The potential of kabuyutan sacred natural site towards a sustainable landscape management in Indonesia

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Abstract. Sacred natural sites have been recognized by International Union for Conservation of Nature (IUCN) as a landscape heritage that contains biological and cultural diversity due to conserved over generations and sacred by indigenous people. This study identified the characteristics and ecological significance of kabuyutan, a sacred natural site perceived by Sundanese people in West Java Province, Indonesia. The observation participant method was used to gain a close and intimate relationship between Sundanese people and their natural and cultural environment, particularly kabuyutan. We identified 33 kabuyutan and found a typical structure compared to the surrounding landscape which is dominantly covered by dense vegetation and marked by sacred trees, springs, ancestor's graves, or stones. Kabuyutan were perceived to have a vital role in conserving land and water, which is proven by their specific land variables, and proposed a watershed-based management concept. However, we found that changes in the buffer zone of kabuyutan into the agricultural or residential area have potentially affected their existence due to the land ownership status. We suggested that empowering custodians and transferring information about the critical role of sacred natural sites are necessary for landscape management to prevent the negative impact of landscape dynamic.

1. Introduction

Thousands of sacred natural sites remain globally, and many are little known and ignored [1, 2]. These places have been considered important in maintaining and enhancing the quality of the environment through their function as a safeguard of biocultural diversity [1]. In the last two decades, the topic of sacred natural sites has been widely discussed by scholars [2]. However, few case studies have been conducted in Indonesia [1]. To expand the geographical range of studies and enrich the repertoire of knowledge, we conducted a study on kabuyutan sacred natural sites, which is closely related to Sundanese people in West Java, Indonesia. Further, like other sacred natural sites, kabuyutan is facing challenges maintaining the balance along with social, cultural, and spatial dynamics, such as land-use change [3].

Historically, the term of kabuyutan was used to define the sacred place allocated for the center of knowledge, settlement of priests, or conservation areas [4]. This term was occasionally used by philologists and archeologists who concern Sundanese study. The evidence of its existence can be found in the ancient Sundanese manuscript such as Amanat Galunggung [5].

In the manuscript of Amanat Galunggung, for instance, kabuyutan have considered as an essential place for the Sunda Kingdom that is strongly protected from the destruction. The King Darmasiksa
(1175 to 1297 A.D.) mandated kabuyutan to be kept and he despised anyone who ruined it even more despicable than sable in the trash [5]. This shows the important role of kabuyutan in a landscape as well as the strong suggestion to ensure its sustainability.

As for physical features, kabuyutan landscapes can be easily distinguished within their surrounding landscape because it is mainly covered by dense vegetation or marked by the particular sacred element that shaped their structure. The sacredness of kabuyutan has been understood over generations and its existence has been protected by the customary rule that perceived as taboo [4]. Sundanese people argued that restriction of accessibility is the main rule in managing kabuyutan. Thus, there are two types of status of kabuyutan, namely, restricted access and limited access. Common people might be allowed to enter the limited access with permission from custodian, whereas they are strictly prohibited from entering the restricted ones.

Kabuyutan located in Ciomas Village were known as kabuyutan with limited access. This provides an opportunity to explore their characteristic as a basis for deeper understanding of their role in a landscape management. As an interdependent system, the characteristic of kabuyutan could not be disassociated from a whole landscape [2]. Therefore, understanding kabuyutan landscape characteristics is important to highlight a type of whole Sundanese landscape [4]. Concerning the vital role of kabuyutan and its challenges towards sustainability, the objectives of study were set (1) to identify the structure, function, and change of kabuyutan landscape and (2) to analyze its significance for landscape management.

2. Methods

2.1. Study area

This study was conducted in 33 kabuyutan distributed in Ciomas Village, Panjalu District, Ciamis Regency, West Java Province (latitude 07°07'00" to 07°12'00" S, longitude 108°15'00" to 108°19'00" E). Ciomas Village is located in the northern part of Ciamis Regency dominated by the hilly area as part of Mt. Sawal, ranging between 512-1762 masl. The average daily temperature is about 25 °C, humidity 85%, and the average annual precipitation is about 2,000 mm with rainy season almost all year long except in June, July, and August. Dryland farming, paddy field, and forests dominate the land-use type to indicate the prominent local people's activity as farmers (Figure 1).

2.2. Data collection and analysis

Data were obtained by observation participant through in-depth interviews with four key informants selected by snowball sampling method, starting from the Custodian then continuing to the eligible person until data saturation. In total, ten sessions (5-8 participants per session) within three Focus Group Discussions were conducted with key informants and 63 purposely selected local people living close to kabuyutan. The questions covered three main topics that focused on identifying the landscape structure, their major function within a whole landscape, and the changes during the last decades. A field survey also has been conducted to verify data spatially.

Two topographical maps from 2000 and 2014 were collected from the National Land Authority of Ciamis Regency to better understanding the spatial characteristic of kabuyutan within a whole landscape. These maps were used to derive spatial data of six particular land variables that support the existence of kabuyutan, namely elevation (ELEV), aspect (ASPC), slope (SLPE), approximate distance to a river (DTRV), approximate distance to a road (DTRD), area, and land-use (LU). Information about the main element for each kabuyutan and the status of land (LS) were also collected to analyze the significance of kabuyutan.

A participatory GIS-based analysis method [6, 7] was conducted to identify the structure, function, and change of kabuyutan. Analytical process [8, 9] was conducted by selecting important land variables to determine their relative influence and then overlaying all variable maps to determine their significance. Finally, results were discussed qualitatively to describe the phenomena.
3. Results and discussion

3.1. Landscape structure of kabuyutan

The findings from both the in-depth interview and the FGDs revealed that the most of respondents have a good understanding according to the condition of kabuyutan and the surrounding landscape. They perceived that landscape has been divided into three types regarding to the traditional forest's function. Basically, a whole landscape was designated as a protected forest (leuweung larangan) and kabuyutan exist within these areas. Next, people utilized the landscape as a production forest (leuweung baladahan) while perceiving the area between them as a conservation forest (leuweung tutupan).

Over generations, protected forest has been gradually changed to other uses and apart into small patches. Other studies have reported this condition as a landscape fragmentation [3]. Currently, kabuyutan landscape were distributed within a whole landscape in the small patches and perceived as an anchor which confers resistance to the surrounding landscape. However, the existence of sacred sites, such as kabuyutan, which mainly fragmented within a whole landscape were revealed an endangerment to damage unless it is adequately managed. This study found that about 33 kabuyutan were found and their characteristics were identified based on six land variables and other attributes (Table 1).

![Figure 1. The distribution of 33 kabuyutan in Ciomas Village](image-url)
| No. | ELEV (m asl) | ASPC | SLPE  | DTRV (m) | DTRD (m) | Area (ha) | LU     | LS | Element |
|-----|--------------|------|-------|----------|----------|-----------|--------|----|---------|
| K01 | 730          | W    | VGS   | 180.0    | 84.9     | 6.6       | AF (PF) | G  | Spr, Plt, Grv |
| K02 | 748          | E    | VGS   | 150.0    | 84.9     | 3.3       | AF (PF) | G  | Grv, Plt |
| K03 | 703          | E    | VGS   | 67.1     | 94.9     | 2.2       | AF (S)  | G  | Grv, Plt |
| K04 | 680          | E    | VGS   | 174.9    | 67.1     | 2.1       | AF (CF) | G  | Grv, Plt |
| K05 | 693          | E    | VGS   | 134.2    | 216.3    | 1.7       | AF (S)  | G  | Grv, Plt |
| K06 | 784          | N    | GS    | 84.9     | 284.6    | 1.2       | AF (PF) | P  | Spr, Plt |
| K07 | 718          | E    | VGS   | 60.0     | 417.9    | 1.1       | AF (PF) | P  | Grv, Plt |
| K08 | 665          | E    | NL    | 127.3    | 90.0     | 1.1       | AF (CF) | P  | Spr, Plt |
| K09 | 794          | E    | VGS   | 90.0     | 60.0     | 1.0       | AF (CF) | G  | Grv, Plt |
| K10 | 760          | N    | VGS   | 30.0     | 60.0     | 1.0       | AF (PF) | P  | Spr, Plt |
| K11 | 645          | E    | VGS   | 283.0    | 67.1     | 0.8       | AF (CF) | G  | Grv, Plt |
| K12 | 728          | E    | VGS   | 0.0      | 0.0      | 0.7       | AF (PF) | G  | Plt, Riv |
| K13 | 731          | E    | VGS   | 42.4     | 180.0    | 0.7       | AF (CF) | G  | Grv, Plt |
| K14 | 987          | W    | GS    | 0.0      | 150.0    | 0.7       | CF (CF) | P  | Spr, Plt |
| K15 | 861          | W    | GS    | 0.0      | 123.7    | 0.6       | AF (CF) | P  | Spr, Plt |
| K16 | 929          | W    | GS    | 94.9     | 84.9     | 0.5       | CF (PF) | G  | Spr, Plt |
| K17 | 748          | W    | NL    | 123.7    | 60.0     | 0.4       | DS (DS) | G  | Grv, Plt |
| K18 | 755          | W    | VGS   | 247.4    | 60.0     | 0.3       | AF (PF) | P  | Spr, Plt |
| K19 | 741          | E    | NL    | 161.6    | 42.4     | 0.3       | CC (DS) | P  | Plt |
| K20 | 729          | E    | VGS   | 84.9     | 108.1    | 0.3       | PF (PF) | P  | Grv, Plt |
| K21 | 736          | E    | NL    | 42.4     | 67.1     | 0.2       | AF (PF) | P  | Spr, Plt |
| K22 | 928          | E    | MS    | 201.2    | 247.4    | 0.2       | CF (CF) | P  | Plt, Stn |
| K23 | 1043         | W    | NL    | 60.0     | 390.0    | 0.2       | NF (CF) | G  | Spr, Plt |
| K24 | 591          | E    | VGS   | 0.0      | 0.0      | 0.2       | PF (S)  | P  | Plt, Riv |
| K25 | 794          | E    | VGS   | 0.0      | 0.0      | 0.2       | PF (S)  | P  | Plt, Riv |
| K26 | 788          | E    | VGS   | 84.9     | 30.0     | 0.2       | DS (DS) | G  | Plt |
| K27 | 764          | E    | NL    | 0.0      | 30.0     | 0.1       | PF (CF) | P  | Spr, Plt |
| K28 | 712          | E    | NL    | 134.2    | 30.0     | 0.1       | PF (CF) | P  | Spr, Plt |
| K29 | 756          | E    | VGS   | 0.0      | 60.0     | 0.1       | PF (CF) | P  | Spr, Plt |
| K30 | 815          | E    | MS    | 30.0     | 84.9     | 0.0       | PF (CF) | P  | Spr, Plt |
| K31 | 734          | E    | VGS   | 42.4     | 120.0    | 0.0       | PF (CF) | P  | Plt, Stn |
| K32 | 762          | E    | VGS   | 42.4     | 42.4     | 0.0       | PF (CF) | P  | Spr, Plt |
| K33 | 772          | E    | VGS   | 161.6    | 0.0      | 0.0       | PF (CF) | P  | Grv, Plt |

**Abbreviation:** Number of Kabuyutan (K00); Elevation (ELEV); Aspect (ASPC) with area towards northern (N), western (W), eastern (E), and southern (S); Slope (SLPE) with area nearly level of 0-1% (NL), very gentle slope of 1-3% (VGS), gently slope of 3-5% (GS), and moderately sloping of 5-15% (MS); Approximate distance to river (DTRV) and road (DTRD); Land-use (LU) with primary forest (PF), artificial forest (AF), crop field (CF), pasture (P), paddy field (PF), and settlement (S); Land status (LS) with land belongs to government (G) and private (P); and main element of kabuyutan such as grave (Grv), spring (Spr), plant (Plt), river (Riv), and stone (Stn).
According to the elevation (ELEV), most kabuyutan are located on an average of 718 masl. They are mostly located around the highest and lowest point of the surrounding area. This showed the role of kabuyutan in conserving land and water resources. Kabuyutan located around the highest point more functioned as water catchment areas, while those in the lowest point serve as a water reservoir. This important role corresponds to the area located above 600 m asl that is recognized as the mountainous region and designated as a protected area by the formal rules. This condition might support the existence of kabuyutan landscape that play important role in managing a whole landscape.

In term of slope (SLPE), core zone of kabuyutan mostly located on average 1.22% of slope. However, they are surrounded by buffer zones that range from nearly to steep slopes. This area potentially causes damages ranging from splash erosion to material movements such as landslides and land erosion [10]. The instability of the potentially disastrous land has been well-understood and they arranged kabuyutan within this area to prevent and reduce the negative impact of slope-related disasters.

Among aspect (ASPC) and land-use (LU), most kabuyutan are located on the area towards the whole direction except areas without direction (flat) where functioned for developed areas (settlement). The increase in demand of settlement areas in line with population growth has been well-considered by local people. This has a potential impact on land-use change [3] that will also affect the existence of kabuyutan and the surrounding area. Therefore, people set kabuyutan in other directions to control the development of settlement areas. Furthermore, kabuyutan located on areas toward the east and west were set for protecting agriculture lands, while the north and south direction were set to support the hydrological system due to understanding of water cycle that flows from the north (forested areas) to the south (developed and cultivated areas).

According to approximate distance to river (DTRV), most kabuyutan were found close to water bodies such as springs, rivers, tributaries, or lakes. The existence of water bodies in kabuyutan, indicated the important role of customary rules (taboo) in protecting them from the disturbance. According to spatial arrangement, findings also showed that kabuyutan has been distributed along the river system from upstream to downstream. This indicates the main function of kabuyutan in conserving land and water resources in a landscape.

The reason can be shown that traditionally distribution of kabuyutan were set to mark a boundary of area. The position of kabuyutan's symbol, for example spring, indicates the benchmark to set the covered area within the kabuyutan as their buffer zone. Then, the edge of buffer zone would be connected to determine the boundary of the whole landscape. This means that Sundanese landscape has been managed according to hydrological system to conserve water resources originating in watershed as well as land of watershed for more efficient and sustained production. This finding is similar to a previous study that stated the function of watershed management in dealing with land and water resources utilization in efficient ways [10].

Understanding the importance of these areas, the Indonesian government set the area around 200 m as the protected area for springs. In addition, the area within 100 m along the river is designated as protected areas. Moreover, such of rules would be more potential to ensure the existence of kabuyutan by combining with customary rules. According to the proximity to road (DTRD), most kabuyutan located more than 100 m from the road. The existence of the road for some kabuyutan perceived for ease of access and management, such as in Kabuyutan Panghulu Gusti which is often visited for pilgrimage. Also, for regular activities held on this kabuyutan, the existence of the road was helpful in management. Nevertheless, the existence of roads may potentially cause an instability of kabuyutan. This condition was strengthened by the development's actual condition, which follows the road (strip development). Prevention effort, especially revitalizing the function of buffer zone is important to be implemented.

Regarding those land variables and associated cultural values, informants reported that several kabuyutan were arranged to protect the vital area to ensure sustainability. For example, five kabuyutan were gradually set to protect land and continuity of the hydrological system (Figure 2).
Figure 2. The arrangement of five kabuyutan which bounded by a myth to unsure the continuity of hydrological system (a), the condition in Kabuyutan Batudatar (b), cigondok (c), kitiwu (d), nusakutu (e), and kawis (f) (source: documentation of author).

In addition, kabuyutan perceived as a part of watershed-based landscape management that borders the region by flowing water. This can be shown by the arrangement of four kabuyutan in order to bound the Cidarma Watershed. Karantenan was set in the peak of Mt. Sawal as the main kabuyutan in the upper-stream. Then, kabuyutan tembong, jagakaya, and kimulud were set to mark the boundary in the west, south, and east, respectively (Figure 3). Karantenan was symbolized by a sacred spring, while ancestral graves symbolized others.

Figure 3. The arrangement of kabuyutan to mark the boundary of Cidarma Watershed (source: documentation of author).
3.2. Dynamic of kabuyutan landscape

Findings showed that major changes have occurred in cultivated pasture areas into non-natural woody areas located in the center of the village (Figure 4). Economic reason is perceived as the main reason due to higher income earned from tree cultivation. This condition also showed the evidence of successful implementation of one billion tree planting program at the village level. These reasons are consistent with the Regional Planning of Ciamis Regency Year 1999-2014 which stated that the northern part was planned as a protected area by encouraging people to plant trees through tree planting program which promoted since 2010.

In general, the current changes did not significantly affect the existence of kabuyutan, especially in their core zone. The existence of main symbol in each kabuyutan indicated the core zones are well-protected. However, fragmentation in kabuyutan which led their landscape into smaller patches has affected the existence of buffer zone (Figure 4). Historically, these kabuyutan have been fully covered by standing trees. But along with the increasing of people's needs and decreasing of their awareness due to lack of knowledge about the significance of kabuyutan are considered the reasons for fragmentation. Respondent reported that managing buffer zones has been traditionally recognized as an appropriate rule in managing kabuyutan. According to this function, previous study stated that a protected area, particularly small patches, is supported by their buffer zone [1, 2, 3].

![Figure 4](image-url)

**Figure 4.** Changes in land-use during 14 years in Ciomas Village which led to loss of main elements and buffer zone of kabuyutan.
Moreover, it is found that most of kabuyutan located on personal lands indicated more vulnerability due to landowner's interest. Unpredictable change of landowner's need leads kabuyutan landscape more susceptible to damage and even loss of their area. Figure 4 presented the vulnerability of kabuyutan located in personal land. These kabuyutan have lost their buffer zones due to land-use changing. However, the sacredness of these places has succeeded in preventing extensive damage to the core zone. Therefore, revitalizing land status according to improvement the awareness of local people related to the importance of kabuyutan and other sacred natural sites in general is essential as a preventive effort.

4. Conclusions
This study concluded that local knowledge has provided significant information in defining the landscape as well as the changes and its reasons. About 33 kabuyutan were found and identified to have a unique structure compared to surrounding landscape, specifically covered by plant species and marked by springs, graves, or stones. Kabuyutan varied in characteristic depending on their physical features. Kabuyutan in Ciomas Village were mostly found in higher than 600 m above sea level, located on a wide range of slope, close to water bodies, far away from the road, and distributed in various types of land-use with a variety of its functions. This showed that kabuyutan greatly functioned as a landscape element to conserve land and water resources and proposed a landscape management based on watershed. However, kabuyutan located on personal land were vulnerable to damage and even loss of their areas. This study suggested that knowledge sharing related to important role of sacred natural sites is essential to increase local people's understanding that may affect their perception and attitude more wisely. This is a potential to be reinforced by customary and formal rules through revitalization of the core zone and its buffer zone. Further, the sustainability of landscape would be realized by protecting these natural sacred sites.

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