Analysis of Telajakan characteristic and the existence of ritual plants in Canggu Village and Penglipuran Village

I M P D Natawiguna¹*, H S Arifin², R L Kaswanto²,

¹Graduate Student of Landscape Architecture Department, IPB University, Bogor, Indonesia
²Landscape Architecture Department, Faculty of Agriculture, IPB University, Bogor, Indonesia

Email: mademonde13@gmail.com

Abstract: The life of Balinese people can never be separated from ritual activities or religious ceremonies. The existence of telajakan is essential to preserve. Aside from being a traditional Balinese identity, it also provides space for ritual plants and biodiversity. So that effort is needed to manage the existence of telajakan. This research is expected to analyze the characteristics of telajakan and the existence of ritual plants found in telajakan. Field observation was undertaken to inventory distribution point of remains telajakan in Canggu village. The sampling method uses purposive sampling by tracing along the main road and marking the visible point of telajakan. Changes function of telajakan was found in the Canggu area, and in Penglipuran villages, there is still preserved. Following this study, 49 samples of remains telajakan were collected from Canggu village and 69 samples from Penglipuran village. The characteristics of telajakan can be observed with the structure and size. The result shows, the structure of telajakan can be any combination of an open ditch, covered ditch, pedestrians track, open ground, grass, and fence wall. Size of telajakan can be grouped into small size (width <50 cm), medium size (width 50-99 cm), large size (width 100-149 cm), and extra-large size (width > 150 cm). Based on survey research and observation, various plants are found in each sample. Seventy-seven species of plants were found in 49 samples of telajakan in Canggu village. Plumeria accuminata, Codiaeum Sp, and Bougainvillea spectabilis is the most common species. Meanwhile, in Penglipuran village, 117 species of plants were found in 69 samples of telajakan. Furthermore, the most common species found were Plumeria accuminata, Alternanthera ficoidea, Cordyline terminalis, and Cananga odorata. Result show both Canggu village and Penglipuran villages have high species diversity index ($H'$>3). Canggu village species diversity index amount 3.88 and Penglipuran village amount 4.12. The utilization of telajakan as space for ritual plants can preserve Balinese tradition and cultures' local identity.

Keywords: Canggu, green space, Penglipuran, ritual plants, telajakan

1. Introduction
Indonesia, as a developing country, has rapid growth. Economic growth from 2010-2019 around 5-6%, and population growth of 1.25%. Based on the 2020 population census, Indonesia's current population is 270 million [10]. Fast economic and population growth increased the need for land for economic development and residence. Land-use changes inevitable, especially changes of green space into built area. Some major cities in Indonesia, such as DKI Jakarta, Bandung, and Yogyakarta, have decreased the green space in 1972-2013
Bali, as one international tourist destination, also experience land-use changes. The existence of traditional green space in Bali has begun to change. It is urgent to keep Balinese traditional identity. Rapid land-use change from green area to build area in Bali can reduce green space. Canggu, as a favorite tourist destination in Bali, runs into significant land-use change. During 2012-2017, the increased number of tourists cause land conversion from an agricultural area into buildings and tourism accommodation in Canggu [1]. Land conversion directly decreased agricultural production and undoubtedly impacted the environmental aspect [2]. Greenspace has an essential role in maintaining environmental sustainability. Green spaces can provide growing space for various plant species. Land conversion into build spaces should be balanced with the provision of green space.

Bali has local wisdom to managing human living space in harmony with nature. The philosophy of Tri Hita Karana (THK) and Tri Mandala (TM) form the spatial configuration in Bali’s spatial layout. Balinese traditional housing has telajakan that have become an identity in traditional housing pattern in Bali. The existence of telajakan as a green space with a strong linear pattern shape green corridor in Bali’s traditional villages [3]. Efforts to increase the presence of green space in tourism areas can be made by restoring the existence of telajakan. THK philosophy guides the Balinese to living harmoniously with nature. Balinese respect nature by utilizing the existence of plants as a ritual facility for the religious ceremony. The plants that are used for a ritual facility called ritual plants. Various plant species are used as a raw material for the ritual facility. Approximately there are 300 kinds of plants used in Bali Hindu rituals [4]. Utilizing the ritual plants directly maintains the diversity of plants and a sustainable environment.

In Indonesia, Constitution No. 32 of 2009 [5] explains environmental management can be based on local wisdom. The development of telajakan as a green space in the tourism area can strengthen Bali’s local identity. As an example, the tourism area in Penglipuran villages maintains telajakan as a part of the attraction. Canggu villages and Penglipuran villages show the different characteristics of telajakan. Canggu village with high community dynamics, and Penglipuran village with low community dynamics. This study will explain the structural configuration of the telajakan and the existence of the ritual plants in both villages.

2. Material and Methods

2.1 Study site and time
The study was conducted in Canggu villages, Badung Regency and Penglipuran villages, Bangli Regency, (Bali Figure 1). Sample of remains telajakan in Canggu was collecting alongside Jalan Raya Batu Bolong, and Penglipuran was collecting on the village’s main road (Rurung Gede). The reason for choosing these two villages because Canggu villages and Penglipuran villages are famous tourism areas with different community dynamics and land-use changes. This study starts from January 2019 until May 2020.

2.2 Tools and Materials
The material used in this study is spatial data such as Google satellite images year 2019 obtains from Google Earth and literature data from the Encyclopedia of Balinese Ritual Plants. At the same time, the tools used are the Global Position System (GARMIN GPS map 62s), laptops (Intel core i7 6700 HQ), and smartphones (OPPO F7). The software that was used is ArcGIS (ArcMap 10.3), Microsoft Office 2016, AutoCAD 2018, Sketchup 2019, and Adobe Photoshop CS6.
2.3 Study Methods
This study's object is telajakan in Canggu village (Figure 1) and Penglipuran villages (Figure 2). This study used direct survey, observation, and measurement. A literature study was conducted to determine the variety of ritual plants used by Balinese. Data collection in-site study consists of general condition, sample point of telajakan, and existing plant species. Furthermore, the sampling method uses purposive sampling by tracing along the main road and marking the visible point of telajakan. The stages of this study include preparation, inventory, analysis, and output.

Figure 1 Study Site and Sample Location in Canggu Village
2.3.1 Preparation
Preparation starts from administrative and technical preparation. Pre-survey was conducted before selecting the location of the sample. Selection of potential study site by quick observation of the remains telajakan and pedestrians' crowd.

2.3.2 Inventory
In the inventory stages, the sample point of the telajakan collecting by GPS. Recording the plant species and documentation of each sample point is also carried out at this stage. For the telajakan characteristics, 49 samples of remains telajakan were collected from Canggu village and 69 samples from Penglipuran village.

2.3.3 Analysis
Data analysis on collected samples were compared based on the shape typology, and each sample was grouped according to the same shape. Descriptive qualitative analysis approach used to know the structural configuration of the telajakan. Structure configuration was conducted by observing the ditch, open ground, grass, pedestrians track, and fence wall. Size observation was also carried out at this stage. For the ritual plants' existence, the descriptive...

**Figure 2** Study Site and Sample Location in Penglipuran Village
quantitative analysis was used to find plant species diversity. This analysis generated the value of the species diversity index and list of ritual plants. Species diversity index can be calculated with equation Shannon and Weinner [7]

\[ H' = \sum_{i=1}^{s} P_i \ln P_i \]

Information:
- \( H' \): Species diversity index
- \( n_i \): Number of individual species
- \( N \): Total number of individuals
- \( P_i = n_i/N \)

The value calculation of the diversity index \((H')\) show high species diversity \((H'>3)\), medium species diversity \((1 < H' < 3)\), or diversity low species \((H' <1)\). High species diversity has high community stability, while low species diversity has low community stability in an ecosystem.

2.3.4 Output
This study’s output is the general condition of Canggu village and Penglipuran villages, characteristics of telajakan, the value of plants species diversity index, and a list of telajakan ritual plants in both villages.

3. Result and Discussion

3.1 General Condition
Canggu village is located in southwest Bali Island, specifically in North Kuta district, Badung regency, Bali province, Indonesia. The name Canggu famous as a top destination for international surfer. Canggu Beach and Batu Bolong beach becomes the most visited tourist spots. Topography condition mostly flat with a slope less than 3%. The total area of this village is 5.23 Km² and 1.265 People/Km² for the population density. Average temperature ranges around 25-29 °C and annual average rainfall amount to 82.75 mm/year. The landscape structure dominates rice fields in the northwest area and the coastal tourism landscape in the southwest area. Jalan Raya Batu Bolong as main access road in the Canggu area (Figure 3) direct access to the beach. Alongside this road can be rice fields, houses, hotel villas, art shops, café, and restaurants.

![Figure 3 Jalan Raya Batu Bolong](image-url)
Penglipuran village is located in Bali Island, specifically in Bangli district, Bangli regency, Bali province, Indonesia. This village provides examples of spatial management following the Tri Mandala (TM) philosophy. The linear pattern in the Penglipuran villages following the mountain's axis in the north and sea in the south. TM philosophy explained mountain represents the pure space, and the sea represents the impure space [6]. Topography condition relatively flat with a slope of less than 5%. The site location is 500-625 meters above sea levels. Average temperature ranges around 18-27 °C and annual average rainfall amount 2000 mm/year. The landscape structure dominates with a bamboo forest in the northside and mix garden around the village. As a tourist village, the main road (Rurung Gede) is only accessible by walking. The parking area provides in the center and the north of the village (Figure 4).

![Main Road (Rurung Gede) and Parking Area in Northside](image)

**Figure 4** Main Road and Parking Area

### 3.2 Characteristics of Telajakan
Following this study, 49 samples of remains telajakan were collected from Canggu village and 69 samples from Penglipuran village. The characteristics of telajakan can be observed with the structure and size. The result shows, the structure of telajakan can be any combination of an open ditch, covered ditch, pedestrians track, open ground, grass, and fence wall. Size of telajakan can be grouped into small size (width <50 cm), medium size (width 50-99 cm), large size (width 100-149 cm), and extra-large size (width > 150 cm).

The telajakan structure configuration in Penglipuran villages has an original form and applied in all found. This proves that the telajakan structure in these villages is still preserved. The format is an open ditch, open ground, grass, and fence wall. For the size of the telajakan, these villages have a large size (width 100-149) on average. While in Canggu village, 11 structure configuration was found (Table 1). This structure configuration can be used for the development of telajakan models in areas with high community dynamics. STc code means structure configuration, and the following number one until eleven is a total configuration found during the observation. STc-2 consists of ten samples that were the highest number found. Structure configuration of Canggu telajakan mostly in the form of STc-2. This happens because, in Canggu, the pedestrian track is more often used by foreign tourists. So, the structure of the pedestrian track, visible in most samples. Construction of pedestrian's way closed the ditch alongside telajakan, thereby further strengthening the presence of STc-2.
Table 1. Telajakan Structure Configuration

| Structure of Telajakan | Configuration |
|------------------------|--------------|
| covered ditch          | pds-track    | grass   | fence wall | STc-1 |
| covered ditch          | pds-track    | open ground | fence wall | STc-2 |
| covered ditch          | open ground  | fence wall | STc-3 |
| covered ditch          | pds-track    | open ground | STc-4 |
| covered ditch          | pds-track    | open ground | grass | fence wall | STc-5 |
| covered ditch          | open ground  | grass   | fence wall | STc-6 |
| covered ditch          | open ground  | grass   | fence wall | STc-7 |
| covered ditch          | open ground  | grass   | fence wall | STc-8 |
| covered ditch          | open ground  | grass   | fence wall | STc-9 |
| open ditch             | open ground  | grass   | fence wall | STc-10 |
| open ditch             | open ground  | grass   | fence wall | STc-11 |

Note: pds-track means pedestrians track

In Canggu villages, the average size of telajakan in range medium size (width 50-99 cm). Pedestrians track occupied the original width of telajakan. The high density of pedestrians reduces green space on telajakan. The covered ditch also combines with the open ground to provide commercial space. An interesting finding was seen in sample C056 with Stc-5. This sample have extra-large size (width > 150 cm) telajakan and 16 species plants. This is the largest size and the most varied plant species found in Canggu villages. This sample’s existing condition is a hotel that concern with green space—modification of telajakan in Canggu village highly influenced by the rapid development of tourism. Economic benefits are obtained easily by utilizing the space as a tourism support area. The remaining telajakan is community creativity for preserving telajakan.

3.3 Plants Diversity in Telajakan

Based on survey research and observation, various plants are found in each sample. Seventy-seven species of plants were found in 49 samples of telajakan in Canggu village. *Plumeria accuminata*, *Codiaeum Sp.*, and *Bougainvillea spectabilis* is the most common species (Table 2). Meanwhile, in Penglipuran village, 117 species of plants were found in 69 samples of telajakan. Furthermore, the most common species founded were *Plumeria accuminata*, *Alternanthera ficoidea*, *Cordyline terminalis*, and *Cananga odorata* (Table 3). Result show both Canggu village and Penglipuran villages have high species diversity index ($H’>3$). Canggu village species diversity index amount 3.88 and Penglipuran village amount 4.12. This value showed the variety of plants in Penglipuran village higher than Canggu village. The community in Penglipuran has increased awareness of the environment affected by local wisdom and local law (*awig-awig*) that is still respected [11]. Thereby the existence and the diversity of plants in Penglipuran telajakan close to the community.
Likewise, in Canggu, there is a high value of species diversity index obtained with an awareness of the community. Although the development of tourist facilities in Canggu is relatively rapid, the community is still trying to maintain the existence of the ritual zone [12]. So, the existence of telajakan and ritual plants can be pursued.

### Table 2. Frequent plants species found in telajakan of Canggu Village

| No | Scientific Name     | Local name               | Frequent species found in telajakan |
|----|--------------------|--------------------------|------------------------------------|
| 1  | Plumeria accuminata| Jepun bali/kamboja bali  | 28                                 |
| 2  | Bougainvillea spectabilis | bougenvil             | 12                                 |
| 3  | Codiaeum sp.       | Puring                  | 11                                 |
| 4  | Cocos nucifera L.  | Kelapa                  | 9                                  |
| 5  | Dypsis lutescens   | Palem kuning            | 9                                  |
| 6  | Syzygium oleina    | Pucuk merah             | 9                                  |
| 7  | Cordyline terminalis | Hanjuang              | 8                                  |
| 8  | Dracaena draco     | Pandan bali             | 8                                  |
| 9  | Hymenocalis speciosa | Bakung mancur         | 8                                  |
| 10 | Veitchia merillii  | Palem putri             | 8                                  |

### Table 3. Frequent plants species found in telajakan of Penglipuran Village

| No | Scientific Name     | Local name               | Frequent species found in telajakan |
|----|--------------------|--------------------------|------------------------------------|
| 1  | Alternanthera ficoidea | krokot merah kerdil     | 40                                 |
| 2  | Plumeria accuminata| Jepun                    | 40                                 |
| 3  | Cordyline terminalis | Hanjuang                | 29                                 |
| 4  | Cananga odorata    | sandat/kenanga           | 27                                 |
| 5  | Chlorophytum comosum | lily paris              | 21                                 |
| 6  | Zinnia elegans     | Kembang kertas           | 18                                 |
| 7  | Impatiens balsamina | pacah                   | 17                                 |
| 8  | Hibiscus rosa sinensis | Bunga kembang sepatu   | 16                                 |
| 9  | Hydrangea macrophylla | Bunga pecah siu         | 16                                 |
| 10 | Codiaeum sp.       | puring                  | 13                                 |

### 3.4 Existence of Ritual Plants in Canggu village and Penglipuran village

Literature study referring to the Encyclopedia of Balinese Ritual Plants [8]. The plant species data collected in-site research was compared to the literature and selected plant with a ritual function. Result show 56.4% of plants species that found in Penglipuran village have functioned as ritual plants. *Plumeria accuminata, Cananga odorata, Impatiens balsamina, Hibiscus rosa sinensis, and Hydrangea macrophylla* are common in this area. This composition of flowers usually used in canang and kwangen ritual facilities (Figure 5). *Canang* is a daily ritual facility that is easily found in the Bali environment. *Cordyline terminalis* and *Codiaeum sp* are the typical leaves found in Penglipuran villages. The community uses these...
leaves to complete penjor ritual facilities. The use of penjor symbolizes the mountain and community usually made for Galungan and Kuningan's special day.

Figure 5 canang, kwangen, and penjor ritual facilities

The percentage of ritual plants found in Canggu village was 45.4%. The most common plant species found, namely Plumeria accuminata, Bougainvillea spectabilis, Codiaeum sp., and Cocos nucifera L. Jepun flowers used, were the same as those found in Penglipuran villages. Bougainvillea flowers have various colors that are also usually used in many ritual facilities. Utilizing the cocos leaves often seen on primary material of ritual facilities. Supplementary material that is traditionally used is banana leaves (Musa paradisiaca), but in this study, this plant is not in telajakan.

4. Conclusion
Following this study, 49 samples of remains telajakan were collected from Canggu village and 69 samples from Penglipuran village. The characteristics of telajakan can be observed with the structure and size. The result shows, the structure of telajakan can be any combination of an open ditch, covered ditch, pedestrians track, open ground, grass, and fence wall. Size of telajakan can be grouped into small size (width <50 cm), medium size (width 50-99 cm), large size (width 100-149 cm), and extra-large size (width > 150 cm). Based on survey research and observation, various plants are found in each sample. Seventy-seven species of plants were found in 49 samples of telajakan in Canggu village. Plumeria accuminata, Codiaeum sp., and Bougainvillea spectabilis is the most common species. Meanwhile, in Penglipuran village, 117 species of plants were found in 69 samples of telajakan. The most common species founded were Plumeria accuminata, Alternanthera ficoidea, Cordyline terminalis, and Cananga odorata. Result show both Canggu village and Penglipuran villages have high species diversity index ($H^\prime$>3). Canggu village species diversity index amount 3.88 and Penglipuran village amount 4.12. Result show 56.4 % of plants species that found in Penglipuran village have functioned as ritual plants. Plumeria accuminata, Cananga odorata, Impatiens balsamina, Hibiscus rosa sinensis, and Hydrangea macrophylla are common in this area. The percentage of ritual plants found in Canggu village was 45.4%. The most common plant species founded were Plumeria accuminata, Bougainvillea spectabilis, Codiaeum sp., and Cocos nucifera L. The utilization of telajakan as a space for ritual plants can preserve Balinese tradition and cultures’ local identity.
Reference

[1] Lanya I I, I N Dibia, I W Diara, and D G Suarjaya. Analysis of Subak Landuse Change Due to Tourism Accommodation Development in North Kuta Sub-district, Badung Regency, Indonesia. IOP Conference Series: Earth and Environmental Science. 2017; 98:012024.

[2] Irene, Pinta Lizti. Farmland Conversion in Karawang, Indonesia: Discourse Analysis. Dissertation Faculty of Bioscience Engineering, Universitet Gent. 2015

[3] Yudantini, N M Natah and Telajakan: The Role and Identity in Indigenous Villages. Pages 179-187 in Proceedings of International Seminar on Place Making and Identity. 2012

[4] Sardiana I K, and K K Dinata. Studi pemanfaatan tanaman pada kegiatan ritual (upakara) oleh umat Hindu di Bali. Jurnal Bumi Lestari. 2010; 10:123-127

[5] [PRI] Pemerintah Republik Indonesia. Undang-Undang Republik Indonesia Nomor 32 Tahun 2009 tentang Perlindungan dan Pengelolaan Lingkungan Hidup. 2009

[6] Arifin H S, and N Nakagoshi. Landscape ecology and urban biodiversity in tropical Indonesian cities. Journal of Landscape ecological engineering. 2009; 7:33-43.

[7] Magurran A E. Ecological Diversity and Its Measurement. New York (US): Chapman & Hall. 1991

[8] Sardiana I K, I W Windia, I K Sundra, I K K Dinata, I S M Sarwadana, and D I W Sukersa. Taman Gumi Banten Ensiklopedi Tanaman Upakara. Swasta Nulus. 2014

[9] Budiman A, Sulistyantara B, Zain A F. Deteksi perubahan ruang terbuka hijau pada 5 kota besar di Pulau Jawa (Studi kasus: DKI Jakarta, Kota Bandung, Kota Semarang, Kota Jogjakarta, dan Kota Surabaya). Jurnal Lanskap Indonesia. 2014 May 23;6(1):7-15.

[10] BPS-Statistics Indonesia. Statistical Yearbook of Indonesia 2020. BPS-Statistics Indonesia. 2020

[11] Qolby MT, Alhaq MT. Kajian kepedulian masyarakat berbasis kearifan lokal dalam upaya pelestarian lingkungan di desa penglipuran bali. Jurnal Ilmiah Pendidikan Lingkungan dan Pembangunan. 2019 Sep 28;20(02):1-2.

[12] Nurjani N P, Dwijendra N K. How Traditional Balinese Houses Can Adjust and Cater for International Tourists in the Canggu Area, Bali Indonesia. International Journal of Psychosocial Rehabilitation. 2020;24(03).