

## Natural Orchid Diversity and Its Conservation Strategies in Wonosobo Aqua Biodiversity Park

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**Abstract.** This study aims to determine the diversity of natural orchids and to design a strategy for preserving natural orchids in the KEHATI AQUA Park, Wonosobo, Province of Central Java Indonesia. The data analyzed number, diversity of orchids, and questionnaire respondent data. The results showed three types of natural orchids in KEHATI AQUA Wonosobo Park, namely *Dendrobium crumenatum*, *Eria retusa*, and *Liparis* sp. Overall, the total number of orchids found was 487 individuals. The three types of orchids were epiphytic orchids found on 6 types of host trees. Based on the questionnaire respondents' data which was carried out by a SWOT analysis, there were several strategies designed, namely optimizing the land for orchid conservation, utilizing existing facilities in cultivation (greenhouse), increasing the types of orchids to be cultivated, and caring for and maintaining existing vegetation for orchid host trees, making policies aimed at preserving orchids and establishing cooperation with the orchid conservation community. The conclusion of this study is that there are 3 types of natural orchids in KEHATI AQUA Wonosobo Park, namely *Dendrobium crumenatum* with a vital value index (INP) value of 1.04, *Eria Retusa* with an INP value of 0.87 and *Liparis* sp with an INP value of 0.09, a diversity index value of 0.72, an evenness index value of 0.66 and the species richness index value of 0.32. the alternative strategy used in the conservation of natural orchids in the KEHATI AQUA Park Wonosobo is the SO (Strength and Opportunities) strategy or a strategy made to take advantage of all strengths to seize and take advantage of opportunities as much as possible.

**Keywords:** conservation Strategy; diversity; natural orchid

### I. INTRODUCTION

Bangli Orchids are taxonomically included in the family Orchidaceae. Orchids as one of the groups of flowers that have the most species diversity and have different habitat characteristics [1-2]. The natural orchid is one of the biological potentials with high commercial value. The beauty of the color and shape of the flowers of orchids makes this plant one of the most popular [3]. However, the existence of natural orchids is currently increasingly threatened, this is due to the increasing habitat destruction and overexploitation of orchids [4-5].

Tirta Investama Wonosobo is one of the largest bottled water industries in Indonesia. In the area of PT. Tirta Investama Wonosobo also has a Biodiversity Park (KEHATI) AQUA Wonosobo which is useful for preserving nature [4]. In the KEHATI AQUA Park area, there are also several types of natural orchids that are

deemed necessary to be identified in order to maintain and preserve these natural orchids [6-7].

This study aims to determine the diversity of natural orchids in the KEHATI AQUA Park Wonosobo and design a strategy for preserving natural orchids in the KEHATI AQUA Park Wonosobo.

### II. RESEARCH METHOD

#### *Research Location*

This I'm doing this research in August 2021 at the KEHATI AQUA Park, Wonosobo. This area is 4.6 ha. The tools used were stationary, climbing equipment (one set), camera, tally sheet, GPS, altimeter, lux meter, and thermohygrometers. Meanwhile, the materials in this study were natural orchids, a map of the KEHATI Park area, and a guidebook for the identification of orchid species. The parameters in this study were the type and number of

natural orchids, the diversity of natural orchids, and the strategy for preserving natural orchids [8].

In this study, the data taken were data on types of orchids, number of orchids, altitude, light intensity, temperature, humidity and questionnaire respondent data. Data collection on the type and number of orchids was carried out using the census method and data collection for questionnaire respondents was carried out through the distribution of a list of questions (questionnaires) which was conducted randomly.

*Analytical Methods*

There are two analyzes carried out in this study, namely an analysis of the diversity of natural orchids and a SWOT analysis of strategies for preserving natural orchids in the KEHATI AQUA Park, Wonosobo [9-11].

Natural orchid diversity analysis is carried out in order to find the value of density, relative density, frequency, relative frequency, dominance and relative dominance to produce an important value index or INP, then also calculate the diversity index value, evenness index and species richness index [12].

a. Important value index:

$$INP = KR + FR$$

b. Species Diversity Index:

$$H' = \sum p_i \ln p_i$$

c. Species Evenness Index:

$$(E) = H' / \ln S$$

d. Specific Richness Index:

$$(R) = (S-1) / \ln (N)$$

SWOT analysis of natural orchid conservation strategies was used to analyze the conservation strategy of natural orchids in the KEHATI AQUA Park, Wonosobo. This analysis is used as the basis for formulating natural orchid conservation strategies [11] [13-15]. SWOT analysis is the systematic identification of various factors to formulate strategies.

The steps in compiling a SWOT matrix are to create an IFAS (Internal Strategic Factors Analysis Summary) and EFAS (External Strategic Factors Analysis Summary) Matrix. The first step in making a SWOT matrix is to create an IFAS (Internal Strategic Factors Analysis Summary) and EFAS (External Strategic Factors Analysis Summary) Matrix [16-18].

The next step is calculating the weight and rating of the IFAS and EFAS indicators, then Formulating alternative strategies in the form of determining coordinates in a SWOT analysis diagram and compiling strategic factors for preserving natural orchids in a SWOT matrix, the last method is Compile a SWOT matrix, this matrix contains a description of the strategy for preserving natural orchids in responding to the calculation results from the SWOT

Analysis diagram. This is Rangkuti [22] stated this was put forward.

III. RESULTS AND DISCUSSION

*Natural Orchid Diversity*

a. Importance Value Index

Based on Table I data, it can be seen that the Important Value Index (INP) of the three types of orchids in the KEHATI AQUA Wonosobo Park in a row, namely *Dendrobium crumenatum* of 1.04, *Eria retusa* of 0.87 and *Liparis sp* of 0.09.

b. Value of Natural Orchid Diversity, Wealth and Evenness Index

The index value of natural orchid diversity in KEHATI AQUA Park Wonosobo is 0.72. This diversity value is included in the low diversity criteria. According to Odum (1971), the range of grouping values of the species diversity index is categorized as very low if the value of  $H' < 1$ . This low diversity condition is caused by only three species of orchids and the type of orchid being dominated by the same species [19-22]. In this study also obtained an evenness index of natural orchids of  $E = 0.65$ . According to the criteria above, the evenness index value according to Krebs [12], the orchids in the KEHATI AQUA Park Wonosobo are included in the category of high evenness. The index value of natural orchid species richness in KEHATI AQUA Park Wonosobo is 0.32. This is because only 3 types of orchids were found. Species richness is a parameter of the amount of diversity of a plant species contained in a place. Species richness is the number of species of a community (Figure 1).

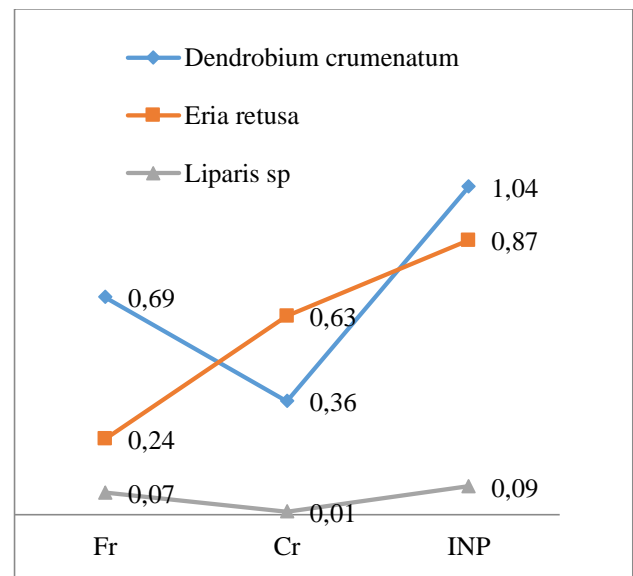


Figure. 1. Graph of Diversity, Wealth and Evenness Index Values

### *SWOT Analysis of Natural Orchid Conservation*

In accordance with the existing conditions and potential as well as the response of the local community and the manager of KEHATI AQUA Park Wonosobo, a SWOT (Strengths, Weaknesses, Opportunities and Threats analysis) was carried out (Table I). Next, create an IFAS (Internal Strategic Factors Analysis Summary) matrix and an EFAS (External Strategic Factors Analysis Summary) matrix. Making this matrix in order to give weight and rating to each factor (Table II and III).

Based on information and data collection in the field, a description of the factors, rating values and weight values of each is obtained as follows. Based on the description of internal and external factors, the interaction of the two factors will be carried out to formulate strategic points. The description of the strategy is presented in Table IV.

### IV. CONCLUSION

The conclusion of this research is there are 3 types of natural orchids in KEHATI AQUA Park Wonosobo, namely *Dendrobium crumenatum* with an INP value of 1.04, *Eria Retusa* with an INP value of 0.87, and *Liparis* sp with an INP value of 0.09, a diversity index value of 0.72, an index value of 0. the evenness of 0.66 and the value of the species richness index of 0.32 and alternative strategy used in the conservation of natural orchids in the KEHATI AQUA Park Wonosobo is the SO strategy or a strategy made to utilize all strengths to seize and take advantage of opportunities as much as possible. We suggest, for further research, you can research the propagation of orchids in Wonosobo AQUA Biodiversity Park the Faculty of Forestry, Yogyakarta Stiper Agricultural Institute.

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TABLE I  
 IMPORTANCE VALUE INDEX OF NATURAL ORCHIDS IN KEHATI AQUA PARK WONOSOBO

No	Types of Orchids	FR	CR	INP
1	<i>Dendrobium crumenatum</i>	0.69	0.36	1.04
2	<i>Eria retusa</i>	0.24	0.63	0.87
3	<i>Liparis sp</i>	0.07	0.01	0.09
Amount		1	1	2

TABLE II  
 IFAS FACTOR ANALYSIS

IFAS ( Internal Strategic Factors Analysis Summary )				
No	Strength (S)	Bbt	Rtg	Bbt x Rtg
1	KEHATI AQUA Wonosobo Park has a large area of land.	0.03	3	0.09
2	KEHATI AQUA Wonosobo Park has many dense trees.	0.1	3	0.3
3	PT. Tirta Investama Wonosobo supports the preservation of natural orchids in the KEHATI AQUA Park Wonosobo.	0.2	3	0.6
4	The existence of a greenhouse can help preserve orchids in the KEHATI AQUA Park, Wonosobo.	0.2	3	0.6
5	PT. Tirta Investama Wonosobo in collaboration with institutions that have tissue culture laboratories can help preserve orchids.	0.2	3	0.6
No	Weakness (W)	Bbt	Rtg	Bbt x Rtg
1	The facilities at KEHATI AQUA Wonosobo Park are incomplete or inadequate.	0.05	3	0.15
2	Management and development activities at the KEHATI AQUA Park Wonosobo have not focused on natural orchids.	0.05	3	0.15
3	KEHATI AQUA Conservation Park Wonosobo does not yet have competent human resources in the preservation of orchids.	0.2	3	0.6
4	KEHATI AQUA Wonosobo Park is not well known to the public.	0.05	3	0.15
5	KEHATI AQUA Park Wonosobo there is no information about natural orchids yet.	0.1	3	0.3

TABLE III  
 EFAS FACTOR ANALYSIS

EFAS ( External Strategic Factors Analysis Summary )				
No	Opportunity (O)	Bbt	Rtg	Bbt x Rtg
1	Orchid cultivation in Wonosobo is very promising.	0.04	3	0.12
2	Natural orchids are flora that must be preserved	0.05	3	0.15
3	KEHATI AQUA Wonosobo Park is suitable for the development of natural orchids	0.05	3	0.15
4	The development of natural orchids can add advantages and attractiveness to the KEHATI AQUA Park Wonosobo	0.1	3	0.3
5	Advances in information and communication technology as well as internet access help in the preservation of orchids	0.1	3	0.3
6	The development of natural orchids can expand community empowerment activities and increase the economy	0.1	3	0.3
7	The development of natural orchids in the KEHATI AQUA Park Wonosobo can make an education-based conservation park	0.2	3	0.6
8	KEHATI AQUA Wonosobo Park is the center for the preservation of natural orchids in Wonosobo.	0.05	3	0.15
No	Threat (T)	Bbt	Rtg	Bbt x Rtg
1	The presence of pests and plant diseases can damage the growth of natural orchid plants.	0.08	3	0.16
2	There is an opportunity for management activities (garbage) in the KEHATI AQUA Wonosobo Park to damage the orchid habitat.	0.03	2	0.06
3	The expansion of the plant area is a real threat to the orchid habitat.	0.15	2	0.3
4	The high selling value and attractiveness of natural orchids allows theft to occur	0.05	3	0.15

TABLE IV  
 SWOT INTERACTION MATRIX

Strength-opportunity (SO) strategy SWOT interaction
- Optimizing the land for the preservation of orchids.
- Utilizing existing facilities in cultivation ( <i>greenhouse</i> )
- Increase the types of orchids to be cultivated and care for and maintain the existing vegetation for orchid host trees.
- Making policies that aim to conserve orchids.
- Collaborating with the orchid preservation community.
- culture laboratories in the preservation of orchids.
Weakness-opportunity (WO) strategy SWOT interaction
- Caring for and maintaining existing vegetation for orchid host trees.
- Optimizing the existing workforce in the preservation of orchids.
- Making information boards for natural orchid species.
- Make a special policy regarding the preservation of orchids.
Strength-threat (ST) strategy SWOT interaction
- Installation of sign boards is prohibited from littering
- Carry out tree and orchid monitoring activities on a regular basis.
- Provide sanctions if anyone commits the theft of orchids.
Weakness-threat (WT) strategy SWOT interaction
- Does not damage existing vegetation.