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The ecology of *suweg* (*Amorphophallus paeoniifolius*) in the Citanduy and Cimanuk Watersheds, West Java, Indonesia

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Abstract. *Mutaqin AZ, Husodo T, Kendarto DR, Wulandari I, Shanida SS, Megantara EN, Kurniadie D, Iskandar J, Nurzaman M. 2022. The ecology of suweg (*Amorphophallus paeoniifolius*) in the Citanduy and Cimanuk Watershed, West Java, Indonesia. Biodiversitas 23: 6520-6529. Suweg* (*Amorphophallus paeoniifolius* (Dennst.) Nicolson) is one of the plants distributed in Indonesia, including in the Citanduy and Cimanuk Watershed. *Amorphophallus* grows in various land cover types. This species exhibits wide agroecological adaptation to dry and moist lands. Citanduy Watershed passes through the Leuwikeris Dam, and the Cimanuk watershed passes through the Kertajati International Airport. These projects can affect the condition of the surrounding environment, including biodiversity. This study was conducted to observe the distribution, population, and habitat characteristics of the *suweg* in the Citanduy and Cimanuk Watersheds. Exploratory surveys and intensive studies were applied in this study. An exploratory survey was conducted randomly through direct observation. An intensive study was carried out to determine the ecological description of *suweg* in several areas, namely Kuta Subvillage, Ciangir Subvillage, and Pasiripis Village, with existing projects, still have strong local cultures, and the discovery of *suweg* growing. *Suweg* is growing in several sites, including the Citanduy and Cimanuk Watersheds, with certain elevations and environmental conditions. The Summed Dominant Ratio (SDR) of *suweg* in Kuta Subvillage, Ciangir Subvillage, and Pasiripis Village in the home garden and garden, respectively, are 8.50 and 13.77; 10.07 and 19.25; and 0 and 22.92, which indicate the population or density of *suweg* is low. The abiotic and biotic environmental parameters observed at each site varied.

Keywords: *Amorphophallus paeoniifolius*, Cimanuk and Citanduy Watersheds

INTRODUCTION

There are many species of plants on the earth's surface. In general, plants are grouped into marine and terrestrial flora in Indonesia. The marine flora includes species of seagrass and mangroves. Terrestrial flora plants reproduce by spores which are popularly known as Cryptogamae. Plants reproduce by seeds which are popularly known as Spermatophyta/ Phanerogamae. Specifically related to the number of plant species, Indonesia occupies the top five positions in the world. Of these species, 55% are endemic plants (Ministry of Environment and Forestry of Indonesia, 2014).

The plants live in various ecosystems. Ahad and Ferdous (2019) informed that the ecosystem is the biological community in an area and all of the abiotic factors influencing that community; here, a biotic community and its abiotic environment function as a system. Plants interact with ecosystem components and other environmental factors in an ecosystem. Apart from being influenced by internal factors, the growth or distribution of plants is also influenced by certain external or environmental factors, known as the habitat. Taylor et al. (2018) define habitat as a place where an organism lives, an ecological situation in which an organism lives. Hickman et al. (2012) informed the definition of habitat as the place where an organism usually lives or where individuals of a population live. Environmental factors that affect the plants' growth or distribution, either directly or indirectly, are biotic and abiotic. The biotic environmental factors are certain species of organisms (Wisz et al. 2013), including humans (Truyen 2015). Meanwhile, the abiotic factors include land use (Chauvier et al. 2021); soil pH, soil moisture, soil organic matter (Hafsah et al. 2018); soil nutrients (Wicaksono et al. 2010); elevation (Bin Yusof et al. 2013; Ortiz et al. 2019); light intensity; humidity (Barrancos et al. 2019); temperature (Lewu et al. 2017); precipitation (Lopes et al. 2016); and seasons (Sungkajanttranon et al. 2018).

A watershed is a landscape consisting of various types of ecosystems. Along the watershed, plants grow either wild in the natural ecosystems or cultivated in the artificial ecosystems. A watershed is a complex unit involving many biophysical, social, economic, and cultural aspects.

Regarding policy, watersheds are used as the planning unit for wetlands and stream mitigation purposes because they are the context in which the major physical, chemical, and biological processes determine the functions and services of wetlands and streams. The watershed approach is often used to inform decisions (Environmental Law Institute and the Nature Conservancy 2014).

Suweg (*Amorphophallus paeoniifolius* (Dennst.) Nicolson) is one of Indonesia's most widely distributed plant species, including around watershed areas. This species grows wild in Indonesia, Malaysia, the Philippines, and other South East Asian countries (Madhurima et al. 2012). *Amorphophallus* grows in many land cover types, such as gardens, the edge of rice fields, around ponds, and home gardens (Mutaqin et al. 2020). This species exhibits wide agroecological adaptation to dry and moist lands (Santosa and Sugiyama 2016). In the West Java Province, several watersheds, such as Citanduy and Cimanuk Watershed, have various conditions, including landscape, climate, and biodiversity. Citanduy Watershed passes through the Leuwikeris Dam, and the Cimanuk watershed passes through the Kertajati International Airport. These projects can affect the condition of the surrounding environment, including biodiversity. However, information on biodiversity in these watershed areas has yet to be widely published. Thus, this study aims to determine the biodiversity in these watersheds related to the distribution and habitat of *suweg*.

MATERIALS AND METHODS

Study area

This study was conducted from January 2019 to November 2021, and data analysis in 2022. This study exploratory surveys and intensive studies. An exploratory survey was conducted randomly through direct observation to record the distribution and population of *suweg* and the biophysical factors in the Citanduy and Cimanuk Watersheds (Budiman and Arisoesilaningsih 2012; Yuzammi et al. 2014; Arianto et al. 2018; Hafsah et al. 2018; Sungkajanttranon et al. 2018; Hidayat 2019). Intensive studies were carried out to explore more detailed data related to the ecology of *suweg* in certain areas determined purposively (Etikan et al. 2016). Those areas are Kuta Subvillage in the Karangpaningal Village Tambaksari Subdistrict, Ciamis District; and Ciangir Subvillage in the Tamansari Village, Tasikmalaya City, which is in the Citanduy Watershed. The other area is Pasiripis Village in the Kertajati Subdistrict, Majalengka District, which is in the Cimanuk Watershed (Figure 1). The study location was determined based on several considerations, including the discovery of *suweg* and close to strategic development projects.

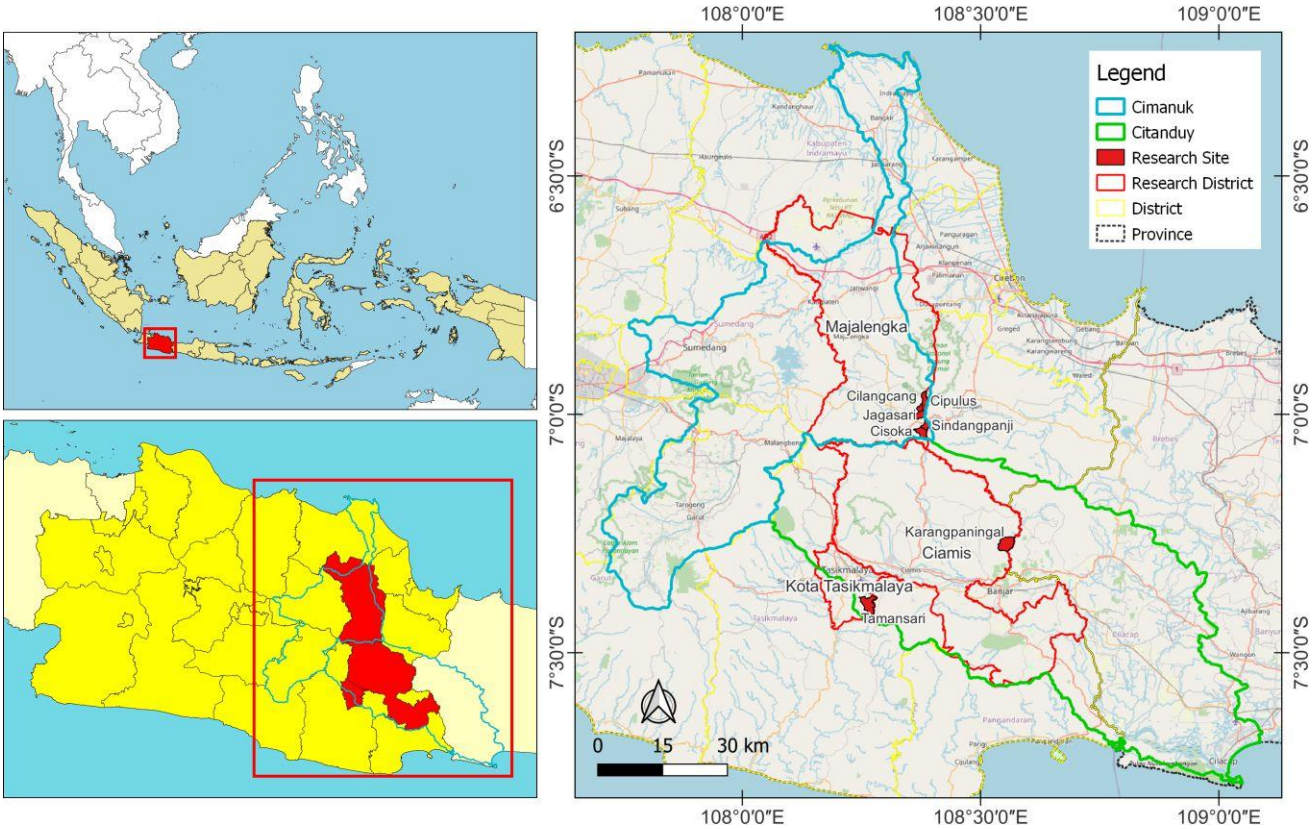

Figure 1. Research site in the Citanduy and Cimanuk Watersheds, West Java, Indonesia

Procedures

The parameters measured were the population of *suweg*, land use types, altitude, soil pH, soil moisture, air temperature, air humidity, air pressure, light intensity, and the plants growing around *suweg* (Hidayat 2019). The sampling plot is determined based on *suweg* existence (Hidayat 2019). We specify the *suweg* the land-owner planted, categorized as food, medicinal and decorative plants. The plant species found around the suweg were identified directly in the field, and if not identified, a herbarium was made to be identified at another time. The identification guidebook is Flora of Java Vol. III (Backer and Bakhuizen van den Brink 1968) and Mountain Flora of Java (van Steenis et al. 1972).

Data analysis

The ecological parameters, namely land type, altitude, soil pH, soil moisture, air temperature, humidity, air pressure, light intensity, and the plants growing around *suweg* were analyzed descriptively. Another parameter was analyzed by calculating the Summed Dominant Ratio (SDR) on *suweg* populations, which exist in each land use type, to determine the level of dominance. Calculating the frequency and dominance is conducted to analyze the SDR with the following formulas (Suwinda et al. 2019):

$$\text{F (Frequency)} = \frac{\text{Number of sampling plots found in a species}}{\text{Total number of sampling plots}}$$

$$\text{RF (Relative Frequency)} = \frac{\text{F of a species}}{\text{F of all species}} \times 100\ \%$$

$$\text{D (Dominance)} = \frac{\text{Number of individuals of a species}}{\text{Number of individuals of all species}}$$

$$\text{RD (Relative Dominance)} = \frac{\text{D of a species}}{\text{D of all species}} \times 100\ \%$$

$$\text{SDR} = \frac{\text{RF} + \text{RD}}{2}$$

RESULTS AND DISCUSSION

Results

Suweg was found in the Citanduy and Cimanuk Watersheds (Table 1 and Figure 2) with several characteristics of individual conditions, land use, and abiotic and biotic environment (Tables 2-3). Generally, *suweg* in the Citanduy Watershed is found below 500 masl, while in the Cimanuk Watershed, *suweg* is above 500 masl.

Based on the intensive studies, the *suweg* has varied conditions related to population, density, dominance, and growing environment (Tables 4-8). *Suweg* is found in home gardens and gardens managed by the community. The population, density, and dominance of *suweg* in these land use types are generally low.

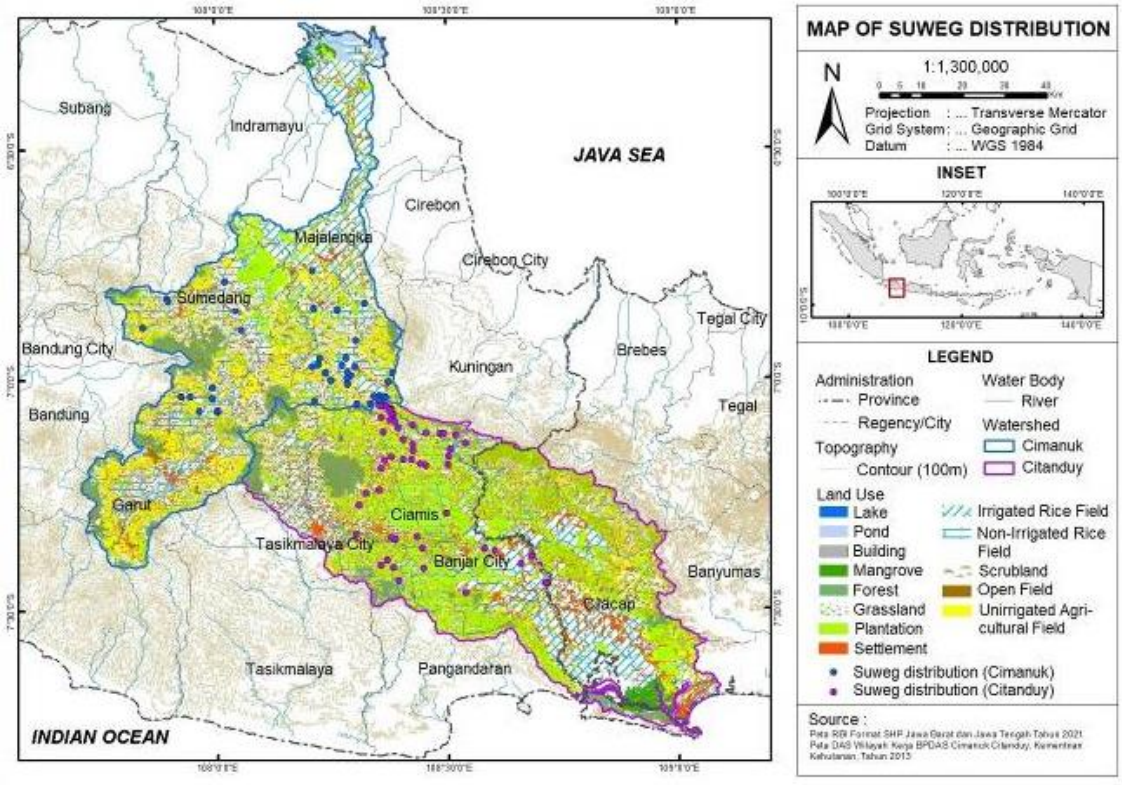

Figure 2. Distribution of *suweg* in the Citanduy and Cimanuk Watersheds

Table 1. Distribution of *suweg* in the Citanduy and Cimanuk Watersheds (2020-2021)

Watershed	District	Sub district
Citanduy	Tasikmalaya	Pagerageung, Rajapolah, Manonjaya, and Cineam
	Tasikmalaya City	Tamansari and Purbaratu
	Ciamis	Cihaurbeuti, Sadananya, Cipaku, Kawali, Panawangan, Jatinagara, Rajadesa, Sukadana, Cijeungjing, Cimaragas, Cidolog, Pamarican, Banjarsari, Purwadadi, Lakbok, Rancah, and Tambaksari
	Banjar City	Langensari and Pataruman
	Kuningan	Darma, Selajambe, and Subang
Cimanuk	Garut	Cibatu, Selaawi, Blubur Limbangan, Cibiuk
	Bandung	Nagreg
	Sumedang	Sumedang Utara, Pamulihan, Cisitu, and Darmaraja
	Majalengka	Cikijing, Cingambul, Talaga, Bantarujeg, Lemahsugih, Malausma, Maja, Cigasong, Panyingkiran, Kasokandel

Table 2. Land use types, individuals, and plants around *suweg* in the Cimanuk and Citanduy Watersheds

Watershed	Land use types	Elevation (masl)	Area condition	Individuals	Vegetation around *suweg*
Citanduy	Home gardens, gardens, rice field, pond edge	71-801	Opened, shaded	Solitary, clustered	Tree, herb, shrub
Cimanuk	Home gardens, gardens, rice field, pond edge	124-1037	Opened, shaded	Solitary, clustered	Tree, herb, shrub

Table 3. The abiotic environment of *suweg* in the Citanduy and Cimanuk Watersheds

Watershed	Air condition			Soil condition		Light intensity (Lux)
	Temperature (°C)	Pressure (hPa)	Humidity (%)	pH	Humidity (%)	
Citanduy	26,1-42,7	920,7-1004,9	46-86	5,8-7,2	40-95	105 x 10-1100 x 100
Cimanuk	21,6-39,0	884,3-998,5	40-84	5,8-7,4	40-95	190 x 10-1170 x 100

Table 4. Population and density of the *suweg* (2020-2021)

Locations	Land use types	Number of lands	Average land area (m^2)	Population of *suweg*	Density of *suweg* (per m^2)
Kuta	Garden	14	137	27	0.20
	Home garden	12	221	21	0.10
Ciangir	Garden	4	53	23	0.43
	Home garden	9	116	10	0.09
Pasiripis	Garden	1	945	1	0.001

Table 5. Topographic, land condition, and abiotic environment of *suweg*

Locations	Elevation (masl)	Land condition	Physical environmental conditions				
			Air temp. (°C)	Air pressure (hPa)	Air humidity (%)	Soil pH	Soil humidity (%)
Kuta	223-315	Opened, shaded	27.8-32.4	976.0-987.2	65-85	5.8-7.0	25-90
Ciangir	361-388	Opened, shaded	30.0-34.7	964.0-967.2	63-72	6.6-7	25-90
Pasiripis	104	Shaded	30.2	1000.8	79	6.8	70

Table 6. Vegetations around *suweg*

Locations	Land type	Habitus
Kuta	Home garden	Tree, shrub, herbs (Phanerophyte, chamaephyte, hemicryptophyte)
	Garden	Tree, shrub, herbs (Phanerophyte, chamaephyte, hemicryptophyte)
Ciangir	Home garden	Tree, shrub, herbs (Phanerophyte, chamaephyte, hemicryptophyte)
	Garden	Tree, shrub, herbs (Phanerophyte, chamaephyte, hemicryptophyte)
Pasiripis	Home garden	Tree, shrub, herbs (Phanerophyte, chamaephyte, hemicryptophyte)
	Garden	Tree, shrub, herbs (Phanerophyte, chamaephyte, hemicryptophyte)

Table 7. Species around the *suweg*

Scientific name	Local name	Locations		
		Kuta	Ciangir	Pasiripis
Musa paradisiaca L.	*Cau*	√	√	-
Mangifera indica L.	*Mangga*	√	√	-
Garcinia mangostana L.	*Manggu*	√	√	-
Ananas comosus (L.) Merr.	*Danas*	√	√	-
Carica papaya L.	*Gedang*	√	√	-
Coffea robusta L. Linden	*Kopi*	√	-	-
Syzygium aromaticum (L) Merr and Perry	*Cengkeh*	√	-	-
Arenga pinnata Merr.	*Kawung*	√	√	-
Cocos nucifera L.	*Kalapa*	√	√	-
Areca catechu L.	*Jambe*	√	-	-
Rhapis excelsa	*Waregu*	√	-	-
Parkia speciosa Hassk.	*Peuteuy*	√	√	-
Parkia javanica (Lam.) Merr.	*Peundeuy*	√	-	-
Leucaena leucocephala (Lam.) de Wit	*Peuteuy selong*	-	√	-
Gnetum gnemon L.	*Tangkil*	√	-	-
Salacca edulis Reinw	*Salak*	√	√	-
Persea americana P. Mill.	*Alpuket*	√	√	-
Muntingia calabura L.	*Kersen*	√	-	-
Passiflora edulis Sims	*Markisah*	√	-	-
Psidium guajava L.	*Jambu batu*	√	√	-
Syzygium aqueum (Burm. f.) Alston	*Jambu air*	√	-	-
Syzygium polyanthum (Wight) Walp.	*Salam*	√	√	-
Citrus amblycarpa (Hassk.) Ocshe	*Jeruk lemo*	√	-	-
Citrus sinensis (L.) Osbeck	*Jeruk*	√	√	-
Citrus hystrix Dc	*Jerukpurut*	√	-	-
Citrus × *aurantiifolia* (Christm.) Swingle	*Jeruk nipis*	-	√	-
Durio zibethinus Murray	*Kadu*	√	√	-
Nephelium lappaceum L.	*Rambutan*	√	√	-
Spondias dulcis Parkinson	*Kadongdong*	√	-	-
Lansium domesticum Corr. var. duku Hasskl.	*Dukuh*	√	√	-
Lansium domesticum Corr. var. kokosan Hasskl.	*Kokosan*	-	√	-
Lansium domesticum Corr. var. pisitan Hasskl.	*Pisitan*	-	√	-
Artocarpus heterophyllus Lmk.	*Nangka*	√	√	-
Annona muricata L.	*Nangka Walanda*	√	√	-
Theobroma cacao L.	*Coklat*	-	√	-
Hylocereus undatus (Haw.) Britton & Rose	*Buah naga*	-	√	-
Pterocarpus indicus Willd.	*Angsana*	√	-	-
Albizia chinensis (Osbeck) Merr.	*Albasiah*	√	-	-
Swietenia mahagoni (L.) Jacq.	*Mahoni*	√	√	-
Hibiscus macrophyllus Robxb ex Horner	*Tisuk*	√	√	-
Lagerstroemia speciosa (L.) Pers.	*Bungur*	√	√	-
Pterospermum javanicum Jungh.	*Caruy*	√	-	-
Tectona grandis L.f.	*Jati*	√	√	√
Melia azedarach L.	*Mindi*	-	-	√
Bambusa vulgaris Schrad. ex J.C.	*Awi*	-	-	√
Gliricidia sepium (Jacq.) Steud.	*Kalikiria*	-	-	√
Manihot esculenta Cranzt	*Sampeu*	√	√	-
Xanthosoma sagittifolium (L.) Schott.	*Taleus Padang*	√	√	-
Colocasia esculenta (L.) Schott	*Taleus*	√	√	-
Caladium bicolor (Aiton) Vent.	*Taleus hideung*	√	-	-
Alocasia plumbea Van Houtte.	*Taleus hias*	√	√	-
Alocasia macrrorhiza (L.) Schott, orth.	*Sente*	√	√	-
Piper nigrum L.	*Sahang*	√	-	-
Curcuma domestica Val.	*Koneng*	√	√	-
Curcuma zedoaria (Berg.) Roscoe	*Koneng bodas*	√	-	-
Zingiber officinale Rosc.	*Jahe*	√	√	-
Zingiber cassumunar Roxb.	*Panglay*	-	√	-
Boesenbergia pandurata (Roxb.) Schlecht.	*Temu kunci*	-	√	-
Amomum compactum Sol. ex Maton	*Kapol*	-	√	-
Alpinia galanga (L.) Sw.	*Laja*	√	-	-
Etlingera elatior (Jack.)	*Honje*	√	-	-
Cucurbita moschata Durch	*Waluh*	√	-	-
Moringa oleifera Lam.	*Kelor*	√	√	-

Zea mays L.	*Jagong*	√	-	-
Ipomoea batatas L.	*Hui*	√	√	-
Sauropus albicus Wight.	*Katuk*	√	√	-
Capsicum frutescens L.	*Cengek*	√	√	-
Solanum nigrum L.	*Leunca*	-	√	-
Solanum melongena L.	*Terong*	√	-	-
Kaempferia galanga L.	*Cikur*	√	-	-
Cymbopogon citratus (DC.) Stapf.	*Sereh*	√	√	-
Pandanus amaryllifolius Roxb.	*Pandan*	√	√	-
Morinda citrifolia L.	*Cangkudu*	√	-	-
Cnidoscolus chayamansa McVaugh	*Chaya*	√	√	-
Erythrina subumbrans (Hassk.) Merr.	*Dadap*	√	-	-
Ocimum basilicum L.	*Surawung*	√	-	-
Allium fistulosum L.	*Bawang daun*	√	-	-
Jatropha multifida L.	*Betadine*	√	√	-
Strobilanthes crispus Blume	*Pecah beling*	√	√	-
Ixora coccinea L.	*Kembang soka*	√	-	-
Dahlia rosea Cav.	*Dahlia*	√	√	-
Rosa gallica L.	*Eros*	√	√	-
Polyscias scutellaria (Burm. f.) Fosberg	*Mamangkokan*	√	-	-
Cordyline fruticose (L.) A.Chev.	*Hanjuang*	√	√	-
Codiaeum variegatum (L.) A. Juss.	*Puring*	√	√	-
Hibiscus rosa-sinensis L.	*Wera*	√	√	-
Sansevieria trifasciata Hort. ex Prain	*Lidah mertua*	√	-	-
Portulaca oleracea L.	*Gelang*	√	√	-
Eleusine indica (L.) Gaena	*Jampang*	√	√	√
Cyperus rotundus L.	*Teki*	√	√	-
Ageratum conyzoides L.	*Babadotan*	√	√	√
Crassocephalum crepidioides (Benth.) S. Moore	*Sintrong*	√	√	-
Sida rhombifolia L.	*Sadagori*	√	√	√
Mimosa pudica L.	*Jukut Barong*	√	√	√
Pluchea indica L.	*Baruntas*	√	√	-
Sonchus arvensis L.	*Rayana*	√	√	√
Cynodon dactylon L.	*Kakawatan*	√	√	√
Stachyarpheta indica (L.) Vahl	*Jarong*	√	√	√
Commelina bengalensis L.	*Gewor*	√	√	-
Amaranthus spinosus L.	*Senggang cucuk*	√	√	-
Bidens pilosa L.	*Hareuga*	√	√	-
Hedyotis corymbosa (L) Lamk.	*Jukut Siku-siku*	√	√	-
Isotoma longiflora Pres. L.	*Ki korejat*	√	√	-
Imperata cylindrica (L.) P. Beauv.	*Eurih*	√	√	-
Blumea balsamifera (L.) DC.	*Sembung*	√	√	-
Eupatorium odoratum L.	*Kirinyuh*	√	√	-
Peperomia pellucida (L.) Kunth	*Rangu-rangu*	√	√	-
Euphorbia hirta L.	*Nanangkaan*	√	√	√
Elephantopus scaber L.	*Jukut Cancang*	√	√	√
Cyanthillium cinereum (L.) H. Rob.	*Leuleuncaan*	√	√	-
Phyllanthus niruri L.	*Memeniran*	√	√	-
Acalypha australis Linn.	*Jukut Kokosan*	√	√	-
Urena lobata L.	*Pungpurutan*	√	√	-
Axonopus compressus (Sw.) P. Beauv.	*Jukut Pait*	√	√	√
Eragrostis unioloides (Retz.) Nees ex Steud.	*Jukut Piit*	√	√	-
Chloris barbata (L.) Nash	*Kembang Goyang*	√	√	√
Sporobolus berterianus ((Trin.)Hitchc. & Chase	*Nyenyerean*	√	√	-
Digitaria ciliaris (Retz.) Koeler	*Jalamparan*	√	√	√
Cyperus kyllingia Endl.	*Jukut Pendul*	√	-	√
Chrysopogon aciculatus (Retz.) Trin	*Jukut Jarum*	√	-	√
Echinochloa colona (L.) Link.	*Jajagoan leutik*	√	-	-
Hyptis capitata Jacq.	*Jukut Knop*	√	√	√
Phragmites karka (Retz.) Trin ex Steud.	*Bayongbong*	√	√	-
Themeda arguens (L.) Hack	*Memerakan*	√	√	-
Costus spiralis Rosc.	*Pacing*	-	-	√
Cuscuta australis R. Br.	*Tali putri*	-	-	√

Table 8. Summed Dominant Ratio (SDR) of the *suweg*

Locations	Species	Land use types	
		Home garden	Garden
Kuta	*Amorphophallus paeoniifolius* (Dennst.) Nicolson	8.50	13.77
	Musa x *paradisiaca* L.	6.50	12.03
	Coffea arabica L.	4.48	4.99
	Curcuma longa L.	14.10	12.87
	Kaempferia galanga L.	7.12	-
Ciangir	*Amorphophallus paeoniifolius* (Dennst.) Nicolson	10.07	19.25
	Musa paradisiaca L.	12.90	5.08
	Colocasia esculenta (L.) Schott	7.72	-
	Manihot esculenta Cranzt	8.67	13.91
	Alocasia plumbea Van Houtte.	5.15	-
Pasiripis	*Amorphophallus paeoniifolius* (Dennst.) Nicolson	-	22.92
	Tectona grandis L. f.	-	34.03
	Melia azedarach L.	-	6.25
	Bambusa vulgaris Schrad. ex J.C.	-	15.53
	Gliricidia sepium (Jacq.) Steud.	-	21.52

Discussion

Suweg was distributed in several areas, including the Citanduy and Cimanuk Watersheds, as informed in Table 1, Table 2, and Figure 2, indicating its presence in the land managed by the community. Besides, environmental conditions in the Citanduy and Cimanuk Watersheds match the needs for growing *suweg*. Sulistiyowati et al. (2014) and Barrancos et al. (2019) state that environmental factors and human activities influence the Araceae group's existence. Sugiyama et al. (2010) stated that *suweg* is cultivated, and some grow wild. Furthermore, Gao et al. (2017) said that wild populations have higher genetic diversity than cultivated populations. Widodo et al. (2014) stated that ecologically, bulbous plants can grow in upland in dry areas until swampy submergence conditions.

Table 2 informs that *suweg* is generally found growing solitary or in clusters. This statement is in line with what was stated by Permatasari et al. (2014) that *suweg* is spread over several locations or lands with a solitary or clustered presence. Hidayat (2019) found *suweg* with various individual numbers in several observation plots. In general, the distribution of Araceae species is strongly influenced by habitat factors (Hafsah et al. 2018). The spreading or dispersal of *suweg*, which are included in the herb group, can occur with or be influenced by human intervention or natural/ environmental factors (Salisu et al. 2021). Komsiati and Achyani (2021) concluded that the distribution of *A. titanium* was clustered because it required specific conditions. Chen et al. (2014) mention that the distribution pattern is closely related to ecological and environmental conditions, types of land use, and humans. If there is a disturbance to an organism or some environmental factors, it will affect the whole community.

The phenomenon of *suweg* is found in several types of land use often managed by residents, such as home gardens and gardens related to ease of access. Residents are interested in planting certain species of plants on both land use types. In general, the species of plants, including *suweg*, that exist in these land use types are used for several purposes for the community's life. Nguyen et al. (2016) state that every family member who owns the home garden can participate actively in managing the family home garden. Sanchez et al. (2015) informed that the home garden, as one of the traditional agroforestry systems, has multiple functions for the community's social, economic, and cultural aspects. Beyene et al. (2018) mention that the home garden system can provide economic benefits and ecological services for households that own and manage home garden agroecosystems. More specifically, these *Amorphophallus* species are grown on cultivated land by communities in several Asian countries, such as Indonesia and India (Kumar et al. 2015; Mandal et al. 2016). Santosa et al. (2017) stated that this plant species has wide agroecological adaptation and exhibits suitability for the agroforestry system.

The percentage of *suweg* density has a low category in various land use types (Table 4). This plant is not a commercial cultivation plant or a priority agricultural commodity for the local community; unlike cayenne pepper, red onion, kale, spinach, cucumber, or other cultivated plants, it is rarely planted on purpose. Li et al. (2020) inform that density plays an important role in plant growth, development, and distribution. Meanwhile, Xu et al. (2019) report that human activities affect the distribution and scarcity of many plant species. Prihatini et al. (2018) revealed that along with the development of the market economy, the home garden changed in function, leading to a commercial function. Mohri et al. (2013) also revealed that recent socioeconomic changes had altered plant cultivations in the home garden from subsistence-oriented to commercial in Indonesia, Sri Lanka, and Vietnam. Abdoellah et al. (2020) stated that the commercialization of home gardens contributes to monoculture cultivation patterns.

According to the dominance level (Table 8), *suweg* is a plant species with a high SDR value compared to plant species commonly cultivated by the community. Other species with high SDR values are bananas, cassava, and taro. The community rarely harvests *suweg*, so *suweg* is always found on the same land, and the population may

also increase. Meanwhile, the community often harvests other plant species and does not necessarily replant them for the next season on the same land. Sugiyama et al. (2010) stated that *suweg* is a rarely consumed plant. Like cassava and taro, *suweg* is a group of tuber plants that may be important for the community and easy to plant. Arora (2014) stated that the community has long known and consumed tubers as food. Wakhidah et al. (2020) state that food crops dominate the home garden.

Park et al. (2019) concluded that the home garden has a function as a provider of food sources and a source of increasing economic income. Yuzammi et al. (2014) informed that the existence or population of *Amorphophallus* is related to community knowledge and activities. Besides, Prihatini et al. (2018) mention that herbaceous plants, shrubs, and vines are widely planted in the home garden. Sujarwo and Caneva (2015) concluded that the community tends to plant vegetables, medicine, edible fruits, spices, and edible seeds in their home gardens.

According to Table 2, Table 3, and Table 5, *suweg* is located below 800 masl, an agroecosystem zone. Araceae plants are found in the lowlands until the highlands (Mansor et al. 2012). *Amorphophallus paeoniifolius* is distributed or found growing on land up to 800 masl (Yuzammi et al. 2017); 750 masl (Madhurima et al. 2012); 200, 400, and 600 masl (Mulyati et al. 2017); <400 (Hafsah et al. 2018) 64-134 masl (Hidayat 2019); 8-572 masl (Trimanto and Hapsari 2016); and 24-230 masl (Mursyidin et al. 2022).

Suweg is found on lands with temperatures between 19.2-42.3ºC in the Cimanuk Watershed and 26.1-42.7ºC in the Citanduy Watershed. This range corresponds to the normal temperature range for plant growth, which is 15-40ºC. Previous studies show that *Amorphophallus* is found to grow in lands with a temperature of 25-35ºC (Ravi et al. 2011); 33.4-33.9ºC (Hidayat 2019); 23-33ºC (Permatasari et al. 2014); 30-33ºC (Mulyati et al. 2017); and 19.2-42.3ºC (Mutaqin et al. 2021).

Suweg is found in areas with humidity of 35-95% in the Cimanuk Watershed and 46-86% in the Citanduy Watershed. Therefore, locations with this humidity range are suitable for growing *suweg*. Generally, Araceae are found in moist. Previous studies showed that *suweg* was found to grow in lands with an air humidity of 58.5-65.8% (Hidayat 2019); 59-100% (Permatasari et al. 2014); and 18-22% (Mulyati et al. 2017).

According to light intensity, *suweg* grew on land with light intensity between 1900 - 1175 x 100 lux in the Cimanuk Watershed and 1970 - 1030 x 100 lux in the Citanduy Watershed. The light intensity range is relatively large. Nursanti et al. (2019) state that *Amorphophallus titanum* has a light intensity of 88 - 17500 lux or canopy cover of more than 50%, the same genus as *suweg*. Previous studies show that *suweg* grows on lands that have a canopy cover of 40-100% (Hidayat 2019) with a light intensity of 80 - 226.9 lux (Hidayat 2019); 7500 - 37700 lux (Permatasari et al. 2014); 1180 - 1820 lux (Mulyati et al. 2017); and 15-276 (Hafsah et al. 2018).

Regarding soil pH, *suweg* was found with a pH of 5.6-7.2 in the Cimanuk Watershed and 5.8-7.2 in the Citanduy Watershed. This soil pH range is a normal range for plant growth. The optimal soil for the growth of cultivated plants generally has a pH range of 6-8 (Läuchli and Grattan 2012) or 5.0-6.5 (Hafsah et al. 2018). Previous studies show that *suweg* is found to grow on a clay texture, sandy loam, and fertile soil (Permatasari et al. 2014) with a pH of 6-7 (Ravi et al. 2011); 5.8-6.5 (Hidayat 2019); 7-7.4 (Permatasari et al. 2014); 7 (Mulyati et al. 2017); and 6.2-7 (Mutaqin et al. 2021).

Table 6 and Table 7 inform that many plants grow around *suweg* with various habitus. Some plants are cultivated or non-cultivated plants/wild plants. The presence of plants does not affect the existence of *suweg*. Craine and Dybzinski (2013) state that competition between plants occurs when the resources needed by plants are limited, such as limited water, nutrients, and light. The plants that grow around *suweg* have various species and crown strata. Those plants referred to *Imperata cylindrica* (L.) Raeusch., *Caesalpinia sappan* L., *Costus spiralis* (Jacq.) Roscoe, *Ficus montana* Burm.f., and *Paspalum conjugatum* P.J.Bergius (Hidayat 2019), *Psidium guajava* L. (Chandra 2014), *Phylanthus emblica* (Singh and Singh 2015), *Vigna radiata* L. (Jata et al. 2019), *Colocasia esculenta*, *Curcuma longa* (Kumar et al. 2014), *Ageratum conizoides* L., *Mimosa pudica*, *Cyperus rotundus* L., *Zingiber officinale* Rosc., *Curcuma domestica* Val., *Psidium guajava* L., *Musa paradisiaca* L., *Albizzia chinensis* (Osb), and *Tectona grandis* L.f. (Mutaqin et al. 2021).

In conclusion, *suweg* has a wide spectrum of habitats or growing environments. This statement is reflected in the distribution of *suweg* found in the Citanduy and Cimanuk Watersheds on various elevations, each of which has specific biophysical environmental conditions.

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