

artikel_10

by Ahmad Jupri_2021 [2]

Submission date: 28-Apr-2021 09:45AM (UTC+0700)

Submission ID: 1571980000

File name: 2_Jupri_2021_IOP_Conf._Ser._Earth_Environ._Sci._712_012051.pdf (601.32K)

Word count: 4723

Character count: 24652

PAPER • OPEN ACCESS

Community-based spring conservation in Catchment area of Kemalik Lingsar, Lombok, Indonesia

To cite this article: Ahmad Jupri 2021 ⁷
IOP Conf. Ser.: Earth Environ. Sci. **712** 012051

View the [article online](#) for updates and enhancements.



The Electrochemical Society
Advancing solid state & electrochemical science & technology

240th ECS Meeting ORLANDO, FL

Orange County Convention Center Oct 10-14, 2021

Abstract submission due: April 9

SUBMIT NOW

Community-based spring conservation in Catchment area of Kemalik Lingsar, Lombok, Indonesia

Ahmad Jupri*

Department of Environmental Sciences, Faculty of Mathematics and Natural Sciences,
University of Mataram, Mataram, Indonesia

*Corresponding author : juprizikril@gmail.com

Abstract

Water is the main and irreplaceable need for living things, both plants, animals and humans. Springs are one of the important elements, especially in the dry season, for the survival of living things, especially humans. The availability of water can play a role in many aspects including being able to function as drinking water, bathing, latrines (MCK), washing, plantations and livestock, irrigation of agricultural land, the need to purify oneself (as a support for the implementation of worship), and the economy. Conservation of springs through programmed reforestation activities in spring water catchment areas such as those carried out by the community and the NTB government requires precise references, so it is necessary to study the relationship or role between vegetation, soil (land) and climate in the conservation of spring sources. This research was conducted in Lingsar village, Lingsar District with quantitative research methods, namely observing vegetation directly in the field in the Kemalik Lingsar spring catchment area. Field data were then analyzed to determine the stratification, diversity, structure and composition of vegetation in the study area. The structure and composition of vegetation is carried out by calculating the density, frequency, dominance and importance of each species. Based on the research results it can be concluded that the number of tree species found in Kemalik is 14 species. Mangosteen is the dominant species with an IVI value of 104% and a density of 125 ph / ha. Utilization of land in the Kemalq spring is mangosteen-based agroforestry which has been carried out for a long time, which can be seen from the old mangosteen trees which are planted at regular intervals and arrangements and are maintained (the community has long contributed to efforts to conserve soil and water). Underplants found in Kemalik were 16 species of herbaceous, 13 species of shrubs and saplings

Key words : Kemalik, conservation, springs, human, plants, animal



Content from this work may be used under the terms of the [Creative Commons Attribution 3.0 licence](#). Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.

Published under licence by IOP Publishing Ltd

1. Introduction

Water is the main and irreplaceable need for living things, both plants, animals and humans. Data released by meteorological agency geophysical climatology (BMKG) states that the availability of water in Indonesia is influenced by the potential rainfall in Indonesia which averages 1000-4000 mm / year with an estimate of approximately 6 wet months [1]. However, in reality in Indonesia, many areas experience floods in the rainy season and drought in the dry season. This situation also occurred in West Nusa Tenggara, including West Lombok. The problem of limited scarce water often creates social conflicts in the community.

Springs are one of the important elements, especially in the dry season, for the survival of living things, especially humans. The availability of water can play a role in many aspects including being able to function as drinking water, bathing, latrines (MCK), washing, plantations and livestock, irrigation of agricultural land, and the economy [2]. To keep its availability useful and sustainable for long-term interests, a spring management system is needed. Therefore, the management of spring is an effort to make use of water sources in an integrated manner by controlling and preserving them. So that water needs in the rainy season can be met from rainwater, while in the dry season water needs can be supplied from springs.

The increase in the population of Indonesia in general is certainly accompanied by an increase in water needs for agriculture, fisheries, power generation and for toilet needs, but on the one hand the increase in demand cannot be matched by an increase in the water cycle or which is relatively constant. This can be seen from the frequent drought and water scarcity that hit several parts of Indonesia, particularly the islands of Java, Bali and Nusa Tenggara [3]. This increase in the number and pressure of population activities also resulted in changes in land use, among others, into settlements which of course resulted in changes to water bodies that formed on land and had an impact on the existence of springs. Landslides and floods in the rainy season and drought in the dry season in various regions or the same area are real events every year.

Conservation of springs through programmed reforestation activities in spring water catchment areas such as those carried out by the community and the NTB government requires precise references, so it is necessary to study the relationship or role between vegetation, soil (land) and climate in the conservation of spring sources. Thus it is necessary to study the relationship between the characteristics of other catchment areas such as rainfall, soil biophysics and hydrology with the presence of springs. This study aims to evaluate the characteristics of the vegetation in the catchment area of Kemalik Lingsar, Lombok, Indonesia.

The vegetation in the Kemalik spring location is mangosteen-based agroforestry in home gardens. The number of tree species found in Kemalik is 14 species. Mangosteen is the dominant species with an IVI value of 104% and a density of 125 tree / ha. Other types found in these locations are bananas, mangoes, and rambutan. The vegetation around the Kemalik spring is dominated by fruit trees.

Utilization of the land in the Kemalik spring is mangosteen-based agroforestry which has been carried out for a long time, which can be seen from the old mangosteen trees which are planted regularly spaced apart and are maintained because mangosteen is an important commodity in the Lingsar area.

2. Methodology

2.1. Place and time of research

This research was conducted in Lingsar village, Lingsar District, West Lombok for 3 months (from October to December 2019).

2.2. Types of Research and Data Sources

The research was conducted in Lingsar Village, Lingsar District, West Lombok Regency with quantitative research methods, namely observing vegetation directly in the field in the Kemalik Lingsar spring catchment area.

2.3. Data retrieval

Field data were then analyzed to determine the stratification, diversity, structure and composition of vegetation in the study area. The structure and composition of vegetation is carried out by calculating the density, frequency, dominance and importance of each species. The calculations were carried out according to Cox (2000) [4]. Vegetation diversity is determined by calculating the Shannon – Weiner diversity index [5]. Vegetation stratification is carried out by dividing vegetation classes based on tree height into 5 strata according to Indriyanto (2012) as follows: stratum A (height > 30 m), B (height 20-30), C (height 4-20 m), D (height 1-4 m), and E (height <1m).

2.4. Vegetation Characteristics

Vegetation characterization is carried out in each land use system which has the potential as a water catchment area. Vegetation data collection was carried out for four categories of vegetation growth, namely trees, poles, saplings, and seedlings [6]. The sample plots were determined to be 20 m x 20 m in size to use for tree level data collection (more than 20 cm in diameter), then a sub-plot of 10 m x 10 m was created for data collection at the pole level (10 - 20 cm in diameter), and inside the plot. The 10 x 10 m plot was made 5 x 5 m plots for data collection at the sapling level (tree diameter <10 cm, height > 1.5 m), and inside the 5 x 5 meter plots were made 2 m x 2 m plots for data collection. seeding (seeding) for plant height <1.5 m and understorey (herbs / ground cover).

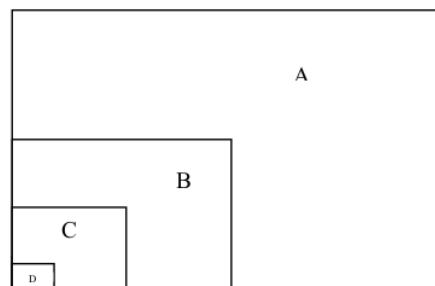


Figure 1. Sample plot design for vegetation data collection.

The observation plots are placed randomly in the upstream part of the spring which is suspected to have a water catchment area. The number of observation plots made was 3 plots at the research location. The tools and materials used included a meter, 100 m and 2 m meter tape, raffia rope, 2 x 2 m squares, wooden stakes, cameras, stationery, cameras and herbarium equipment.

Several indicators or vegetation characteristics measured at the research location include species composition, importance value, stratification, canopy cover, basal area, density and diversity index.

2.5. Composition of type

The species composition is the arrangement of the types of plants that make up the vegetation. To determine the composition of vegetation types, tree species identification has been carried out directly in the field. Unidentified species are photographed and plant parts are taken to be identified at the Basic Biology Laboratory of Mataram University.

2.6. Vegetation density

Density is a value that indicates the number of individuals of the species that are members of the vegetation in a certain area. The density measured is the density of each species and the density of the vegetation as a whole. Species density values were obtained by counting all individuals of each plant species found in the sample plots. The number of individuals of each species in each sample plot was counted and then added up to get the total of individuals from the three sample plots. The number of individuals of each species in the three sample plots is divided by the area of the sample plots so that the species density in the sample plots is obtained. The overall vegetation density at each sampling location was obtained by adding up all

individual trees on the three sample maps. The total number of individual trees is then divided by the sample plot area to obtain the vegetation density in the sample plot area. The density value is then converted into tree density per hectare.

2.7. Basal Area

Basal area or basal area is the circumference of the stem formed as a result of secondary growth of the stem that occurs simultaneously with the primary growth of roots and tree shoots. The basal area is determined by measuring the tree diameter with a meter tape at a height of 130 cm from the base of the tree or at the first fork if the main trunk is less than 130 cm. The basal area is then calculated using the area formula for a circle:

$$(BA = \frac{1}{4} \pi d^2)$$

2.8. Stratification

Stratification or canopy coating is the distribution of plants in vertical space in a vegetation. To determine stratification, the tree height was measured using a Hagameter. The highest point of each tree is shot at a distance of 15 - 20 m from the base of the tree. The height of the tree is determined based on the number indicated by the needle on the instrument plus the height of the observer. The tree canopy layering pattern is then grouped into stratum A (tree height more than 30 meters), stratum B (tree height between 20-30 meters), stratum C (tree height between 4 -20 meters), stratum D (tree height between 1- 4 meters) and stratum E (tree height between 0 - 1 meter) [7].

2.9. Canopy Cover

Canopy cover is the proportion of land surface area covered by vegetation to the total habitat area [8]. Canopy cover is measured by projection of the outer points of the canopy in the 4 cardinal directions perpendicular to the sample plot; the projection of these points is drawn on millimeter block paper for further measuring the area.

2.10. Important score

Importance value index is a vegetation parameter to express the level of dominance of a species in a vegetation [9]. Importance value index is obtained from the sum of the values of relative density, relative frequency and relative dominance.

INP = KR + FR + DR INP = Importance Value Index (IVI)

KR (relative density) = $\frac{\text{species density th- i} \times 100\%}{\text{density of all species}}$

FR (relative frequency) = $\frac{\text{frequency of species th- i} \times 100\%}{\text{frequency of all species}}$

DR (relative dominance) = $\frac{\text{dominance of species th- i} \times 100\%}{\text{Dominate all species}}$

2.11. Diversity Index

Diversity index is one of the characteristics of vegetation that describes the diversity of species and the stability of an ecosystem. The diversity index of vegetation in the study location was determined using the Shannon-Wiener diversity index (Barbour et. Al. 1987) with the following equation:

$$H' = - \sum p_i \log_2 p_i$$

H' = diversity index

p_i = n_i / N (n_i = number of individuals of the i th species,

N = number of individuals of all species).

3. Results and Discussion

3.1. Characteristics of Vegetation in Kemalik Springs²⁹

Vegetation as a component of water catchment areas plays an important role in maintaining the stability and function of the ecosystem, so that it can provide beneficial ecological services for humans, one of which is regulation and water supply. Several indicators or vegetation characteristics measured at the research location include species composition, importance value, stratification, canopy cover, basal area, density and diversity index. Characteristics of tall vegetation will improve ecosystem services in regulation and water supply. The hydrological role of vegetation in an area is determined by canopy cover, root structure, litter production and tree architecture [10].

The vegetation in the Kemalik spring location is mangosteen-based agroforestry in home gardens. The number of tree species found in Kemalik is 14 species. Mangosteen is the dominant species with an IVI value of 104% and a density of 125 tree / ha. Other types found in these locations are bananas, mangoes, and rambutan. The vegetation around the Kemalik spring is dominated by fruit trees. Apart from mangosteen as the main plant in that location, there are also several types of plants such as banana, mango, and rambutan as intercrops. There are 16 herbaceous species found in Kemalik, 13 species of shrubs and saplings.

One of the parameters / characteristics of vegetation that affects the role of vegetation in regulating the hydrological cycle is the building tree architectural model [11]. Judging from its architecture, mangosteen has relatively wide leaves, smooth surface, and collects on the surface of the canopy. This canopy condition causes low canopy interception power. In contrast to the banyan, which has a relatively wider, denser canopy and smaller leaves.

3.2. Composition of vegetation type

The species composition is the arrangement of plant species that make up vegetation. The results of the inventory of plant species at the research location found 43 plant species with a composition of 10 species of stratum A (tree height more than 30 meters), stratum B (tree height between 20-30 meters) as many as 28 species, stratum C (tree height between 4 - 20 meters and stratum D (tree height 1-4 meters)) totaling 22 species and stratum E (tree height between 0 - 1 meter)) totaling 26 species. The types of vegetation in the research location are a combination of forestry plants, plantation crops, fruit trees and ornamental plants. The species composition and significance values for stratum A and stratum B categories can be seen in Table 1.

Table 1. Composition and importance of vegetation in stratum A and B stratum categories in research sites.

No.	Local name	species name	Important value
1	Soursop	<i>Anona muricata</i>	10.81
2	Pinang	<i>Areca cathecu</i>	18.61
3	Mango	<i>Mangifera indica</i>	24.16
4	Rambutan	<i>Nephelium lappaceum</i>	13.23
5	Garcinia	<i>Garcinia mangostana</i>	104.04
6	Coconut	<i>Cocos nucifera</i>	12.86
7	Trembesi	<i>Samanea saman</i>	10.35
8	Cambodia	<i>Plumeria sp.</i>	9.28
9	Morinda	<i>Morinda citrifolia</i>	8.57
10	Turi	<i>Sesbania grandiflora</i>	8.19
11	Matoa	<i>Pometia pinnata</i>	9.36

No.	Local name	species name	Important value
12	Bamboo pole	<i>Dendrocalamus asper</i>	10.77
14	Nusa indah	<i>Musaenda frondosa</i>	8.31
15	Banana	<i>Musa</i> sp.	51.46
16	Durian	<i>Durio zibethinus</i>	-
17	Persimmon	<i>Diospyros khaki</i>	-
TOTAL			300

The important value is the vegetation parameter obtained from the sum of the relative frequency, relative density and relative dominance of species. The value of importance indicates the role of the species concerned in the community or at the research location. Species that have the greatest importance in a plant or vegetation community are said to be dominant species.

Utilization of the land in the Kemalik spring is mangosteen-based agroforestry which has been carried out for a long time, which can be seen from the old mangosteen trees which are planted regularly spaced apart and are maintained because mangosteen is an important commodity in the Lingsar area.

3.3. Canopy Cover

The results of the study state that land which is covered by vegetation with a dense canopy and is composed of multistory plant structures has a good ability to hold rainwater, so that the collision of rainwater directly onto the ground can damage the soil layer can be prevented. In addition, denser plants are also able to increase soil organic matter more, thus increasing soil fertility and supporting sustainable land management practices, one of the vegetation characteristics that play an important role in the hydrological cycle is the architecture and cover of the vegetation canopy.

The percentage of vegetation canopy cover in each vegetation class in the research locations is presented in Figure 4.1 below.

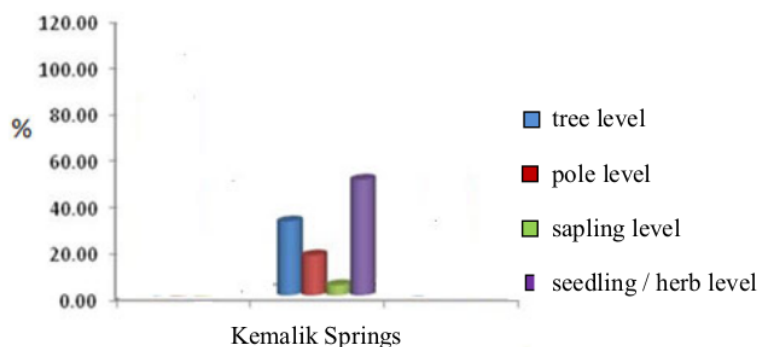


Figure 2. Percentage of vegetation canopy cover at Kemalik Springs.

The vegetation canopy cover at each location is determined based on the projection of the canopy cover of each plant, then grouped according to vegetation class, namely tree level, pole level, sapling level, and seedling / herb level [12].

Based on Figure 2 it was found that the largest seedling level vegetation cover was at the location of the Kemalik spring with a coverage percentage of 60%, while the vegetation category at pole level had a canopy

cover of around 20%. In addition, there are many types of vegetation in Kemalik which do not form a wide canopy such as mangosteen, banana and rambutan. The less dense canopy cover results in large amounts of rainwater escaping so that it can disperse soil particles so that the chances of clogging the soil pores increase. Such conditions can reduce the ability of an area to absorb water

3.4. Stratification

Stratification is the vertical structure of a vegetation that describes the canopy layer based on tree height. Vegetation canopy at the observation location shows that the abundance and number of plant species varies. Vegetation stratification at all observation locations is incomplete like stratification in tropical forests in general. (i.e. **Stratum A (tree height more than 30 meters)**, **Stratum B (tree height between 20 - 30 meters)**, **Stratum C (tree height between 4 - 20 meters)**, **Stratum D (tree height between 1 - 4 meters)** and **Stratum E (tree height between 0 - 1 meter)**, because based on the results of tree height measurements at the research location, no trees with a height above 30 m were found, which are trees that occupy strata A. ranges between 0.5-21 m and spread across strata B to E. The number of species tends to be high in the three strata namely strata C, D, and E.

In the spring, the abundance of plants in strata E (herbaceous) was the highest followed by trees with stratum D and C.

Kemalik spring consists of three strata layers, namely strata C, D, and E. The types of plants found in strata C are mangosteen, soursop, rambutan, trembesi, mango, coconut, matoa, areca nut, bamboo. Strata D is occupied by waru, majapahit, bonsai, Ficus, kumbi, Tevetia mahogany, Rubus, rubber cassava, banana. Meanwhile, level E is occupied by fireworks, alamdana, rubber cassava, sentro, Synedrella, Urena, Alternantera, grasses, Boreria, and Ageratum.

A layered plant canopy can withstand rainwater so that rainwater does not fall directly to the ground. In addition, in a multistrata agroforestry system, the more complex the strata, the more leaves that form litter can protect the soil surface.

3.5. Basal Area and Vegetation Density

Basal area or basal area is formed as a result of secondary growth activities of the stem that occur simultaneously with primary growth of roots and tree crowns. Therefore, the basal area size can indicate the root area of the plant. The root system is also concerned with the density of vegetation. The higher the vegetation density, the more root bearing capacity, the older the vegetation, the longer the root length and its support in increasing the activity of soil biota.

Basal area measurements were carried out at tree level and pole level. The results of basal area measurements at the research location show that the total basal area of vegetation at the Kemalik spring is 2.76, furthermore the vegetation density for tree level and pole level at the Kemalik spring is 441.

Table 2. Vegetation Density and Basal Area at the study site.

Location	Tree density / ha	Basal area (m ²) /sample plot area
Kemalik Springs	441	2.76

At the Kemalik spring location, the highest density is bananas. Banana is a monocot plant that forms a shallow and relatively small root system.

The depth of the root system plays an important role in the hydrological cycle which can affect water absorption. It prevents erosion and increases infiltration [13].

3.6. Species Diversity

Vegetation conditions including the composition and diversity of species can be used as an indicator of the sustainability of watershed resources, particularly in relation to soil and water conservation (Maitre et al. 2014). The results of the calculation of the vegetation diversity index at the Kemalik spring location had a diversity index of 4.43 and the number of species 38. The vegetation diversity index in the study location was in the medium to high category [14]. The vegetation diversity index is one of the vegetation characteristics which has an important meaning in regulating the water system of an area. High species numbers and abundance will result in greater canopy cover and higher litter production. High species diversity also leads to more complex stratification. Based on the results of the study, there was a tendency that the higher the diversity index of the vegetation, the greater the spring discharge in that location. Diversity as an indicator of vegetation characteristics has two components, namely evenness and richness [15]. High evenness can increase invasion resistance, total productivity of below-ground organisms, and reduce plant extinction rates [16]. Below-ground organisms play an important role in improving soil structure and fertility, which in turn can improve soil porosity and infiltration.

4. Conclusion

Based on the research results it can be concluded that the number of tree species found in Kemalik is 14 species. Mangosteen is the dominant species with an IVI value of 104% and a density of 125 ph / ha. Utilization of land in the Kemalik spring is mangosteen-based agroforestry which has been carried out for a long time, which can be seen from the old mangosteen trees which are planted at regular intervals and arrangements and are maintained (the community has long contributed to efforts to conserve soil and water). Underplants found in Kemalik were 16 species of herbaceous, 13 species of shrubs and saplings. It is necessary to plant a variety of tree species to increase the diversity of vegetation at the Kemalik spring location so that soil and water conservation in that location can be improved.

References

- [1] H. S. Lee, "General Rainfall Patterns in Indonesia and the Potential Impacts of Local Seas on Infall Intensity," *Water*, vol. 7, no. 4, Art. no. 4, Apr. 2015, doi: 10.3390/w7041751.
- [2] D. S. Hayes, J. M. Brändle, C. Seliger, B. Zeiringer, T. Ferreira, and S. Schmutz, "Advancing towards functional environmental flows for temperate floodplain rivers," *Sci. Total Environ.*, vol. 633, pp. 1089–1104, Aug. 2018, doi: 10.1016/j.scitotenv.2018.03.221.
- [3] H. Kuswanto, F. Hibatullah, and E. S. Soedjono, "Perception of weather and seasonal drought forecasts and its impact on livelihood in East Nusa Tenggara, Indonesia," *Heliyon*, vol. 5, no. 8, p. 2360, Aug. 2019, doi: 10.1016/j.heliyon.2019.e02360.
- [4] P. Cox, R. Betts, C. Jones, S. Spall, and I. Totterdell, "Cox PM, Betts RA, Jones CD, Spall SA, Totterdell IJ.. Acceleration of global warming due to carbon-cycle feedbacks in a coupled climate model. *Nature* 408: 184-187," *Nature*, vol. 408, Dec. 2000, doi: 10.1038/35041539.
- [5] G. Barrantes and L. Sandoval, "Conceptual and statistical problems associated with the use of diversity indices in ecology," *Rev. Biol. Trop.*, vol. 57, no. 3, pp. 451–460, Sep. 2009, doi: 10.15517/rbt.v57i3.5467.
- [6] C. G. Threlfall, A. Ossola, A. K. Hahs, N. S. G. Williams, L. Wilson, and S. J. Livesley, "Variation in Vegetation Structure and Composition across Urban Green Space Types," *Front. Ecol. Evol.*, vol. 4, 2016, doi: 10.3389/fevo.2016.00066.
- [7] G. Rutten, A. Ensslin, A. Hemp, and M. Fischer, "Vertical and Horizontal Vegetation Structure across Natural and Modified Habitat Types at Mount Kilimanjaro," *PloS One*, vol. 10, no. 9, p. e0138822, 2015, doi: 10.1371/journal.pone.0138822.

- [8] L. Korhonen, K. Korhonen, M. Rautiainen, and P. Stenberg, "Estimation of Forest Canopy Cover: a Comparison of Field Measurement Techniques," *Silva Fenn.*, vol. 40, pp. 577–588, Jan. 2006, doi: 10.14214/sf.315.
- [9] M. Asigbaase, S. Sjogersten, B. H. Lomax, and E. Dawoe, "Tree diversity and its ecological importance value in organic and conventional cocoa agroforests in Ghana," *PLoS ONE*, vol. 14, no. 3, Jan. 2019, doi: 10.1371/journal.pone.0210557.
- [10] T. Epp, H. Neidhardt, N. Pagano, M. A. W. Marks, G. Markl, and Y. Oelmann, "Vegetation canopy effects on total and dissolved Cl, Br, F and I concentrations in soil and their fluxes along the hydrological flow path," *Sci. Total Environ.*, vol. 712, p. 135473, Apr. 2020, doi: 10.1016/j.scitotenv.2019.135473.
- [11] A. Gabersčik and J. Murlis, "The role of vegetation in the water cycle," *Ecohydrol. Hydrobiol.*, vol. 11, no. 3, pp. 175–181, Jan. 2011, doi: 10.2478/v10104-011-0046-z.
- [12] "Tree Species Diversity, Richness, and Similarity in Intact and Degraded Forest in the Tropical Rainforest of the Congo Basin: Case of the Forest of Likouala in the Republic of Congo." <https://www.hindawi.com/journals/ijfr/2016/7593681/> (accessed Feb. 01, 2021).
- [13] P. Doerner, J. E. Jørgensen, R. You, J. Steppuhn, and C. Lamb, "Control of root growth and development by cyclin expression," *Nature*, vol. 380, no. 6574, pp. 520–523, Apr. 1996, doi: 10.1038/380520a0.
- [14] H. Qureshi *et al.*, "Multiple comparisons of diversity indices invaded by *Lantana camara*," *Braz. J. Biol. Rev. Bras. J. Biol.*, Mar. 2020, doi: 10.1590/1519-6984.222147.
- [15] W. D. Gosling *et al.*, "Pollen-vegetation richness and diversity relationships in the tropics," *Veg. Arch. Archaeobotany*, vol. 27, no. 2, pp. 411–418, 2018, doi: 10.1007/s00334-017-0642-y.
- [16] T. O. Kvålseth, "Evenness indices once again: critical analysis of properties," *SpringerPlus*, vol. 4, May 2015, doi: 10.1186/s40064-015-0944-4.

Community-based spring conservation in Catchment area of Kemalik Lingsar, Lombok, Indonesia

ORIGINALITY REPORT

13%

SIMILARITY INDEX

11%

INTERNET SOURCES

11%

PUBLICATIONS

8%

STUDENT PAPERS

PRIMARY SOURCES

- | | | |
|---|---|----|
| 1 | hdl.handle.net
Internet Source | 1% |
| 2 | Submitted to University of Cambridge
Student Paper | 1% |
| 3 | Marine Roulier, Maïté Bueno, Frédéric Coppin, Manuel Nicolas et al. "Atmospheric iodine, selenium and caesium depositions in France: II. Influence of forest canopies", Chemosphere, 2021
Publication | 1% |
| 4 | Submitted to Higher Education Commission Pakistan
Student Paper | 1% |
| 5 | Heri Kuswanto, Anggi Wahyu Puspa, Imam Safawi Ahmad, Fausania Hibatullah. "Drought Analysis in East Nusa Tenggara (Indonesia) Using Regional Frequency Analysis", The Scientific World Journal, 2021
Publication | 1% |
| 6 | hal.archives-ouvertes.fr
Internet Source | 1% |

7	shura.shu.ac.uk Internet Source	1 %
8	www.phytologia.org Internet Source	1 %
9	Submitted to University of Technology, Sydney Student Paper	1 %
10	id.123dok.com Internet Source	1 %
11	Michael Asigbaase, Evans Dawoe, Barry H. Lomax, Sofie Sjogersten. "Biomass and carbon stocks of organic and conventional cocoa agroforests, Ghana", Agriculture, Ecosystems & Environment, 2021 Publication	1 %
12	Krzysztof Wolski, Tomasz Tymiński. "Studies on the threshold density of Phragmites australis plant concentration as a factor of hydraulic interactions in the riverbed", Ecological Engineering, 2020 Publication	1 %
13	dipot.ulb.ac.be Internet Source	<1 %
14	R.S.K. Barnes. "Interspecific relationship of patchiness to occupancy and abundance, as	<1 %

exemplified by seagrass macrobenthos",
Ecological Indicators, 2020

Publication

15

Submitted to Warwick Valley High School

Student Paper

<1 %

16

M A Salim, SW Budi, L Setyaningsih, Iskandar, H Kirmi. "Diversity of Flora as Affected by Time Consequences of Revegetation Age in Post Coal Mine Area at PT Berau Coal Tbk, East Kalimantan Indonesia", IOP Conference Series: Earth and Environmental Science, 2020

Publication

<1 %

17

Blanca L. Figueroa-Rangel, Miguel Olvera-Vargas, Socorro Lozano-García, Gerald Islebe et al. "Chapter 17 Forests Diversity in the Mexican Neotropics: A Paleoecological View", Springer Science and Business Media LLC, 2020

Publication

<1 %

18

Submitted to Texas Christian University

Student Paper

<1 %

19

Tharcisse Ukizintambara, Lee White, Kate Abernethy, Christophe Thébaud. "Gallery forests versus bosquets: conservation of natural fragments at Lopé National Park in central Gabon", African Journal of Ecology, 2007

Publication

<1 %

20	www.e3s-conferences.org Internet Source	<1 %
21	Juan Shi, Guozeng Yan, Ling Guan, Zhenyu Li, Jihua Feng. "Stand Factors and Risk Analysis of Harm Extent of Gypsy Moths", Frontiers of Forestry in China, 2006 Publication	<1 %
22	Sébastien Boinot, Guillaume Fried, Jonathan Storkey, Helen Metcalfe, Karim Barkaoui, Pierre-Éric Lauri, Delphine Mézière. "Alley cropping agroforestry systems: Reservoirs for weeds or refugia for plant diversity?", Agriculture, Ecosystems & Environment, 2019 Publication	<1 %
23	dias.library.tuc.gr Internet Source	<1 %
24	lutpub.lut.fi Internet Source	<1 %
25	onlinelibrary.wiley.com Internet Source	<1 %
26	worldwidescience.org Internet Source	<1 %
27	www.nature.com Internet Source	<1 %
28	scholarworks.sfasu.edu Internet Source	<1 %

30

Heri Kuswanto, Fausania Hibatullah, Eddy Setiaji Soedjono. "Perception of weather and seasonal drought forecasts and its impact on livelihood in East Nusa Tenggara, Indonesia", Heliyon, 2019

Publication

<1 %

31

Tatjana Epp, Harald Neidhardt, Norina Pagano, Michael A.W. Marks, Gregor Markl, Yvonne Oelmann. "Vegetation canopy effects on total and dissolved Cl, Br, F and I concentrations in soil and their fate along the hydrological flow path", Science of The Total Environment, 2020

Publication

<1 %

Exclude quotes Off

Exclude matches Off

Exclude bibliography Off