

Integrated Ecology Recreational Edu-Forest Sibuatan Center

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Abstract (English)

The tourism sector is crucial to Indonesia's economy, especially in the Sibuatan Forest Area, Merek Subdistrict, Karo Regency. However, ecosystem degradation and a lack of public awareness about forest conservation pose significant challenges. To address these, a holistic approach involves designing recreational facilities that integrate ecotourism, education, and ecological architecture. These facilities aim to protect and optimize the forest while inspiring, educating, and creating sustainable local economic opportunities, fostering harmony between humans and nature. The ecological architecture theme is chosen for its ability to blend buildings with the environment while maintaining sustainability and ecological balance. This approach also promotes using environmentally friendly materials to reduce the carbon footprint. Architectural design in the forest emphasizes minimizing environmental impact through recycled materials and sustainable technologies. Facilities will be strategically placed to avoid disrupting the ecosystem and biodiversity. This design enhances tourism appeal by providing an educational and sustainable ecotourism experience. Furthermore, this initiative is expected to raise local awareness about environmental conservation and create new economic opportunities through tourism. Ultimately, the community will benefit from environmental preservation efforts and sustainable economic development in the protected forest area.

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Forest, Tourism, Ecology, Recreational, Conservation

1. Introduction

Over the past few decades, the tourism sector has significantly contributed to economic growth in Indonesia. Lake Toba, a major tourist destination in North Sumatra, includes six main tourist areas: Parapat, Simanindo, Pangururan, Balige, Muara, and Merek. Among these, Merek has untapped natural potential, particularly the hills and forests in Pangambaten Village, Merek Subdistrict, Karo Regency. While tourism often focuses on beaches, rivers, and mountains, the vast potential of Indonesia's forests is often overlooked. These forests not only play a crucial role in nature conservation but also offer unique tourist destinations and educational opportunities. Recognizing the value of forests opens new opportunities for sustainable tourism development, benefiting both the community and the environment.

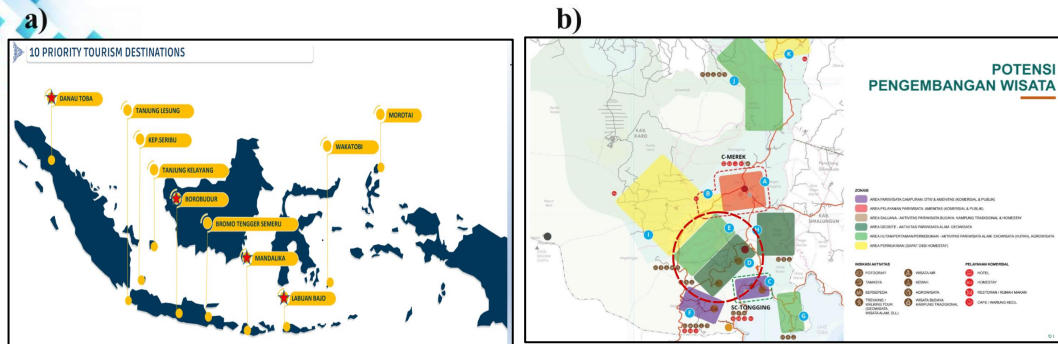


Figure 1 a.) List of 10 Priority Tourism Destinations in Indonesia; (Source: Google Images. 2023) b.) Potential Destinations Development in Toba Area; (Source: *Integrated Tourism Masterplan For Lake Toba. 2020*)

Moreover, education and knowledge play a crucial role in bridging the public awareness gap regarding forest conservation. Education can enhance public awareness of the importance of nature preservation, and through ecotourism facilities, the community can gain firsthand experiences that foster environmental responsibility. Therefore, a holistic solution is necessary. One effective approach is designing a recreational center that integrates ecotourism, environmental education, and strategies to address carbon emissions. This facility will include various elements such as an environmental education center, canopy bridges, trekking paths, research and observation center, a botanical garden in the protected forest, eco-friendly facilities, and other relevant components.

The chosen approach for this project is ecological architecture, selected due to its alignment with the area's focus on nature conservation and environmental education. Ecological architecture emphasizes harmonious integration with the natural environment, utilizing recycled materials, renewable energy, and efficient waste management systems. Additionally, it considers the well-being of inhabitants and visitors, creating cool, comfortable environments that support interaction with nature. By integrating ecotourism, environmental education, and ecological architecture principles into these facilities, we aim to provide a comprehensive solution for protecting and utilizing the Bukit Gajah Bobok protected forest area in Pangambaten Village. These facilities are expected to inspire visitors, educate the community, and maintain ecosystem sustainability while creating sustainable local economic opportunities. This project is not merely about constructing physical structures but also about realizing a vision of a better future where humans and nature coexist harmoniously.

2. Literature Review

2.1 Recreational Edu-Forest Center

In an effort to integrate educational, recreational, and environmental preservation aspects into a single project, the Recreational Edu-Forest Center has emerged as a primary focus in the development of ecotourism and sustainable facilities. The following is an overview of the project and the facilities that are being designed:

a. Definition of Forest

According to UU No. 41 of 1999, a forest is an ecosystem unit consisting of an expanse of land containing natural biological resources, predominantly trees, in natural association with its environment, which are inseparable from one another.

b. Definition of Recreational Center

A facility that integrates educational and recreational aspects, this venue serves as a means for visitors to explore knowledge about nature and the environment while enjoying various recreational activities. Its primary objectives include raising environmental awareness, educating the public, and supporting nature conservation.

2.2 Facilities

a. Glamping

a)



b)



Figure 2 a.) Glamping Facility (Source: Google Images.2023); b) Glamping Facility at Shanaya Resort Malang (Source: Google Images.2023)

Glamping, short for "glamorous camping," is a unique form of outdoor accommodation that combines the luxury of hotel stays with the adventure of traditional camping. Unlike standard camping, glamping provides high-end amenities such as comfortable beds, electricity, private bathrooms, and sometimes air conditioning and Wi-Fi. Accommodations range from deluxe tents and yurts to cabins and treehouses, all designed to offer comfort while still immersing guests in nature.

This concept has become increasingly popular among travelers who want to experience the outdoors without giving up modern conveniences. Glamping appeals to those looking for relaxation and a connection with nature, offering a way to enjoy scenic landscapes and outdoor activities with the comfort of upscale lodging. It presents a perfect mix of luxury and adventure, making it an attractive choice for a wide range of travelers, including families, couples, solo adventurers, and groups of friends.

b. Outbound Area

a)



b)



Figure 3 a.) Outbound Facility at Taman Budaya Sentul (Source: Google Images.2023); b) Treetop Walkway Outbound Facility (Source: Google Images.2023)

An outbound area is a specialized outdoor environment designed for recreational activities, training, and personal or group development. These areas utilize natural settings to

offer a range of physical and mental challenges, promoting teamwork, leadership skills, and personal growth. Common facilities in outbound areas include flying fox (zip lines), obstacle courses, wall climbing, trekking, rafting, and outbound villages, each serving to enhance physical fitness, problem-solving abilities, and collaboration among participants.

The primary objectives of outbound activities are team building, leadership development, personal growth, and environmental awareness. These activities encourage participants to step out of their comfort zones, face fears, and develop self-confidence and resilience. Additionally, the design of outbound areas prioritizes safety, accessibility, and engagement, ensuring a holistic and enriching experience for all participants.

c. Education Center

a)



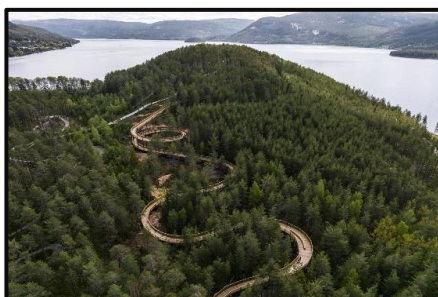
Figure 5 a.) Educational Area and Visitor Service Center of Chapultepec Zoo (Source: ArchDaily.2023)

An education center serves as a hub offering educational services to individuals and groups. Its main goal is to foster a supportive environment for learning, allowing students and participants to improve their knowledge, skills, and understanding in different subjects or specific activities. These centers provide structured programs and resources designed to facilitate learning and personal development. By offering a range of educational opportunities, they cater to diverse learning needs and interests, encouraging lifelong learning and skill enhancement.

At an education center focused on forests, the emphasis is on educating visitors about the importance of forest ecosystems, biodiversity, and sustainable practices. Through interactive exhibits, workshops, and guided tours, participants learn about conservation efforts, wildlife habitats, and the role of forests in mitigating climate change. Such centers aim to inspire a deeper appreciation for nature and empower individuals to become stewards of the environment. By providing accessible and engaging educational experiences, they play a crucial role in raising awareness and fostering a sense of responsibility towards our natural world.

d. Forest Tracking Walkway

a)



b)

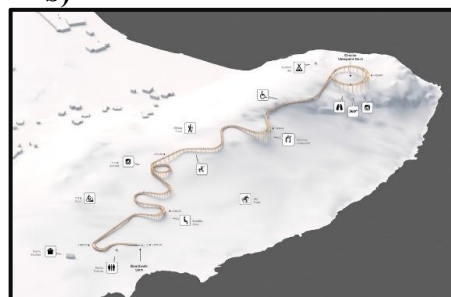


Figure 5 a.) Treetop Walk Hamaren Activity Park (Source: ArchDaily.2023); b.) The axonometry view plan of Treetop Walk Hamaren Activity Park (Source: ArchDaily.2023)

Designing tracking paths in a protected forest involves creating trails that allow people to access the area with minimal harm to the environment. The main goal is to ensure that these paths help in monitoring and managing the forest sustainably, while also protecting the biodiversity and ecosystems within it. This process requires careful planning to ensure that the trails do not disrupt wildlife habitats, cause soil erosion, or lead to the destruction of native vegetation. By creating these paths thoughtfully, we can facilitate essential activities such as research, conservation efforts, and controlled tourism.

The tracking paths are strategically placed to minimize their environmental footprint. This involves avoiding sensitive areas, using materials that blend with the natural surroundings, and implementing erosion control measures. The paths will allow forest rangers, scientists, and visitors to access different parts of the forest without causing significant harm. Additionally, well-designed paths can educate visitors about the importance of conservation and the need to protect natural habitats. Overall, the creation of tracking paths in protected forests aims to balance human access with the preservation of the forest's ecological integrity.

e. Yoga and Meditation Center

a)



Figure 6 a.) View of Yoga & Meditation Facility at Torok Hill Resort (*Source: World Architecture Community. Google Images.2023*)

The yoga facilities and meditation center offer a range of practices aimed at improving overall health and well-being. Through yoga sessions, and meditation classes, they help people relax, reduce stress, and improve focus in a welcoming setting. These activities promote physical flexibility, mental calmness, and emotional balance, fostering a sense of harmony and inner peace.

By providing guided yoga sessions and tranquil spa treatments, the center supports individuals in achieving relaxation and managing stress effectively. Meditation classes further enhance concentration and mindfulness, creating a supportive environment for personal growth and holistic wellness. Together, these practices empower individuals to lead healthier, more balanced lives by nurturing both body and mind.

2.3 User and Activities

The users of the Recreational Education Forest Center encompass various groups, such as:

- a. Students: They can visit the Recreational Education Center as part of their school curriculum or environmental education programs.
- b. Tourists: Local and international tourists can enjoy recreational activities and deepen their understanding of the natural environment.
- c. Environmental Researchers: For researchers, the Recreational Education Forest Center can serve as a valuable source of data and insights for conducting research projects.
- d. Local Communities: The local community can use the facilities of the Recreational Education Center for meetings, events, or community activities.

Activities that can be conducted at the Recreational Education Forest Center include:

- a. Educational Tours: Visitors can participate in guided tours led by environmental experts to understand the surrounding ecosystem.

- b. Nature Exploration: Users can explore hiking trails, camping areas, or biking routes to appreciate biodiversity.
- c. Recreational Activities: For those seeking recreation, the Recreational Education Forest Center can offer various activities and facilities for outbound activities or glamping.
- d. Special Education Programs (Workshops): It can organize special education programs such as environmental workshops, sustainability training, or field research.

2.4 Theme

a. Ecology Architecture

Ecology is a branch of science that studies the mutual interactions between living organisms and their surrounding environment, focusing on how organisms interact with each other and with environmental factors that influence their existence. In the context of architecture, ecological principles emphasize several design aspects, such as the use of local or natural materials that do not exceed the environment's capacity for renewal, harmonious integration with nature, optimization of renewable energy use, and the generation of waste that can be reused as a source of new materials. Ecological architecture reflects concern for the environment and limited resources, aiming to create environments that are more resource-efficient and productive in their utilization. While it cannot completely avoid negative impacts on the environment, ecological architecture seeks to minimize damage by considering factors such as climate, supply chains of materials, and the lifespan of building materials.

The main principle of ecological architecture is to achieve a balance between human needs and environmental sustainability. As for the components of ecological architecture, they are as follows:

- a. Building Configuration: This refers to the interface between the building mass and space. Form is an inclusive term with various meanings, often relating to an externally recognizable shape (Ching, 2008).
- b. Building Orientation: Solar radiation heats surfaces of buildings facing the sun. Sunlight from the east (sunrise direction) can create uncomfortable temperatures between 09:00 and 11:00, while westward sunlight (sunset direction) reaches peak heating intensity from 13:00 to 15:00. Therefore, careful planning is necessary to optimize sunlight utilization without compromising occupant comfort.
- c. Facade and Openings: According to Idea magazine (Issue 63/VI/2009), as cited in (Tyas, Fairuz, Annisa, & Suci, 2015), effective building facades for adequate lighting face north or south, with openings also oriented in these directions to minimize excessive sunlight exposure.
- d. Energy Sources: Everything around us capable of generating energy. Non-renewable energy sources are defined as those unable to be replenished by nature quickly. Consumed energy refers to that used in daily activities.
- e. Environmental Control: The management of human-induced environmental damage, including concerns such as air pollution, waste, and refuse.
- f. Material Sources: Ecological architecture emphasizes environmentally friendly materials used in construction. The selection of materials is crucial as it can significantly impact a building project's environmental footprint. Commonly used materials include locally sourced or renewable resources such as sustainably managed timber, clay bricks, bamboo, and eco-friendly soil. Choosing these materials helps reduce carbon footprints and construction waste, while supporting local economies and preserving natural environments.

- g. Site Selection: Proper site selection is crucial for designing environmentally friendly buildings. In ecological architecture, site selection must consider various factors including natural environmental conditions, spatial planning, and sustainability. This includes analysis of vegetation, topography, solar orientation, microclimate conditions, and available natural resources surrounding the site.

2.5 Eco-Tourism

Ecotourism is a manifestation of efforts towards sustainable tourism development, taking into account its connection to natural resources and subcultural aspects. The development of ecotourism is considered a necessary strategy to optimize the responsible use of natural resources, thereby creating new economic opportunities and opening job prospects, especially in service sectors such as tour guides, restaurants, local transportation, and other relevant jobs. Furthermore, rural ecotourism development can enhance social entrepreneurship and foster local business development (Ahmad and Mara, 2014).

The economic benefits of ecotourism development directly impact local community support for the environment (Liu et al., 2014). Ecotourism development promotes living standards, enriches diverse cultures, and enhances regional infrastructure (Nyaupane and Poudel, 2011). Additionally, by improving access to information and increasing local community participation in various fields, ecotourism can empower local communities (Sutawa, 2012). Therefore, ecotourism, as an alternative livelihood for local communities, can contribute to forest protection (Eshetu, 2014), (Tang, 2015).

2.6 Conservation

Conservation, derived from the Latin roots "con" (together) and "servare" (keep/save), denotes the prudent preservation of resources we possess, emphasizing both maintenance and wise utilization. Theodore Roosevelt, an early proponent, introduced the concept in America. Ecologically, conservation entails the strategic allocation and sustainable management of natural resources, ensuring their availability for current and future generations. Protecting forests involves designating areas as sanctuaries to safeguard biodiversity and ecological balance.

3. Method

In this study, a qualitative method was chosen to discuss the project in greater detail. This approach emphasizes detailed presentation and comprehensive understanding of the project under investigation. It also accounts for subjective elements in interpretation, thereby collecting data through observation, analysis, and case studies to obtain thorough information. Abstract. It is the first part in scientific article. It comprises summary of the whole content of scientific article. It brings a general overview about the content of scientific article to the reader. By reading abstract, readers can decide whether the research topic is relevant with their wish or not.

4. Result and Discussion

4.1 Project Description

The "Integrated Recreational Edu-Forest Sibuatan Center" project is located in Sibuatan Forest, Pangambaten Village, originally a protected area with untapped potential for ecotourism, conservation, and educational initiatives. This center aims to blend recreational activities with environmental education, showcasing the forest's biodiversity and ecological significance through interactive exhibits, guided tours, and workshops. The project underscores the synergy between conservation efforts and sustainable tourism, aiming to set a precedent for integrating

environmental stewardship with educational tourism experiences in protected areas like Sibuatan Forest.

4.2 Location

a)

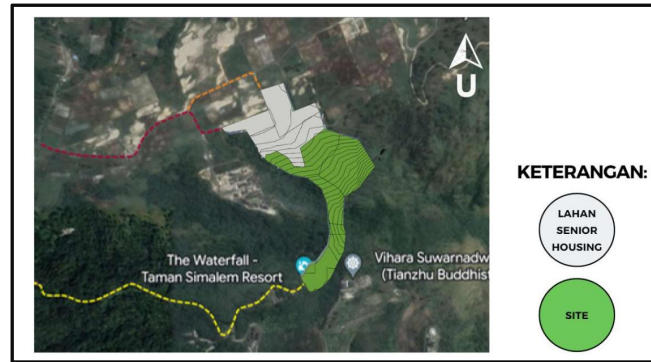


Figure 7 a.) Site of the initial project (*Source: Author. Google Earth.2023*)

The site for the design project is located in Sibuatan Forest, Pangambaten Village. This area is originally a protected forest zone, but its potential can be developed to enhance ecotourism industry, conservation efforts, and education about the protected forest.

4.3 Site Boundaries

a)

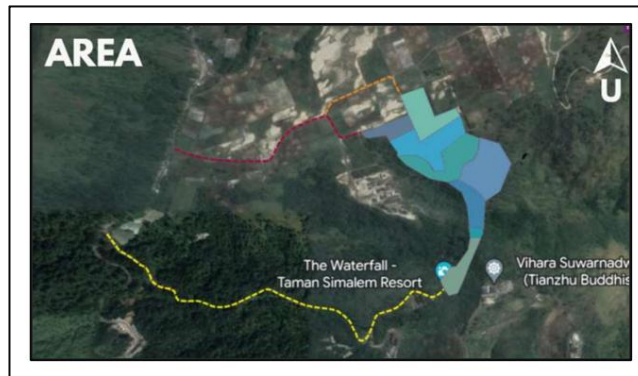


Figure 8 a.) Map of the Site at Pangambaten Village (*Source: Author. Google Maps.2023*)

The site area of the protected forest area in Pangambatan Village, Merek District, borders:

- East: Valley or Cliff
- South: The Waterfall Taman Simalem Resort, Vihara Suwarnadwipa
- West: Cafe Maulana, Sidolon-dolon Hill
- North: Land, Residential area

4.4 Regulation

4.4.1 Regulation of Law on the Utilization of Protected Forests

In the Republic of Indonesia Law Number 41 of 1999 concerning Forestry, Article 38, Paragraph (1) states that development interests outside forests which may be carried out within protected forest and production forest areas are selectively determined. Activities that could

cause serious damage and result in the loss of forest functions are prohibited. Development interests outside forests include strategic activities that are unavoidable, such as mining, the development of electricity, telephone, and water installations, religious interests, as well as defense and security interests. According to the law, the planning of education, recreation, and conservation centers in protected forest areas is not considered a violation since they are within protected forest zones.

4.5 Site Context and Connectivity

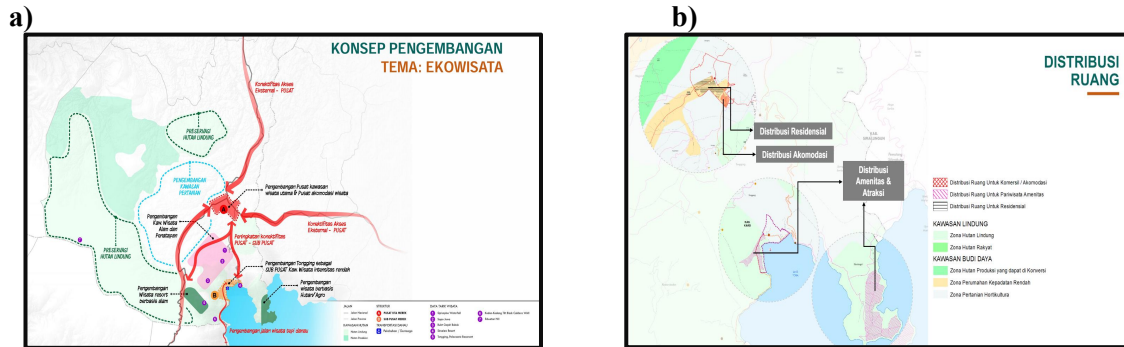


Figure 6 a.) Concept of Merek Tourism Area Development (Source: KTA Danau Toba.2020); b.) Space Area Distribution (Source: KTA Danau Toba.2020)

This site is a protected forest area that has not been fully utilized for its natural potential. It is situated among various tourist destinations and recreational facilities such as Taman Simalem Resort, Maulana Café, Bukit Gajah Bobok Tourist Area, Simalem Waterfall, and spiritual tourism sites like Vihara Suwarnadwipa. Therefore, the design of educational, recreational, and conservation facilities is considered highly suitable for the function of the area itself.

4.6 Space Program

Table 1 Facility and Space Requirements

Visitor Center			
Activity Category	Room Requirements	Quantity	Type
Lobby & Reception	Lobby & Reception	1	Public
Commercial	Gallery & Souvenir	1	Public
Meeting Room	Meeting Room	1	Semi-Public
Toilet	Public Toilet	1	Public
Management Service	Storage Room	1	Private
Glamping			
Bedroom	Bedroom	1	Private
Bathroom	Private Restroom	1	Private
Resto			
Service and Administration	Lobby & Reception	1	Public
Food Production	Kitchen	2	Private
Toilet	Public Toilet	4	Public
Gazebo Resto			
Dining Outdoor	Gazebo Outdoor	20	Public
Outbound Area			
Recreational	Outbound Facility	5	Public

Education Forest Center

Education	Panel Exhibition Space	1	Public
Recreational	Panoramic Space	1	Public
Management Service	Storage Room	1	Private
Restroom	Public Toilet		Public
	Yoga Shala		
Recreational	Yoga & Meditation	5	Public

Source: (Author, 2023)

4.7 Zoning and Segmentation Site

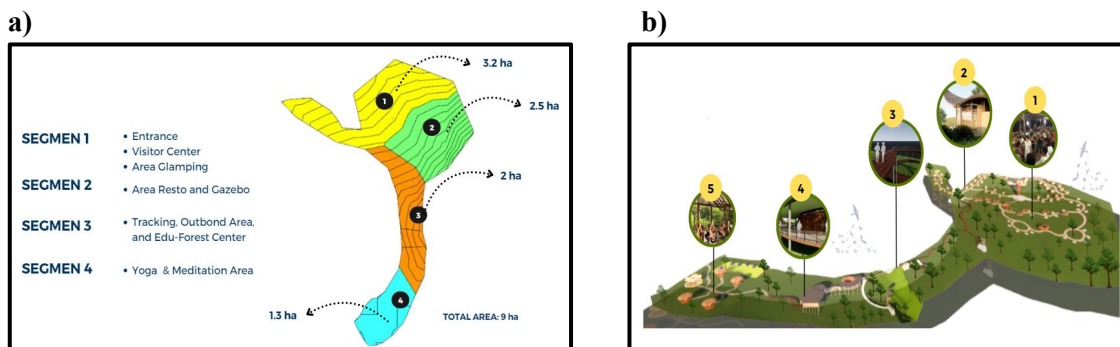


Figure 7 a.) Zoning Site and Segment Description (Source: Author. 2023); b.) Axonometry of Segmentation Site (Source Author. 2023)

- Segment 1:

Glamping is located in the upper site area for a deep nature experience, while the visitor center is positioned near the entrance for easy access, education, environmental conservation support, and minimal ecosystem impact.

- Segment 2:

The restaurant and gazebo are strategically located in Segment 2 of the protected forest recreation area to provide essential dining and resting facilities for visitors. These amenities generate revenue crucial for maintaining trails, conducting environmental monitoring, and supporting conservation efforts. By offering on-site dining, they help minimize environmental impact by discouraging littering and reducing the need for outside food, thus ensuring a balanced approach to conservation and visitor experience in the protected forest.

- Segment 3:

Outbound facilities in forest recreation areas are crucial as they enable visitors to deeply engage with and understand the natural environment. They also offer opportunities to improve physical and social skills through diverse outdoor activities. Additionally, this site segment features an education forest center, providing valuable educational resources and programs for visitors to learn about forest ecosystems and conservation efforts.

- Segment 4:

Yoga, meditation, and camping ground facilities help connect people with nature, promote mental and physical health, and raise awareness of the importance of preserving the natural environment. This area is located at the far end of the site due to the privacy and tranquillity needed for yoga and meditation sessions.

5. Conclusion

The Recreational Edu-Forest Center in Sibutan Protected Forest is an ideal solution to address ecosystem degradation and low public awareness of forest conservation. By integrating ecotourism, education, and ecological architecture, this recreational facility will protect the forest, educate visitors, and create sustainable local economic opportunities. Using eco-friendly

materials and minimizing environmental impact, the design promotes sustainability. Strategically placed facilities enhance the ecotourism experience, raise environmental awareness, and support sustainable economic development, benefiting the local community. This initiative effectively tackles the discussed challenges, ensuring both environmental preservation and eco-conscious tourism.

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