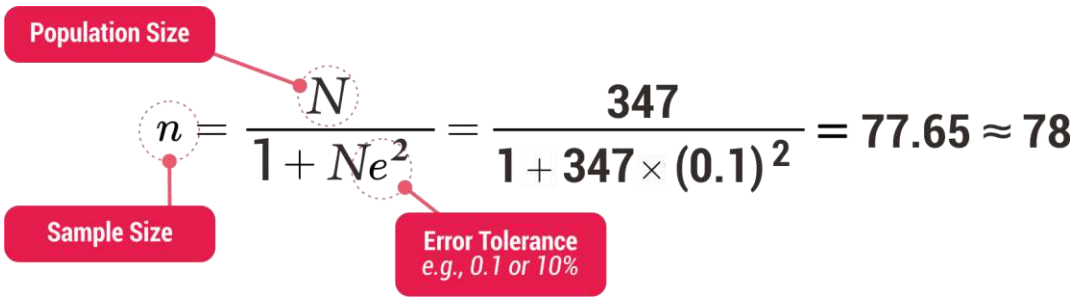
The research population includes all residents directly or indirectly affected by the Rempang Eco City project on Rempang Island. With a total area of 16,583 hectares encompassing 16 traditional villages, the Alliance of Rempang Galang United Communities (Aliansi Masyarakat Rempang Galang Bersatu/AMAR-GB) reported that, as of the time this study was conducted, approximately 347 households remain, representing 80% of residents who reject relocation. These households are distributed across several villages, including Pasir Panjang (112 residents), Sembulang Hulu (90 residents), Belongkeng (60 residents), Sembulang Tanjung (20 residents), and Sembulang Pasir Merah (65 residents).

Table 1. Population Distribution

No	Village	Population
1	Pasir Panjang	112
2	Sembulang Hulu	90
3	Belongkeng	60
4	Sembulang Tanjung	20
5	Sembulang Pasir Merah	65
	Total	**347**

Source: Alliance of Rempang Galang United Communities (AMAR-GB), 2025

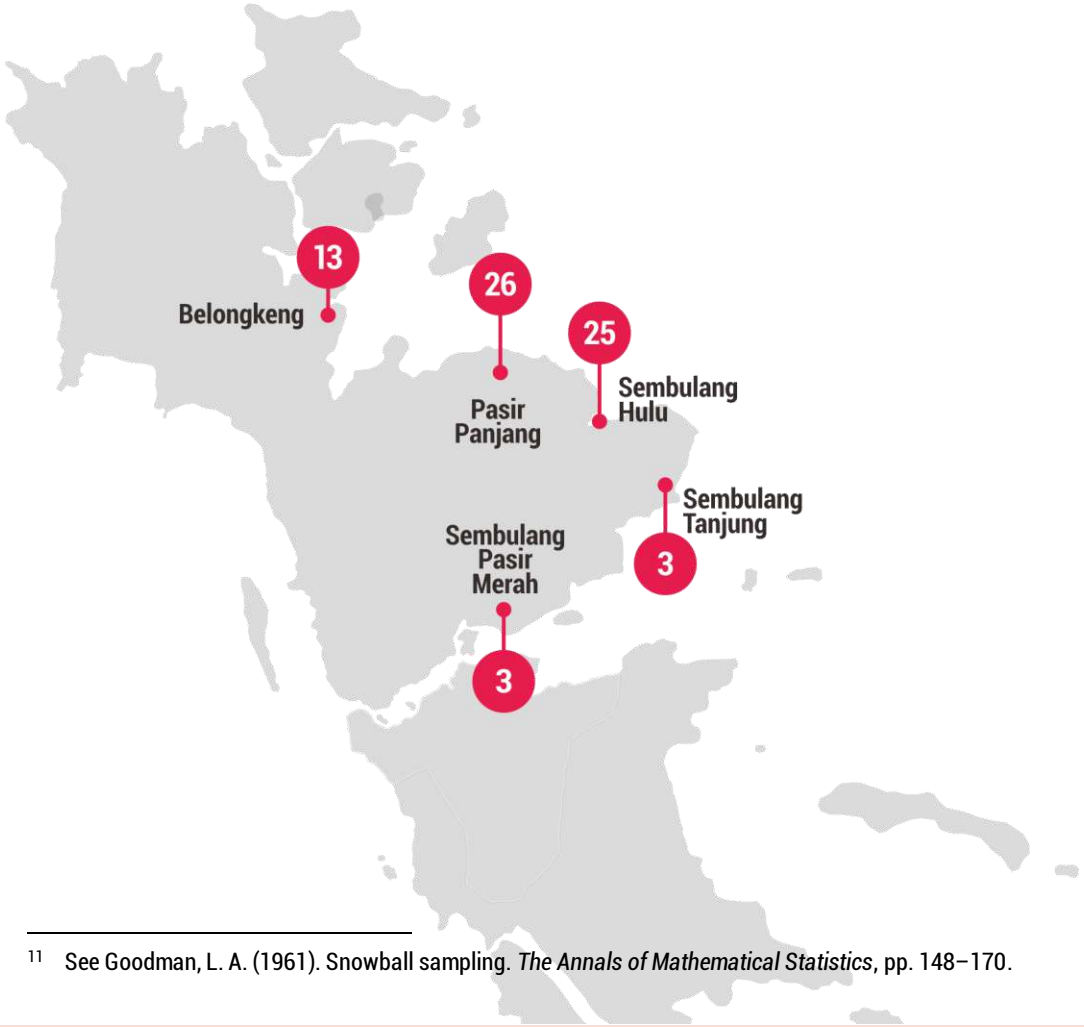
To obtain a comprehensive and representative analysis, the sample was determined using a proportional purposive sampling approach. The selection criteria required respondents to possess knowledge, experience, or direct exposure to environmental impacts caused by the project. The sample size was calculated using Yamane's formula (1973) with a 10 percent margin of error.



From the total of 347 households, a sample size of 82 respondents was obtained. The sample was then distributed proportionally across the 5 (five) villages that served as the research sites. To enrich the findings, five key informants were also interviewed, selected using the snowball sampling[11] technique, representing diverse stakeholders including community leaders, local government officials, business actors, NGOs, and academics.

Table 2. Sample Distribution

No	Village	Population
1	Pasir Panjang	26
2	Sembulang Hulu	25
3	Belongkeng	13
4	Sembulang Tanjung	3
5	Sembulang Pasir Merah	15
	Total	**Total**



[11] See Goodman, L. A. (1961). Snowball sampling. *The Annals of Mathematical Statistics*, pp. 148–170.

From Field to Paper Trails: Reflections on the Data Collection Process

Before analyzing the estimated environmental losses from the Rempang Eco City project, data collection was conducted through both primary and secondary sources. Primary data were collected through household surveys using structured questionnaires, aimed at generating in-depth information on demographic profiles, household economic structures, and community patterns of resource use and dependence. In addition, key informant interviews were conducted to capture historical context, social dynamics, and community changes on Rempang Island, including risks of conflict of interest in the face of the project. From an ecological standpoint, these interviews also enriched the understanding of coastal and terrestrial landscape characteristics from local perspectives, while highlighting community views on the Rempang Eco City project, including its design transparency, public consultation processes, and collective expectations and concerns.

Secondary data were collected to complement and validate the primary findings. This included a review of previous studies on economic valuation of coastal ecosystems, such as mangroves, fisheries, and ecosystem services contributing to environmental and economic resilience in coastal communities.

Further, a literature review was conducted on documents related to National Strategic Projects (*Proyek Strategis Nasional*/PSN), including licensing regulations, impacts on indigenous peoples and tenure rights (land rights and governance of customary territories, forests, and waters), and documents assessing project alignment with sustainable development and climate change mitigation policies, including Environmental Impact Assessments (AMDAL) and the master plan of Rempang Eco City.

At the initial stage of the research, information on the Rempang Eco City project was obtained from Amdalnet, an environmental information system managed by the Ministry of Environment and Forestry for processing environmental approvals of business and development plans. This provided a preliminary framework for understanding the project's location, scale, and identified potential impacts. The information was instrumental in shaping the economic valuation methodology tailored to the project design.

As the preliminary research report was being prepared, the official AMDAL document was obtained from BP Batam. This document contained more detailed and technical information, including project phases, environmental baselines, impact analyses, and evaluation measures. The availability of this AMDAL document marked a critical juncture, allowing the study to re-examine its positioning in relation to the official information provided by project implementers.

To enhance analytical rigor, spatial data were also collected from multiple institutions, including government agencies, universities, research institutions, and non-governmental organizations. This included maps of land cover, shoreline changes, distribution of critical ecosystems, and project infrastructure networks. These datasets were analyzed using Geographic Information Systems (GIS) techniques. Lastly, socio-economic and demographic data from the Central Statistics Agency (*Badan Pusat Statistik*/BPS) and related institutions were used, covering local economic trends, community dependence on natural resources, and potential social impacts of the Rempang Eco City project.

The integration of primary and secondary data was then critically examined to identify risks of environmental degradation, understand stakeholder policies and mitigation strategies, map local socio-economic conditions and needs, and trace inequalities and injustices in development at the grassroots level. This holistic approach provided a strong foundation for the economic valuation of environmental impacts and the formulation of policy recommendations grounded in social and environmental justice.

Tools for "Crafting" Research Findings

To analyze research data related to the economic valuation of environmental impacts from the Rempang Eco City project, two methods were employed: (1) calculating the economic potential of Rempang's entire ecosystem using economic formulas reflected in previous studies, and (2) applying social network analysis (SNA) to critically examine systemic environmental losses.

Analysis of the Economic Potential of Rempang Ecosystems

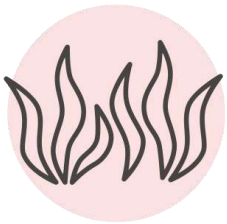
In estimating the economic potential of Rempang Island, this study uses two approaches for synthesizing the research data: **Use Value Analysis** and **Non-Use Value Analysis**.

Use Values are identified as the direct and indirect economic benefits derived by humans. These include production-based components such as seaweed cultivation, marine capture fisheries, freshwater aquaculture, and agriculture. The method applied is the **market price method**, which calculates the **economic value of traded commodities based on actual market prices of harvests or catches**.

For non-market components such as cultural heritage, biodiversity, and landscapes, the **contingent valuation method** (CVM) was used. This method involves surveys to capture community **willingness to pay** (WTP) to preserve, conserve, or maintain local social, economic, and environmental sustainability. For example, cultural heritage values are measured by the extent to which communities are willing to contribute to efforts to sustain traditions tied to environmental conservation. Similarly, WTP for biodiversity and landscapes is mapped through community preferences to protect ecosystems for future generations.

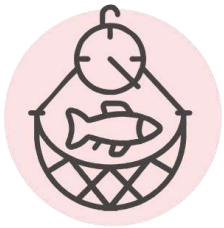
The following are the components of the economic valuation methods used to analyze Use Values:

Market price method



Seaweed

Uses market prices of harvested seaweed to calculate economic value.

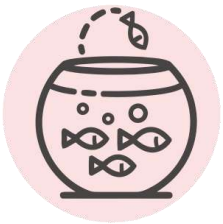


Marine capture fisheries

Uses market prices of fish catches to calculate economic value.

Agriculture

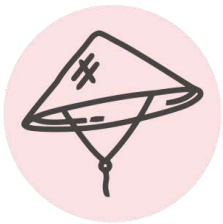
Calculates crop production value based on market commodity prices.



Freshwater aquaculture

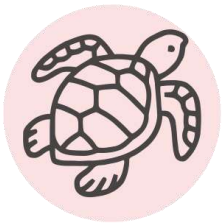
Uses market prices of harvested fish to calculate economic value.

Contingent valuation method (CVM)



Cultural heritage

Surveys community WTP to sustain ecosystem-based traditions.



Biodiversity

Maps community preferences via conservation policy scenarios.

Landscape

Uses WTP to preserve ecosystems for future generations.

On the other hand, **Non-Use Values** are defined as environmental aspects not directly tied to the economic benefits of ecosystems, but which nonetheless hold significant economic and ecological roles. Two valuation methods are applied here: Benefit Transfer and Avoided Cost.

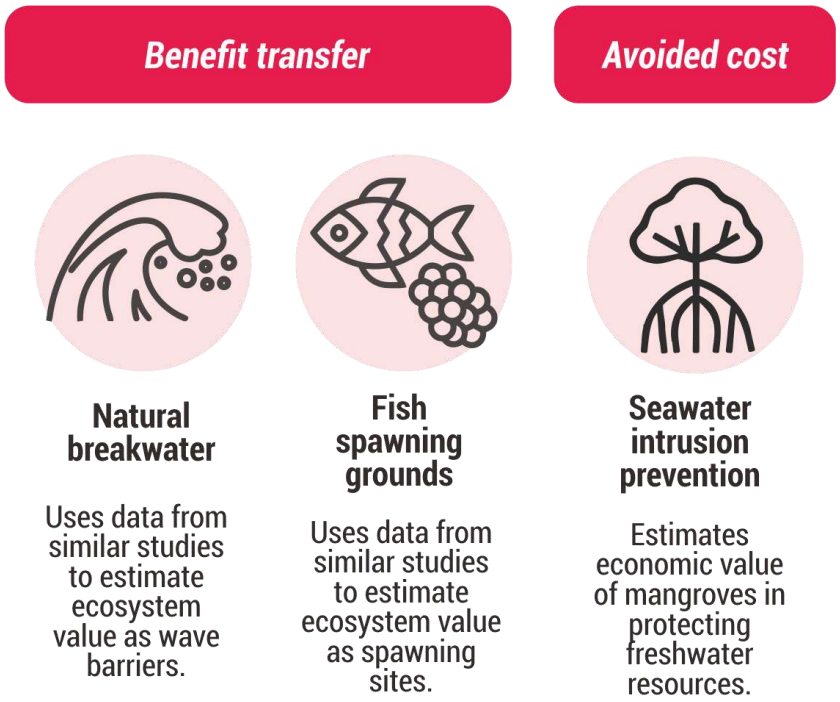
Benefit Transfer is used to calculate the economic value of wave-buffering ecosystems, adapted from studies conducted in locations with similar ecological characteristics. Through this method, we estimated the economic value of mangrove ecosystems in protecting coastal areas from erosion and storm surges.

Based on Alamanda et al. (2024), the annual value of mangroves as wave barriers was estimated at Rp18,518,085,600. This figure was divided by the number of households in the same year (2,294), yielding a household-level benefit of Rp8,072,400 per year.

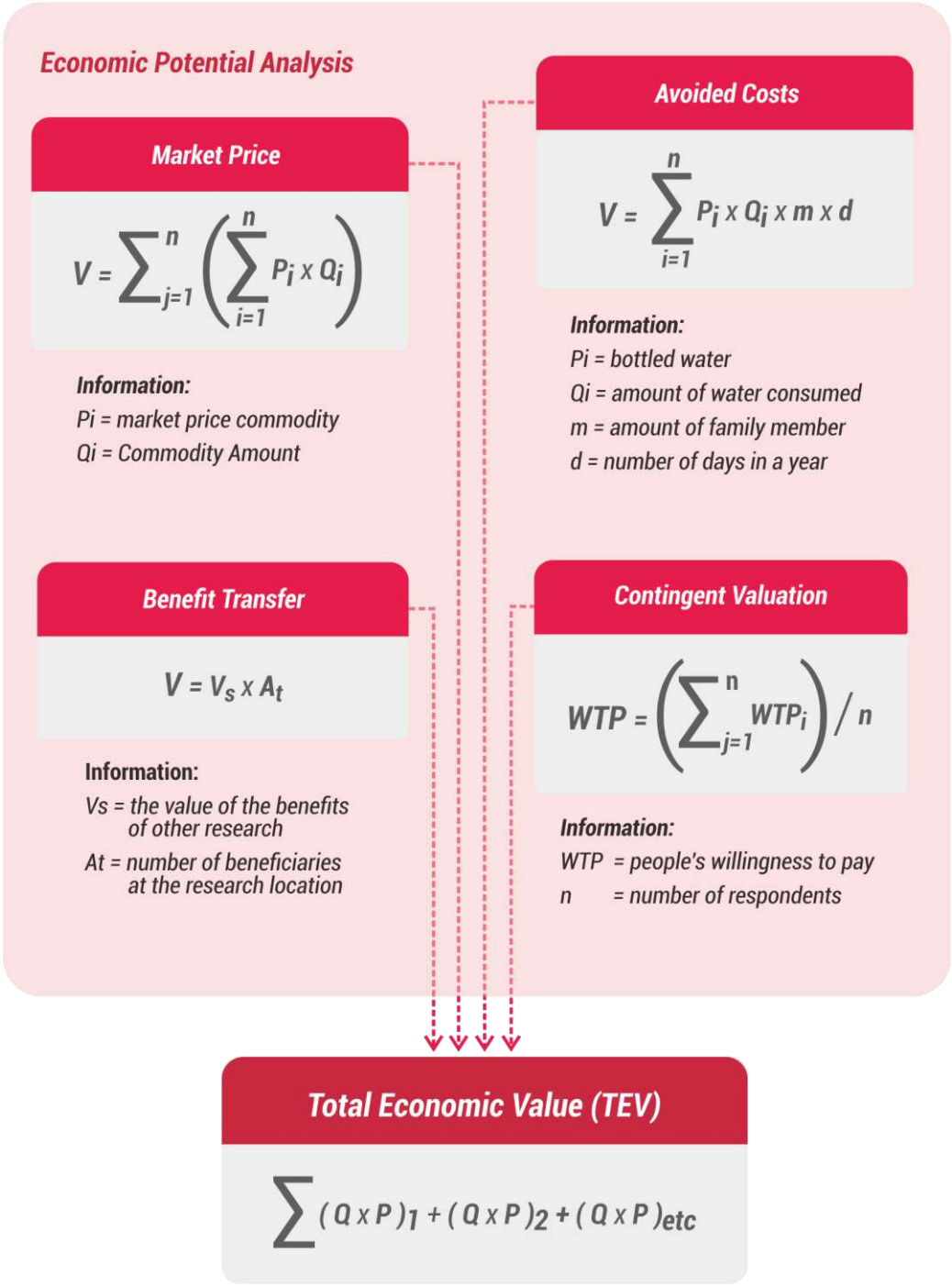
Similarly, the value of mangrove ecosystems as fish spawning grounds was estimated at Rp6,597,432,883 per year (Alamanda et al., 2024). Divided by 2,294 households, this produced a household-level benefit of Rp2,875,951.56 per year.

Avoided Cost is used to estimate the costs avoided when mangrove ecosystems remain functional in maintaining the quality and quantity of freshwater. Specifically, mangroves prevent seawater intrusion into surface and groundwater, ensuring the availability of clean water for local communities.

The following are the components of the economic valuation methods used to analyze Non-Use Values:



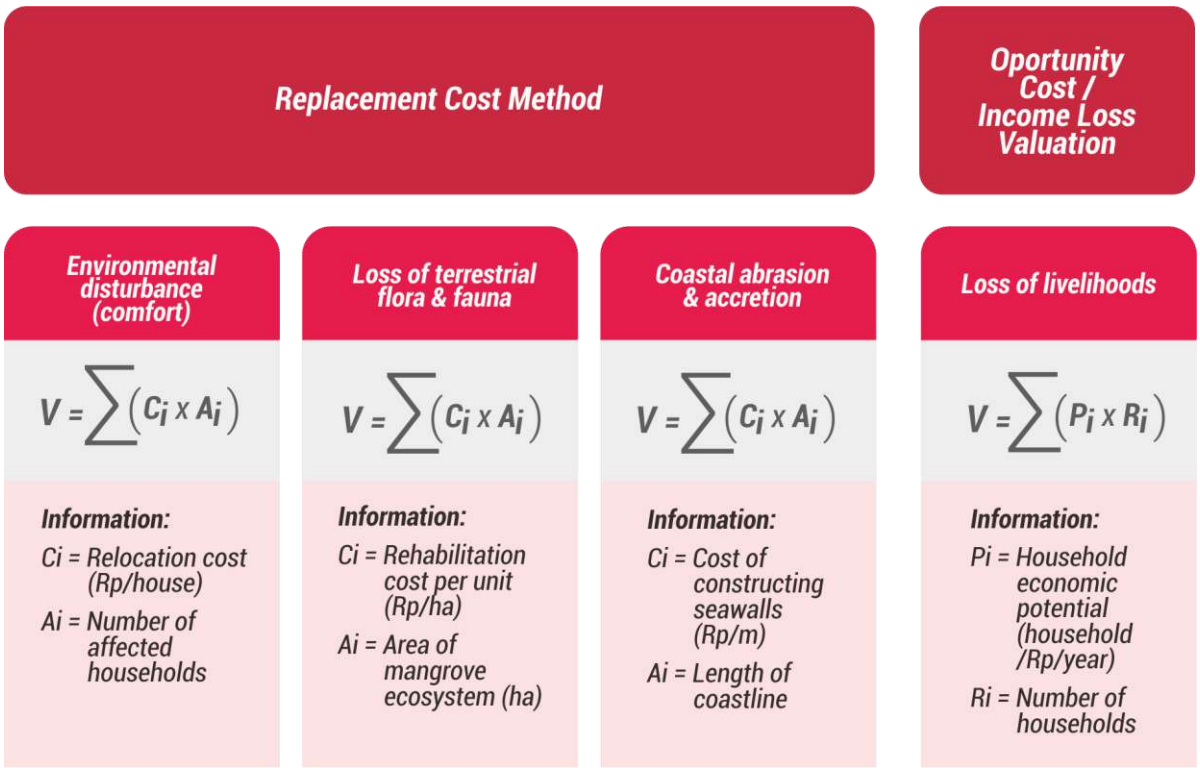
Ultimately, the total economic potential of all socio-ecological components of Rempang Island was obtained by grouping, summing, and statistically aggregating the results using the **Total Economic Value** (TEV) formula. This formula integrates all measurable direct and indirect benefits of natural resources.



Method for Estimating the Losses from the Rempang Eco City Project

The process of analyzing the environmental impacts of this National Strategic Project employs the Social Network Analysis (SNA) method. The purpose of this approach is to study, classify, and identify the potential impacts that may arise from the project. SNA enables us to map the complex relationships linking project plans, ecosystem degradation, and the long-term consequences that may occur in the future.

Unlike linear or binary models, SNA critically examines the systemic chains of cause-and-effect related to socio-ecological degradation resulting from large-scale development. This analysis produces a comprehensive review of how the project affects socio-ecological transformations in Rempang.



Environmental Loss Analysis

Replacement Cost

$$V = \sum (C_i \times A_1)$$

Information:
Pi = cost incurred
Ai = amount / extent of loss

environmental disturbance (comfort), loss of flora and fauna. abrasion and accretion occur.

Income Loss

$$V = \sum (P_i \times R_1)$$

Information:
Pi = economic potential
R1 = number of households

loss of livelihood

Total Value Of Environmental Losses

$$\sum (C \times A)_{1,2,3} + (P_i \times R)_1$$

Methodological Limitations

Throughout the research process, we acknowledge several limitations that must be disclosed openly as part of methodological transparency and research ethics. These limitations reflect a range of constraints that directly or indirectly influenced the scope, depth, and analysis of data.

One of the primary challenges during data collection was the restricted access to critical documents such as the Environmental Impact Assessment (AMDAL)[tl][u], even though AMDAL is a fundamental instrument in Indonesia's environmental management system, designed to ensure that development projects take environmental sustainability into account from the planning stage. During the research period, efforts were made to obtain this document through official communication channels with the relevant authorities.

As a consequence, we faced difficulties in accessing essential information required for a deeper assessment of environmental impacts. The available environmental analysis data was often too general and lacked sufficient detail to support comprehensive economic valuation. In addition, some data sources were inaccessible due to legal, ethical, or technical barriers, which limited the extent of our analysis. As a result, we ultimately narrowed the focus of this study to four specific impacts:

- Environmental disturbance (comfort),
- Loss of terrestrial flora and fauna,
- Displacement of livelihoods,
- Coastal abrasion (land erosion caused by ocean waves and currents),
- and accretion (shoreline changes).

This means that other potential impacts (possibly of equal importance) could not be adequately assessed due to the absence of supporting data.

However, by the time the preliminary research report was being drafted, we were able to obtain the official AMDAL document from BP Batam. This became a critical milestone, allowing us to reassess the positioning of this economic valuation study in relation to the official information provided by project implementers.

A critical review of the AMDAL document is important for understanding the root causes of the issues at hand, including identifying opportunities for socio-ecological advocacy. As a technocratic product prepared to fulfill legal requirements for project implementation, AMDAL presents its analysis within normative and technical frameworks that rely on predictive models and quantitative data. By contrast, this valuation study is an independent effort, not mandated by regulation, but driven by the need to critically measure the economic value of environmental impacts while taking into account local socio-ecological dimensions.

We consciously positioned the AMDAL as a supporting document for this research, one that enables a deeper mapping of Rempang Eco City's impacts and views the project as an interconnected system rather than through a sectoral lens.

Finally, it must be emphasized that the environmental loss values calculated in this study remain partial estimates, and therefore do not yet fully capture the entirety of ecological and social impacts occurring in the field.

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SAVE MANGROVE
MARI KITA
BIOTA
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ISTANA TENGKU BILIK JL. RAJA JA'FAR KEL PENYENGAT -KEC.TANJUNGPINANG
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ADVOKAD :
H.YOPIE BHARATA, SH
ISMAIL MUSLIMIN, SH
DILARANG MERUSAK, MENCABUT,
MENGHILANGKAN DAN MEROBEK
MAKA AKAN DIPROSES
MELALUI JALUR HUKUM

Chapter II

Small pompong boats sail back and forth, paddling toward the coastal waters. Motorized *pancung* boats come and go—sometimes heading out to fish, sometimes carrying passengers who may well be their own neighbors.

In the morning, women dry fish while tending to their children, busy with lively chatter. The distinctive coastal aroma, mingling with salty sea breeze and seaweed, fills the air with a fragrance that sustains life on this small island in southeast Batam.

At certain times, fishermen can be seen drying *rengkam* (a type of seaweed). Spread out like a brown carpet with a salty sea scent, it blends with the warmth of the sun. Neighbors greet one another. Some have just returned from the sea, others head to their gardens to pick coconuts. Meanwhile, in the home yards, a few harvest chili and basil. Will these be sold, or simply enrich the flavors of their meals that day?

Along the coast, stilt houses sway with the rhythm of the waves. They are home to small families who enjoy watching television and holding mobile phones, nurturing a modern imagination of city life, "a luxurious life like in Jakarta." Yet this imagination of the bustling city creates an unavoidable reality: to remain on the land that has sustained and provided for them, or to chase visions of modern grandeur that may never truly be theirs. Meanwhile, the looming shadow of "living space" being seized by the elites, those often appearing on television screens and smartphones, is becoming increasingly visible before their eyes.

Sketches of Life and Livelihood on Rempang Island

We conducted research focused on two villages: Pasir Panjang and Sembulang Hulu. Most residents earn their livelihood as fishermen. Meanwhile, in other villages like Sembulang Pasir Merah and Belongkeng, the majority work as fishermen and farmers. The smallest number of respondents came from Sembulang Tanjung, with work concentrated in fisheries and agriculture.

There, we met respondents dominated by those in their productive years, particularly between 40 and 60 years old, though the age range extended from 28 to 79. Out of 82 respondents, the majority were men. This reflects the local social reality where men dominate economic activities such as fishing, farming, and aquaculture. The limited participation of women in economic activities cannot be separated from traditional divisions of labor that still place women in the domestic sphere, which in turn affects how access and control over natural resources are distributed.

Although women's roles may seem limited, they do in fact contribute to fishermen's household economies. However, their contributions often go unseen, confined to the domestic realm and rarely recognized as productive labor. For instance, women in Rempang are tasked with drying fish, seaweed, and rengkam, as well as processing catches for family consumption. They play an important role in sustaining household economies in the local community.

In Rempang homes—most of which are stilt houses along the shoreline built from wood—between one and ten people usually live together. On average, households consist of three to five members. Most have lived there for more than three decades, reflecting a deep-rooted attachment to the coastal land of their birth that has sustained their lives for generations.

Furthermore, most respondents only attained elementary school education, making up nearly 60 percent of the population on Rempang Island. About one-fifth continued to junior high school, and only a few reached senior high school. There were also respondents who had never received any formal education. Out of the entire population, only one person had completed higher education up to a Master's degree. This situation illustrates the limited access to advanced education within the Rempang community.

Half of the respondents (56 percent) rely on fishing for their livelihoods, while another third (34 percent) are farmers. Thus, almost all surveyed residents depend heavily on the primary sector (direct use of natural resources). Very few work outside these sectors, such as in civil service. This indicates limited access to formal professional sectors.

Calculating the Potential Use Value on Rempang Island

The various economic potentials of Rempang Island that we gathered include seaweed (*rengkam*), marine capture fisheries, agricultural produce, freshwater aquaculture, and mangrove ecosystems—all of which fall under the category of use value. The estimated economic values here were calculated using the Market Price Method and the Contingent Valuation Method (CVM). The potential use value in Rempang is divided into two categories: direct use value and indirect use value.

Rengkam, Capture Fisheries, Agriculture, and Aquaculture as Direct Use Value Potentials

***Rengkam* seaweed**. Out of all respondents, 14 households (17.1 percent) actively utilize seaweed as an additional source of livelihood. *Rengkam*, scientifically known as *Sargassum sp*., has considerable economic value and has long been harvested by coastal communities on Rempang Island as a daily source of income. Generally, *rengkam* is harvested during specific seasons, from October to February, which locals refer to as the north wind season. During this time, when people cannot go fishing as usual, they switch to harvesting *rengkam*. The harvest lasts for about 30–50 days each season, with each household able to collect up to 1.5 tons of *rengkam* per week. The selling price varies, ranging from Rp1,400 to Rp2,000 per kilogram, depending on quality and market demand at harvest time.

Based on average yields and selling prices, it is roughly calculated that one household harvesting *rengkam* can earn an annual income of Rp59,462,857. This figure demonstrates how rengkam provides an economic contribution beyond the capture fisheries sector.

Illustration of drying rengkam (Photo source: Yogi Eka Sahputra/Mongabay Indonesia)

Marine capture fisheries. There are 31 types of marine fishery commodities utilized by the fishing communities in the research area, including crabs, *selar* fish, *debam* fish, *dingkis* fish, and shrimp.

- Crabs are valued at Rp80,000 per kg, harvested by 30 households.
- *Selar* fish at Rp20,000 per kg, harvested by 22 households.
- *Debam* fish at Rp50,000 per kg, harvested by 18 households.
- *Dingkis* fish at Rp170,000 per kg, harvested by 16 households.
- Shrimp at Rp70,000 per kg, harvested by 16 households.

Findings on the types of fish caught, along with their price ranges recorded during household surveys, indicate high market value. These species also influence fishing tendencies among households. For example, *dingkis* fish, although caught by only 16 households, is highly strategic economically, especially during its peak season. Conversely, species like *selar*, *debam*, and crabs are more accessible since they are available year-round, providing relatively stable sources of income.

Fishing households use a variety of gear such as fish traps (*bubu*), nets, fishing rods, and other tools. The choice of gear is selective, depending on the targeted catch. For instance, *bubu*[12] traps are commonly used to catch crabs and shrimp, fishing rods for grouper, snapper, or mackerel, and nets for pelagic fish such as *selar*, tuna, and *tamban*. The diversity in fishing gear reflects local community adaptation strategies to seasonal differences, ensuring maximum catches.

Some marine products like crabs and shrimp are harvested almost daily, taking advantage of coastal and estuarine habitats that are accessible year-round. Meanwhile, high-value fish such as *dingkis*, mackerel, and grouper are typically caught in specific seasons, following local migration patterns and oceanographic conditions. This seasonal fishing strategy highlights how local ecological knowledge serves as a key foundation for the sustainability of Rempang's fisheries.

In addition to documenting catch types, we also recorded the average annual household income of fishermen, which amounts to Rp303,883,645. This income is derived from a combination of daily and seasonal catches as well as the sale of high-value commodities. For example, one kilogram of dingkis can be sold for up to Rp170,000, while grouper can reach Rp200,000 per kg. Other premium commodities include fan shrimp (epo) at Rp140,000 per kg and snapper at Rp100,000 per kg. These results significantly contribute to fishermen's annual incomes, particularly for those who can access external markets or maintain stable trading partnerships.

On the other hand, lower-value species such as *tamban* (Rp10,000 per kg) and *jahan* (Rp15,000 per kg), though less profitable financially, play a crucial role in maintaining daily local food security for Rempang's communities.

Fish catches of Rempang Island fishermen (Photo source: Mohd. Yunus)

[12] It is commonly referred to by the community as *bubu Korea* (Korean fish trap).

Fan shrimp and blue swimming crab caught along Rempang Island coast (Photo source: Yogi Eka Sahputra/Mongabay Indonesia).

Agriculture. Farmers cultivate at least 38 types of crops, consisting of 21 vegetable commodities and 17 types of fruits, reflecting the diversity of produce that is important both as a source of income and for daily household consumption.

These commodities are grown in home gardens, mixed farms, and seasonal fields. Year-round planting patterns serve as an adaptive strategy to cope with crop failure risks and unstable market prices. For instance, vegetables such as water spinach (*kangkung*) and cucumber have fast harvest cycles, so they are planted in stages to maintain a steady supply. Meanwhile, fruit crops such as coconut and banana, which can be harvested regularly throughout the year, serve as "economic buffers" for households when vegetable harvests decline. A diversified farming approach is an essential strategy, as it minimizes dependence on a single commodity and strengthens household economic resilience.

The most widely cultivated vegetables include chili (grown by 21 households), water spinach (18 households), cucumber (18 households), and basil (15 households). Chili has the highest market value among vegetables, selling for Rp50,000 per kg, making it the primary choice for farming households seeking maximum profit from small plots of land. Basil follows with a high economic value at Rp25,000 per kg and relatively short harvest cycles. Water spinach and cucumber, while lower in price–Rp7,000 and Rp9,000 per kg respectively–remain staple commodities because they are easy to grow and quick to harvest.

As for fruit commodities, the most widely cultivated are coconut (28 households), banana (26 households), mango (18 households), sapodilla (10 households), and durian (9 households).

Coconuts provide stable long-term income since they fruit year-round and are usually sold individually at Rp6,000 each. Durian has the highest market value among commonly cultivated fruits, at Rp25,000 per kg, making it the most significant seasonal income source. Bananas and mangoes, although priced lower at Rp5,000-10,000 per kg, are widely planted due to high productivity and steady market demand. Other high-value crops include leek (Rp75,000 per kg), *matoa* (Rp40,000 per kg), and *leunca* or *rimbang* (Rp28,000 per kg). However, these three remain rarely cultivated by Rempang farmers.

Our findings show that the average annual household income from farming is Rp176,027,159. This figure highlights the agricultural sector's contribution to rural livelihoods in the study area. Income estimates were calculated by combining daily vegetable harvests and seasonal fruit yields, which were sold in local markets or to middlemen.

Coconut trees on Rempang Island (Photo source: Mohd. Yunus)

Freshwater Aquaculture. Although most Rempang people work as fishermen or farmers, some households also produce two main aquaculture commodities: catfish (*Clarias sp*.) and pangasius (*Pangasius sp*.). These fish are considered leading commodities in aquaculture, both at household and larger scales. The key reasons are their high adaptability to different environments, rapid growth, and stable market demand. Generally, aquaculture is carried out in tarpaulin ponds or earthen ponds built in household yards, using well water or rainwater. Technically, these two commodities are easy for beginners to manage with limited capital, making them an ideal option for diversifying income sources for Rempang communities.

The average household income from aquaculture is Rp130,350,000 per year, based on catfish and pangasius harvests sold in local markets or to middlemen. Economically, freshwater aquaculture contributes significantly to household livelihoods because most operational costs can be minimized. In addition, the use of alternative feeds such as kitchen scraps or vegetable waste helps reduce dependence on commercial feed.

Mangrove ecosystems play a vital role in supporting environmental sustainability and the socio-economic well-being of coastal communities. One of their main ecological functions is serving as a **natural breakwater** that reduces the energy of ocean waves, whether from daily tides or extreme events like storms and high surges. This function provides natural protection against coastal abrasion, soil erosion, and damage to coastal infrastructure, while also maintaining the productivity of other ecosystems such as seagrass beds, coral reefs, and fishponds.

In a study by Alamanda et al. (2024)[13] on the economic valuation of mangrove ecosystems in Rempang, the estimated value of mangroves' wave-breaking function was Rp18,518,085,600 per year. This figure was calculated using the replacement cost method, estimating the expenses that would be required if the ecological function of mangroves had to be substituted with man-made infrastructure such as concrete breakwaters or seawalls.

Economically, this annual total was divided by the number of households (2,294) recorded in the same year, producing an estimated benefit of Rp8,072,400 per household per year. This can be understood as a form of "natural subsidy" that protects coastal communities annually.

Thus, although the economic value of mangroves may appear abstract in daily transactions, their role is critical in reducing disaster risk, preventing asset damage, and sustaining coastal economic activities.

Another role of mangrove ecosystems is **preventing seawater intrusion**. Intrusion occurs when saline seawater enters freshwater aquifers in coastal areas, contaminating drinking water sources. The impact of intrusion includes the deterioration of clean water quality, which affects health, agriculture, and household consumption.

The intrusion-prevention function is vital for maintaining the stability of freshwater resources essential to communities. Healthy, dense mangrove forests form natural buffer zones that reduce seawater pressure inland. Their complex root systems slow the flow of seawater, help maintain soil salinity levels, and protect shallow groundwater layers from salt contamination. Over the long term, this function reduces household costs for water treatment or alternative water sources.

Economically, the ecological benefit of mangroves as barriers against seawater intrusion was estimated using the avoided cost method, calculating the costs avoided if communities do not need to buy clean water, treat saline water, or repair infrastructure damaged by salt contamination.

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[13] See Alamanda, L. N., Ismail, K., Suryanti, A., & Habibah, S. N. (2024). Economic valuation of mangrove ecosystem in Rempang Island, Batam City, Riau Islands Province. *Jurnal Perikanan dan Kelautan*, 29, 266–274.

Based on this approach, the benefit per household is estimated at Rp36,196,644 per year. In other words, mangroves directly help households save money in meeting their basic water needs.

Furthermore, mangroves serve as crucial **spawning and nursery grounds for various aquatic species** such as fish, crabs, and shrimp. Their dense root structures create ideal habitats for juvenile marine species to grow and develop, offering abundant food sources and protection from predators. This supports healthy aquatic populations and ensures continuous regeneration of fish, crabs, and shrimp over time.

The estimated economic value of mangroves as spawning and nursery grounds is Rp6,597,432,883 per year. When broken down to household level, this equals Rp2,875,951.56 per household per year. While this may seem modest individually, it is highly significant when viewed as a continuous annual contribution to fishermen's household economies.

Mangrove ecosystem along Rempang Island's coast (Photo source: Mohd. Yunus)

Understanding Environmental Conservation through the Measurement of Non-Use Value

Beyond the potential of use values, we also assessed non-use values, which consist of local culture, biodiversity, and landscape. This valuation context is employed to measure the economic worth of natural resources and the environment, even when individuals or communities do not directly or indirectly utilize them, either now or in the future.

Culture. The meaning and value of culture arise from the emotional, historical, and spiritual ties between communities and nature, which then shape local cosmologies, including spiritual beliefs, traditional knowledge, and communal identity. Within Rempang's coastal communities, ecosystems are inseparable from local traditions, such as sea rituals, the use of plants for traditional medicine, and customary laws regulating human–nature relationships. In daily life, mangrove ecosystems also serve as natural recreation areas, as well as symbols of cultural resilience and dignity passed down through coastal generations.

The willingness to pay (WTP) approach was used to quantify cultural value by estimating how much communities were voluntarily willing to pay to protect, maintain, and restore mangrove ecosystems. Based on WTP surveys with respondents, we found an average value of Rp956,962 per household per year. This figure reflects the community's ecological awareness and recognition of the importance of mangroves from a cultural perspective. It also indicates their willingness to allocate resources to ensure mangroves continue to function, even if they do not directly derive economic gains from them.

Although the economic figure seems modest compared to direct economic benefits, this cultural dimension cannot be ignored. Indeed, such intangible values form the foundation of social cohesion and environmental conservation, reinforced by social norms, customary laws, and communal solidarity that cannot be replaced with monetary incentives.

Biodiversity sustains human life, flora, fauna, and microorganisms. For coastal communities, the presence of protected species such as dugongs, sea turtles, and dolphins signals healthy and stable ecological conditions, which ultimately contribute both directly and indirectly to community well-being.

To measure how strongly coastal communities value biodiversity in their lives, we again used the WTP method to capture their perceptions of environmental conservation. We assumed that the higher the WTP, the greater the value communities attach to biodiversity.

Survey results showed an average WTP of Rp959,494 per household per year. This indicates that the community has a tangible appreciation for biodiversity conservation, even though it is not directly reflected in their everyday economic activities.

Coastal landscapes, especially mangrove forests and surrounding waters, do not only embody ecological and direct economic values, such as fish catches or coastal protection. They also carry important meanings as part of cultural identity, tranquility, aesthetics, and the reciprocal relationship between nature and people that sustains life across generations.

Using the WTP method, we asked households how much they were willing to contribute voluntarily if the funds were dedicated to protecting the local landscape.

Based on the survey, we calculated that each household was willing to pay an average of Rp954,430 per year to preserve the beauty, tranquility, and sustainability of their surrounding natural landscape. This shows the community's appreciation of well-functioning ecosystems, even if not directly tied to measurable economic benefits like fisheries or agriculture.

Accumulating the Potentials of Rempang's Coastal Communities: Calculating the Total Economic Value

After analyzing both use and non-use value potentials, we consolidated and aggregated the findings at the household level. The method was to divide the total estimated value by the 82 respondents.

The calculation showed that the estimated total value per household amounted to Rp32,772,223 per month, far greater than the government's claim of Rp3 million per month. This figure reflects both direct and indirect contributions of natural resources and livelihood activities to household economies in coastal communities. Our research found that the largest proportion of household economic value comes from the primary sector of capture fisheries and agriculture. Capture fisheries include both daily and seasonal catches such as crabs, *selar*, *debam*, *dingkis*, and shrimp, reflecting community dependence on coastal marine biodiversity.

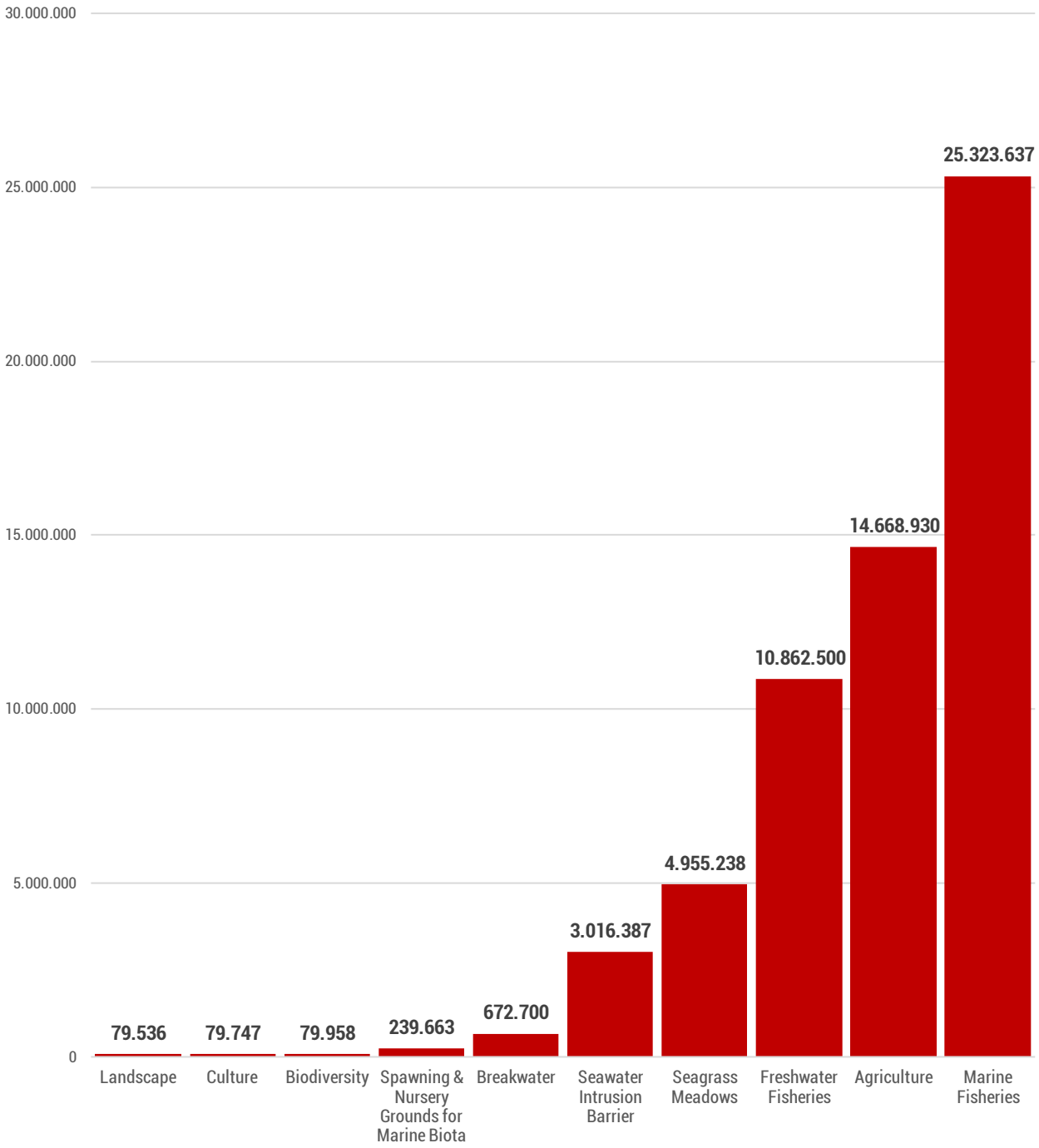
Agriculture, particularly the cultivation of vegetables and tropical fruits like chili, water spinach, coconut, banana, and mango, also contributes significantly to household income year-round. Meanwhile, other sectors such as aquaculture and mangrove ecosystem services provide additional values that strengthen household economic resilience.

The functions of mangroves as natural breakwaters, barriers against seawater intrusion, and nurseries for aquatic species protect coastal ecological stability, making them an essential form of "infrastructure" that enables economic activities to continue. Similarly, the value communities attach to the natural landscape demonstrates their recognition of its importance as a vital support for the continuity of coastal life.

The cumulative calculation, or Total Economic Value, offers a critical and comprehensive picture of the sustainability of community economies in the research area, shaped by the health and persistence of coastal ecosystems.

The Proportion of household economic value based on livelihood sectors in the research location

**In rupiah/month*



Chapter III

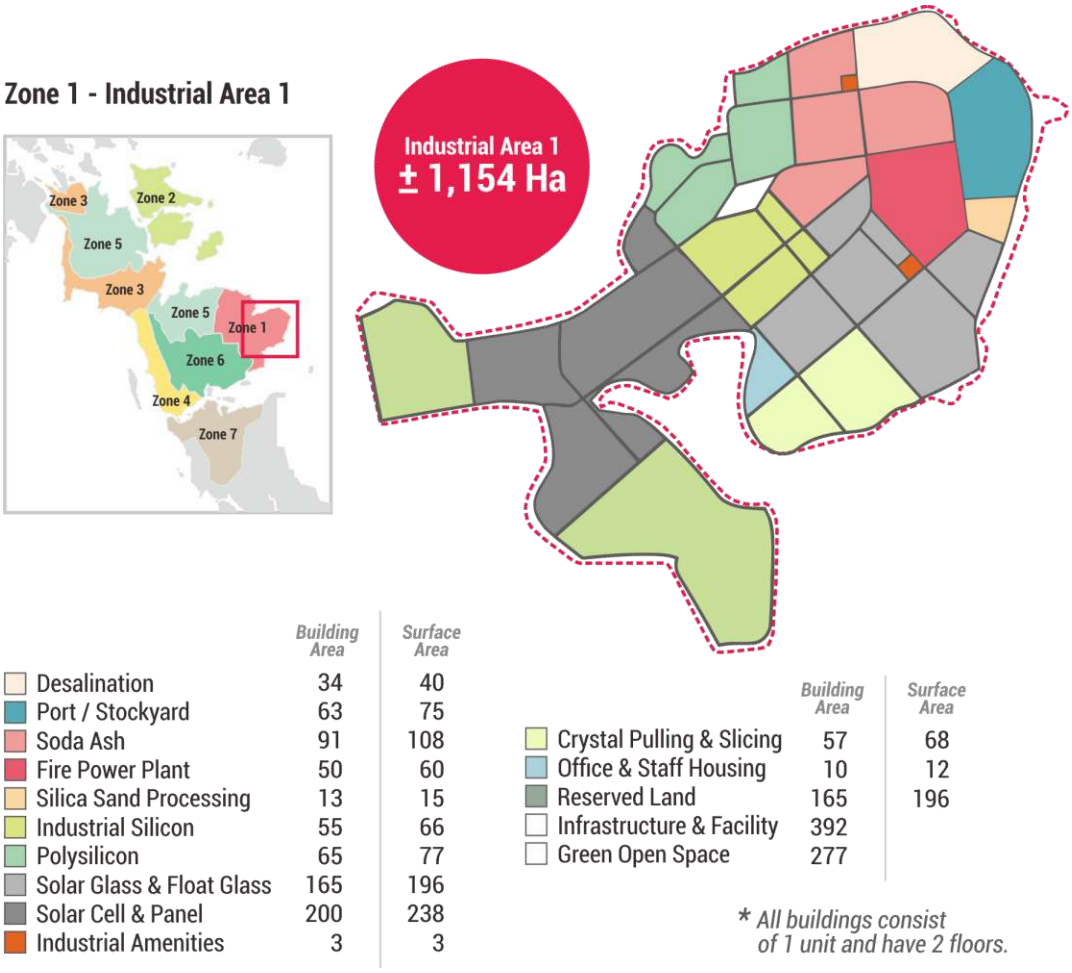
The Rempang Eco City Plan: Infrastructure Development Towards a Dystopia

Standing on 8,142 hectares of land, Rempang Eco City is designed as an integrated zone consisting of industrial areas, ports, housing, trade, and services. In addition, a reclamation island will be built to support industrial activities and residential areas.

Focusing on assessing the socio-ecological impacts of the ambitious first-phase project, which covers approximately 2,300 hectares, or 28 percent of the total area, we found that this phase will span three zones: Zone 1 and Zone 2 as industrial areas, and Zone 3 as a commercial area.

Zone 1 consists of an industrial complex for solar panel manufacturing (Photovoltaic Solar Industrial Park) along with supporting facilities on 1,154 hectares.

This industry processes raw materials into finished products in the form of ready-to-use solar panels. The following is a map of point locations and the division of areas based on land use designation:



Details of land use in Zone 1 (KLHK 2023)

The solar panel industry supply chain consists of four main stages: raw material processing, upstream industry, intermediate industry, and final products. Each stage involves distinct activities.

In the initial stage of solar panel production, three main raw materials are used: sand as the primary source of silica, ammonia for advanced chemical processing, and quartz to be refined into pure silicon. The raw materials are sourced from Bangka Belitung (silica sand) and Kalimantan (quartz and ammonia), before being processed in facilities such as silica sand processing plants and soda ash plants.

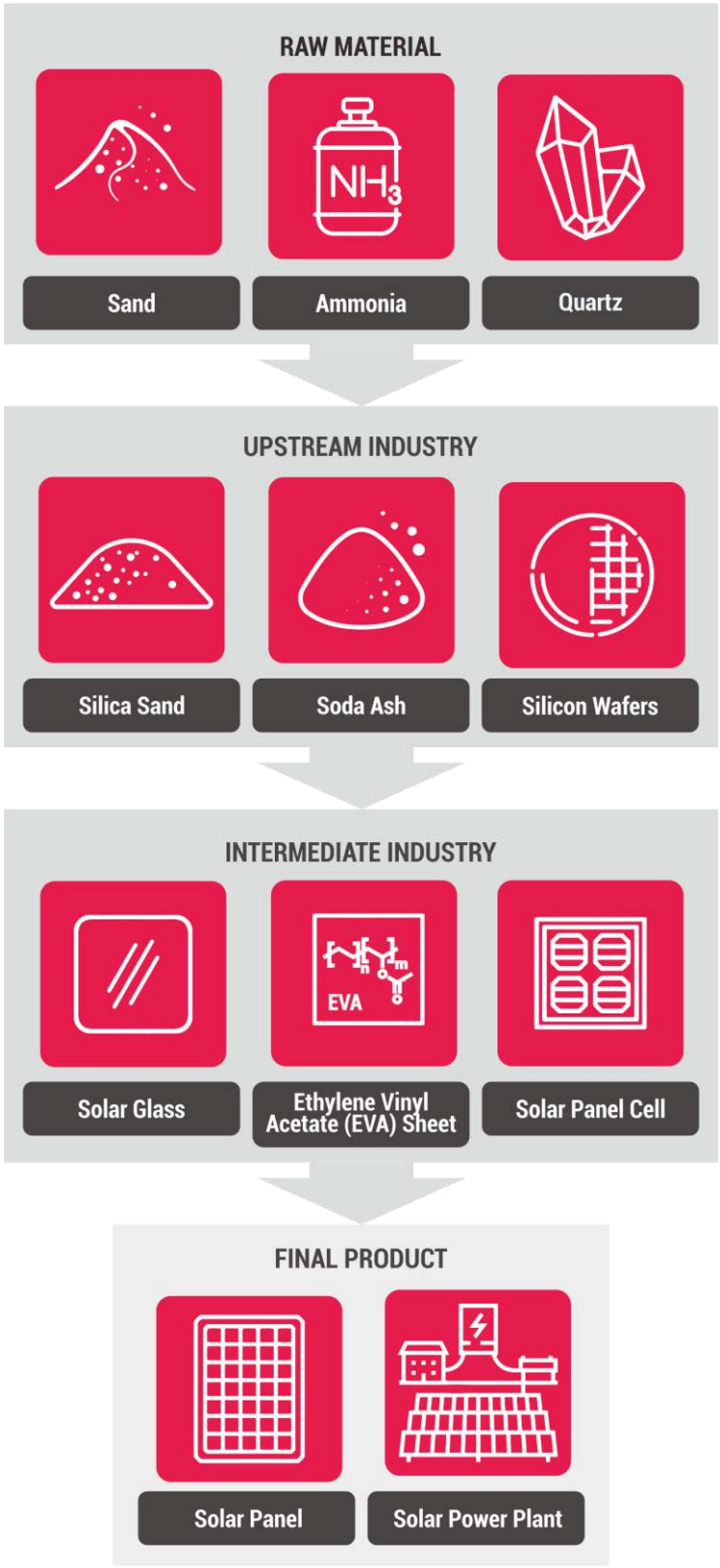
Next, raw materials are processed into basic components in industrial facilities:

1. Silica sand is refined into pure silica, which is used for glass and industrial silicon.
2. Soda ash (sodium carbonate) serves as a mixing material in glass production.
3. Silicon wafers are produced through smelting, purification (polysilicon), and crystal pulling, forming the base of solar cells.

These upstream products are then processed further into solar panel components through:

1. A solar glass factory producing ultra-transparent glass as the protective top layer of solar panels.
2. Production of Ethylene Vinyl Acetate (EVA) sheets as insulating layers.
3. Fabrication of solar cells, combining silicon wafers with electronic circuits to generate photovoltaic cells.

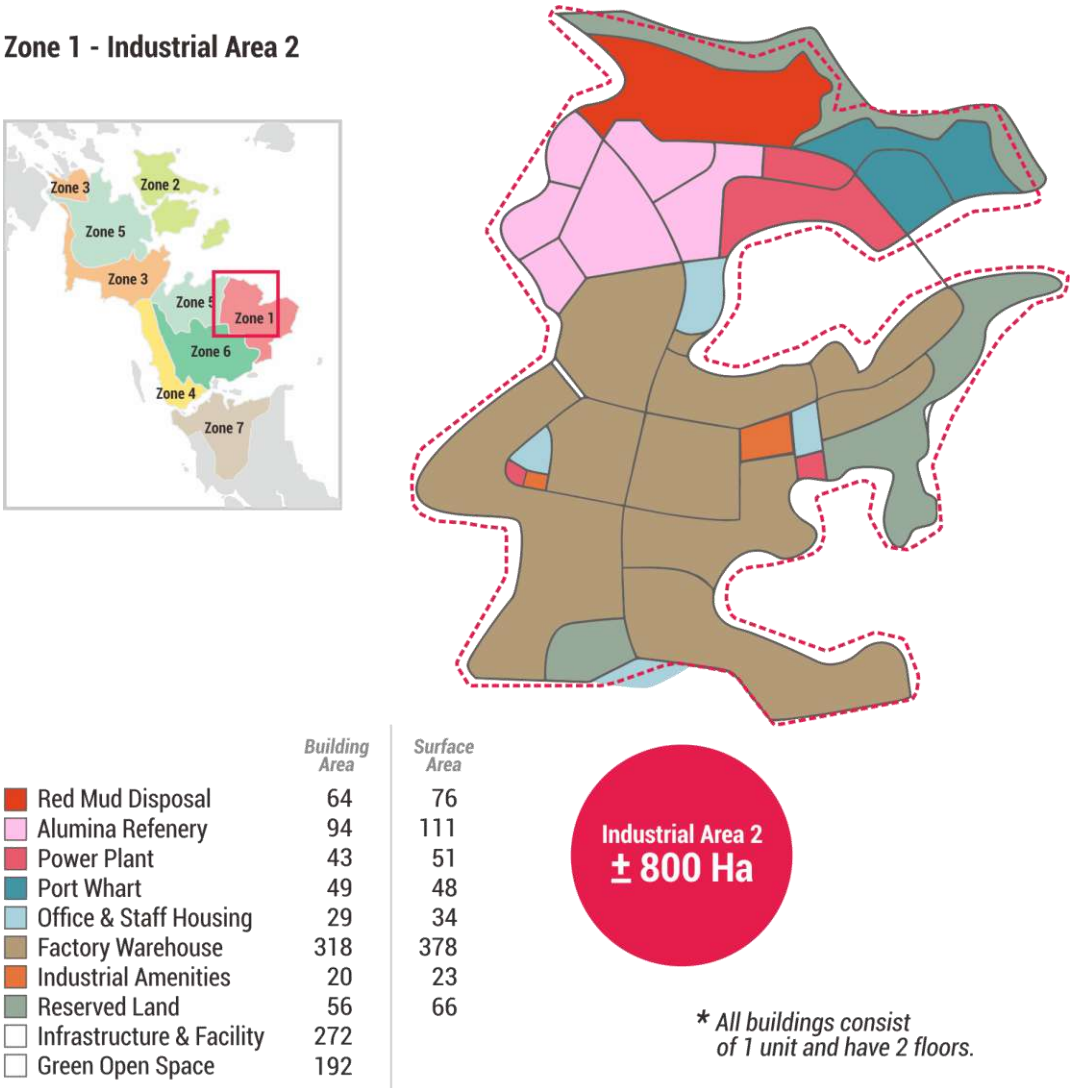
After the upstream stages, components are assembled into solar panels by integrating solar cells, EVA, glass, and frames. The finished product of solar panels are then used in Solar Power Plants (PLTS), large-scale installations designed to generate renewable electricity.



Production process flow of the solar panel manufacturing industry (KLHK 2023).

Zone 2 covers 800 hectares for an alumina refinery and supporting facilities, including red mud disposal areas, a dedicated terminal, and others.

The following is a map of point locations and the division of areas based on land use designation in Zone 2:



Details of land use in Zone 2 (KLHK 2023)

The raw material for alumina processing is bauxite, imported from Kalimantan. Alumina production involves multiple complex stages, requiring large amounts of fuel, water, and energy, while producing hazardous solid waste (red mud) and liquid waste.

The process begins with the grinding of bauxite to reduce particle size, making it easier to process. This stage requires mechanical energy and produces slurry[14]. The ground bauxite slurry then enters the pre-desilication stage, which is the process of removing reactive silica. This is followed by the digestion stage, carried out in a tubular reactor heated with steam from a power plant. At this stage, bauxite reacts with a caustic soda solution under high temperature and pressure to produce a slurry containing dissolved alumina solution.

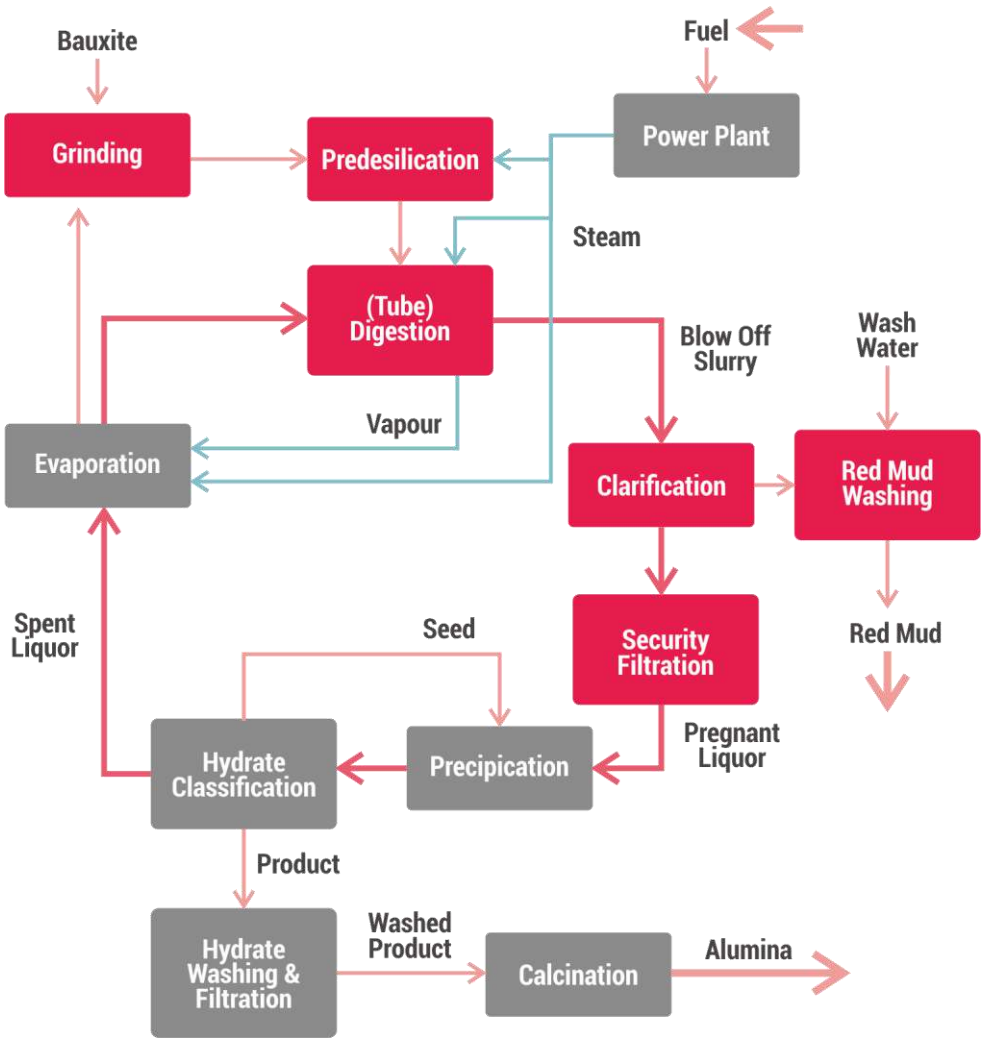
The slurry from digestion proceeds to clarification, where red mud is separated from the alumina-rich solution (pregnant liquor). Red mud is then directed to a washing process and then handled through a waste disposal system, posing risks of soil and water contamination.

The saturated solution, free from red mud, undergoes a filtration process to remove remaining solid particles. This solution then proceeds to the precipitation stage, where seed crystals are added to gradually precipitate alumina hydrate.

The process continues with the separation and washing of the hydrate. The residual solution that does not precipitate (spent liquor) is returned to the process through an evaporation system, where it is reconcentrated and reused. The final step is calcination, where alumina hydrate is dried and heated in the calcination process to produce pure solid alumina (Al_2O_3).

Although the stages of alumina refining production may sound complex and scientific, it is important for us to examine the process in order to analyze the potential impacts of the industry on the Rempang coastal ecosystem once this plant has been built and is in operation.

[14] A mixture of solid materials and liquid, typically water, characterized by high viscosity.



Production process flow of an alumina manufacturing plant (KLHK 2023)

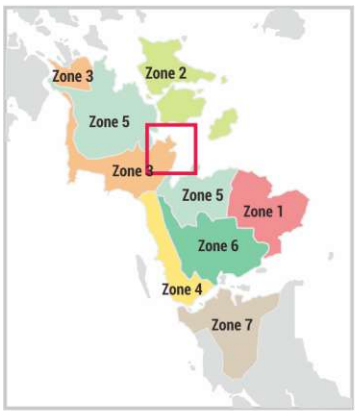
Zone 3 covers 371.4 hectares designated for housing, commercial activities, services, tourism, and the Rempang Tower.

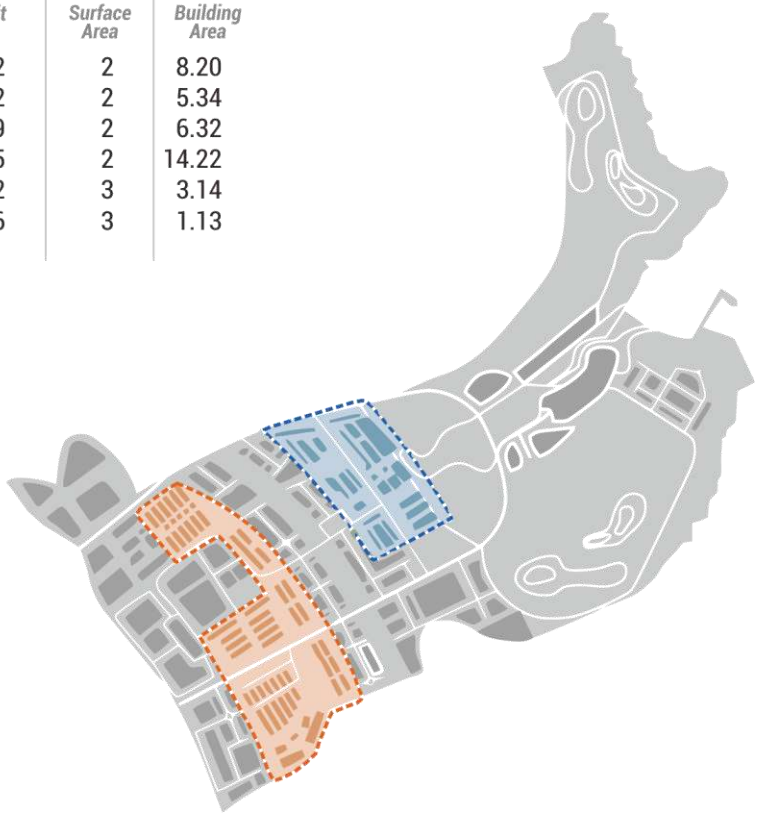
The developed land consists of residential areas covering 38.35 hectares, a golf tourism zone covering 125.59 hectares, a bay commercial zone covering 31.79 hectares, a tower commercial zone covering 43.33 hectares, and a commercial zone covering 201.05 hectares.

The designated residential area (38.35 ha) includes six types of buildings: row houses with three lot variations, single houses, a residential clubhouse, and supporting commercial areas, as presented in the following figure.

Residential

	Unit	Surface Area	Building Area
60-Plot Row House	712	2	8.20
96-Plot Row House	742	2	5.34
160-plot Row House	329	2	6.32
Single House Plot 300	395	2	14.22
Housing Clubhouse	12	3	3.14
Commercial Housing	6	3	1.13



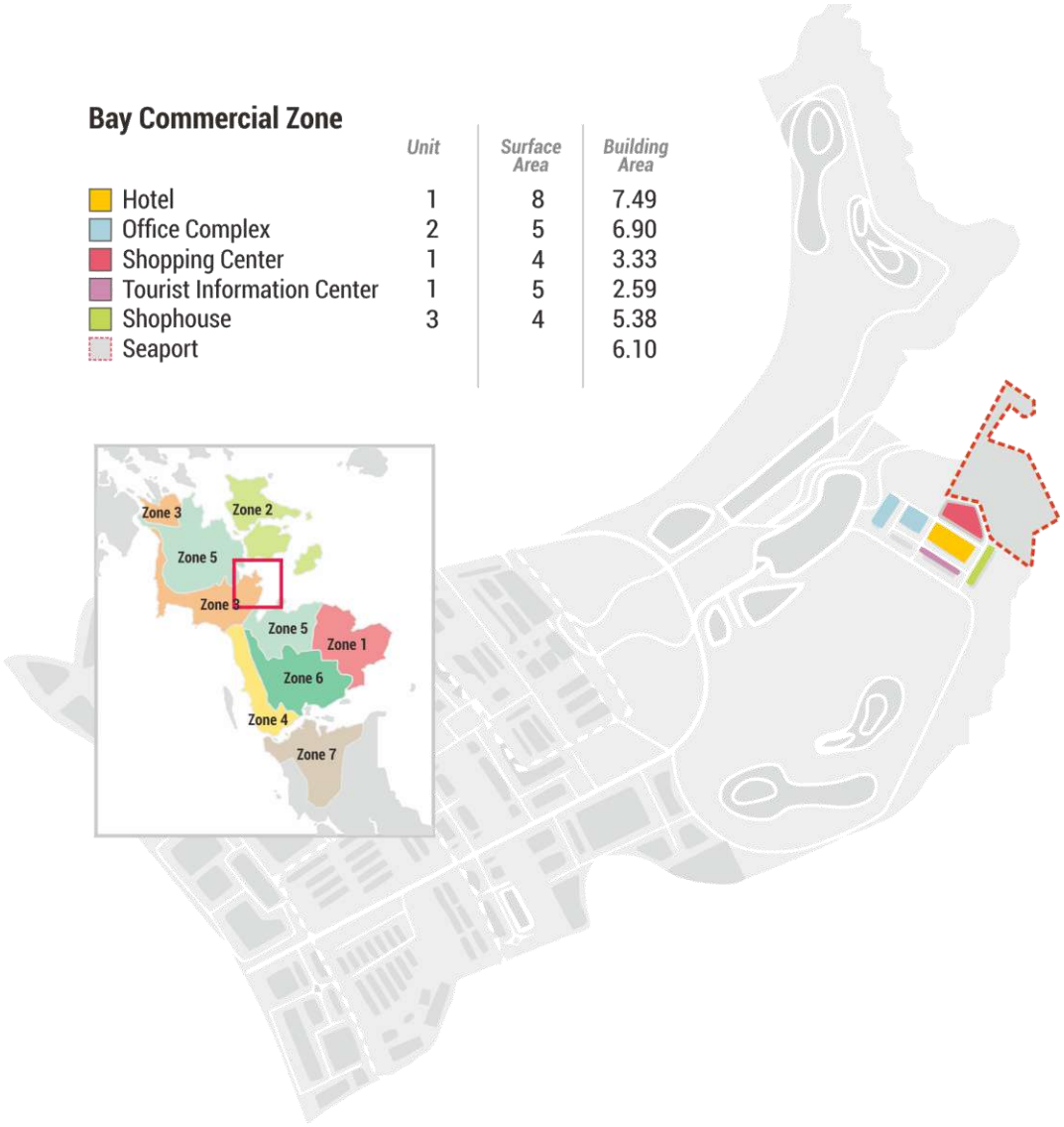


Residential Area (KLHK, 2023)

The golf tourism zone (125.59 ha) is designed thematically within the area's development. Located in the northeast, spatially this zone is directly connected to the main road network and premium residential areas. The main components of this zone include a golf course, supporting facilities such as a clubhouse, exclusive residential units in the form of golf villas, and a high-rise hotel, as presented in the following figure.

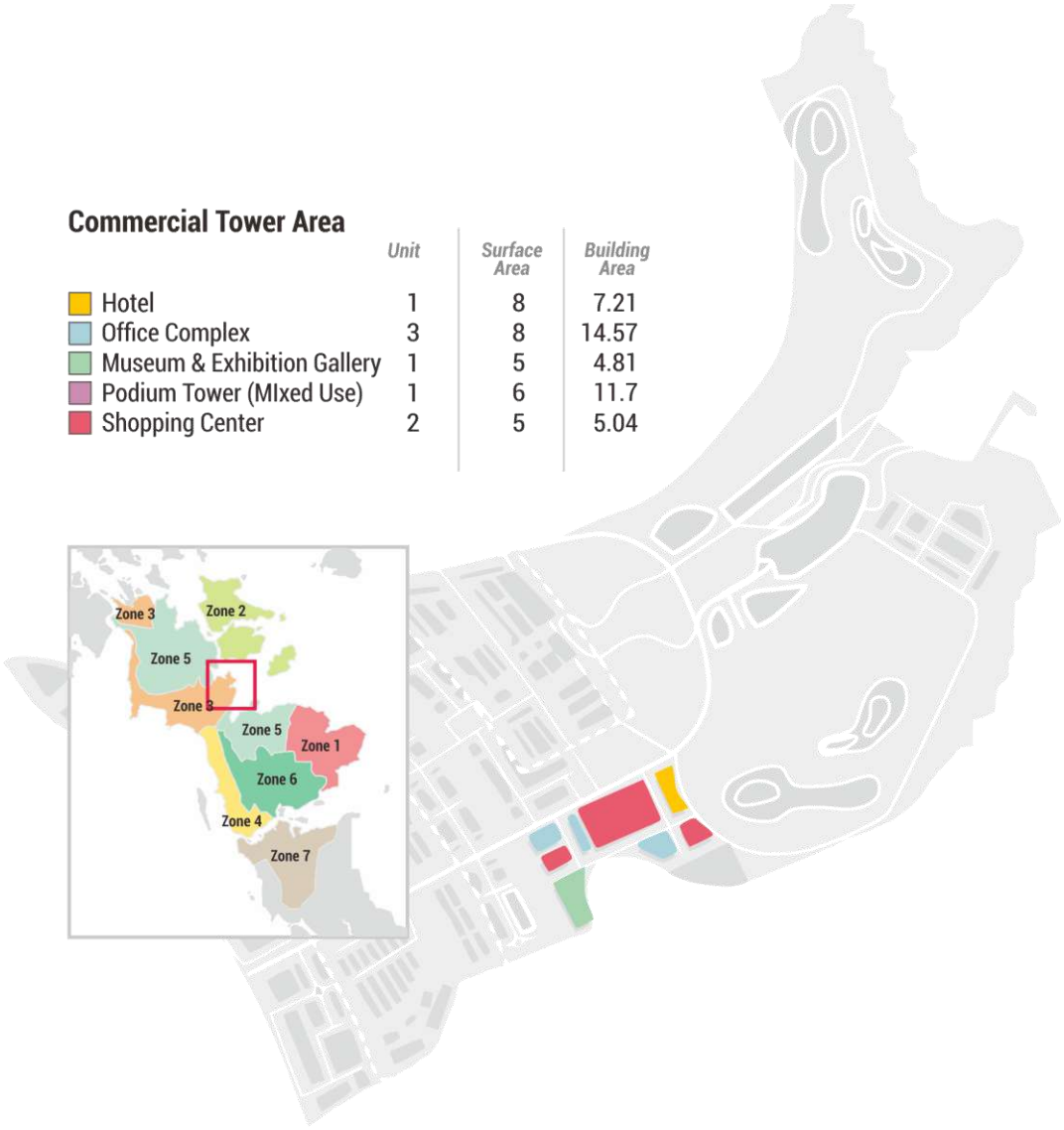
Golf Tourism Zone (KLHK, 2023)

The bay commercial zone (31.79 ha) is designed as the economic and tourism hub within the integrated development area, strategically located next to the golf zone and port. This zone functions as a key hub for the movement of people, goods, and information to support the overall dynamics of the area. It includes hotels (±7.49 ha), a two-building office complex (±6.90 ha), a shopping center (±3.33 ha), a Tourist Information Center (±2.59 ha), three shop-house blocks (±5.38 ha), and a seaport for passenger and cargo transport.



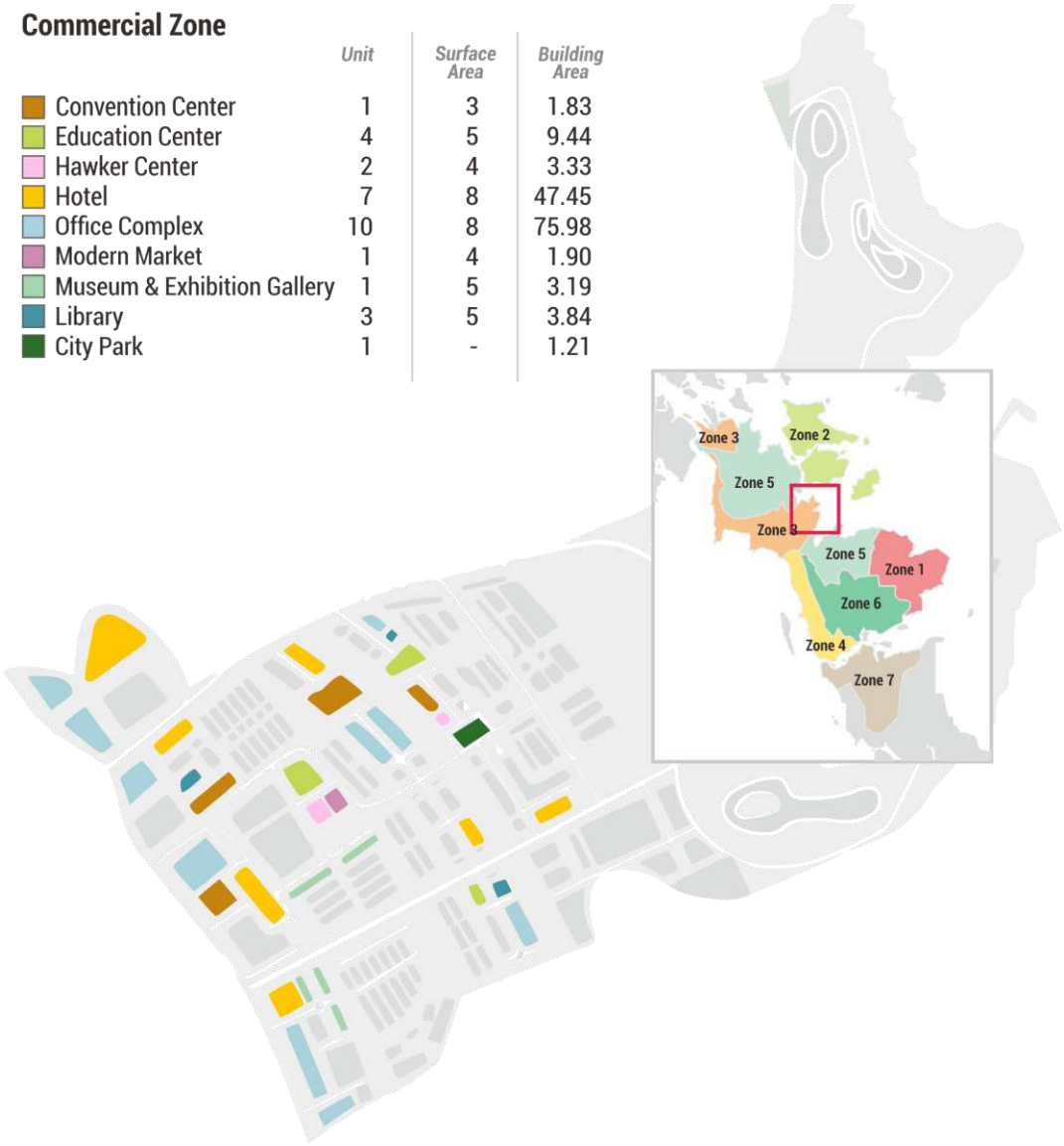
Kawasan komersial tepi pantai (bay commercial zone) (KLHK, 2023)

The tower commercial zone (43.33 ha) serves as the center of business and commercial activities, acting as the economic heart of the area by combining office, hospitality, retail, and public space functions. This zone consists of five main components: a hotel (1 building, 8 floors, on ±7.21 hectares), office complexes (3 office buildings, 8 floors each, totaling ±14.57 hectares), a museum and exhibition gallery (1 building, 5 floors, on ±4.81 hectares), a tower podium or multifunctional tower (1 building, 6 floors, on ±11.70 hectares), and shopping centers (2 buildings, 5 floors each, totaling ±5.04 hectares).

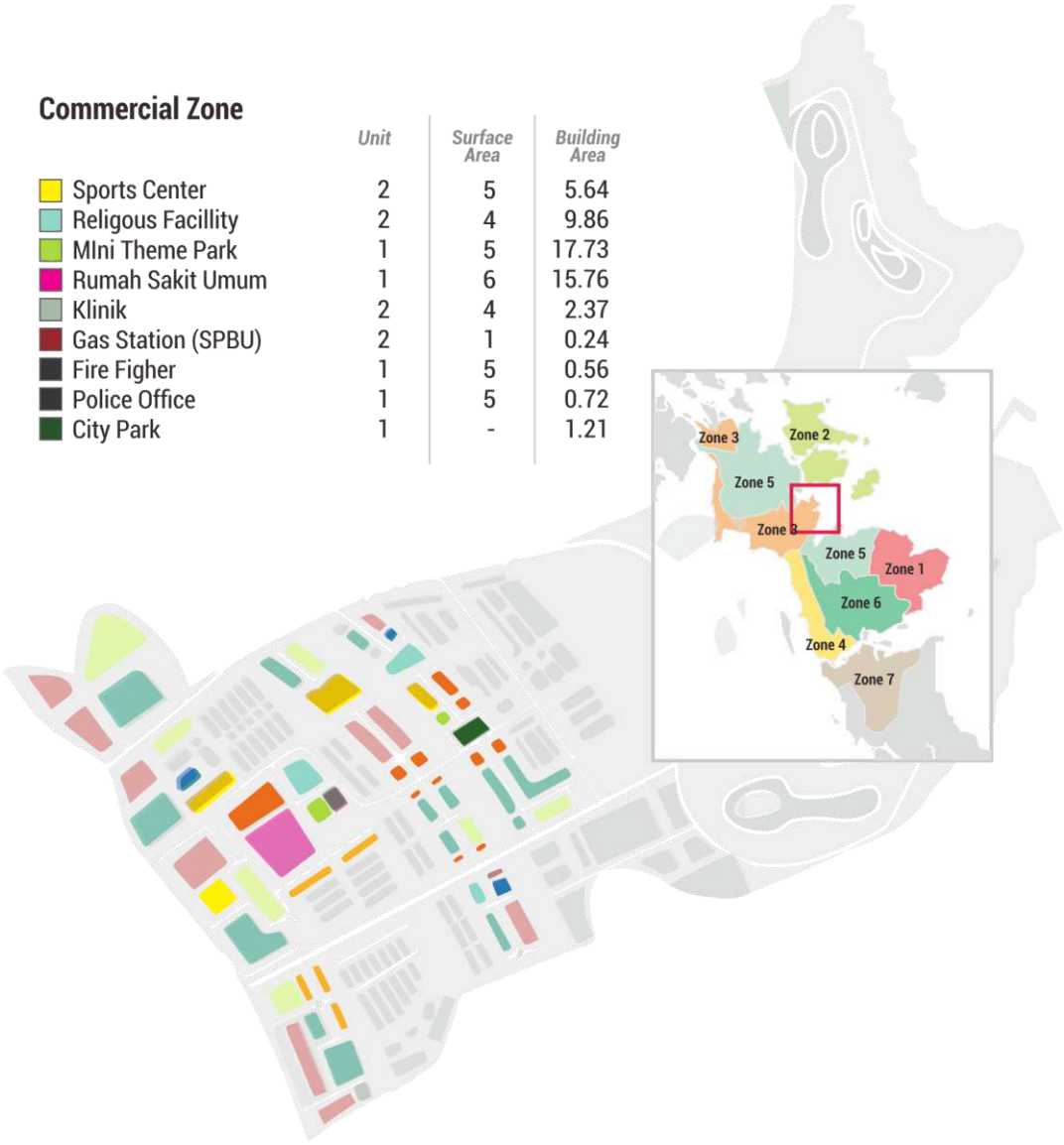


Tower Commercial Zone (KLHK, 2023)

The larger commercial zone (201.05 ha) functions as a hub for public services, business, social, and recreational facilities. It includes a convention center (±1.83 ha), education centers (±9.44 ha), hawker centers (±3.33 ha), hotels (47.45 ha), office complexes (75.98 ha), modern markets (±1.90 ha), museums (±3.19 ha), a library (±3.84 ha), religious facilities (±9.86 ha), entertainment areas (±17.73 ha), a general hospital (±15.76 ha) and clinics (±2.37 ha), a gas station (±0.24 ha), a fire station (±0.56 ha), a police station (±0.72 ha), and a city park (±1.21 ha).



Commercial Zone (KLHK, 2023)



Commercial Zone (KLHK, 2023)

Analyzing the Environmental Impacts of the Rempang Eco City Project

The development of Rempang Eco City across three zones openly demonstrates an ambition to modernize Rempang while completely disregarding the social and environmental changes that will be experienced by Indigenous and local communities once the project is implemented.

On paper, Rempang Eco City is packaged as a clean energy transition toward green economic growth. However, what occurs on the ground is the opposite. Far from being "green," this development resembles soot staining the landscape of Rempang, sacrificing vulnerable groups and local communities for the sake of investment. The economic benefits are channeled to a small elite occupying sterile spaces, detached from the dynamics, nuances, and complexities of Rempang's coastal communities.

In this study, we identify environmental impacts in each phase of the Rempang Eco City development, consisting of the pre-construction, construction, and operational stages.

The pre-construction phase, or the initial stage of project implementation, consists of a series of activities before physical construction begins.

This phase includes project plan socialization, land acquisition, and the relocation of traditional villages. Analysis of factual conditions shows that environmental and social impacts at this phase have already occurred on a massive scale, with a high risk of escalating into crisis if not managed fairly and inclusively.

During the **socialization of project plans**, which should have been a medium for building shared understanding between project implementers and affected communities, unrest instead arose. The process was carried out in a top-down manner, leaving no room for equal dialogue, symbolic and ceremonial in nature, and lacking transparency. Many residents who were initially neutral or supportive turned resistant because decisions were made without involving their voices. This reflects a public trust deficit in the government and authorities.

Meanwhile, **land acquisition**, which converts land use from farms, forests, and customary territories into industrial and commercial areas, creates shock and economic vulnerability for local communities and triggers massive environmental change. The impact is that local people become more vulnerable and even structurally impoverished. At this stage, social conflicts emerge not merely as a reaction to the project, but as a response to injustice and neglect of community rights. Living spaces converted into commercial areas do not create better access for local people, but rather generate long-term socio-ecological instability.

The lack of **transparency** regarding information on project phases, the identity and commitments of investors, and the actual scale of the Rempang Eco City development makes it difficult for communities and civil society organizations to conduct independent monitoring and evaluation of project implementation. Without adequate information about implementation, the technology to be used, or environmental standards to be applied, public oversight becomes ineffective. Yet in the context of good governance, transparency is a fundamental element of public accountability.

The next stage, **relocation of traditional villages**, introduces the most complex dimension of the pre-construction phase, as it contains physical, social, cultural, cosmological, and spiritual elements. Cultural heritage sites such as ancestral graves, historic places, and communal spaces rooted in daily life cannot be replaced by new physical infrastructure, which instead divides communities. Industrial and commercial development will displace the identity and collective memory of communities regarding Rempang as their living space. Relocation also disrupts access to marine resources, as it fails to consider the geographical and ecological logic of coastal and seafaring communities. As a result, livelihoods are cut off, and adapting to new economic structures becomes extremely difficult. Therefore, local resistance is not merely emotional but a rational manifestation of a project that clearly threatens their well-being.

The pre-construction phase of Rempang Eco City shows that social and environmental changes do not only begin when physical construction takes place, but already from the planning stage. Ecological damage and social crises are being cultivated through the dispossession of living spaces, collective identity, and community safety.

Construction of Rempang Eco City, the project implementation phase marked by the transition from the design process to realization.

In this phase, all components of development begin to take physical form, including workforce recruitment, mobilization of heavy equipment and materials, land preparation, and the construction of infrastructure and supporting facilities. In the case of Rempang Eco City, the construction phase becomes one of the most critical moments, because interventions in space, ecosystems, and communities take place massively and directly.

The first stage is **workforce recruitment**. In principle, this process actually has the potential to generate new economic opportunities for local communities. However, if recruitment is not conducted fairly, inclusively, and transparently—for example, if non-local workers are prioritized—such a situation can trigger social jealousy. In the context of affected communities, fairness and inclusivity in access to jobs are highly sensitive issues. Therefore, economic opportunities lose their meaning if they are not accompanied by justice for local people.

The next stage is the **mobilization of heavy equipment and construction materials**, which directly sacrifices ecology, green open space, and productive land belonging to the community. This process displaces people's living spaces, since physical development often ignores ecological and social values. Ironically, Rempang is treated as "vacant land," when in fact it is part of a cultural landscape filled with historical complexity, life values, and social dynamics.

The following stage is the **preparation of relocation housing for affected communities**, which fails to take into account cultural dislocation. This is ironic, because resettlement areas, which should function as a place of recovery for displaced communities, instead become new sources of environmental stress. Local residents must not only adapt socially but also face environmental decline in their own homeland.

Then comes **land preparation and landscaping**, where the use of heavy equipment and large-scale earthworks generate noise and disrupt mobility. This not only affects people's comfort but also interferes with local economic activity. Such disruptions are spatial (affecting space) and temporal (lasting over time), meaning they can expand widely and continue throughout the construction period. Moreover, noise pollution can affect the psychological and biological health of communities (particularly children and the elderly) due to air pollution, noise, massive environmental degradation, and disruption of wildlife migration patterns.

The next stage involves **basic infrastructure construction, such as roads, water networks, and electricity**. These activities can cause vibrations that damage traditional house structures and alter seabed morphology (bathymetry), especially in reclamation projects. Such work can drive erosion and sedimentation, creating ecological imbalances in coastal areas. This situation has serious consequences for the sustainability of coastal ecosystems such as seagrass beds and mangroves, as well as for fishing activities that depend on stable marine conditions.

Finally, **the construction of the Rempang Eco City area** is the most complex and multidimensional part of this phase. Large-scale activities create widespread pollution and ecological pressures. The increase in surface runoff[15] heightens the risks of flooding and erosion. In addition, declines in both water quality and quantity threaten water resources for communities and ecosystems. Beyond the overall decline in environmental quality, this process significantly destroys habitats for flora and fauna.

Thus, rather than creating hope for better livelihoods, the construction phase of Rempang Eco City brings about serious socio-ecological disruptions to the Rempang coastal ecosystem, as well as structural impoverishment and a significant decline in the quality of life of local communities.

[15] The flow of water over the land surface that occurs when rainfall intensity exceeds the soil's infiltration capacity, preventing absorption and causing water to run across the surface toward lower areas.

The Operational Phase, when all components of Rempang Eco City start functioning actively and on a sustained basis.

This phase includes workforce recruitment, the operation of industrial and commercial zones, the functioning of infrastructure and utilities such as roads, water and electricity networks, and public facilities. While this stage represents the realization of the development vision, at the grassroots level it marks complex and layered social and environmental changes.

The first aspect is **operational workforce recruitment**. Promoted through narratives of economic benefits such as reduced unemployment and increased local purchasing power, this stage contains latent problems. If the majority of workers are recruited from outside the region, and the system is non-transparent or even discriminatory against local communities, unequal access to employment will occur. This situation becomes a seed for horizontal social conflict between migrants and local people, while also structurally marginalizing the latter. In addition, social disparities arising from income differences between formal project workers and those in informal and traditional sectors risk creating horizontal conflict.

Next, **the operation of industrial and commercial zones within Rempang Eco City** will generate chronic and widespread pollution. Declining air quality caused by production activities, transportation, and energy generation threatens community health, particularly for vulnerable groups such as children and the elderly. In addition, increased noise pollution affects comfort, stress levels, productivity, and mental health. For coastal communities who were previously accustomed to the tranquility of nature, such changes create acoustic cultural disruption, damaging their relationship with the environment.

Furthermore, the presence of **infrastructure and utilities** as the backbone of project operations brings environmental decline in multiple, systemic dimensions. Examples include traffic disruptions, vibrations, and water runoff that damage traditional infrastructure such as village roads and irrigation systems. Shoreline changes, through erosion and sedimentation caused by reclamation and maritime development, further weaken the resilience of coastal areas. The decline in surface and groundwater quality and quantity creates clean water crises, while biodiversity loss, economic exclusion, and marginalization of local communities intensify. Meanwhile, cultural disruption caused by sudden spatial transformation will fragment communities and create feelings of alienation.

Social and Cultural Consequences Based on the AMDAL Document Analysis

AMDAL (Environmental Impact Assessment) is a fundamental instrument within the environmental management system, designed to ensure that development projects take environmental sustainability into account. The Rempang Eco City project initiated by BP Batam represents Indonesia's ambition to create an integrated industrial zone with the concept of an Eco City; an urban model that emphasizes ecological sustainability. However, as previously outlined, the project has instead triggered widespread controversy and resistance.

First, Rempang Eco City was initiated before environmental approval was issued. Activities such as land measurement and demarcation were already being conducted before the environmental document received official approval from the competent authority.

Second, community participation has been minimal. Ideally, AMDAL regulations require community involvement not only at the stage of public consultation but from the scoping phase through to impact evaluation. Since local communities were not involved from the outset, they had no chance to provide input on the project's fundamental design. Public consultations that were conducted tended to be merely informative; people were given project information but not sufficient space to express objections or propose modifications. In addition, "conditioning" of participation occurred, with most attendees being those in favor of the project, thus failing to represent the full spectrum of community voices. Moreover, participation was 'conditioned', with most attendees being those in favor of the project, thus failing to represent the full spectrum of community voices.

This demonstrates a misunderstanding of AMDAL's fundamental function as a predictive and preventive instrument. AMDAL is designed to anticipate potential environmental impacts of a project and to provide a scientific basis for decision-making regarding its environmental feasibility. When AMDAL is prepared after project activities have already begun, its function shifts from being a predictive instrument to a mere tool for legitimizing extractive development.

Such practices not only contravene Government Regulation No. 22 of 2021 on Environmental Protection and Management but also demonstrate bad faith in upholding the precautionary principle within environmental governance.

Analysis of the AMDAL document for the Rempang Eco City project reveals bias, as it emphasizes biophysical aspects while marginalizing social, economic, and cultural dimensions. The document identifies 18 significant biophysical impacts but only 12 social, economic, and cultural impacts. Such imbalance reflects the neglect of social, economic, and cultural consequences in the context of Rempang's living environment.

In addition, AMDAL should prioritize analysis of alternatives, including alternative locations, technologies, and project designs. As the "heart" of decision-making for environmental sustainability, the analysis of alternatives is intended to identify different options to achieve project goals with minimal social and environmental costs. Yet the Rempang Eco City plan demonstrates a very weak analysis of alternatives. The absence of serious alternative consideration eliminates opportunities to identify more sustainable and environmentally viable solutions. Unfortunately, no thorough consideration of alternative locations was taken into account during the decision-making process.

This indicates that the shortcomings of the AMDAL process go beyond technical deficiencies. A document that seems to exist merely as a formality for development reflects systemic governance problems in Indonesia's environmental management. From project implementation that began before environmental approval was granted, to the lack of inclusive community participation, absence of transparency, biophysical bias, and weak alternative analysis—these reveal a pattern of tolerating poor practices in large-scale development projects such as Rempang Eco City. Such conditions erode AMDAL's function as a preventive environmental instrument and, in turn, perpetuate social injustice, exacerbate environmental degradation, and undermine public trust in development governance institutions for the future.

Critical Review:
Interwoven Social Conflict, Ecological Crisis, and Cultural Erosion

Analyzing the overall environmental impacts of the Rempang Eco City project, we can see that social impacts lie at the center of the crisis. Community unrest becomes the most central node, connected to nearly all other impacts; ecological, social, cultural, and economic. This indicates that unrest is not the sole result of a single type of impact, but rather the accumulation of a series of simultaneous, interacting losses. The unrest stems from the loss of access and living space (accessibility, marine resources, land, and culture), changes in livelihoods (fisherfolk and farmers), environmental disruptions (comfort, air, water, and noise quality), and uncertainty about the future due to project planning that excludes indigenous and local communities.

In addition, social conflict also emerges as a central point directly connected to impacts such as community resistance, shifts in perceptions and attitudes, declining income and livelihoods, loss of terrestrial flora and fauna, and disruption of cultural practices and community well-being. This suggests that conflict is not only about eviction or the loss of physical assets, but also about the breakdown of social relations and trust between the community and policymakers.

Environmental impacts in the form of disturbances to aquatic biota occupy a central position within the ecological dimension. This is closely linked to declining water quality, changes in land use, and coastal erosion. The implications are significant for food security and the economy of fishing communities that depend on coastal ecosystem sustainability. This also shows that ecological and social crises occur within the same web of losses, making them inseparable. Through impact network analysis, we found that environmental losses never occur linearly but rather form a tightly interconnected web. Each impact amplifies the others, creating a layered socio-ecological crisis.

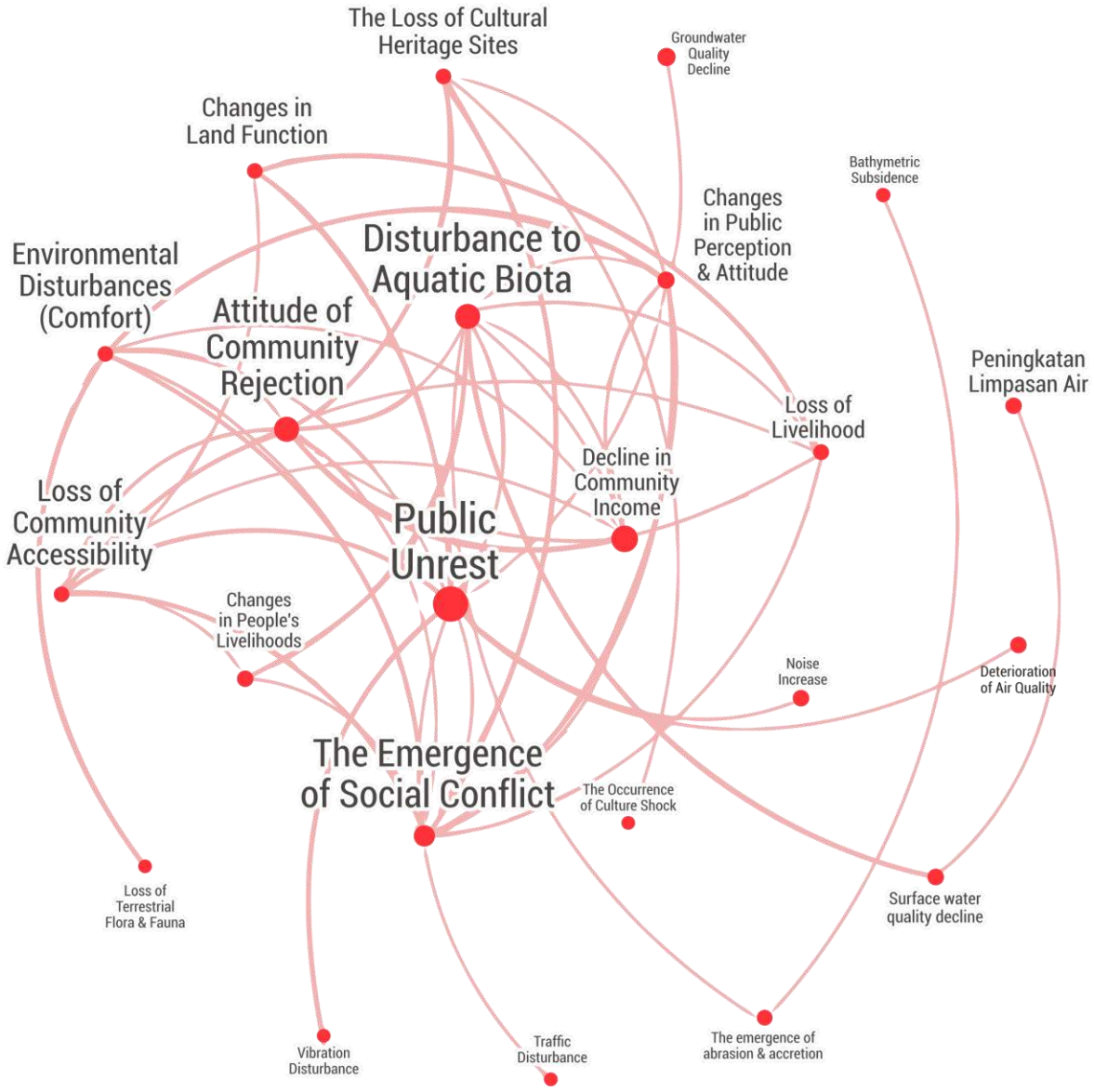
Furthermore, the loss of cultural heritage sites and changes in community attitudes may not always appear in visual diagrams but have a deeply transformative effect on life in Rempang. For example, the risk of losing sacred sites and cultural heritage reflects the erosion of the collective identity of the Coastal Malay, *Orang Darat*, and *Orang Laut* communities. Such changes in perception reflect a process of collective disorientation. Communities begin to lose their foundations of identity and sense of collective purpose within the transformation of social spaces.

The Rempang Eco City project, which promotes the narrative of "clean energy transition" and "green economy," reveals a harsh reality. The ambition to "modernize" Rempang in fact massively destroys the island's landscape functions. Secondary forests, community farms, and old villages are forced to make way for industrial and commercial zones. Marine ecosystems are battered by reclamation, sedimentation, and water pollution from industrial waste. The local community's reliance on the sea as their primary source of food and livelihood is forcibly stripped away. Urbanization, as a risk of expansion, will also significantly increase environmental pollution from household waste, construction, rising vehicle emissions, and clean water shortages.

All of these impacts converge into one harsh reality: the dispossession of life and livelihoods. When living space and access are taken, identities uprooted, and economic resources dried up, what remains is dependency and vulnerability. This condition signifies the expansive creation of structural poverty.

From the perspective of environmental justice, this situation illustrates the failure of both state and market to ensure inclusive and sustainable development for all, especially grassroots communities. The Rempang Eco City project has thus created ecological injustice. Indigenous peoples and coastal communities, who lived in harmony with nature long before "Eco City" was launched, are now forced to bear heavy environmental burdens for the benefit of others – namely the government, political elites, and investors.

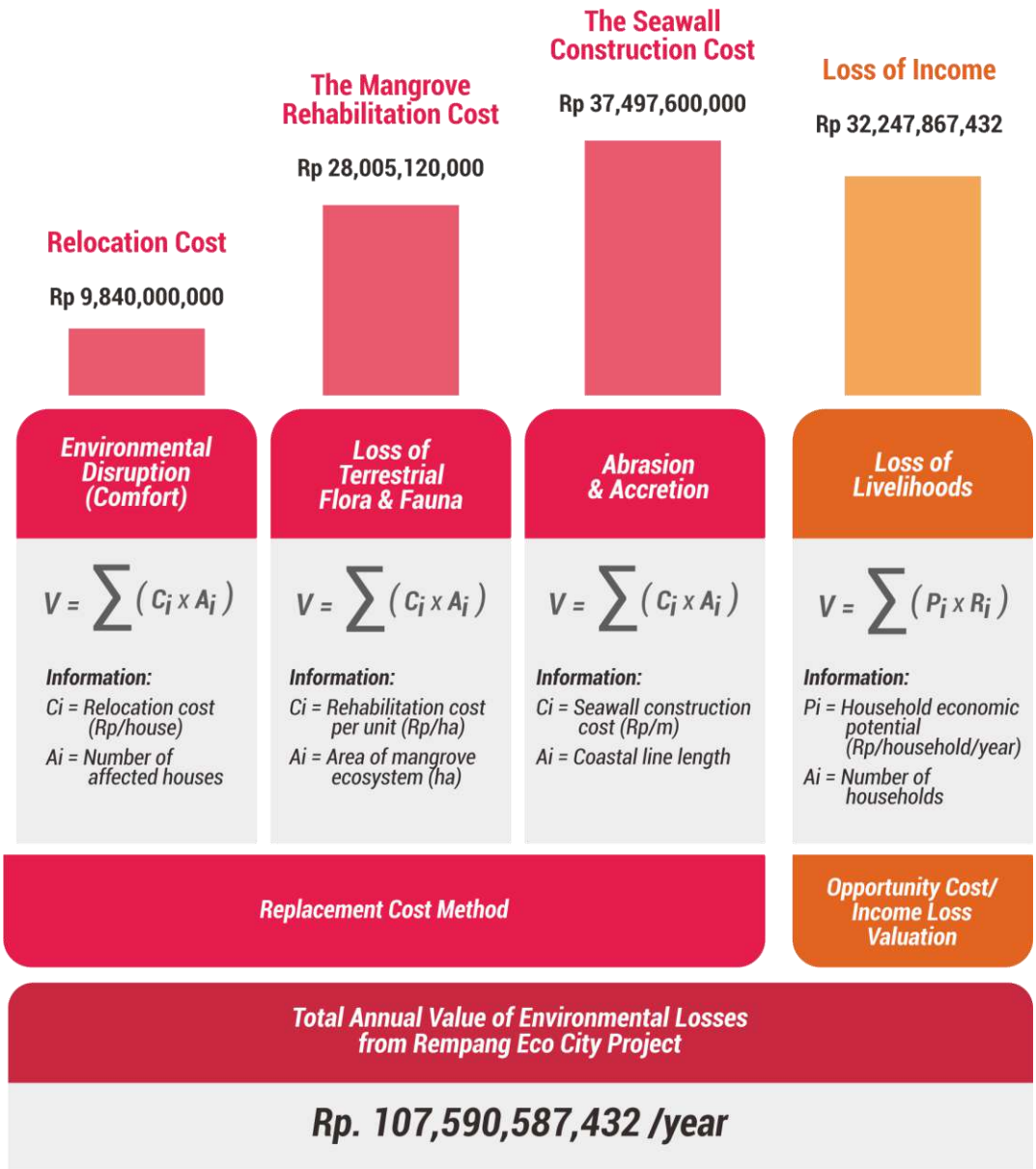
Thus, by analyzing the Environmental Impact Assessment (AMDAL) documents and comparing them with the social realities of land dispossession in Rempang, this research positions itself as a critique of development practices that neglect the people. The White Paper: Economic Valuation of Rempang Eco City serves as an effort at intellectual and moral intervention, uncovering the hidden consequences of this megaproject. While it claims to bring modernization, economic growth, and regional transformation, research on Rempang Eco City demonstrates the opposite. Behind the sweet promises lie massive environmental and social costs. Ironically, costs that do not always appear in conventional economic calculations.



Environmental impact network analysis of the Rempang Eco City project

Estimated Total Losses from Environmental Degradation due to the Rempang Eco City Project

After reviewing how the Rempang Eco City project poses risks of massive social and environmental losses, we conducted a comprehensive evaluation of its impacts, including environmental disruption (comfort), loss of terrestrial flora and fauna, loss of livelihoods, and the emergence of abrasion and accretion.



Environmental disruption (comfort) is calculated using the Replacement Cost Method to measure community losses by assessing the costs required to replace the physical loss of affected households. Based on BP Batam data (2023), the relocation cost per house is set at Rp120,000,000. Multiplying this figure by the number of affected sample households results in a total estimated loss of Rp9,840,000,000. This figure reflects a substantial financial burden to mitigate the social and environmental impacts caused by Rempang Eco City.

Regarding the **loss of terrestrial flora and fauna**, we applied the Replacement Cost Method, focusing on the estimated costs to restore or replace the lost ecosystem functions. This approach covers two key components: rehabilitation costs and the affected ecosystem area. One major focus is the mangrove ecosystem, which plays a crucial role in maintaining coastal environmental balance. The rehabilitation cost reference is from The World Bank (2022), which sets it at around USD 900 per hectare (≈ Rp64,000,000). With a mangrove area of 437.58 hectares in Rempang[16], the total rehabilitation cost is estimated at Rp28,005,120,000. This figure is not merely financial representation but also reflects the immense ecological value lost and the efforts needed to minimize the ecological damage caused by the project.

Loss of livelihoods is another unavoidable impact of Rempang Eco City. Using the opportunity cost or income loss valuation approach, we estimated the economic losses per household resulting from socio-environmental changes, based on field survey data of average household economic potential at Rp32,772,223 per month. By multiplying this by 82 affected households, the estimated total loss amounts to Rp2,687,322,286 per month, or Rp32,247,867,432 per year if the project proceeds. This figure highlights the massive socio-economic impact on local communities. The project will inevitably eliminate the primary source of livelihood for hundreds of families, most of whom depend on the primary sector. This situation triggers further consequences such as poverty, migration, and the breakdown of community structures.

Abrasion and accretion are also critical impacts that must be highlighted. We used the **Replacement Cost Method** to estimate the costs required to repair and protect the affected shoreline. The analysis focuses on the cost of seawall construction as a mitigation measure against coastal erosion. The reference price comes from the Official Unit Price established by the Riau Islands Provincial Government under Governor Regulation No. 18/2023 on Standard Unit Prices for FY 2024. The seawall construction cost per meter is Rp1,736,000, which includes various technical and material components. With a coastline length of 21,600 meters in the research area—measured accurately using GIS technology—the total cost of building the seawall as a mitigation measure is Rp37,497,600,000.

[16] Bunting, P., Rosenqvist, A., Hilarides, L., Lucas, R.M., Thomas, N., Tadono, T., Worthington, T.A., Spalding, M., Murray, N.J. & Rebelo, L.-M. (2022) Global Mangrove Extent Change 1996–2020: Global Mangrove Watch Version 3.0. Remote Sensing 14, 3657. https://doi.org/10.3390/rs14153657

Various Socio-Ecological Costs Borne by the People of Rempang

Research on the estimated economic losses from the environmental impacts of the Rempang Eco City project provides an in-depth picture of the scale of losses borne by surrounding communities, particularly households that remain and refuse to be relocated. Based on the study's analysis, the total annual value of environmental impacts from Rempang Eco City reaches Rp107,590,587,432.

With 82 households in the sample, when the total losses are distributed evenly, each household bears an environmental loss of Rp1,312,080,334.54 per year, or Rp109,340,027.88 per month. When compared to the average economic potential per household—Rp32,772,223 per month—the environmental losses are about 3.33 times greater than the potential income. In other words, people not only lose their income but also shoulder the burden of environmental damage. Like the saying goes, "already fallen, only to be struck by the ladder as well."

This valuation reflects the stark inequality produced by mega-projects like Rempang Eco City, where the social and environmental costs are borne directly by local communities. The socio-ecological impacts not only erode household economic potential but also threaten their livelihoods and overall well-being. Moreover, the numbers show that development without social and environmental justice only generates multiple forms of vulnerability: structural poverty, ecological decline, cultural disruption, displacement from living spaces, and ultimately losses that outweigh the promised economic benefits.

Policy Maneuvers and the Ongoing Expropriation of Citizens' Rights

Based on the latest information gathered in 2024, the civil society coalition under the National Solidarity for Rempang issued a report highlighting the issue of energy transition. One of the key points raised was the absence of justice in the transition process, including the planned solar panel glass factory in Rempang, which disregards community rights.

Following the report, policies on Rempang underwent several changes. On October 20, 2024, Joko Widodo's presidency ended and Prabowo Subianto took office. This political shift clearly influenced policies regarding Rempang as a National Strategic Project (PSN).

At the national level, PSN is regulated by the Coordinating Minister for Economic Affairs Regulation (*Permenko*) No. 7/2023, later amended several times, most recently by Permenko No. 12/2024, where Rempang Eco City remained listed as a PSN. However, under Prabowo's administration, Presidential Regulation (*Perpres*) No. 12/2025 on the 2025-2029 National Medium-Term Development Plan (RPJMN) was issued. This regulation, particularly Appendix IV, page 65, no longer lists Rempang as a PSN but instead as part of the Development Targets of Riau Islands Province. This change sparked heated debate among members of the House of Representatives (DPR RI) overseeing the Batam Free Trade and Free Port Authority (BP Batam).

Whether or not Rempang is officially designated as a PSN, uncertainty remains over whether the project will proceed or be abandoned. In the meantime, people continue to face eviction and land grabbing, including through the so-called "local transmigration" program launched by the Ministry of Transmigration.

At first glance, the program name seems positive and even apolitical. In reality, its purpose is to forcibly relocate people from their homes. One of its initiators, Muhammad Iftitah Sulaiman Suryanagara, has served as Minister of Transmigration since October 21, 2024. A politician from the Democratic Party, he has frequently approached Rempang people in attempts to persuade them to move. In line with this, Agus Harimurti Yudhoyono (AHY), Coordinating Minister for Infrastructure and Regional Development (and also Chairman of the Democratic Party) distributed land certificates to relocated Rempang people in housing areas built for resettlement. Through this maneuver, AHY reaffirmed the administration's stance to relocate people.[17]

[17] The maneuvers of AHY and Iftitah in supporting the Rempang Eco City project cannot be separated from the political exposure of Susilo Bambang Yudhoyono (founder of the Democratic Party and father of AHY), who has longstanding ties with Tommy Winata. Tommy, an Indonesian conglomerate, is responsible as both the developer and initiator of the Rempang Eco City project. In the past, Tommy and SBY shared close political relations. Articles published in 2011, 2018, and 2020 indicate the intensity of this relationship. This closeness is believed to have manifested in AHY and Iftitah's maneuvers to push forward the Rempang

The shifting regulations around Rempang have only deepened uncertainty while perpetuating land grabs by BP Batam. Furthermore, Rempang peoplehave faced physical violence and criminalization since the state-led violence in 2023. Less than a month after Rempang was designated as a PSN, security forces were deployed to clear the island. A year later, there was another attack on the people, with three individuals named as suspects in assault cases, although the police later dropped the charges. These repeated attacks indicate a systematic effort to evict the people.

Meanwhile, uncertainty also surrounds investment in Rempang. Xinyi Glass, a Chinese glass manufacturing conglomerate and potential investor, has issued ambiguous statements regarding its commitment. While the government continues to promote Xinyi as a major investor expected to pour hundreds of trillions of rupiah into Rempang, the company's official stance tells a different story. In February 2025, Xinyi Group released the following statement:

> "Our group has not initiated any eco-friendly city project nor reached any agreement or contract. The relevant Batam authorities have only introduced the price and terms of the development project to our company. No individual or organization represents our group or company in discussions or applications regarding development matters with (1) Batam local government departments, (2) the relevant authorities, or (3) other institutions. Our group has not participated in any actions mentioned in the report. Our group respects and cares for the rights of indigenous communities, and ensures that their human rights and housing will not be affected by any plans."[18]

This response indicates that Xinyi has not followed up on the Memorandum of Understanding (MoU) with PT Makmur Elok Graha regarding the development in Rempang. However, the situation on the ground contradicts Xinyi's statement that no agreement has been made.[19] Furthermore, BP Batam claims that the land in Rempang falls under their authority, thereby carrying out forced relocations and the confiscation of people's land.[20]

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project, in contrast to other ministers who tended to remain passive following the regime change. During the Joko Widodo era, the Minister of Investment has been the most active in supporting Rempang Eco City.

18 Xinyi's response regarding its involvement in the Rempang project can be found through the advocacy carried out by the Business and Human Rights Resource Centre. (Xinyi Glass, 2025).

19 On July 28, 2023, a Memorandum of Understanding (MoU) was signed between the Ministry of Investment and Xinyi Group, as well as between Xinyi and PT MEG, in China. The purpose of the MoU was to realize the construction of a glass factory in Rempang with an investment value of US$11.6 billion. At present, Xinyi has already invested in Gresik, East Java (separate from the Rempang Project) amounting to US$700 million. The report on Xinyi's investment was accessed from (Ministry of Investment and Downstreaming/BKPM, 2023) (Pitoko, 2023).

20 Evictions of residents' houses were carried out by BP Batam on July 8, 2025, and the eviction of residents' coconut plantations took place on May 2, 2025 (For further information, see *Kompas.id*, July 11, 2025) (Fajriansyah, 2025).

Incidents of Attacks & Criminalization of Rempang People

September 7, 2023

Photo: Pandu Wiyoga / Kompas

Large-scale deployment of personnel from Polresta Barelang, the Indonesian Armed Forces (TNI), Public Order Agency (Satpol PP), and BP Batam to secure land demarcation marking the start of the Rempang Eco City industrial and entertainment area development.

Photo: tribunriau.com

People opposed the land demarcation because 16 traditional Malay villages in Rempang have occupied the land for generations since 1843. The rejection was also tied to people's refusal to be relocated.


Photo: suara.com

Security forces acted repressively in handling people's protests, including firing tear gas at residents, with some directed toward a nearby school at Barelang Bridge 4.


Photo: Yogi Eka Sahputra / TEMPO

20 people were injured (both serious and minor), including children, women, and the elderly. Children at Batam 22 Junior High School suffered trauma; 10 students and a female teacher were hospitalized due to tear gas exposure. Elderly victim: Ridwan (60), sustained serious injuries and required hospital care.

December 18, 2024

Photo: faktakini.info

Residents of Rempang were attacked by security personnel, allegedly from PT Makmur Elok Graha (MEG), the developer of Rempang Eco City.

Photo: Yogi Eka Sahputra / Mongabay Indonesia

The incident began with allegations that PT MEG security personnel tore down residents' banners opposing Rempang Eco City. Residents demanded accountability from the personnel.

Photo: Yogi Eka Sahputra / Mongabay Indonesia

Afterwards, PT MEG security personnel went to the residents' post, where an attack occurred.

Photo: Yogi Eka Sahputra / Mongabay Indonesia

4 people sustained head lacerations. 1 person seriously injured. 1 person struck by an arrow. 1 person suffered a broken arm. 1 person lightly injured. Dozens of residents' motorcycles were also damaged.

Photo: SINDOnews

Three Rempang residents were named suspects for allegedly detaining PT MEG security personnel who had torn down the banner. In fact, residents detained the security officers to hold them accountable. At the same time, the people also reported the security officers to the police. The suspect status of the people was eventually revoked after strong pressure from the community and civil society groups.

Source: Unequal Justice on Rempang Island (2023), Kompas.id (February 6, 2025), Walhi Riau (December 18, 2024), Batampos.id (December 19, 2024), Idntimes.com (February 18, 2025).


Pisang 40 hari
5000/kg

Chapter IV

A Call to Realize Socio-Ecological Justice for the People of Rempang

Our findings reaffirm the ecological and social harms caused by this project far outweigh its potential economic gains. Therefore, this study recommends that the Rempang Eco City project be halted or entirely canceled, as the long-term losses cannot be replaced by the short-term economic gains promised by project developers and government authorities.

In addition, it is crucial to establish absolute protection status for Rempang Island's coastal areas, seas, and farmland to prevent destructive large-scale projects. For this reason, we urge the adoption of spatial planning policies based on environmental sustainability and the well-being of Indigenous and local communities.

Furthermore, an independent and transparent audit of the entire planning and permitting process must be carried out with the involvement of civil society to ensure integrity and accountability. It is essential to include independent experts and civil society representatives in this audit to safeguard integrity and accountability.

Equally important, we also encourage the government to allocate funding and resources to strengthen the marine fisheries, agriculture, and freshwater aquaculture sectors, which have long sustained the lives of Rempang's people. This includes training, market access facilitation, and ecosystem protection.

The Chapter Continues

Rempang's resistance to the Eco City plan shows how development exploits and even creates multidimensional vulnerabilities—environmental, social, economic, ecological, biophysical, and cultural. This grassroots movement, as cited from Nikita Sud (2025) in "A Green Energy Frontier Long in the Making: From Tin to Solar Power in the Riau Islands, Indonesia", illustrates how the green transition promised by Rempang Eco City becomes a deadly paradox that seizes living spaces.

What is happening in Rempang can be identified as **extractivism**, defined by Naomi Klein (2015) as a non-reciprocal situation based on domination over the earth and focused on appropriating living spaces[21]. Thus far, the design of Rempang Eco City development stands in contrast to the ways in which Indigenous and local communities utilize nature to meet their subsistence needs. The extractive process systematically marginalizes people for the sake of capital accumulation by investors and a small elite group facilitated by the state (Sud 2025).

Today, Rempang has become what Anna Lowenhaupt Tsing (2003) calls a resource frontier—a border zone, an outer territory where various elements of the landscape, livelihoods, and ecologies are transformed into mere "resources" to be exploited for industry. Ciptaningrat Larastiti in Literasi.co (July 21, 2014) elaborates on Tsing's definition of frontier as an entity that transcends geography:

> "a process of capital accumulation through the dispossession of communities imagined as primitive and savage from the forests in which they live. Accumulation is also marked by the extraction of natural resources in zones perceived as unruly."

[21] An excerpt on extractivism from Naomi Klein (2015) in *This Changes Everything: Capitalism vs. The Climate*, which invites reflection, states: "Extractivism is a nonreciprocal, dominance-based relationship with the earth, one purely of taking. It is the opposite of stewardship, which involves taking but also taking care that regeneration and future life continue. Extractivism is the mentality of the mountaintop remover and the old-growth clear-cutter. It is the reduction of life into objects for the use of others, giving them no integrity or value of their own—turning living complex ecosystems into 'natural resources,' mountains into 'overburden' (as the mining industry terms the forests, rocks, and streams that get in the way of its bulldozers)." In Indonesian translation: *"Ekstraktivisme dimaknai sebagai hubungan tanpa timbal balik dan dilangsungkan dengan mendominasi bumi, serta semata-mata 'mengambil' darinya. Ini berkebalikan dengan makna stewardship—atau pengelolaan, perawatan, dan pemeliharaan untuk memastikan regenerasi dan keberlanjutan kehidupan. Ekstraktivisme merupakan mentalitas pengiris puncak gunung dan penebang hutan leluhur hingga habis; mereduksi kehidupan menjadi objek untuk dimanfaatkan orang lain, membuat alam tak memiliki makna dan integritas. Mengubah ekosistem yang kompleks ke dalam definisi sebagai 'sumber daya alam,' gunung-gunung dimaknai sebagai beban berlebih (overburden) yang menghalangi buldoser mereka."* (Klein, 2015)

According to Nikita Sud (2025), Rempang is becoming a frontier for the ever-expanding green energy industry (a green frontier in the making), marking a cultural territory that will continue to be exploited today, tomorrow, and in the future.

There will never be a final chapter in the collective struggle of citizens against the ever-multiplying dispossession of living spaces, even when legitimized by agents of state tyranny. In the end, we are all the feet that hold up the colossal giant called "development." Thus, our steps to keep speaking out become everyday tactics. Loud voices, though caged, are built upon our own land. We keep navigating within a system of power that bulldozes the songs, whispers, and cries of grasses rooted in the soil; excavators slice through the sound of waves crashing against coral rocks in the sea.

Although this research text ends on this page, we must continue sailing forward, amplifying voices, building spirit, and sustaining a shared breath for what will surely be a long journey.

May we, after reading these pages, continue to be fearless subjects of solidarity, amplifying resistance through every channel and within every space of movement.

..Seperti kubilang, malam terasa amat panjang *Luka menganga dalam,* *lubang begitu gelap* *dan tembok-tembok curam.*	..I say, the night has been long, The wound has been deep, The pit has been dark And the walls have been steep.
Namun hari ini, para leluhur bertutur *Bicara pada kita dengan suara menggelegar,* *Melintasi tahun, melampaui abad,* *Mengarung samudra, menyebrangi lautan.* *Kata mereka: Himpun diri satu dengan lainnya,* *Selamatkan kaummu.* *Kau telah berjuang mati-matian di tempat yang jauh,* *Para tetua mengingatkan bahwa rantai penindasan,* *Telah membayar kebebasan kita berulang kali. [..]*	But today, voices of old spirit sound Speak to us in words profound, Across the years, across the centuries, Across the oceans, and across the seas. They say, draw near to one another, Save your race. You have been paid for in a distant place, The old ones remind us that slavery's chains Have paid for our freedom again and again. [..]
[..] Para leluhur mengingatkan, *meski dengan sejarah penuh luka* *Kita adalah orang-orang yang akan terus berjuang, untuk terus bangkit lagi.*	[..] The ancestors remind us, despite the history of pain We are a going-on people who will rise again.
Dan tetap berani, berdiri tegak.	And still we rise.

* The poem above is an excerpt from Million Man March Poem (1995) by Maya Angelou (1928–2016), a poet, writer, and activist who fought against racism and discrimination. This poem refers to the Million Man March, a demonstration of Black men in Washington, D.C., on October 16, 1995. The poem raises the themes of trauma and oppression experienced by Black people and thus became an important symbol in the struggle for collective liberation and unity within the Black movement in America.

This excerpt has been translated interpretively as an inspiration for the class struggle of Rempang residents, who continue to stand firm in defending their right to live in a space now threatened by the Rempang Eco City project's industrial and commercial expansion.

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Valuation Results of the Economic Potential of Rempang Residents

Nomor Responden.	Nilai Guna Langsung (Direct Use Value)				Total Nilai Guna Langsung (Direct Use Value)	Nilai Guna Tidak Langsung (Indirect Use Value			Total Nilai Guna Tidak Langsung (Indirect Use Value	Total Nilai Guna (Use Value)	Nilai Non Guna (Non Use Value)			Total Nilai Non Guna (Non Use Value)	Total Nilai Ekonomi
	Rumput Laut	Perikanan Laut	Pertanian	Perikanan Air Tawar		Pemecah gelombang	Penahan instrusi air laut	Tempat pemijahan dan asuhan biota air			Budaya	Keaneka-ragaman Hayati	Bentang Alam		
1	-	35,640,000	2,280,000	-	37,920,000	8,072,400	36,879,600	2,875,951.56	47,827,952	85,747,952	600,000	800,000	600,000	2,000,000	87,747,952
2	33,600,000	188,800,000	6,480,000	-	228,880,000	8,072,400	46,099,500	2,875,951.56	57,047,852	285,927,852	1,000,000	1,000,000	1,000,000	3,000,000	288,927,852
3	-	529,680,000	224,860,000	-	754,540,000	8,072,400	46,099,500	2,875,951.56	57,047,852	811,587,852	1,000,000	1,000,000	1,000,000	3,000,000	814,587,852
4	-	177,600,000	12,740,000	-	190,340,000	8,072,400	9,219,900	2,875,951.56	20,168,252	210,508,252	1,000,000	1,000,000	1,000,000	3,000,000	213,508,252
5	-	57,120,000	1,080,000	-	58,200,000	8,072,400	64,539,300	2,875,951.56	75,487,652	133,687,652	600,000	600,000	400,000	1,600,000	135,287,652
6	18,000,000	117,600,000	-	-	135,600,000	8,072,400	27,659,700	2,875,951.56	38,608,052	174,208,052	1,000,000	1,000,000	1,000,000	3,000,000	177,208,052
7	-	158,800,000	6,700,000	-	165,500,000	8,072,400	27,659,700	2,875,951.56	38,608,052	204,108,052	1,000,000	1,000,000	1,000,000	3,000,000	207,108,052
8	-	68,160,000	7,800,000	-	75,960,000	8,072,400	36,879,600	2,875,951.56	47,827,952	123,787,952	800,000	800,000	800,000	2,400,000	126,187,952
9	-	36,000,000	15,990,000	-	51,990,000	8,072,400	9,219,900	2,875,951.56	20,168,252	72,158,252	600,000	600,000	600,000	1,800,000	73,958,252
10	-	64,800,000	1,000,000	-	65,800,000	8,072,400	18,439,800	2,875,951.56	29,388,152	95,188,152	800,000	800,000	800,000	2,400,000	97,588,152
11	-	302,520,000	138,600,000	-	441,120,000	8,072,400	46,099,500	2,875,951.56	57,047,852	498,167,852	1,000,000	1,000,000	1,000,000	3,000,000	501,167,852
12	-	533,700,000	114,900,000	-	648,600,000	8,072,400	18,439,800	2,875,951.56	29,388,152	677,988,152	1,000,000	1,000,000	1,000,000	3,000,000	680,988,152
13	-	320,400,000	-	-	320,400,000	8,072,400	27,659,700	2,875,951.56	38,608,052	359,008,052	1,000,000	1,000,000	1,000,000	3,000,000	362,008,052
14	-	64,600,000	18,750,000	-	83,350,000	8,072,400	27,659,700	2,875,951.56	38,608,052	121,958,052	800,000	800,000	800,000	2,400,000	124,358,052
15	-	36,400,000	-	120,000,000	156,400,000	8,072,400	18,439,800	2,875,951.56	29,388,152	185,788,152	1,000,000	1,000,000	1,000,000	3,000,000	188,788,152
16	-	-	147,480,000	-	147,480,000				-	147,480,000	1,000,000	1,000,000	1,000,000	3,000,000	150,480,000
17	-	-	492,400,000	-	492,400,000				-	492,400,000	1,000,000	1,000,000	1,000,000	3,000,000	495,400,000
18	-	-	232,500,000	-	232,500,000				-	232,500,000	1,000,000	1,000,000	1,000,000	3,000,000	235,500,000
19	-	179,280,000	26,500,000	-	205,780,000	8,072,400	36,879,600	2,875,951.56	47,827,952	253,607,952	1,000,000	1,000,000	1,000,000	3,000,000	256,607,952
20	-	-	14,400,000	240,000,000	254,400,000	8,072,400	27,659,700	2,875,951.56	38,608,052	293,008,052	1,000,000	1,000,000	1,000,000	3,000,000	296,008,052
21	-	-	640,500,000	-	640,500,000				-	640,500,000	1,000,000	1,000,000	1,000,000	3,000,000	643,500,000
22	-	-	252,000,000	-	252,000,000				-	252,000,000	1,000,000	1,000,000	1,000,000	3,000,000	255,000,000

Nomor Responden.	Nilai Guna Langsung (Direct Use Value)				Total Nilai Guna Langsung (Direct Use Value)	Nilai Guna Tidak Langsung (Indirect Use Value			Total Nilai Guna Tidak Langsung (Indirect Use Value	Total Nilai Guna (Use Value)	Nilai Non Guna (Non Use Value)			Total Nilai Non Guna (Non Use Value)	Total Nilai Ekonomi
	Rumput Laut	Perikanan Laut	Pertanian	Perikanan Air Tawar		Pemecah gelombang	Penahan instrusi air laut	Tempat pemijahan dan asuhan biota air			Budaya	Keaneka-ragaman Hayati	Bentang Alam		
23	-	-	681,000,000	-	681,000,000				-	681,000,000	1,000,000	1,000,000	1,000,000	3,000,000	684,000,000
24	-	-	411,000,000	-	411,000,000				-	411,000,000	1,000,000	1,000,000	1,000,000	3,000,000	414,000,000
25	-	-	-	31,050,000	31,050,000				-	31,050,000	1,000,000	1,000,000	1,000,000	3,000,000	34,050,000
26	-	283,080,000	18,720,000	-	301,800,000	8,072,400	9,219,900	2,875,951.56	20,168,252	321,968,252	1,000,000	1,000,000	1,000,000	3,000,000	324,968,252
27	-	126,000,000	6,400,000	-	132,400,000	8,072,400	36,879,600	2,875,951.56	47,827,952	180,227,952	1,000,000	1,000,000	1,000,000	3,000,000	183,227,952
28	27,200,000	266,700,000	-	-	293,900,000	8,072,400	46,099,500	2,875,951.56	57,047,852	350,947,852	1,000,000	1,000,000	1,000,000	3,000,000	353,947,852
29	-	-	7,452,000	-	7,452,000				-	7,452,000	-	-	-	-	7,452,000
30	-	495,600,000	21,000,000	-	516,600,000	8,072,400	18,439,800	2,875,951.56	29,388,152	545,988,152	1,000,000	1,000,000	1,000,000	3,000,000	548,988,152
31	-	-	71,200,000	-	71,200,000				-	71,200,000	1,000,000	1,000,000	1,000,000	3,000,000	74,200,000
32	-	-	67,400,000	-	67,400,000				-	67,400,000	1,000,000	1,000,000	1,000,000	3,000,000	70,400,000
33	-	615,690,000	97,200,000	-	712,890,000	8,072,400	27,659,700	2,875,951.56	38,608,052	751,498,052	1,000,000	1,000,000	1,000,000	3,000,000	754,498,052
34	-	146,347,200	800,000	-	147,147,200	8,072,400	36,879,600	2,875,951.56	47,827,952	194,975,152	1,000,000	1,000,000	1,000,000	3,000,000	197,975,152
35	-	-	43,440,000	-	43,440,000				-	43,440,000	1,000,000	1,000,000	1,000,000	3,000,000	46,440,000
36	-	62,400,000	3,280,000	-	65,680,000	8,072,400	36,879,600	2,875,951.56	47,827,952	113,507,952	1,000,000	1,000,000	1,000,000	3,000,000	116,507,952
37	-	260,160,000	14,940,000	-	275,100,000	8,072,400	36,879,600	2,875,951.56	47,827,952	322,927,952	1,000,000	1,000,000	1,000,000	3,000,000	325,927,952
38	-	-	429,600,000	-	429,600,000				-	429,600,000	1,000,000	1,000,000	1,000,000	3,000,000	432,600,000
39	-	13,200,000	55,392,000	-	68,592,000	8,072,400	36,879,600	2,875,951.56	47,827,952	116,419,952	1,000,000	1,000,000	1,000,000	3,000,000	119,419,952
40	-	-	200,400,000	-	200,400,000				-	200,400,000	1,000,000	1,000,000	1,000,000	3,000,000	203,400,000
41	-	-	134,400,000	-	134,400,000				-	134,400,000	1,000,000	1,000,000	1,000,000	3,000,000	137,400,000
42	-	179,880,000	26,100,000	-	205,980,000	8,072,400	27,659,700	2,875,951.56	38,608,052	244,588,052	1,000,000	1,000,000	1,000,000	3,000,000	247,588,052
43	-	78,000,000	84,960,000	-	162,960,000	8,072,400	36,879,600	2,875,951.56	47,827,952	210,787,952	1,000,000	1,000,000	1,000,000	3,000,000	213,787,952
44	-	-	7,000,000	-	7,000,000				-	7,000,000	-	-	-	-	7,000,000
45	-	222,280,000	1,080,000	-	223,360,000	8,072,400	36,879,600	2,875,951.56	47,827,952	271,187,952	1,000,000	1,000,000	1,000,000	3,000,000	274,187,952
46	-	-	189,600,000	-	189,600,000				-	189,600,000	1,000,000	1,000,000	1,000,000	3,000,000	192,600,000
47	-	123,760,000	7,980,000	-	131,740,000	8,072,400	73,759,200	2,875,951.56	84,707,552	216,447,552	1,000,000	1,000,000	1,000,000	3,000,000	219,447,552
48	-	-	163,760,000	-	163,760,000				-	163,760,000	1,000,000	1,000,000	1,000,000	3,000,000	166,760,000
49	-	253,320,000	37,000,000	-	290,320,000	8,072,400	36,879,600	2,875,951.56	47,827,952	338,147,952	1,000,000	1,000,000	1,000,000	3,000,000	341,147,952
50	32,640,000	376,320,000	16,800,000	-	425,760,000	8,072,400	46,099,500	2,875,951.56	57,047,852	482,807,852	1,000,000	1,000,000	1,000,000	3,000,000	485,807,852
51	-	-	940,000,000	-	940,000,000				-	940,000,000	1,000,000	1,000,000	1,000,000	3,000,000	943,000,000
52	-	1,182,780,000	350,100,000	-	1,532,880,000	8,072,400	36,879,600	2,875,951.56	47,827,952	1,580,707,952	1,000,000	1,000,000	1,000,000	3,000,000	1,583,707,952
53	24,000,000	356,400,000	103,400,000	-	483,800,000	8,072,400	46,099,500	2,875,951.56	57,047,852	540,847,852	1,000,000	1,000,000	1,000,000	3,000,000	543,847,852
54	32,000,000	80,640,000	-	-	112,640,000	8,072,400	36,879,600	2,875,951.56	47,827,952	160,467,952	800,000	800,000	800,000	2,400,000	162,867,952
55	-	-	243,300,000	-	243,300,000				-	243,300,000	1,000,000	1,000,000	1,000,000	3,000,000	246,300,000

Nomor Responden.	Nilai Guna Langsung (Direct Use Value)				Total Nilai Guna Langsung (Direct Use Value)	Nilai Guna Tidak Langsung (Indirect Use Value			Total Nilai Guna Tidak Langsung (Indirect Use Value	Total Nilai Guna (Use Value)	Nilai Non Guna (Non Use Value)			Total Nilai Non Guna (Non Use Value)	Total Nilai Ekonomi
	Rumput Laut	Perikanan Laut	Pertanian	Perikanan Air Tawar		Pemecah gelombang	Penahan instrusi air laut	Tempat pemijahan dan asuhan biota air			Budaya	Keaneka-ragaman Hayati	Bentang Alam		
56	35,840,000	546,000,000	-	-	581,840,000	8,072,400	64,539,300	2,875,951.56	75,487,652	657,327,652	1,000,000	1,000,000	1,000,000	3,000,000	660,327,652
57	80,000,000	663,600,000	62,950,000	-	806,550,000	8,072,400	18,439,800	2,875,951.56	29,388,152	835,938,152	1,000,000	1,000,000	1,000,000	3,000,000	838,938,152
58	-	587,160,000	-	-	587,160,000	8,072,400	46,099,500	2,875,951.56	57,047,852	644,207,852	1,000,000	1,000,000	1,000,000	3,000,000	647,207,852
59	-	234,240,000	764,000,000	-	998,240,000	8,072,400	18,439,800	2,875,951.56	29,388,152	1,027,628,152	1,000,000	1,000,000	1,000,000	3,000,000	1,030,628,152
60	-	-	100,700,000	-	100,700,000				-	100,700,000	800,000	800,000	800,000	2,400,000	103,100,000
61	36,000,000	302,736,000	43,200,000	-	381,936,000	8,072,400	64,539,300	2,875,951.56	75,487,652	457,423,652	1,000,000	1,000,000	1,000,000	3,000,000	460,423,652
62	126,000,000	197,920,000	-	-	323,920,000	8,072,400	36,879,600	2,875,951.56	47,827,952	371,747,952	1,000,000	1,000,000	1,000,000	3,000,000	374,747,952
63	-	590,400,000	47,000,000	-	637,400,000	8,072,400	92,199,000	2,875,951.56	103,147,352	740,547,352	1,000,000	1,000,000	1,000,000	3,000,000	743,547,352
64	-	40,800,000	19,800,000	-	60,600,000	8,072,400	27,659,700	2,875,951.56	38,608,052	99,208,052	1,000,000	1,000,000	1,000,000	3,000,000	102,208,052
65	-	-	946,000,000	-	946,000,000				-	946,000,000	1,000,000	1,000,000	1,000,000	3,000,000	949,000,000
66	-	-	706,560,000	-	706,560,000				-	706,560,000	1,000,000	1,000,000	1,000,000	3,000,000	709,560,000
67	120,000,000	134,400,000	94,920,000	-	349,320,000	8,072,400	46,099,500	2,875,951.56	57,047,852	406,367,852	1,000,000	1,000,000	1,000,000	3,000,000	409,367,852
68	224,000,000	153,480,000	38,000,000	-	415,480,000	8,072,400	46,099,500	2,875,951.56	57,047,852	472,527,852	1,000,000	1,000,000	1,000,000	3,000,000	475,527,852
69	-	-	722,000,000	-	722,000,000				-	722,000,000	1,000,000	1,000,000	1,000,000	3,000,000	725,000,000
70	-	-	45,500,000	-	45,500,000				-	45,500,000	600,000	600,000	600,000	1,800,000	47,300,000
71	-	-	740,000,000	-	740,000,000				-	740,000,000	1,000,000	1,000,000	1,000,000	3,000,000	743,000,000
72	-	-	364,400,000	-	364,400,000				-	364,400,000	1,000,000	1,000,000	1,000,000	3,000,000	367,400,000
73	-	92,320,000	-	-	92,320,000	8,072,400	27,659,700	2,875,951.56	38,608,052	130,928,052	800,000	800,000	800,000	2,400,000	133,328,052
74	-	52,800,000	-	-	52,800,000	8,072,400	55,319,400	2,875,951.56	66,267,752	119,067,752	600,000	600,000	600,000	1,800,000	120,867,752
75	-	64,800,000	-	-	64,800,000	8,072,400	36,879,600	2,875,951.56	47,827,952	112,627,952	800,000	800,000	800,000	2,400,000	115,027,952
76	-	440,640,000	-	-	440,640,000	8,072,400	27,659,700	2,875,951.56	38,608,052	479,248,052	1,000,000	1,000,000	1,000,000	3,000,000	482,248,052
77	-	-	9,600,000	-	9,600,000				-	9,600,000	-	-	-	-	9,600,000
78	-	833,280,000	54,520,000	-	887,800,000	8,072,400	27,659,700	2,875,951.56	38,608,052	926,408,052	1,000,000	1,000,000	1,000,000	3,000,000	929,408,052
79	-	457,920,000	11,240,000	-	469,160,000	8,072,400	9,219,900	2,875,951.56	20,168,252	489,328,252	1,000,000	1,000,000	1,000,000	3,000,000	492,328,252
80	-	1,555,680,000	26,580,000	-	1,582,260,000	8,072,400	55,319,400	2,875,951.56	66,267,752	1,648,527,752	1,000,000	1,000,000	1,000,000	3,000,000	1,651,527,752
81	21,600,000	741,600,000	537,740,000	-	1,300,940,000	8,072,400	27,659,700	2,875,951.56	38,608,052	1,339,548,052	1,000,000	1,000,000	1,000,000	3,000,000	1,342,548,052
82	21,600,000	422,400,000	19,500,000	-	463,500,000	8,072,400	36,879,600	2,875,951.56	47,827,952	511,327,952	1,000,000	1,000,000	1,000,000	3,000,000	514,327,952
	832,480,000	**16,105,833,200**	**12,145,874,000**	**391,050,000**	**29,475,237,200**	**435,909,600**	**1,954,618,800**	**155,301,384**	**2,545,829,784**	**32,021,066,984**	**75,600,000**	**75,800,000**	**75,400,000**	**226,800,000**	**32,247,866,984**
	59,462,857	**303,883,645**	**176,027,159**	**130,350,000**	**359,454,112**	**8,072,400**	**36,196,644**	**2,875,952**	**31,046,705**	**390,500,817**	**956,962**	**959,494**	**954,430**	**2,765,854**	**393,266,671**
	4,955,238.10	**25,323,637.11**	**14,668,929.95**	**10,862,500.00**	**29,954,509.35**	**672,700**	**3,016,387.04**	**239,662.63**	**2,587,225**	**32,541,735**	**79,747**	**79,958**	**79,536**	**230,488**	**32,772,223**


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The Rempang Eco City project is touted as a symbol of transition toward a "green economy" through solar panel industry and massive-scale investment. However, behind these development promises, the lives of indigenous and local communities on Rempang Island face tremendous uncertainty. Since 2023, thousands of people have rejected forced evictions euphemistically framed as "relocation," "displacement," or "local transmigration." Their resistance is well-founded in defending and preserving their ancestral villages, which have been their living spaces for generations.

One key message for the government, developers, and investors from this research is: Rempang Island is not an "empty land," but rather a complex socio-ecological space, where mangrove ecosystems, coastal areas, fisheries, agriculture, and cultural heritage all interconnect to sustain community life.

This study is part of an ongoing effort to stand with the people and defend their rights, which will be stripped away by this project. The project places local communities in a "sacrifice zone" in the name of "green development" that the government, developers, and investors ironically glorify. Yet, in reality, the project constitutes the dispossession of living spaces, ecosystem degradation, and socio-ecological injustice for the people of Rempang.

Research on the economic valuation of Rempang people's income indicates figures far higher than the government's claims. The valuation reveals that average household income is IDR 32.77 million/household/month, while the government claims they only earn IDR 3 million per month.

The economic valuation also calculates potential environmental losses reaching Rp109 million/household/month. This is an enormous figure—three times the actual income of the people of Rempang, placing them at compounded risk if the project proceeds.

Rather than bringing prosperity, Rempang Eco City reflects a model of development that seizes living spaces and weakens ecosystems that sustain communities. Through economic valuation, this research underscores that the socio-ecological costs of the project far outweigh its economic benefits. Therefore, we recommend the complete termination and cancellation of the Rempang Eco City project to ensure the continuity of living spaces, ecosystems, and social justice for the people of Rempang Island.

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LBH Pekanbaru
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PERHIMPUNAN PEMBELA MASYARAKAT ADAT NUSANTARA
WALHI Wahana Lingkungan Hidup Indonesia
KIARA Koalisi Rakyat untuk Keadilan Perikanan