Placement of the Temples Site in Wetlands (Case Study in Bumiayu Temples Site)

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Abstract. Bumiayu temples site is located in swampland which is seasonally and annually often flooded by water due to the influence of Lematang River. Even though it is situated in that kind of landscape, Bumiayu temples site does not expose to puddles. It is because the temples site was established in the right place. The problem is what influences the formation of the Bumiayu bathing space and how it is described. The purpose of this research is to determine the factors that form the Bumiayu bathing space and to describe the bathing space. An explanatory qualitative research method with descriptive and observational approach by collecting secondary data from previous research and primary data obtained from the field and followed by data processing and interpretation. This research uses a study of areas space that consists with the aim of knowing the forms and processed of cultural landscapes in the past. The results of the research show that Bumiayu temple is on a wavy plain landscape with a height of 50 to 60 meters above sea level. Factors affecting temples placement are water activity and human hustle. These two factors affect temples site space in a grouped position surrounded by Lematang creeks. Past society has got knowledge related to temples placement in wetlands. Moreover, people have already adapted to the environment by getting at temple material from local place.

1. Introduction

Wetlands are swamp which is often inundated by water, both seasonally and annually due to the influence of the river. Wetlands are landscape formed by both erosion and sedimentation carried out by surface water [1]. Wetlands topography is low which has a high, flat, and concave location. In general, the basin location is inundated by water when it rains or when the river is high [2].

Wetlands provide the necessities of human life [3]. People try to interact in wetlands to fulfill their life necessities physically and non-physically [4]. The interaction includes a series of selecting processes which then taking up decision to encounter the potentials and conditions existing in the environment with all the obstacles [5]. In fulfilling life necessities, man makes natural environment as land to fulfill raw material resources, or food and place of activities. Interaction with this natural environment creates some cultural objects which describes knowledge and human experience in interpreting the nature around it [6]. Those cultural objects related to human-self placement on earth, including the placement of the temple building to organize religious activity [7].
Book mentions several criteria for placing the temple building such as contours, color, smell, adjacent to water sources appearance, taste, touch, surface uniformity, and fertility properties of plants [8]. Silpas Prakasa Book mentions a good land is a land close to water source [9]. It is because water serves as a means of ritual [10]. In Special District of Yogyakarta and Klaten Regency, man found scattered temples site, out of 110 temple locations, 78 are in the lowlands (with a height of 0-199 meters). Likewise, there are 17 temples are off the confluence of the river, such as Borobudur, Pawon and Mendut temple. They are at the confluence of Elo and Progo watershed [11]. Temples site in Sumatera generally are in the lowlands, such as Lesung Batu Temple (District of North Musi Rawas) which is above the meander terrace of Rawas River [12]. Teluk Kijing temples (District of Musi Banyuasin) and Bingin Jungut (District Musi Rawas) are above the natural embankment of Musi River watershed. They are located on a flat and dry land [13]. Those temples site are situated on dry land. However, the surrounding are often logged by water like Tingkip Temple and Teluk Kijing Temple [14]. This is due to the influence of Tingkep River and Musi River tides. Not all temples site in Java and Sumatera meet the criteria stated in Manarasilpasatra and Silpa Prakasa Book [15]. In central Java there are temples site situated in the highland, located on dry land surface, but far from water source such as Ijo Temple and Borang Temple [16] There are also temples sites in the lowlands but far away from water sources [17].

The placement of temples site in wetlands due to an easy accessibility from downstream to upstream and vice versa [18]. Moreover, water is a source of daily needs [19]. So based on the concept of religion, the temple is oriented towards the east and west [10]. The temple building faces east because it functions as building for worship of Gods like Prambanan and Borobudur temple [20]. If the temple faces west, it functions as a tomb building such as Singhasari temple as Pendharmaan (place of honor) to Kartanegara king [21]. Nevertheless, there were also temples site that were oriented to rivers and mountain. In South Sumatera, Bumiayu temples area is found in Lematang river basin. This area consists of temple 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13 [22]. Bumiayu site got Hindu-Buddhist influence from 8th century to the 13th century AD. The chronology of the calendar is based on the dating analysis of the artifacts, which is based on the relative calendar of the temple art style, and paleography inscription and absolute dating of wood artifacts and charcoal found in both regions [23]. The results of previous analysis on ceramics in Bumiayu temples site is known that the majority of ceramic findings are Sung ceramic (10th/11th century AD) [24]. These ceramics have something in common with the ceramic findings which have the same chronology at Hindu-Buddhist sites in Musi River basin [25] The existence of the environment in Bumiayu temples site is estimated not to have much contrast because forming of rock formation has not experienced a lot of changes from ancient times to the present since it will take millions of years [26], so the landscape from development period of Hindu-Buddhism in the archipelago, included Bumiayu temples site, has got no major change and remains relatively constant [27]. Then landscape of Bumiayu temples site can now be a landscape overview at the time the temples site was founded [28]. So far, the depiction of temples space in wetlands is not yet known whether it is influenced by natural or by cultural conditions. Bumiayu temples site is in a grouped position and surrounded by Lematang tributaries [29].

All this time, a spatial study has been conducted by Mundarjito in a dissertation of Ecological Considerations in the placement of temple buildings on sites in the Hindu-Buddhist era in Central Java [30]. The results show that in fertile areas and adjacent to water sources are discovered many sites from Hindu-Buddhist era than in less fertile area [30] Likewise, Soerose has conducted a spatial study related to temple buildings in West Java region. It is known that the areas having clean water sources become the selected one in locating the temple building [31] The placement of the temple building is the result of community adaptation to the environment as well [32]. It can be seen in the temple building placement on Tingkip Site, Lesungbatu and Bingin Jungut in Musi Rawas region [14] The sites were chosen as the location to build temple due to the location close to water source, suitable land and a location that provides a source of temple building materials [33]. Based on the reference review above, an overview of the research that has been done in Bumiayu temples site can be obtained. It focuses more from the point of pure archaeology science. Today’s research is a multidisciplinary study with nautical finding patterns of temple space in wetlands.
Wetlands often experience high tide and tidal conditions of the river [35]. In the past, society with their knowledge and experience tried to escape from the threat of flooding in rainy season or when the tide rose to the surface of the river [36]. Man looking for dry land or land that is not disturbed by standing water as the tide rises in rainy season and the tide recedes during dry season [37]. There are many temples in the wetlands, such as in Bumiayu temples site that indicate residential activities which lasted from 8th to 13th century AD [23]. Bumiayu temples site is located in Lematang sub-basin in the lowlands area that is often inundated by water due to the influence of the river. However, people used to place temples site in a good space (location) and not flooded by water. The problem is what influences the formation of the Bumiayu bathing space and how it is described. The purpose of this research is to determine the factors that form the Bumiayu bathing space and to describe the bathing space. The research benefits are as an input for religious archaeological landscape research in wetlands and an input in arrangement of temples site space in wetlands.

**Theoretical framework**

The formation of the earth's surface is caused by geomorphic control, namely the interplay between land forms and land forms consisting of morphography and morphometry. Morphography is a picture of the elevation (elevation) of the earth's surface while morphometry is a picture of the slope of the earth's surface. Meanwhile, the geomorphic process is the process of forming the surface of the earth which is caused by water activity (fluvial).[38]. This paper discusses the formation of the earth's surface in wetlands, where the wetlands are placed in the Bumiayu bath. Wetland means swampland which is often inundated by water both seasonally and annually due to water activities (rivers) humans.[26]

2. **Methodology of research**

An explanatory qualitative research method with descriptive and observational approach by collecting secondary data from previous research and primary data obtained from the field and followed by data processing and interpretation. This research uses a study of areas space that consists with the aim of knowing the forms and processed of cultural landscapes in the past. In this spatial approach, the location of the temple building will be analyzed so that the relationship between the temple building and its space is known, like the main temple with its complementary temple, inter-temple relations, and the temple’s relationship with rivers and canals. Collection proof technique, processing (analysis), and interpretation of data

3. **Results and discussion**

Bumiayu temples area covering 205 hectares (result of delineation) is included in Tanah Abang sub-district, Penukal Abab Lematang Ilir (Pali) district, South Sumatera province. There is a cluster of temples inside, Menapo, ancient settlement and others, which form a cluster on Lematang river bank with a west-east distribution direction.(Figure 1) The topography of Bumiayu temples site is on a way plain with a height of about 50 to 60 meters above the sea. Lowland morphology consists of swampy landscapes, lakes, Lematang tributaries and embankments, and small hills. The whole area is categorized as wetlands because there are always puddles of water throughout the year, apart from the influence of Lematang River overflow which sometimes brims over, covering the lowlands and part of it is still above the water surface.

![Figure 1. Bumiayu site in PALI district, south sumatera province](image-url)
The main river that crosses at the area of Bumiayu temples is Lematang River which has a width of ±100 meters, and on the west and east sides there are meanders and tributaries. The entire Lematang River as a tributary of Musi River has a length of 49.93 km which traverses from the southwest to the northeast with sub-basin area of 29.588 ha (upstream on Lahat Mountain 258 meters above the sea). According to Law No. 7 of 2004 concerning Water Resource, a river basin is a land area which is an integral part of rivers and tributaries which functions to accommodate, store and flow the water naturally from rainfall to lakes or to the sea, where the boundary on land is a topographical separator and the boundary at sea to water areas is still affected by land activities. In the watershed there is a network of tributaries, where the upstream tributaries are connected to the tributaries below, and Lematang river is a sub-watershed of Musi River which originates at Mount Dempo (3173 meters above sea level) in the city of Pagaralam bordering with Bengkulu. Lematang sub-watershed has an average discharge of 873.44 m$^3$/d, some districts that are crossed by Lematang river at Lahat district, Muaraenim district, Pali district, and Musibanyuasin district, which eventually empties into Musi River. Lematang River often floods Pali region during rainy season. Due to the large discharge of Lematang River which crosses the lowlands, Lematang meanders are formed then, which in part directly face the cliff current. This causes erosion (eroded cliffs) and the part behind the current eventually experience deposition of erosion (growing land), where local community known as “Nyurung island”. On the eroded cliffs often reveal archaeological findings. Lematang tributaries around Bumiayu temples site include: Siku River, Piyabung River, Lamban Lebar river, Jambu dam, Saleh dam, Perigi river and others. Besides the tributaries, there are also many lakes around the temples: Candi Lakes, Lamban Lebar Lake (wide lake). There are also swamps scattered near Tanah Abang and around.

![Figure 2. River genetics and drainage patterns on lematang river-bumiayu temple](image)

Local knowledge, local genius and local wisdom of Bumiayu community in the past is a public knowledge to avoid the threat of the fast flow of Lematang River so that the temple building can survive, other than that, choosing a place that was higher than the surroundings. Moreover, people are able to choose and determine (local genius) even though in the wetlands it can last longer (centuries, 8th to 13th century) by choosing a location above the surface of harder rock formations, which is building temples on top of rock formation of Kasai. Besides its effectiveness as temple building material and its completeness by placing the more important and loftier one in a position that is much higher than Lematang River (Temple 3 Highest Surface), this proves that the structure closest to Lematang River is very difficult to find intact structure anymore. It is also fitting with Hindu and Buddhist ideology with the teachings of the Three Realms which state that the lowest is as a Nista area (threatened), in this case approaching Lematang River. As local wisdom or local culture, past people were able to manage water through canals engineering, lake and dam. This is very wise in dealing with Lematang River phenomenon which threatens when rainy and dry season comes. Apart from avoiding the danger of water overflow, Lematang River water that enters the canals leading to Bumiayu temples site does not have destructive power, but it can be utilized for transportation routes in temples environment. Corroborating evidence to reduce the destructive power of Lematang River is located at Siku River which is use as a water inlet (Lematang water that entered temples area) leads to an
upstream corner. Thus, water that flows in has become local wisdom is the existence of ponds and lakes as water reservoirs or tendons as Lematang River water recedes. There is also an effort to get the water with Tebat manufacturing (dam). The dam also functions as a barrier for fish that have already entered the temples canals.

4. Conclusion

The results of the research on Bumiayu temple site is on a way plain with a height of about 50 to 60 meters above the sea. Lowland morphology consists of swampy landscapes Bumiayu temples area are in the South Sumatra basin, located in the fluvial environment of Lematang River basin. Bumiayu temples site is not located in a Desiccated Basin or fluvial back basin. Both of them stand on terraces that form the in-situ soil from the weathered rocks of its origin on its undulating land so the temples are in a stable position (because they actually stand on weathered rocks that are in-situ) even though the soil conditions are in the alluvium landscape (leaving residual river sediment).

Bumiayu temple cluster is in a grouped position within the tributary area of Lematang River (temple 1 to temple 12), and 2 temples are outside the tributary area of Lematang River (temple 10 and temple 13). The rivers serve as a means of transportation from inside and outside the temples area and also functions as a flood control river. This can be seen from the existence of artificial rivers such as Tebat Jambu River and Tebat Siku River in Bumiayu temples site. The construction of Bumiayu temple area did not fully comply with the rules for building temples according to Manasarasilpasastara scriptures because the temple was built on land that was inundated by water (swamp). However, not all of the temples were erected on flat locations. Soils in Bumiayu are oxisol and inceptisols which are infertile and contain lots of acid, and are brown and black in color, not in accordance with the criteria stated in Manasarasilpasasatra book.

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