Ecological architecture approach to the conservation of the Ria Rio reservoir water area

R J E Zebua*, S P Eni, G Widati and G P Dianty
Department of Architecture of Universitas Kristen Indonesia, Jakarta, Indonesia

*retnajanuarti.zebua@gmail.com

Abstract. Tourism is one of the important economic sectors in Indonesia. In 2009, tourism ranked third in terms of foreign exchange earnings after oil and gas commodities and palm oil. (Indonesian Ministry of Culture and Tourism, 2009). Based on data in 2016, the number of foreign tours coming to Indonesia amounted to 11,525,963 million or grew by 10.79% compared to the previous year. The natural and cultural wealth is a critical component in increasing tourism in Indonesia. Because of the importance of tourism to the Indonesian economic sector, several regions in Indonesia need to be considered and developed by local government tourism objects.

1. Introduction

1.1. Background
The Ria Rio Reservoir is one of the lakes recently beautified by the local government. So that currently, the Ria Rio Reservoir is a suitable reservoir for recreation with natural nuances in Jakarta. This reservoir has an area of approximately 26 hectares. Ria Rio Reservoir is a lake located in the Pedongkelan area, Pulogadung, East Jakarta, Jakarta. In the 1950s, this area was still a swamp, and then during the time of Governor Ali Sadikin, a lake was built to reduce waterlogging and flooding in this area.

The current condition of the Ria Rio reservoir is that it already has a garden to relax in the southern part of the reservoir near the Pulomas Baru road. However, there are still several problems, namely parking is still minimal, water facilities are not available, no foundation land breaking at the edge of the reservoir, and the existence of a hut made by workers there that spoil the view. As we know, the lack of focus on the tourism director of the Ria Rio Reservoir makes tourism activities in the Ria Rio Reservoir only exploit the reservoir literally so that it is necessary to improve existing functions and facilities and develop additional features for water tourism as harmonious support with the potential of the Ria Rio Reservoir itself. Directing tourist destinations towards water tourism activities that are environmentally friendly, not wasteful (zero waste) and also create a place that makes tourists healthy and educated.

1.2. Problem statement
How to plan a tourist spot that pays attention to the environment and blends with nature, in an area that will later be built, following the regulations of the Pulomas area, and creates an outdoor space arrangement that is suitable, well ordered, and can be enjoyed within reach of human sight without covering the building.
1.3. Research purpose
The purpose of this paper is to explain the relationship between the built environment and the natural environment. Other than that, to explain the advantages of ecological architecture from its function and application.

1.4. Scope
Substantially, the scope of the discussion lies in the planning and design aspects related to the architectural discipline. The theme that becomes the reference is ecological architecture, namely utilizing the existing potential in the tourist area of Lake Ria Rio and maintaining the sustainability and initial function of Lake Ria Rio. The area that is the research site is the Lake Ria Rio park located in Pedongkelan, Puloagadung, East Jakarta.

2. Methods
The research methods used to achieve the goals and objectives are data collection methods, data processing methods consisting of analysis and synthesis stages, as well as methods of discussion and concept formulation. The data in this study consisted of primary data and secondary data.

Primary data includes the results of a survey on the development of water tourism and observations of water tourism in Jakarta. Secondary data is a literature study that has data covering studies of water tourism in Jakarta, literature studies on city planning regulations and development plans for the Ria Rio reservoir area, and studies on ecological architecture. The methods used in technical data collection are as follows: survey/observation, interviews, documentation.

3. Results and discussion
Echo Lake Fishing Resort is near the town of Vernon, in the Northern Valley section of British Columbia, western Canada. This place is a lake tourism area that applies the principles of architectural ecology. Besides, this tourist spot is one of the lakes whose ecosystem conditions are still maintained. Wildlife populations in this area still survive environmental conditions that do not experience changes in the area. Echo Lake Fishing Resort received an award for excellence in tourism-related to its management and conservation of environmental conditions that are part of tourism activities therein. This tour features seven cabin houses, thirty-five campsites, licensed fishing grounds, powerboats, rowboats, canoes, kayaks and pedal boarders. Echo Lake Fishing Resort has many similarities in function and potential with Ria Rio reservoir as a water tourism area. See figure 1 below.

![Echo Lake Fishing Resort](source: www.google.com, 2020)

**Figure 1.** Echo lake fishing resort.

3.1. Function analysis
See table 1 below.
### Table 1. Function analysis.

| Primer                                                                 | Secondary                                      | Support                                           |
|-----------------------------------------------------------------------|------------------------------------------------|--------------------------------------------------|
| • Reservoir and forest recreation                                     | • Agro and cultural tourism                    | • Parking area                                   |
| • Reservoir and forest recreation                                     | • Outbond area                                 | • Worship place                                  |
| • Boardwalk                                                           | • Farming area                                 | • Cafe and Restaurant                            |
| • Farming area                                                        | • Jogging and biking track                     | • Fishing area                                   |
| • Amphitheatre                                                        | • Ampitheatre                                  | • Information service                            |
| • Sport Area                                                          | • Sport Area                                   | • Tourist management office                      |
| • Parking area                                                        | • Parking area                                 | • Monitoring and security facilities             |
| • Worship place                                                       | • Worship place                                | • Toilet                                         |
| • Cafe and Restaurant                                                 | • Cafe and Restaurant                          | • Security post                                  |
| • Fishing area                                                        | • Fishing area                                 | • ATM centre                                     |
| • Information service                                                 | • Information service                          | • Marina                                         |
| • Tourist management office                                           | • Tourist management office                    | • Multipurpose Hall                              |
| • Monitoring and security facilities                                   | • Monitoring and security facilities            | • Photobooth area                                |
| • Toilet                                                              | • Toilet                                       | • Recycle education                             |
| • Security post                                                       | • Security post                                |                                                 |
| • ATM centre                                                          | • ATM centre                                   |                                                 |
| • Marina                                                              | • Marina                                       |                                                 |
| • Multipurpose Hall                                                   | • Multipurpose Hall                            |                                                 |
| • Photobooth area                                                     | • Photobooth area                              |                                                 |
| • Recycle education                                                   | • Recycle education                            |                                                 |

#### 3.2. Site analysis

The design site on the east and west sides have areas that receive lots of sunlight. In the east and west, it will be hotter when compared to the other side of the building. Potential noise in the area around the main highway which is located on Jalan Jend. Ahmad Yani and Jalan Pulo Mas Utara. Planting trees at the edge of the site is done to reduce the existing noise.

The location view follows the principles of conservation and the RTH and RTB methods where all the mass of the building faces the Ria Rio reservoir. The view has a potential that focuses on the enjoyment of the reservoir. Based on the site view analysis, the building will face the Ria Rio reservoir to get a good and attractive view. See figure 2 below.

![Figure 2. Site analysis.](image1)

#### 3.3. Data topography

The location has a land area of 13,000 msq with a building boundary line of 10 meters, an essential building coefficient of 40%, and a building floor coefficient of 1.6%. The site to the north is bordered by Perintis Kemerdekaan Road, to the south by PT Pulo Mas Jaya, to the west by Transmart Carrefour Cempaka Putih, and to the east by the Aren Jaya Indah housing estate. See figure 3 below.
The design of the site follows the land pattern or form of land, where there are two building masses designated for reservoir support activities. For the first round building, it is used as an exhibition space, retail space, workshops, and there is also hydroponics on the roof or an open rooftop, and there are also seats overlooking the reservoir so tourists can enjoy the beauty of the reservoir from the top of the building. Food retail spaces such as restaurants, cafes, minibars, multipurpose rooms and meeting rooms are located in the second building. The rooftop will be a green area in the form of a garden which is equipped with railing which is used as a safety so that the rooftop can be used as a sitting area. In addition to the two buildings, there is also a sky bridge that connects the first building with the second building, and there is a marina that serves as spots for selling drinks and snacks, an amphitheatre, a playground for children, a jogging track and also a cycling area. See figure 4 and 5 below.
4. Conclusion
The design of the Ria Rio reservoir has the potential to become a natural tourist spot in Jakarta with an area of twenty-six hectares with a development permit of 1.3 hectares. Two building masses have a function to support activities around the reservoir. The first building has the function of an exhibition room, retail space, workshop, and a hydroponic area on the roof. The second building functions as a container for the restaurant area, café, minibar, there is a multipurpose room and meeting rooms. A sky bridge will connect the two buildings. The design of the Ria Rio reservoir is a plan with natural management that applies a culture of zero waste, both for natural resources and a waste of energy as well as creating new things such as creating an educational space for recycling waste and education for planting. Besides, this reservoir also has a sports area that can be enjoyed by all visitors. Zero waste can also be seen from designs that use natural materials and prioritize natural lighting and ventilation.

4.1. Application of concepts in design
See figure 6 below.

![Figure 6: The implementation.](image)

The building mass uses wide openings on the north and south sides, the use of green roofs, and green shading on the building facades. The concept is also applied through the placement of the building in the Master Plan.

References
[1] http://sigitwijionarchitects.blogspot.com/2012/04/arsitektur-ekologi-eco-architecture.html, 2020/4/20
[2] http://arsitektur dan lingkungan.blogspot.com, 2020/4/20
[3] http://www.echolake-fishing-resort.com, 2020/4/23
[4] http://www.echolakefishingresort.ca, 2020/4/23