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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* landscape 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 purposively 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).

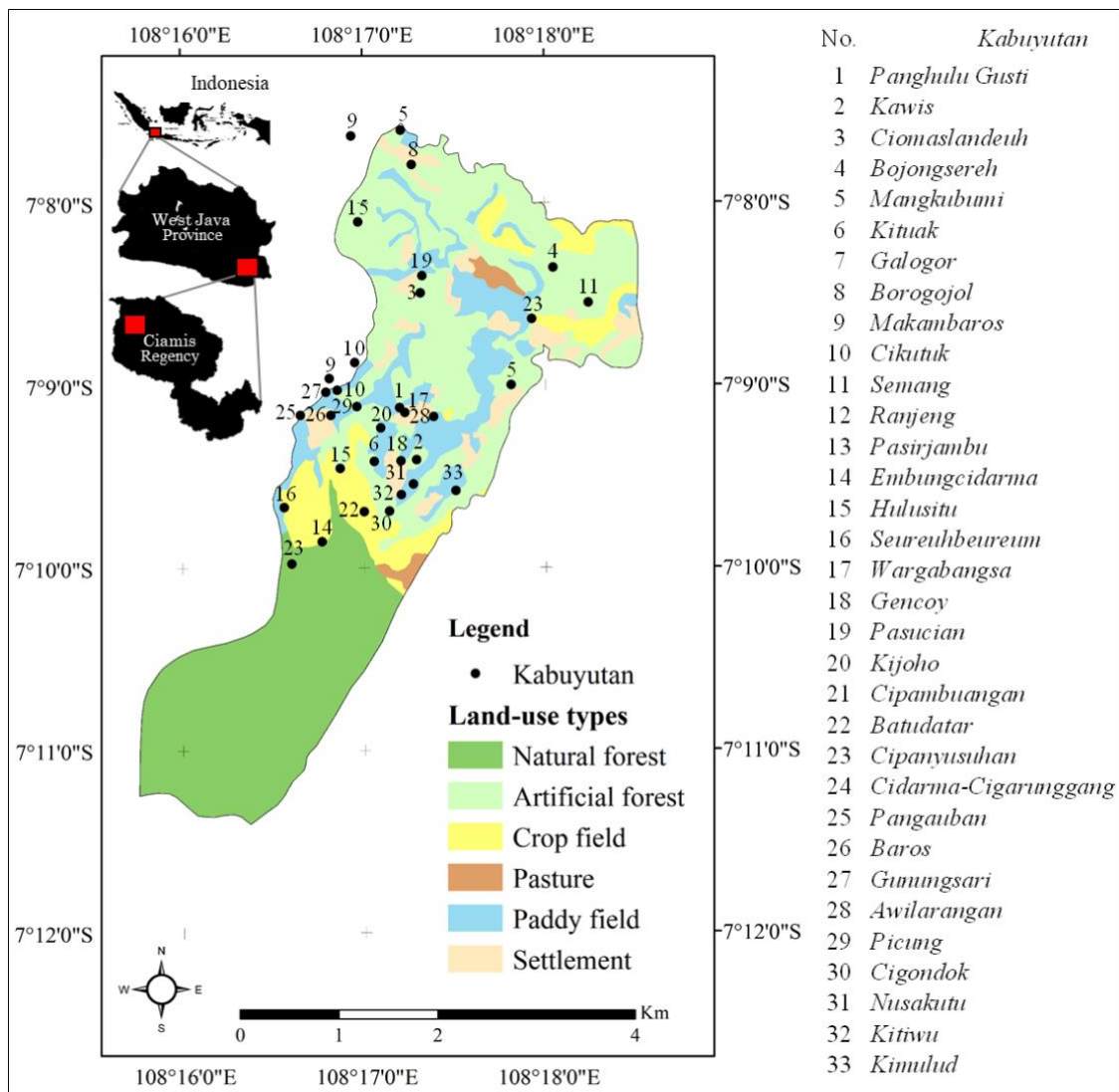


Figure 1. The distribution of 33 *kabuyutan* in Ciomas Village

Table 1. The characteristic of the 33 *kabuyutan*'s landscape structures.

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)	P	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	E	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	W	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	GS	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.

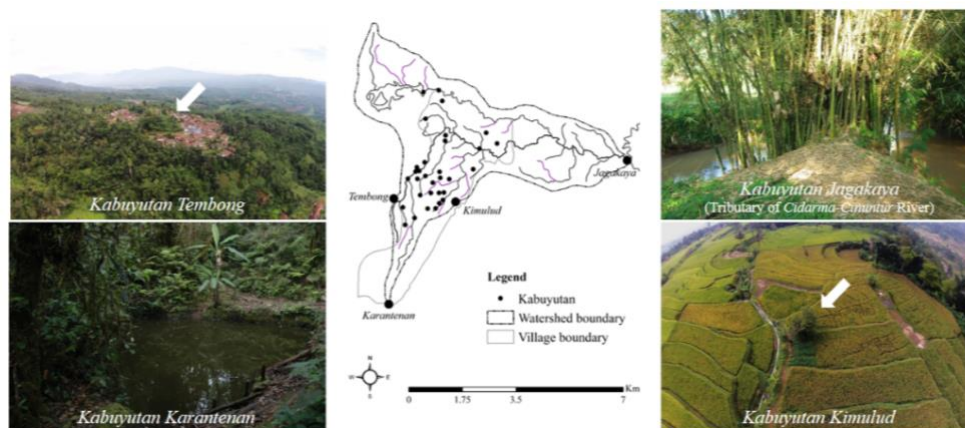


Figure 3. The arrangement of *kabuyutan* to mark the boundary of Cidarma Watershed (source: documentation of author).

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 1999-2104 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].

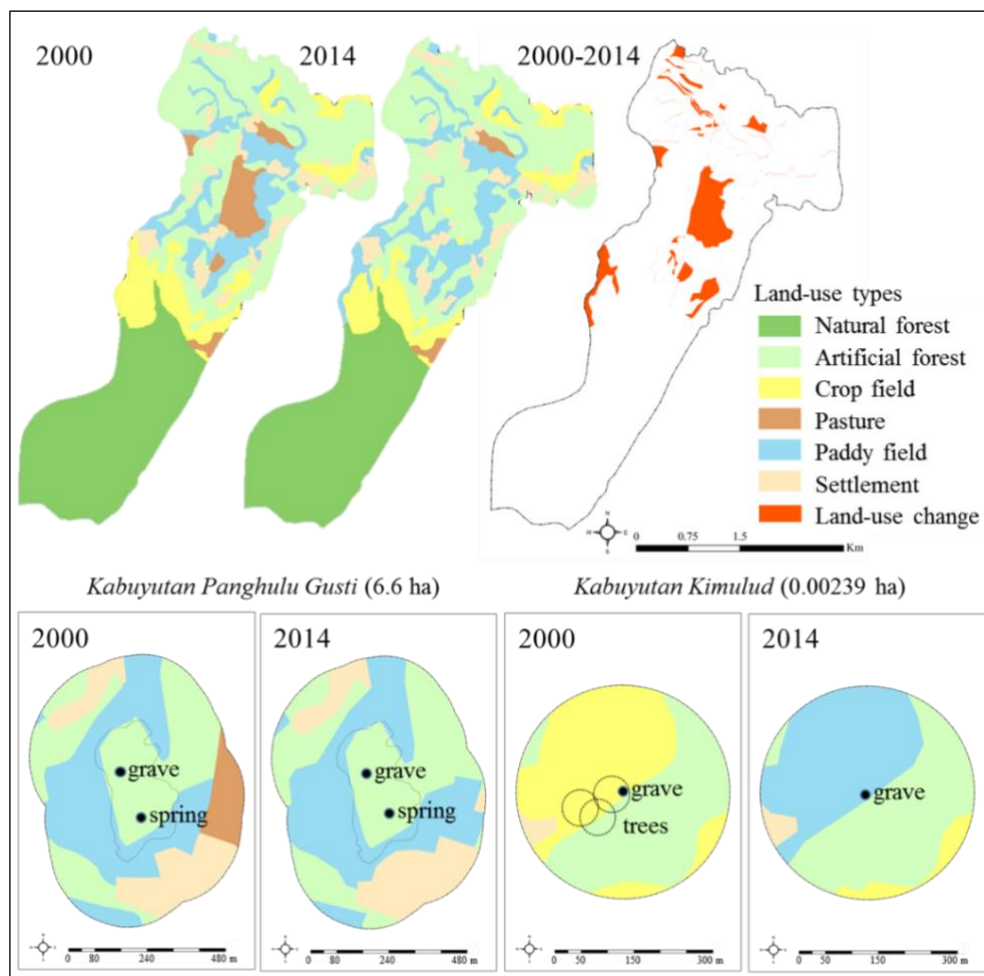


Figure 4. Changes in land-use during 14 years in Ciomas Village which led to loss of main elements and buffer zone of *kabuyutan*.

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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Acknowledgments

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