

CHAPTER 2 LITERATURE REVIEW

This chapter provides a comprehensive review of existing literature pertinent to the research on the visual impact of coastal structures on the landscape of the Toucheng Five Fishing Villages. It delves into various theoretical frameworks and empirical studies that support the research process, covering key areas such as the impacts of climate change on coastal environments, methodologies for visual impact assessment, and the specifics of coastal erosion and management. Furthermore, this review explores the unique characteristics of the Northeast Coast National Scenic Area of Taiwan and the broader concept of landscape in the context of coastal aesthetics. The insights gleaned from this literature will be instrumental in defining the variables and indicators appropriate for this study, thereby strengthening its methodological foundation and analytical approach.

2.1. Climate Change

Through the United Nations Framework Convention on Climate Change in 1992, climate change is defined as a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (United Nations, 1992). These activities have led to a significant rise in global temperatures, resulting in a variety of adverse effects including extreme weather events, rising sea levels, and impacts on food production and health (Raizada, Sharma, & Srivastava, 2022). While natural processes can also contribute to climate change, the current rate of change is largely attributed to human influence (Barcellos, Saccol, Carvalho, & Rosa, 2019).

The cause of climate change is a complex issue, with human activities and natural causes both playing significant roles. (Chen, Salim, & Reyes, 2021) highlight the dominant influence of human activities, particularly the emission of greenhouse gases, in driving climate change. This is further supported by Chand (2021), who emphasizes the role of human-induced systems, such as fossil fuel burning and deforestation, in contributing to climate change. However, Abdollahbeigi (2020) also points out the existence of non-climatic factors, such as fluctuations in the intensity of sunlight, that can contribute to climate change. Despite these various factors, the consensus among scientists is that human activities are the primary cause of climate change.

The current state of climate change is a complex and evolving issue. Tang (2019) argues that while we are not yet in a climate crisis, the synergistic impacts of environmental degradation could push us into one. This is supported by Intergovernmental Panel on Climate Change (IPCC) (2023), who provides a comprehensive assessment of the physical science basis of climate change, highlighting the human influence on climate and the need to limit greenhouse gas emissions. Scherrer et al. (2021) emphasizes the need for more frequent updates to climate normals due to the non-stationarity of the climate and suggests alternative approaches to better describe the current state of the climate. Chowdhuri & Gupta (2023) further underscores the urgency of addressing anthropogenic factors driving climate change, such as greenhouse gas emissions and aerosols, and provides a comprehensive overview of the negative effects of climate change on various aspects of the environment and public health.

2.1.1. Climate Change in Taiwan

Geographically, Taiwan is situated at the convergence of several tectonic plates, including the Eurasian Plate and the Philippine Sea Plate. This tectonic activity is the primary

cause of Taiwan's frequent earthquakes. Additionally, the island's mountainous terrain, combined with its proximity to the Pacific Ocean, makes it vulnerable to landslides, typhoons, and floods.

The average yearly temperature in Taiwan has risen by about 1.6 degrees Celsius over the past 110 years (between 1190-2020), with the rate of increase accelerating in the last 50 years (National Climate Change Adaptation, 2024). This warming trend has led to more frequent and intense heatwaves, affecting human health and agriculture. Taiwan is particularly vulnerable to the impacts of climate change due to its geographical location and exposure to natural hazards. The climate change issues in Taiwan that require close attention are high temperatures, drought, and extreme rainfall.

Taiwan is prone to typhoons, droughts, and floods, which have become more frequent and severe due to climate change. A total of 375 typhoons between 1911 and 2023 have had landfall on Taiwan or have passed offshore without landfall in Taiwan but caused disasters on lands (Central Weather Administration, n.d.). These events pose significant risks to public safety, infrastructure, and livelihoods. On Thursday, October 31st, 2024, Taiwan experienced heavy rainfall and strong winds due to the impact of the most significant storm, Typhoon Kong-rey, to hit the island in nearly 3 decades and made landfall on the southeast coast (Cheung & Magramo, 2024). Gene Huang, a weather forecaster with the Central Weather Administration, stated that Typhoon Kong-rey was the most powerful typhoon to hit Taiwan in the past 28 years (Chien, Petri, & Jones, 2024). While Taiwan experiences frequent tropical storms during the July to October period, the late-season arrival of a powerful typhoon like Kong-rey is considered unusual (France 24, 2024). Scientists have raised concerns that climate change may be intensifying storms, resulting in heavier rainfall, flash floods, and stronger wind gusts.

Sea levels around Taiwan are rising at a faster rate than the global average, threatening coastal communities and infrastructure (Yang, 2020). If Taiwan continues to emit large amounts of carbon dioxide in the coming decades, rising sea levels and storm surges could endanger millions of people living in its major cities. Typhoons and other storms can push sea levels even higher and cause seawater to flood inland. Taiwan has already experienced such flooding due to typhoons Dujuan and Megi in recent years. Rising sea levels are eroding beaches and coastal infrastructure, threatening coastal communities and agricultural lands.

Taiwan has recognized the urgent need to address climate change and has implemented various measures to mitigate its impacts. These include promoting renewable energy, improving energy efficiency, and developing climate change adaptation strategies. To enhance Taiwan's capacity to address climate change, the National Development Council established a national mechanism and task force in 2010, which led to the formulation of the "National Climate Change Adaptation Policy Guidelines" in 2012, followed by the approval of the "National Climate Change Adaptation Action Plan (2013-2017)" in 2014 (National Climate Change Adaptation, 2024). Since then, it has undergone several revisions and updates, with the most recent being the "National Climate Change Adaptation Action Plan (2023-2026)". The Action Guidelines prioritize climate change adaptation by focusing on research, risk assessment, and resilience building. It outlines seven key adaptation areas: infrastructure resilience, water resource management, land use planning, coastal protection, energy adaptation, agriculture and biodiversity, and public health. These efforts aimed to guide government agencies in implementing relevant climate change adaptation policies. Despite these efforts, Taiwan continues to face significant challenges from climate change. Addressing these challenges will require continued action and international cooperation.

2.2. Visual Impact Assessment

Visual Impact Assessment is a critical component of environmental impact assessment, focusing specifically on the aesthetic and perceptual changes to a landscape resulting from a proposed development or project. It serves as a structured process to evaluate the potential effects of proposed actions on both people and the environment, enabling informed decision-making regarding project modification or even abandonment if necessary (Bhatt, 2023). VIA's roots trace back to the growing environmental awareness of the 1960s and 1970s, when public opposition to large-scale federal projects lacking environmental and social consideration was on the rise (Smardon, 2016). As such, VIA emerged as a tool to incorporate aesthetic values into the planning and design processes, aiming to mitigate negative impacts and enhance positive ones (Bhatt, 2023). It has evolved from a rather subjective exercise to a more formalized and standardized process, integrating quantitative and qualitative methods to ensure a comprehensive evaluation of visual impacts. The need for VIA arises from the understanding that landscapes possess intrinsic value, contributing significantly to human well-being, cultural identity, and economic prosperity, while the visual character of a landscape can influence property values, tourism, and overall quality of life. VIA is essential for sustainable development as it aims to balance economic progress with environmental protection and social equity. It ensures that development projects respect the visual integrity of landscapes, contributing to the long-term health and vitality of communities.

The methodology of Visual Impact Assessment is multi-faceted, often varying based on the specific project, landscape context, and regulatory requirements (Kumar, Talan, & Tyagi, 2020). However, a general framework can be identified, typically involving several key stages (Coutinho, et al., 2019). The initial stage involves defining the scope of the assessment, establishing the geographical boundaries of the study area, and identifying the relevant visual receptors. Visual receptors are locations or viewpoints from which the proposed development may be visible and where people are likely to experience visual impacts. This step also includes establishing the baseline visual conditions, which involves documenting the existing landscape character through field surveys, photography, and analysis of existing data such as maps, aerial photographs, and GIS datasets. The magnitude of visual change is assessed, considering factors such as the size, scale, form, color, and texture of the proposed development and its contrast with the surrounding landscape (Tara, Lawson, & Renata, 2021).

2.2.1. Key Components of Visual Impact Assessment

A comprehensive VIA typically involves several key components:

- **Identification of Viewpoints:** This involves determining the locations from which the proposed development will be visible. Intervisibility Analysis (IA) is often used to identify these viewpoints (Dentoni, Grosso, Massacci, Cigagna, & Levanti, 2018).
- **Assessment of Visual Sensitivity:** This component evaluates how sensitive the landscape is to visual changes. It may involve the use of visual sensitivity assessment through multi-factor calculations (Kou, Zhang, & Zhang, Visual Impact Assessment Method for Cultural Heritage: West Lake Cultural Landscape in Hangzhou, China, 2024).
- **Visual Perception Assessment:** This involves understanding how the proposed development will be perceived by observers. Techniques such as questionnaire surveys and the Analytical Hierarchy Process (AHP) method may be employed (Kou, Zhang, & Zhang, Visual Impact Assessment Method for Cultural Heritage: West Lake Cultural Landscape in Hangzhou, China, 2024).
- **Quantitative and Qualitative Methods:** VIA often combines both quantitative and qualitative methods. Quantitative methods may involve the calculation of the Level of Visual Impact

(Lvi) for each viewpoint, while qualitative methods may involve expert judgment and public participation (Dentoni, Grosso, Massacci, Cigagna, & Levanti, 2018) (Palmer, A Diversity of Approaches to Visual Impact Assessment, 2022).

- Digital Techniques: The use of digital techniques such as Digital Surface Models (DSM), Geographic Information Systems (GIS), and 3D isovists and voxels has become increasingly common in VIA. These tools allow for more accurate and objective assessments of visual impact (Czyńska, Visual Impact Analysis of Large Urban Investments on the Cityscape, 2019) (Chmielewski, 2021).

2.2.2. Applications of Visual Impact Assessment

VIA is applied in a wide range of contexts, including:

- Cultural Heritage Management: VIA is used to evaluate the impact of development projects on the visual aspects of cultural heritage sites. For example, the Shangri-La Hotel East Building project at the West Lake Cultural Landscape in Hangzhou, China, was assessed using a comprehensive framework that combined visual sensitivity and perception assessments (Kou, Zhang, & Zhang, Visual Impact Assessment Method for Cultural Heritage: West Lake Cultural Landscape in Hangzhou, China, 2024).
- Urban Planning: VIA is used to assess the impact of large urban investments on cityscapes. For instance, a study in Gdansk, Poland, used the Visual Impact Size (VIS) method to evaluate the impact of a building facility on the cityscape (Czyńska, Visual Impact Analysis of Large Urban Investments on the Cityscape, 2019).
- Environmental Impact Assessment: VIA is an integral part of the EIA process, particularly for projects that could have significant visual impacts, such as wind farms and agricultural constructions. A comparative study in Spain evaluated the visual impact of wind turbines and agricultural constructions, finding that agricultural constructions were generally better integrated into the landscape (Cañas, Lago, García, Ruiz, & Maseda, 2020).
- Visual Pollution: VIA is also used to assess the impact of visual pollution, such as outdoor advertising billboards, on landscape openness. A study in Lublin City, Poland, found that billboards could obstruct up to 35% of the visual volume in some areas (Chmielewski, 2021).

2.2.3. Methodologies and Tools in Visual Impact Assessment

A variety of methodologies and tools are employed in VIA, reflecting the diversity of approaches in the field. Some of the key methodologies and tools include:

- Intervisibility Analysis (IA): This method is used to identify the viewpoints from which a proposed development will be visible. It is often combined with the calculation of the Level of Visual Impact (Lvi) for each viewpoint (Dentoni, Grosso, Massacci, Cigagna, & Levanti, 2018).
- Visual Impact Size (VIS) Method: This method is used to assess the visual impact of large urban investments on cityscapes. It involves the use of digital surface models and dedicated software to simulate the visual impact of proposed developments (Czyńska, Visual Impact Analysis of Large Urban Investments on the Cityscape, 2019).
- 3D Isovist and Voxel Approach: This method is used to assess the visual impact of outdoor billboards on landscape openness. It involves the calculation of the visible and obstructed subsets of visible volume using 3D isovists and voxels (Chmielewski, 2021).
- Public Participation and Questionnaire Surveys: Public participation is an important component of VIA, particularly in the assessment of visual perception. Questionnaire surveys and the AHP method are often used to incorporate public opinion into the assessment process (Kou, Zhang, & Zhang, Visual Impact Assessment Method for Cultural

Heritage: West Lake Cultural Landscape in Hangzhou, China, 2024) (Palmer, A Diversity of Approaches to Visual Impact Assessment, 2022).

- GIS and Digital Techniques: The use of GIS and digital techniques, such as Digital Surface Models (DSM) and 3D modeling, has become increasingly common in VIA. These tools allow for more accurate and objective assessments of visual impact (Czyńska, Visual Impact Analysis of Large Urban Investments on the Cityscape, 2019) (Chmielewski, 2021).

Visual Impact Assessment is a critical tool for evaluating the effects of development projects on the visual aspects of landscapes and cultural heritage. It involves a combination of quantitative and qualitative methods, including intervisibility analysis, visual sensitivity assessment, and public participation. The use of digital techniques, such as GIS and 3D modeling, has enhanced the accuracy and objectivity of VIA. However, challenges such as subjectivity, lack of standardization, and the need for public participation remain. As VIA continues to evolve, it is likely that new methodologies and tools will be developed to address these challenges and improve the assessment process.

2.2.4. Visual Impact Assessment Guidelines

The “Guidelines for Landscape and Visual Impact Assessment (GLVIA) Third Edition” (Landscape Institute & Institute of Environmental Management & Assessment, 2013) outlines the practical application of LVIA, detailing the underlying principles, the sequential process of assessment, and effective methods for presenting findings. It begins by establishing that LVIA is not a rigid formula but a methodology that relies heavily on professional judgment, emphasizing clarity, objectivity, and proportionality in its application. It details how LVIA integrates into the broader Environmental Impact Assessment (EIA) framework, highlighting the LVIA Process Stages:

1. Site Selection: Initial considerations for choosing appropriate development locations.
2. Screening: Determining if a project is likely to have significant effects and thus requires an EIA and LVIA.
3. Scoping: Defining the extent and depth of the assessment, identifying key issues, potential impacts, and relevant receptors (e.g., sensitive landscapes, specific viewpoints).
4. Project Description: A thorough understanding of the proposed development, including its scale, design, and operational characteristics.
5. Baseline Studies: Comprehensive data collection to establish the existing landscape character and visual conditions of the area before development.
6. Identification and Description of Effects: Predicting the changes that the development will introduce to the landscape and visual environment.
7. Assessing Significance: Evaluating the magnitude and nature of these predicted effects against established criteria to determine their significance.
8. Mitigation: Proposing measures to avoid, reduce, remedy, or compensate for adverse effects.
9. Reporting and Review: Documenting the entire assessment process and its findings in a clear and defensible report.
10. Engaging with Stakeholders: Emphasizes the importance of consultation with relevant parties throughout the assessment.

The guidance further delves into the crucial relationship between project understanding, design, and mitigation. It underscores the necessity for LVIA practitioners to fully comprehend the proposed development's intricacies, as this knowledge directly influences the assessment of potential effects. The document advocates for landscape and visual considerations to actively inform the design process from its inception, noting that proactive design can significantly minimize adverse impacts. Various mitigation strategies are explored, including avoidance,

reduction, remediation, and compensation, all aimed at diminishing the negative consequences of development.

Dedicated chapters then detail the methodologies for assessing landscape and visual effects individually. For landscape effects, the focus is on evaluating changes to the landscape's character and specific elements, considering its susceptibility to change and inherent value to determine the magnitude and significance of the effects. For visual effects, the assessment centers on changes to people's views and visual amenity. This involves identifying different visual receptors (e.g., residents, road users) and their sensitivity to change, analyzing how views will be altered from key viewpoints, and determining the magnitude and significance of these visual alterations.

Viewpoint Selection

Regarding the selection of viewpoints, several factors are critical:

- **Accessibility to Public:** Viewpoints are primarily chosen from publicly accessible locations or those with secured access, ensuring that the assessment reflects views available to the general public.
- **Potential Number and Sensitivity of Viewers:** Consideration is given to the number and type of people who might be affected by the development. Viewpoints are selected to represent sensitive receptors, such as residents in their homes or users of tranquil recreational routes, who are generally more sensitive to visual changes.
- **Viewing Direction, Distance, and Elevation:** Viewpoints are chosen to capture a range of perspectives, including views from different directions (e.g., north, south), varying distances (short, medium, and long-distance views), and diverse elevations (e.g., from a valley floor versus a hilltop).
- **Nature of Viewing Experience:** The assessment considers how people experience views. This includes static views (e.g., from a fixed window or bench), views from settlements, and views experienced sequentially along routes (e.g., a footpath, road, or railway line).
- **View Type:** Viewpoints are selected to represent different types of views, such as broad panoramas, focused vistas (framed views), or fleeting glimpses.

Once viewpoints are selected, the next crucial step is to characterize the existing views from each point. This involves:

- **Visual Receptors and Activities:** Detailed information is gathered on the types and estimated numbers of people (visual receptors) likely to be affected at each viewpoint, clarifying the activities they are typically involved in (e.g., residential, recreational, commuting) as this influences their sensitivity to change.
- **Viewpoint Details:** The exact location, nature, and characteristics of each chosen viewpoint (representative, specific, or illustrative) are recorded, including details of the visual receptors present.
- **Nature, Composition, and Characteristics of Existing Views:** A comprehensive description of the current view is made. This includes the dominant landscape features, the presence of human elements, the general visual character, and the direction of the view.
- **Visual Characteristics:** Specific visual qualities of the existing view are noted, such as the nature and extent of the skyline, aspects of visual scale and proportion (e.g., whether the view has a strong horizontal or vertical emphasis), and any key focal points or elements that draw the eye.
- **Influencing Elements:** Any existing elements that may interrupt, filter, or otherwise influence the view—such as landform (hills, valleys), existing buildings, or vegetation

(trees, hedges)—are identified and described, as these can significantly alter how a proposed development is perceived.

Value

In the context of a Visual Impact Assessment (VIA), it's crucial to make judgments about the value attached to the views that are experienced. This goes beyond simply describing what is seen and delves into the cultural, historical, and recreational significance that certain views hold for people. The Guidelines for Landscape and Visual Impact Assessment (GLVIA) Third Edition suggests that this judgment should take into account two main aspects:

1. **Formal Recognition of Value:** This refers to instances where the value of particular views has been officially acknowledged. Examples include views that are integral to the setting or appreciation of designated heritage assets (like historic buildings, monuments, or conservation areas). It also encompasses views that have specific recognition through planning designations or policies at local, regional, or national levels, which highlight their importance.
2. **Indicators of Value Attached by Visitors:** This considers how the public, particularly visitors, demonstrate their appreciation for certain views. Such indicators might include:
 - **Inclusion in Guidebooks or Tourist Maps:** If a view is featured prominently in tourist literature, it suggests a recognized appeal.
 - **Provision of Facilities:** The presence of specific facilities for the enjoyment of views, such as designated parking places, signboards, interpretive material, or viewing platforms, signifies an investment in and recognition of the view's value.
 - **References in Literature or Art:** Views that have inspired writers, poets, painters, or other artists often possess a deep-seated cultural or aesthetic value that resonates with a wider audience.

By assessing the value attached to views, assessors can better understand the potential sensitivity of these views to change and consequently, the significance of any visual effects caused by a proposed development.

Finally, the guidance emphasizes the critical importance of clear and effective presentation of LVIA findings. This includes detailed reporting requirements, the strategic use of visual aids such as photomontages and wirelines to illustrate predicted changes, and the clear communication of findings through maps and well-structured written descriptions, ensuring proportionality in all aspects of presentation.

Impact Assessment

When assessing the "impact" in Landscape and Visual Impact Assessment (LVIA), the process involves measuring the "effects" of a proposed development, as the guidelines distinguish between an "impact" (the action) and an "effect" (the resulting change). This "measurement" is a structured qualitative assessment, combining two primary factors: the sensitivity of the receptor and the magnitude of the effect. Here's how this is typically done:

1. **Understanding the Baseline:** Before any measurement, a thorough understanding of the existing landscape character and visual amenity is established. This baseline forms the reference against which changes are assessed.
2. **Assessing the Sensitivity of the Receptor:**
 - **For Landscape:** This considers the inherent value of the landscape (e.g., whether it's a nationally designated area, its rarity, quality, or cultural associations) and its

susceptibility to the type of change proposed by the development. A highly valued and susceptible landscape would be considered more sensitive.

- For Visual: This focuses on the people (visual receptors) who will experience changes in views. Factors determining sensitivity include the type of receptor (e.g., residents in their homes are generally more sensitive than motorists), their activity at the viewpoint (e.g., leisure activities versus passing through), and the importance or quality of the view itself.
3. Assessing the Magnitude of the Effect:
 - For Landscape: This evaluates the scale, extent, and duration of the physical and perceptual changes to the landscape. Factors considered include the size and scale of the new elements, the area over which the change will be felt, and whether the change is temporary or permanent, and reversible or irreversible.
 - For Visual: This considers the degree to which the development will be noticeable in the view. Factors include the size and scale of the development in the view, its distance from the observer, the extent to which it occupies the view, and the duration and reversibility of the visual change.
 4. Determining the Significance of the Effect: The "measurement" culminates in a judgment of the significance of the effect, which is derived from combining the sensitivity of the receptor with the magnitude of the effect. Effects can be described as significant (major, moderate) or not significant (minor, negligible), and can be positive/beneficial, negative/adverse, direct, indirect, short-term, long-term, or cumulative.

The Taiwan Institute of Landscape Architects has a report on Landscape Assessment Technical Specification by (侯錦雄 & 李素馨, 2013), which could also be used as a reference. It provides description and guidelines for the current situation survey, the analysis, and the findings presentation. The details are described below:

Landscape Current Situation Survey

1. Description of Basic Data for Development Activities

A general description of the environmental location where the development activity is located, including geographical location, a description of the land use patterns in the area (e.g., urban or rural areas), and an overview of the development plan content.

2. Description of the Scope of Landscape Survey for Development Activities

The content of the landscape survey scope for development activities needs to be explained with drawings. The landscape survey scope map of the development project includes both the development activity project scope and the development activity landscape survey scope. The landscape survey scope is generally defined as extending outward from the development project boundary line by a radius of not less than 1.2 kilometers. This scope can be adjusted based on the characteristics of the development activity or the environmental conditions, but the reasons for adjustment must be stated.

3. Landscape Data Survey within the Scope of Landscape Survey for Development Activities

- Natural Landscape Elements - topography, water bodies, flora and fauna, etc.
- Human Landscape Elements - settlement patterns, transportation axes, important landmarks, land use, night landscape, etc.
- Special Landscape Elements - special meteorological factors, obvious boundary zones with significant topographical changes

Conduct surveys and explanations on the above elements based on the environmental characteristics of the development activity location.

4. Description of Landscape Current Situation Survey Time/Frequency

At least one survey should be conducted within 3 years before the environmental impact statement or environmental impact assessment report is submitted for review.

5. Description of Landscape Survey Data Source Acquisition

The sources of data collected and analyzed in each step of the landscape impact survey should be explained.

- Literature Collection: If the data is obtained from existing relevant literature, the source and year of the data must be noted in the text or footnotes of the item, and references must be listed in detail.
- Current Situation Survey: If the data is obtained from a current situation survey and analysis, the method of data acquisition, survey date, and survey location must be stated in the item.

Landscape Current Situation Analysis

1. Visible Area Survey and Analysis

This section focuses on determining the "visible area," which is the zone surrounding the development area from which the development can be seen. The process involves:

- Drawing the visible area.
- Analyzing and explaining the visible area map.
- The map should include the project's planned area and the visible area.

2. Selection of Landscape Control Points

This part details how to choose specific locations for detailed landscape analysis. These locations are called "landscape control points". The selection criteria are:

- Landscape control points should be evenly distributed around the development project scope, and for linear development activities, they should be evenly distributed on both sides. In addition, at least one landscape control point should be selected within the near-view (within 500M), mid-view (501-1200M), and far-view (above 1201M) distance ranges. For linear development activities exceeding 10 kilometers, one point should be added for every additional 10 kilometers (if the excess part is less than 10 kilometers, no addition is required).
- Within the visible view area, the number of selected landscape control points shall not be less than 6 points, and the reasons for selection must be stated. If, due to the environmental characteristics of the development project, the selected locations of landscape control points cannot be evenly distributed, or if it is not possible to select at least one point in the near, mid, and far view distance ranges, or if the number of selected points is less than 6, the reasons should be stated.

Three Principles for Selecting Landscape Control Points:

- Near major transportation routes. If the development activity project scope is near major transportation routes or trails, due to the high volume of road or trail usage, it will affect the visual landscape experience of most people. It is recommended to select several

landscape control points within the development activity scope along the same route that can be observed and conduct analysis.

- Near or located at activity gathering points, scenic spots, or concentrated population areas. If the development activity is near densely populated areas or major activity gathering points, such as rest areas along roads, settlements, or scenic spots, these are places where people stay, rest, or engage in activities. There will be many opportunities to appreciate the surrounding scenery, and the development activity will be easily seen, thus making it one of the conditions for selecting landscape control points.
- Areas with special scenic views. If the development area is located at or near the following locations, a survey and selection of the best landscape control points must be conducted.
 - Special meteorological landscapes (e.g., sunrise, sunset, celestial phenomena, etc.)
 - Landscape interface change locations (e.g., skyline, ridgeline, waterline, land-water interface edge, areas with significant topographical changes, etc.)

The appendix specifies the required elements for the control point location map, including:

- Marking the location of each control point and the project area.
- Dividing the area into near (within 500m), middle (501-1200m), and far (beyond 1201m) distance zones from the project boundary.

Principles for On-site Photo Taking of Landscape Control Points

When taking photos, pay attention to the relationship between the illuminated and shaded sides, considering the realistic presentation of the on-site situation. Do not arbitrarily use the following methods to enhance shadows or contrast effects, etc., which may affect the current landscape:

- Do not add filters or polarizing filters in front of the lens.
- Do not use photography techniques to alter the current situation, such as changing lenses, optical elements, photography techniques, darkroom techniques, or computer software.

Operation Methods:

- On-site photos must record the true appearance of the environment. The horizontal field of view for photo taking must be greater than 75 degrees; the shooting time should be between 9 AM and 4 PM on a clear day.
- For special scenic areas, such as development projects involving nightscapes or lighting design, sunrise, sunset, starlight, moonlight, etc., photos should be taken at appropriate times, without being limited by the shooting time in point 1, and explanations should be provided.
- The file format for on-site photos is jpeg, with a resolution of not less than 100dpi (dots per inch). The pixel size shall not be less than 1500*2100, and must be presented as a color image.

3. Landscape Condition Analysis Results

This section describes how to document and present the findings of the landscape analysis. It involves compiling the analysis results for each control point into a "Landscape Control Point Landscape Condition Analysis Table". The table includes:

- Control point identification information (number, location, coordinates, elevation, viewer position, distance from project, photo details).
 - Landscape control point number
 - Location and latitude/longitude coordinates of the landscape control point
 - Elevation data of the landscape control point
 - Viewer position (upper, middle, lower)
 - Distance data between the landscape control point and the development project boundary (near, mid, far view zones)
 - Photo shooting date and time
- A diagram showing the view from the control point.
- A description of the existing environmental conditions.
- The photographs taken at the control point.
- A description of the environmental colors, possibly using color codes. Graphic software can be used to provide RGB (Red, Green, Blue) or CMYK (Cyan, Magenta, Yellow, Black) color codes to understand the main environmental color content.

In the Landscape Assessment book (林雨莊, 2022), the "Color and Volume Change Analysis" section in the landscape impact assessment chapter discussed how to analyze the visual impact of proposed development projects in terms of their material, shape, color, and volume, emphasizing harmony with the existing environment. The details are described below:

Material and Visual Harmony

In areas with outstanding natural beauty and high ecological integrity, constructing man-made structures from modern industrial materials like glass, steel, or plastic often feels discordant and unacceptable. Conversely, using natural materials such as bamboo, wood, earth, stone, or brick tends to be more readily accepted. This is because natural materials inherently blend better with the surrounding environment in terms of texture and visual appeal.

Shape and Background Harmony

The shape of a building and its harmony with the background landscape are also crucial. For instance, a sloped-roof building often appears more welcoming against a conical mountain backdrop, especially if the roof's pitch closely matches the mountain's slope. Renowned American architect Frank Lloyd Wright famously emphasized the coordination between architecture and nature. His "Desert House" design (Taliesin West) sits low within its desert surroundings, utilizing materials and colors that mimic local sand and stone, and is enveloped by desert plants like cacti, perfectly integrating with its environment. These principles of harmony can be quantified and used as standards for assessing visual impact.

Quantifying Color Change

The visual impact related to color can be quantified through the following steps:

1. Background Photo Analysis:
 - Select a background photo taken from a viewpoint, typically with a 12:9 aspect ratio.
 - Divide the image into a 5-row by 4-column grid matrix, with each square approximately 2.4 units wide by 2.25 units high (close to square).
 - Use Photoshop's "Filter > Blur > Average" function to average the tens of thousands of pixels (color points) within each square into a single color, resulting in 20 single color blocks across the entire image.
 - Use the "Eyedropper" tool to sample the color of each single color block and view its CMYK percentage or RGB values in the "Window > Info" panel.

2. Proposed Development Simulation Analysis:
 - Perform the same matrix division, color averaging, and CMYK percentage value retrieval for a simulated image of the proposed development plan.
3. Quantitative Comparison:
 - By comparing the CMYK percentage values of the color blocks in the background photo and the simulated development image, the degree of visual impact due to color can be quantitatively assessed.

Quantifying Volume Impact

The visual impact of a proposed structure's volume can also be quantitatively measured using Photoshop:

1. Divide into Depth Zones:
 - First, segment the image into foreground, midground, and background using lines.
2. Calculate Area:
 - Use Photoshop's "Window > Measurement Log" and "Record Measurement" function to calculate the "Area (number of pixels)" of each enclosed region.
 - From this, you can deduce the percentage of the 12:9 frame occupied by the foreground, midground, and background in the photograph.
3. Calculate Structure Volume:
 - After the 2D landscape simulation, the enclosed area of the proposed structure can also be drawn. Its percentage of the total image, or its impact percentage on the midground and foreground, can then be calculated to quantitatively measure the degree of visual impact.

Visual Perception Standards for Volume Impact

Typically, if the volume of a proposed structure exceeds 1% of the visual receiving area of the image, it will be noticed (considered a minor impact). If the volume area exceeds 5% of the visual image, it becomes significant. When it exceeds 12.5% of the visual image, it will have a very significant impact, becoming difficult to ignore or tolerate. This implies that on natural, vegetated hillsides, if the area cleared of surface trees or the open-pit mining area exceeds 12.5% of the visual field, it will lead to an unignorable and unbearable experience.

2.3. Coastal Erosion

Coastal erosion, a significant global challenge, is the wearing away and loss of land along the coastline due to the action of waves, tides, currents, and winds (Rizzo & Anfusio, 2020). This complex phenomenon is driven by a combination of natural processes, such as sea-level rise, storm surges, and longshore currents, and human activities, including coastal development, deforestation, and construction of coastal structures (Kanwal, Ding, Sajjad, & Abbas, 2019) (Vieira, Vieira, Silva, Barbieri, & Morgado, 2021). Coastal erosion is becoming an increasingly severe problem for worldwide coastal ecosystems, derived from coupled impacts of climate change, through sea-level rise, and intensified anthropogenic activities. The implications of coastal erosion extend to the degradation of water quality, damage to infrastructure, displacement of communities, and loss of recreational areas, affecting both natural and human systems (Boumboulis, Apostolopoulos, Depountis, & Nikolakopoulos, 2021).

2.3.1. Coastal Erosion Management

The management of coastal erosion is a complex and multifaceted challenge, with different approaches and strategies employed across various case studies. In the Caribbean coast of Colombia, hard structures have been the primary response to erosion problems, with over 1484 structures built by 2016 (Rangel-Buitrago, Williams, & Anfuso, 2017). These structures, including breakwaters, groins, and seawalls, have been implemented to protect shorelines and infrastructure from wave action (Maiolo, Mel, & Sinopoli, 2020). Many shorelines around the world depend on coastal barriers for defense against meteorological events (Johnson, et al., 2021). Coastal barriers, such as barrier islands and spits, provide critical protection for human populations and coastal ecosystems by dissipating wave energy, reducing storm surge, and providing a buffer against coastal flooding (Özkan, Mayo, & Passeri, 2022).

The impacts of coastal protection structures, however, are not always positive. In some cases, the construction of coastal structures has led to the disappearance of specific beach areas, negatively impacting the livelihoods of coastal communities, such as canoe docking and fishing activities. In Toubé, stabilization of shorelines has been achieved through the use of sand bags, sea walls, and the creation of buffer zones with mangrove trees, demonstrating a more integrated approach to coastal management (Tataw, Wanie, Akoh, & Mua, 2021). Accumulations of *Sargassum* macroalgae on beaches can significantly reduce coastal erosion by attenuating wave energy, diminishing scouring velocity in the swash zone, and promoting sediment accretion on embryonic dunes (Innocenti, Feagin, & Huff, 2018).

2.3.2. Types of Interventions

Hard Engineering Approaches

Coastal protection through hard engineering approaches involves the construction of rigid structures designed to physically impede wave energy and stabilize the shoreline (Hein, et al., 2019). Seawalls, constructed parallel to the coast, are massive structures built to withstand wave impact and prevent shoreline retreat. Breakwaters, installed offshore, dissipate wave energy before it reaches the coast, creating calmer waters and reducing erosion (Anton, Panaitescu, Panaitescu, & Ghiță, 2019). Groins, perpendicular structures extending from the shoreline, trap sediment transported by longshore currents, building up the beach on their updrift side (Sundar, Sannasiraj, & Babu, 2021). While effective in protecting specific areas, hard engineering structures can have adverse impacts on adjacent coastlines by altering sediment transport patterns and disrupting natural processes (Franzen, Fernandes, & Siegle, 2021). The implementation of these structures involves substantial capital investment for construction, and they necessitate continuous monitoring and maintenance to ensure their long-term functionality and structural integrity against the relentless forces of the marine environment.

Soft Engineering Approaches

Soft engineering approaches, on the other hand, focus on working with natural processes to stabilize the coastline and minimize erosion. Beach nourishment involves replenishing eroded beaches with sediment dredged from offshore or other sources, restoring the beach profile and providing a buffer against wave action. Enhancing the resilience of coastal dunes is achieved through stabilization techniques, recognizing their crucial role as natural barriers against storm surges and erosion, which involves the strategic implementation of vegetation planting, utilizing species specifically adapted to the coastal environment, and the installation of sand fencing, strategically positioned to promote sediment accretion and foster the natural development of robust dune ecosystems (Pranzini, Anfuso, Cinelli, Piccardi, & Vitale, 2018). Distinct from the structurally intensive nature of hard engineering solutions, soft engineering approaches offer a more ecologically integrated strategy, maintaining the natural aesthetics of

coastal environments while minimizing disturbances to both marine and terrestrial ecosystems; conversely, the long-term success of soft engineering interventions is contingent upon meticulous monitoring and adaptive management strategies, necessitating a comprehensive understanding of local sediment dynamics and the potential impacts of climate change (Solan, et al., 2023). Salt marsh restoration involves re-establishing and protecting these intertidal ecosystems, which act as natural buffers against wave energy and promote sediment accumulation (Vona, Gray, & Nardin, 2020).

Hybrid Approaches

Hybrid approaches combine elements of both hard and soft engineering to provide integrated coastal protection solutions (Tomiczek, Webbmartin, Scyphers, O'Donnell, & Furman, 2018). These strategies involve the strategic integration of structural defenses, such as submerged breakwaters designed to reduce wave energy (Kuznetsova & Saprykina, 2019), with ecosystem-based approaches, such as the restoration of mangrove forests to stabilize shorelines and provide natural flood protection. This integrated approach maximizes the benefits of both methods while minimizing their individual drawbacks (Sutton-Grier, et al., 2018).

2.4. Northeast Coast National Scenic Area of Taiwan

The Northeast Coast, including Taixi Coast and Toucheng Zhanhai, Scenic Area is one of Taiwan's thirteen national scenic areas. It is currently known as Northeast and Yilan Coast National Scenic Area (NEYC). This planning area is located in the northeast of Taiwan, bordering the line from Bitou Cape to Sandiao Cape and the Pacific Ocean to the east, a clear and appropriate ridgeline to the west, the East China Sea to the north, and the Toucheng Urban Planning Area of Yilan County to the south. It includes the former Northeast Coast Scenic Area, the former Daxi Coast Scenic Area, and the former Toucheng Coastal Scenic Area. A Comprehensive Review plan was announced in January 2012 to address the long-standing issue of reserved but unacquired urban planning public facilities land.



Figure 2.3.2-1 Location of the Northeast Coast National Scenic Area in Taiwan

Source: (內政部, 2023)

The Northeast Coast National Scenic Area Plan was implemented in 1982, with the main objectives being to protect the natural ecology, natural and cultural landscape resources, to develop necessary recreational and service facilities in accordance with the characteristics of the local landscape resources, in order to meet the growing demands of domestic and international tourism, to maintain the external transportation function of the coastal highway, to utilize the educational and academic research functions of the unique natural resources, and to reasonably regulate land use and allocate appropriate public facilities to avoid scattered development and ensure environmental quality of life (宜蘭縣政府, 2022). In 1985, the "Daxi Coastal Scenic Area Project" and the "Toucheng Coastal Scenic Area Project" were incorporated into the first comprehensive review and announced for implementation in 1991. In 1990, "Change of the Scenic Area of the Northeast Coast (including Daxi Coast and Toucheng Coast)" was implemented. Concurrently, to improve the accessibility of urban planning resources and facilitate future data integration, the "Changes to the Northeast Coast (including Daxi Coast and Toucheng Coasts) Scenic Special Area Plan (Urban Planning Map Re-production and Book and Map Inconsistency Project Comprehensive Review)" plan was announced in December 2018. Furthermore, the "Changes to the Northeast Coast (including Daxi Coast and Toucheng Seaside) Scenic Special Area Plan (Public Facilities Land Project Comprehensive Review)" plan was announced in January 2022 to properly resolve the problem of urban planning public facilities land that has been reserved for a long time but has not been obtained (內政部, 2023). The administrative area of this plan belongs to Ruifang District, Gongliao District of New Taipei City and Toucheng Township of Yilan County (see Figure 2.3.2-2), with a total planned area of 13,511.81 hectares.

According to the coastal protection areas specified in the "Integrated Coastal Management Plan", the coastal protection area of Yilan Coast was from Waiao Village in Toucheng Town to the midline of the Lanyang Creek estuary, with a coast length of 26.4 kilometers, but the southern boundary was extended 500 meters to the south bank of the Lanyang Creek estuary, and a newly designated protection zone length of 26.9 kilometers was established (宜蘭縣政府, 2022). This area is included in the Northeast Coast National Scenic Area, a designated plan to protect its natural and cultural resources, foster sustainable communities, and support sustainable economic activities, which aim is to balance environmental preservation with economic development, ensuring the long-term well-being of the area and its residents (Northeast and Yilan Coast National Scenic Area, 2020).

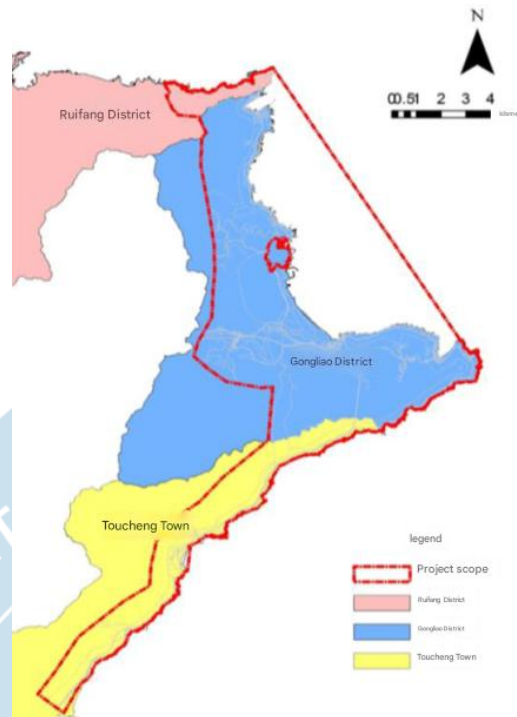


Figure 2.3.2-2 Schematic diagram of the project scope

Source: (內政部, 2023)

2.4.1. Geographical Context

The coast of Yilan County can be divided into two different types: fault coast (such as Jiaoxi Fault) and alluvial coast (such as Lanyang Alluvial). The Lanyang alluvial coast, from the south of Toucheng North Port (Wai'ao Village) to the northern bay of Su'ao, is part of the Yilan alluvial plain. It is mainly formed by the sand supply of the Lanyang River. The coastline is bounded by the mouth of the Lanyang River, forming two independent bays in the north and south. The Yilan Secondary Coastal Protection Area is located in the northern section of the Lanyang alluvial coast (Beiwan'ao). The coastline of this area has become an arched coast that is sunken to the west due to sea erosion. There is a natural sand dune on the inner side of the coast, which is arranged parallel to the coastline. Due to the undulating terrain of the coastal sand dunes and depressions, a series of sand dunes and wetlands are formed.

The Ministry of Interior (內政部, 2020) acknowledges the potential negative impacts of tourism on natural resources and the environment. Therefore, it stresses the need to mitigate these impacts through careful planning and sustainable management practices. It highlights the need to manage and reduce environmental disaster risks, which may include natural disasters such as floods, coastal erosion, and the effects of climate change. It also emphasizes the importance of proper land-use management to protect natural landscapes, avoid inappropriate development, and maintain ecological balance.

The primary coastal hazard in the project area is coastal erosion. The planning and management of coastal areas, as per the Coastal Management Act Article 7, prioritize the protection of natural coastlines, maintenance of natural equilibrium, conservation of natural and

cultural assets, preservation of coastal landscapes, and land use planning that aligns with these objectives (宜蘭縣政府, 2022). Sensitive areas like coral reefs, dunes, beaches, and mangroves are to be conserved, maintaining habitat and environmental integrity. Addressing climate change and coastal disaster risks is crucial, with measures like building setbacks and adaptive land use in vulnerable areas. To avoid damaging coastal protected areas, coastal protection measures should be designed and implemented carefully, using non-engineering solutions like sand replenishment and near-natural stabilization, alongside necessary engineering repairs, and adapting to climate change impacts.

The dominant land use along the coastal region is specific agricultural zones, accounting for approximately 61% of the land (宜蘭縣政府, 2022). General agricultural zones are the second most prevalent, making up about 21%. Additionally, the current land use on the terrestrial side primarily consists of paddy fields for agricultural use, followed by mixed forests for forestry. The coastal areas are mostly public lands, while the areas behind the seawalls and forests are predominantly private lands. The current plan has a total of 28 types of use zones, with a total area of 12,497.19 hectares, including residential areas, villa areas, commercial areas, ecological protection areas, geological protection areas, landscape protection areas, marine resources protection areas, protection areas, and general protection areas, aquaculture area, agricultural area, youth activity center area, camping area, recreation area, hotel area, water supply area, religious preservation area, first type of religious area, second type of religious area, third type of religious area, yacht harbor area, beach area, river area, gas station area, forest recreation area, general recreation area, seaside recreation area, tourism service center area (see Figure 2.4.1-1).

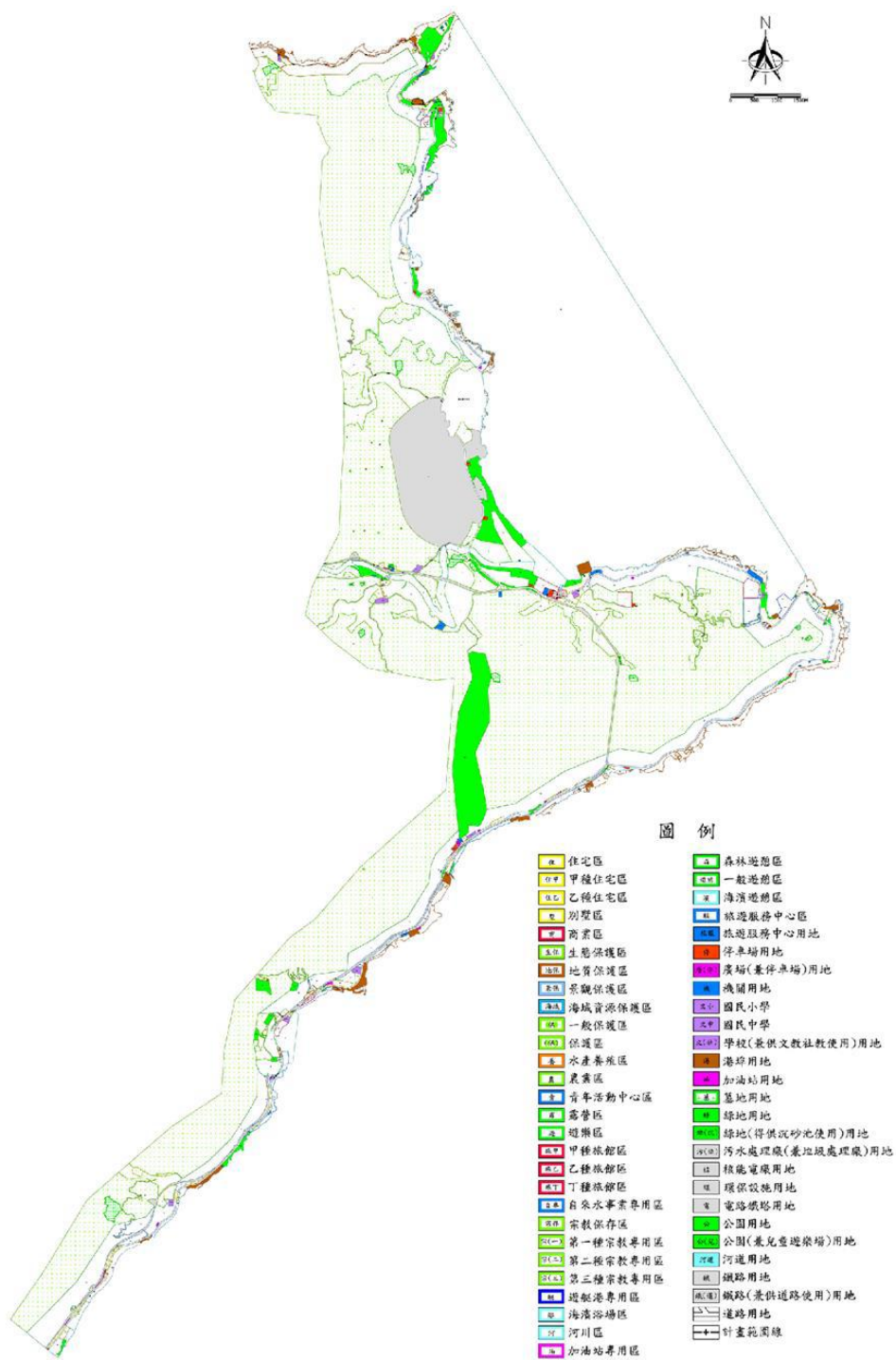


Figure 2.4.1-1 Current planned land use zoning map

Source: (內政部, 2023)

2.4.2. Sustainable Tourism Development Targets

There are a few sustainable tourism development targets for the Northeast Coast National Scenic Area (Northeast and Yilan Coast National Scenic Area, 2020):

- Innovation and Sustainability: To stimulate competitiveness and develop sustainability.
- Responsible Tourism: To promote the development of sustainable, responsible, and high-quality tourism.
- Development of Smart Tourism: To consolidate the image as a collection of sustainable, high-quality destinations.
- Creation of a Happy Local Industry: To maximize the potential for supporting and encouraging sustainable trades/businesses.

The Change of Northeast Coast (Including Daxi Coast and Toucheng Binhai) Scenic Area Plan (Public Facilities Land Project General Review) (內政部, 2020) emphasizes the importance of sustainable development, which includes the preservation of natural resources, biodiversity, and cultural heritage. This aims to ensure that development meets the needs of the present without compromising the ability of future generations to meet their own needs. There are also some tourism policies, such as:

1. Tourism content diversification policy: Taking local, cultural and ecological characteristics as the tourism content, supporting construction, and developing diversified tourism.
2. Internationalization policy of tourism environment: reduce the negative impact of tourism resources, plan the multi-purpose utilization of resources, and build a friendly tourism environment.
3. Policy for improving the quality of tourism products: Improve the investment and operation environment of the tourism industry, establish order in the tourism market, and enhance the quality of tourism products.
4. Tourism market expansion policy: cater to the different needs of domestic and foreign tourism, expand the depth and breadth of the tourism market, and attract international tourists to visit Taiwan.
5. Tourism image shaping policy: Based on the trend of the tourism market, shape tourism products with Taiwanese local characteristics and effectively market and promote them.

2.4.3. Criterias of Scenic Areas

Based on the Regulations Governing the Management of Designated Scenic Areas, specifically the Evaluation Criteria for Special Scenic Areas document, here are the evaluation criteria and factors for a special scenic area (全國法規資料庫):

Table 2.4.3-1 Evaluation Criteria for Special Scenic Areas

Criteria	Characteristics						
	Topography & Geology	Water	Weather	Animal	Plant	Ancient Culture	Overall Landscape

Factors	1. Uniqueness 2. Rarity 3. Variability 4. Ornamental	1. Uniqueness 2. Rarity 3. Ornamental	1. Originality 2. Rarity 3. Variability 4. Ornamental	1. Historic 2. Rarity 3. Completeness 4. Ornamental	1. Uniqueness 2. Rarity 3. Variability 4. Ornamental 5. Experience
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Source: Ministry of Transportation and Communication 交通部 (全國法規資料庫)

Rating and evaluation level factors:

1. Topography and geology: including the ups and downs of the earth's surface, special topography, geological structure, geothermal energy, strange rocks and various erosion and accumulation landforms.
2. Water bodies: including oceans, lakes, rivers, water features caused by topography, waterfalls, turbulence, meanders and hot springs, etc.
3. Weather: including sea of clouds, rosy clouds, mist and special sunrise, sunset, rosy clouds, snow scenes, etc.
4. Animals: including the species, numbers, and distribution of major animal groups, as well as rare and unique animals of scientific and educational value.
5. Plants: including the types, size, and distribution of major plant communities, as well as rare and unique plants of scientific and educational value.
6. Ancient culture: including mountain culture, traditional culture, ancient monuments, ruins, temples and traditional architecture, etc.
7. Overall landscape: The above items are partial assessments, and the overall landscape is a comprehensive assessment of all evaluation items.

2.5. Landscape

Landscape, a multifaceted concept, has undergone significant evolution in its definition and interpretation, influenced by cultural, economic, and environmental factors (Talento et al., 2019). The academic interest in landscape has surged across various disciplines, including anthropology, archaeology, sociology, history, and philosophy, reflecting its profound impact on human societies and the environment (Han et al., 2025). Landscape embodies a complex interplay of natural and cultural elements, encompassing physical features, ecological processes, and human perceptions (Karadağ, 2019; Kawther & Hassan, 2021).

The term "landscape" eludes a singular, universally accepted definition, as its meaning is shaped by diverse perspectives and contexts. Traditionally, landscape was understood primarily through a visual lens, emphasizing its aesthetic qualities and scenic value (Antrop & Eetvelde, 2017). This perception often reduced landscape to a picturesque panorama, neglecting its complex ecological and social dimensions (Axelsson, 2020). However, contemporary understandings of landscape have expanded beyond mere visual appreciation, incorporating ecological, cultural, and historical considerations (Olwig, 2019). Landscape ecology, a relatively new branch of ecology, emphasizes the distribution patterns of landscape elements, flows of energy, mineral nutrients and water (Thinh et al., 2024).

The elements of landscape encompass a variety of natural and artificial components that contribute to the overall aesthetic, functional, and perceptual qualities of a space. These elements can be categorized into several key types, each playing a distinct role in landscape design and management. Natural elements constitute the fundamental biophysical components of a landscape, encompassing a complex interplay of landforms, vegetation, water bodies, and climatic conditions (Thinh et al., 2024). Artificial elements also contribute significantly to the composition and character of landscapes, reflecting human activities and interventions in the

natural environment. Human settlements, varying in scale from small rural villages to expansive urban centers, fundamentally reshape landscapes through concentrated habitation and associated infrastructural development (Wu & Liu, 2023).

2.6. Summary

The initial section of the literature review focused on Climate Change, defining it and discussing its global and local implications. It highlighted that climate change, primarily driven by human activities leading to greenhouse gas emissions, resulted in severe adverse effects such as extreme weather events, rising sea levels, and impacts on various sectors like food production and health. The chapter particularly emphasized Taiwan's vulnerability due to its unique geographical location and exposure to natural hazards, including frequent earthquakes, landslides, typhoons, and floods. It noted that sea levels around Taiwan were rising at an alarming rate, exceeding twice the global average, and underscored the increased frequency and intensity of typhoons and storm surges, which exacerbated coastal erosion and flood risk, especially in low-lying coastal areas like Yilan. The review also mentioned Taiwan's proactive measures and adaptation strategies to mitigate these impacts.

The chapter detailed various VIA approaches, emphasizing the integration of both quantitative and qualitative methods. This informed the thesis's mixed-methods approach, which combined systematic photographic documentation (qualitative visual analysis) with comprehensive questionnaire surveys (quantitative perception analysis). The review highlighted important visual variables and indicators used in VIA. These included the scale, form, color, and materials of structures, as well as their impact on view obstruction and the overall sense of harmony or disharmony with the surrounding natural and built environment. These were the specific visual attributes that the thesis's data analysis focused on. The literature discussed specific analytical techniques applicable to visual data, such as methods for assessing volume impact (i.e., the percentage of view occupied by structures) and color analysis. The underlying principles of quantifying color differences and contrast, which could involve metrics like Delta E, stemmed from the VIA methodologies presented in the literature. The emphasis on public participation and perception analysis within VIA guided the use of a questionnaire survey in the thesis to gather visitor perceptions of the visual impacts, which formed a crucial part of the data collected for analysis.

The sections on Coastal Erosion and the Northeast Coast National Scenic Area of Taiwan provided essential context for interpreting the visual impact data. Understanding the threats of erosion and the functional necessity of coastal structures helped frame the analysis of their aesthetic effects. Similarly, the description of the scenic area's value and commitment to sustainable tourism provided a benchmark against which the perceived scenic quality was evaluated.