

## Perception of Vocational High School on the Existence of Probolinggo Municipality Mangrove Forest

A.Y. Andhika<sup>1\*</sup>, Abdul Hakim<sup>2</sup>, Harsuko Riniwati<sup>3</sup>

<sup>1</sup> Master Program of Environmental Resources Management and Development, Brawijaya University, Malang, Indonesia

<sup>2</sup> Faculty of Administrative Sciences, Brawijaya University, Malang, Indonesia

<sup>3</sup> Faculty of Fisheries and Marine Sciences, Brawijaya University, Malang, Indonesia

### Abstract

This study aims to analyze and describe the perceptions of educational institution (SMKN 4 in Probolinggo Municipality) on the existence of the Probolinggo Municipality mangrove forest, and develop an alternative strategy for increasing perceptions of SMKN 4 in the management of Probolinggo Municipality mangrove forest. Data analysis was done using descriptive statistics and SWOT analysis. The results showed that the perceptions of students in SMKN 4 were in sufficient adequate, while the perceptions of employees in SMKN 4 were in adequate condition. The calculation results of the SWOT analysis, score for Strength is 1.78, Weakness 1.82, Opportunity 2.12, and Threats 1.77. Based on the scores of SWOT, so the SWOT coordinate can be calculated, -0.04 for the abscissa, and 0.35 for the ordinate. SWOT Coordinate (-0.04; 0.35) is positioned in quadrant IV, it means that SMKN 4 is expected to make efforts to support a change-oriented strategy. It can be done by minimizing the weaknesses and immediately achieve all available opportunities, with the implementation in the form of incorporating mangrove forest material in learning activities and carrying out mangrove forest management practices both independently and through collaboration with relevant parties such as fisheries services and environmental services.

**Keywords:** mangrove, perception, SWOT, SMKN 4

### INTRODUCTION

The rapid development in coastal areas has led to the conversion of coastal land into industrial estates, residential areas, trade areas, aquaculture areas, and residents' livelihood areas. The pace of development without control is equivalent to its sustainability, will make development unsustainable. The most significant impact is the degradation of the coastal environment which causes disruption of coastal ecosystems. Like a chain there are parts that break up, so it won't function optimally. There is a strong relevance between development and coastal sustainability, between stakeholder development and the sustainability of coastal ecosystems [1].

Coastal ecosystems store very high biodiversity, in this area including coral reef, seagrass, estuary and mangrove ecosystems. Logging of mangrove forests, destruction of mangrove forests due to the entry of industrial or household waste, makes mangrove forests

unable to carry out their functions as a buffer for the life of coastal areas. As much as 42% of Indonesia's mangrove forest is in a state of severe damage, and 29% is in a damaged condition [2].

Efforts to manage sustainable mangrove forests are the responsibility of all parties including the government, the private sector and the community (including educational institution), in which the participation of all parties is in accordance with their capacity. Describing participation will not be separated from each party's perception of the existence of mangrove forests. A good perception will encourage the level of participation. Participation is a prerequisite for sustainable development. In other words, a good understanding of nature is needed as a basis for sustainable natural resource management [3].

Perception is the event of compiling, identifying, and interpreting sensory information received by the five senses and then processed by the brain in the form of thought so that it can provide a description and understanding of the environment. Perception has meaning as knowledge, needs, trust and beliefs, values, assumptions, and attitudes [4]. Perception, among others, is influenced by knowledge, information, and communication [5].

---

Correspondence address:

**Arief Yudi Andhika**

Email : andhika.ngalam@gmail.com

Address : Program Magister Pengelolaan Sumberdaya Lingkungan dan Pembangunan, Universitas Brawijaya, Jl. Mayjen Haryono, Malang, 65145.

Aims of this study were to analyze and describe the perceptions of SMKN 4 (State Vocational High School) in Probolinggo Municipality towards the existence of the Probolinggo Municipality mangrove forest, and develop an alternative strategy to increase perceptions in the management of Probolinggo Municipality mangrove forest.

**MATERIAL AND METHOD**

This study uses a descriptive method with a quantitative approach. The study was conducted in February to April 2019 in SMKN 4. Determination of the location of research in SMKN 4 is a case study, where the author wants to see how the perceptions of vocational high schools on the existence of mangrove forests.

Taking data for the first aim, analyzing and describing perceptions of SMKN 4 towards the existence of Probolinggo Municipality mangrove forests was carried out by survey method, the data were analyzed by descriptive statistics, while the second aim of perception improvement strategies in SMKN 4 was carried out with focus group discussion, data were analyzed by SWOT method.

**Data Collection**

Taking data for the aim of analysis and description of perception in SMKN 4 was conducted by survey method through questionnaires on students and employees of SMKN 4, the sampling method used was purposive sampling, determining the number of samples using Slovin formula.

$$n = N * (1 + N * e^2)^{-1}$$

where,

- n : number of samples
- N : number of population
- e : margin of error 5%

Questionnaire answers were arranged using a Likert scale of 1 to 4. The results of answers from all respondents tabulated then calculated the total score of each variable, then interpreted according to the percentage obtained, with 4 categories, inadequate, sufficient adequate, adequate, and highly adequate. The category determination is based on a prediction analysis of the average percentage frequency table, which is obtained from the calculation of the class interval:

$$CI = (PT-PR) * (C)^{-1}$$

where,

- CI : Class Interval
- PT : Highest Percentage
- PR : Lowest Percentage
- C : Number of Class

So that it is obtained,

$$CI = (100\% - 25\%) * (4)^{-1} = 18.75\%$$

With the following categories:

Table 1. Category Based Percentage Intervals

No.	Class Intervals	Category
1.	25,00% – 43,74%	Inadequate
2.	43,75% - 62,49%	Sufficient Adequate
3.	62,50% - 81,24%	Adequate
4.	81,25% - 100,00%	Highly Adequate

Retrieval of data for the aim of increasing perceptual strategies alternative in SMKN 4 was done by a focus group discussion method using a questionnaire instrument compiled from the identification results of S-W-O-T indicators which has been compiled by Regional Mangrove Working Group of Probolinggo Municipality listed in Mangrove Ecosystems Management Strategic Plan of Probolinggo Municipality. In addition, an unguided interview was conducted to deepen the chosen strategy based on the results of the SWOT analysis.

SWOT analysis is carried out with 5 operational steps, i.e. : (1) weighting, (2) calculating relative weights, (3) rating, (4) calculating scores, and (5) determining coordinates on the development diagram. Weighting is done by pairwise comparison method by using a pairwise comparison questionnaire instrument. Calculation of relative weights based on the total value of the Strength and Weakness elements is equal to 1, and the total value of Opportunity and Threats is equal to 1.

Rating is done by a questionnaire that uses closed questions type with answers using a Likert scale 1 to 4. The results of the multiplication of relative weights with ratings are scores. Abscissa value is obtained from a reduction in the total strength score minus the total score of weakness, while ordinate value is obtained from a reduction the total Opportunity score minus total score of Threats. Based on the coordinates that have been calculated, it can be determined in the quadrant of the existing conditions of mangrove forest management, so that priority strategies can be formulated in increasing perceptions of

the existence of the Probolinggo Municipality mangrove forest.

**RESULT AND DISCUSSION**

The population of students in SMKN 4 of Probolinggo Municipality was 826 students, with the Slovin formula, number target of sample was 270 students, the realization of the sample of students was 271 students, while the employees population of SMKN 4 in Probolinggo Municipality was 96 people, with the Slovin formula the target was 77 employees, realization of employee samples as many as 77 people.

Table 2. Target and Realization of Sampling

Sampling Element	Pop	Sample				
		T	ST	M	F	SS
Student	826	271	110	93	17	Grade 10 <sup>th</sup>
			77	58	19	Grade 11 <sup>th</sup>
			84	63	21	Grade 12 <sup>th</sup>
Employee	96	77	60	31	29	Teacher
			17	13	4	Besides the teacher
Grand Total	922	348	348	258	90	Overall Academic Community

Keterangan:

- Pop : Population
- T : Total
- ST : Sub Total
- M : Male
- F : Female
- SS : Sub Sample

The perception of SMKN 4 in the existence of the Probolinggo Municipality mangrove forest was obtained from the average percentage of knowledge, information, communication, and perceptions of Probolinggo City mangrove forest management by students and employees of SMKN 4 in Probolinggo Municipality.

The results of the data tabulation obtained 74% of students' knowledge of the existence of the Probolinggo Municipality mangrove forest, included in the **adequate** category, information obtained by students on the existence of Probolinggo Municipality mangrove forests by 55%, included in the category of **sufficient adequate**, communication conducted by students towards the existence of Probolinggo Municipality mangrove forests is 43%, included in the **inadequate** category, and students' perceptions of the management of Probolinggo Municipality mangrove forest are 71%, in the **adequate** category. Students' perceptions of the existence of the Probolinggo Municipality mangrove forest amounted to 61%, included in

the category of **sufficient adequate**. A brief description of students' perception can be seen in figure 1. ....#

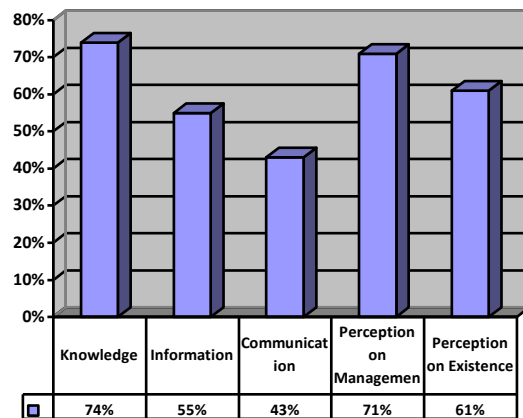


Figure 1. Chart of Students' Perception

Based on the results of the tabulation of the data, it can be analyzed that students' knowledge in the category is **adequate**, this is supported by the results of descriptive statistics of respondents' answers of 51% knowing about mangrove forests, 60% of respondents responding to mangrove tourism when they first mentioned mangrove forest, 68% respondents stated important function of mangrove forests as a supporter of fish abundance, protect the coast from waves, erosion, abrasion and carbon sequestration. As many as 55% of respondents stated that mangrove forest has an important meaning as an alternative livelihood for the community, and 53% of respondents stated that mangrove forest had an important role as a tourist area.

Knowledge as one of the forming constituent is strongly influenced by the amount of stakeholder understanding regarding the ecological and socio-economic functions of mangrove forests. Stakeholders' understanding is drawn from observations and empirical experiences in everyday life carried out by stakeholders, as well as habits and information flows obtained by stakeholders, whether formally or non-formally, through education, training, counseling, or daily conversation with friends and neighbors. In addition to this, the level of stakeholder understanding is supported by the level of interaction with mangrove forests [6, 7, 8].

The information obtained by the students in the category is **sufficient adequate**, this is supported by the results of descriptive statistics

of respondents by 45% getting information about mangrove forests from the government more than once, 42% of respondents getting information about mangrove forests from the private sector more than once, 36% Student respondents did not get information about mangrove forests from SMKN 4 or Brawijaya University, 50% of respondents did not get information about mangrove forests from NGOs, and 40% of respondents did not get information about mangrove forests from neighbors or surrounding communities.

The level of information obtained by stakeholders is one of the factors that determines stakeholder perceptions and participation in sustainable management of mangrove forests [9]. The more information obtained by stakeholders with high intensity from various sources of information that exist, both from the government, the community, the private sector, NGOs, and educational institution will further enhance stakeholder understanding of the existence of mangrove forests.

Student communication on the existence of the Probolinggo Municipality mangrove forest in the category of **inadequate**, this is supported by the results of descriptive statistics of respondents by 68% never talking about mangrove forests with the government, 41% of respondents never discussed mangrove forests with the private sector, 61% never talked about mangrove forests with SMKN 4 or Brawijaya University, 69% of respondents never talked about mangrove forests with NGOs, and 39% of respondents had once talked about mangrove forests with neighbors or surrounding communities.

The level of communication carried out by stakeholders is one factor that determines the delivery of information obtained in a chain, this will strengthen the perception and participation of stakeholders in the management of sustainable mangrove forests [9]. The more communication carried out by stakeholders with high intensity, both by the government, the community, the private sector, NGOs, and educational institution will further enhance stakeholder understanding of the existence of mangrove forests.

Respondents' perceptions of the management of Probolinggo Municipality mangrove forest were in an **adequate** category, this was supported by the results of descriptive statistics of respondents' answers of 54% stating that non-timber forest products such as fruit and leaves could be utilized, 55% of respondents

stated that they were responsible for regulating the use of mangrove forest products is the community, as much as 72% of respondents said that mangrove forests really need to be conserved, 65% of respondents said that all parties have a responsibility in the preservation of mangrove forests, 53% of respondents stated that the current management of mangrove forests was in good status, 31% of respondents stated male portion more than women in access to the Probolinggo Municipality mangrove forest, 32% of respondents stated that the proportion of men was more than women in the control of Probolinggo Municipality mangrove forest management, 29% of respondents said the same portion of men and women in the participation in Probolinggo Municipality mangrove forest management, and 29% of respondents stated that the proportion of men and women was the same in the utilization of the Probolinggo Municipality mangrove forest.

The level of stakeholder perceptions regarding the existence of mangrove forests greatly influences the level of stakeholder participation in mangrove forest management. The more adequate the level of stakeholder's perception will accelerate the realization of sustainability in the management of mangrove forests [10, 11, 12, 13, 14].

The results of the data tabulation obtained 80% of employees' knowledge of the existence of the Probolinggo Municipality mangrove forest, included in the **adequate** category, information obtained by employees on the existence of Probolinggo Municipality mangrove forests by 54%, included in the category of **sufficient adequate**, communication carried out by employees towards the existence of Probolinggo Municipality mangrove forests was 38%, included in the **inadequate** category, and employees perceptions of the management of Probolinggo Municipality mangrove forest were 79%, included in the **adequate** category. Employees' perceptions of the existence of the Probolinggo City mangrove forest were 63%, included in the **adequate** category. A brief description of students' perception can be seen in figure 2.

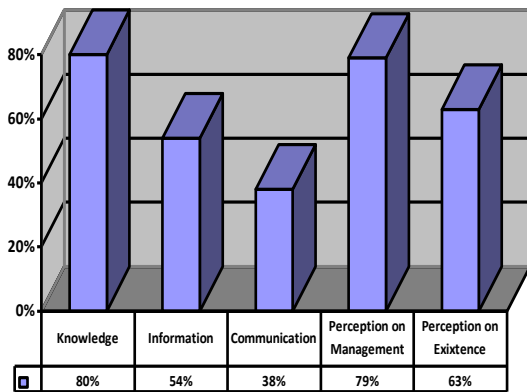


Figure 2. Chart of Employees' Perception

Based on the results of the tabulation of the data, it can be analyzed that the knowledge of employees in the category is **adequate**, this is supported by the results of descriptive statistics from respondents answers, as much as 62% knowing about mangrove forest, 36% of respondents responded with wood, fruit and mangrove leaves when they first mentioned mangrove forests, 68% of respondents rated the importance of the function of mangrove forests as supporting fish abundance, protecting the coast from waves, erosion, abrasion and carbon sequestration. 56% of respondents stated that mangrove forests have an important meaning as an alternative livelihood for the community, and 53% of respondents stated that mangrove forests have an important role as a tourist area.

The understanding of stakeholders on the ecological and socio-economic functions of mangrove forests will affect the breadth of knowledge held by stakeholders. This understanding is obtained by stakeholders from the daily activities undertaken, observations made on the environment, both in passing and in depth, and information obtained by stakeholders from all information media that can be accessed. In addition, the level of stakeholder interaction with mangrove forests will strengthen stakeholder understanding of the existence of mangrove forests. [6, 7, 8].

The information obtained by employees in the category is sufficient **adequate**, this is supported by the results of descriptive statistics of respondents by 48% getting information about mangrove forests from the government more than once, amounting to 34% of respondents getting information about mangrove forests from the private sector more than once, 34% Employee respondents received information about mangrove forests from SMKN 4 or

Brawijaya University more than once, for 58% of respondents not getting information about mangrove forests from NGOs, and 48% of respondents not getting information about mangrove forests from neighbors or surrounding communities.

Information is material that will be processed by stakeholders in shaping the perception and participation of stakeholders in the existence of mangrove forests [9]. Information about mangrove forests with high quantity and intensity of all sources of information, whether from government, private sector, community, NGOs, and educational institution will be able to form an adequate perception in the management of sustainable mangrove forests.

Communication of employees to the existence of the Probolinggo Municipality mangrove forest in the category of **inadequate**, this is supported by the results of descriptive statistics of respondents by 65% never talking about mangrove forests with the government, 69% of respondents never discussed mangrove forests with the private sector, 44% of respondents never talked about mangrove forests with SMKN 4 or Brawijaya University, 84% of respondents never talked about mangrove forests with NGOs, and 49% of respondents never talked about mangrove forests with neighbors or surrounding communities.

The channel for conveying information from one stakeholder to another is communication. Effective communication will be able to convey messages accurately, so that the purpose of delivering information to strengthen stakeholder's perceptions and participation will be achieved [9]. Communication about mangrove forests with high quantity and intensity of all sources of information, whether from government, private sector, community, NGOs, and educational institution will be able to form an adequate perception in the management of sustainable mangrove forests.

Respondents' perceptions of the management of Probolinggo Municipality mangrove forest were in an **adequate** category, this was supported by the results of descriptive statistics of respondents by 66% stating that non-timber forest products such as fruit and leaves could be utilized, 56% of respondents stated that they were responsible for regulating the use of mangrove forest products is the government, 83% of respondents said that mangrove forests really need to be preserved, 86% of respondents said that all parties have a responsibility in the

preservation of mangrove forests, 49% of respondents stated that the current management of mangrove forests was in good status, 42% of respondents said men portion equal to women in access to the Probolinggo Municipality mangrove forest, 35% of respondents stated that the portion of men is equal to women in control of the management of the Probolinggo Municipality mangrove forest, 36% of respondents stated that the portion of men and women was the same in the management of Probolinggo Municipality mangrove forest, and 36% of respondents stated that the portion of men and women was the same in the utilization of the Probolinggo Municipality mangrove forest.

The level of stakeholder’s participation is very much considered by the level of stakeholder’s perceptions in viewing mangrove forests. An increasingly adequate level of stakeholder’s perception will increase the achievement of sustainable mangrove forest management [10, 11, 12, 13, 14].

The results of the Focus Discussion Group (FGD) conducted by the Regional Mangrove Ecosystems Management Working Group of Probolinggo Municipality as outlined in the Mangrove Ecosystem Management Strategic Plan of Probolinggo Municipality identified 32 indicators in the Strength element, 29 indicators in Weakness elements, 34 indicators in Opportunity elements, and 49 indicators in the Threats element.

The researcher conducted a reclassification of the results of the FGD with the results of strength elements become 7 indicators, i.e: (1) availability of facilities, infrastructure, and resources, (2) the existence of legal instruments, (3) development priorities of the Probolinggo Municipality Government, (4) fishermen culture, (5) social structure (the role of traditional leaders and community leaders), (6) community institutions, and (7) commitment.

The element of Weakness into 8 indicators includes: (1) communication between stakeholders, (2) lack of human resources, funds, and operational infrastructure, (3) the existence of regional regulations and enforcement of all relevant rules, (4) similarity of perceptions, (5) planning and implementation of development, (6) lack of socialization of management of mangrove ecosystems, (7) participation in management of mangrove ecosystems, and (8) authority to manage coastal areas.

Opportunity elements into 9 indicators include: (1) resource utilization, (2) utilization of technology, (3) wealth of cultural arts, (4) structuring coastal areas of the Probolinggo Municipality, (5) strength of community institutions, (6) regional superior products, ( 7) conducive business climate, (8) cooperation between related stakeholders, and (9) gender mainstreaming in development.

Threats elements into 8 indicators include: (1) environmental (ecological) and disaster damage, (2) socio-economic conditions, (3) development activities and environmental impacts, (4) perceptions and awareness, (5) legal instruments and enforcement, ( 6) limited ability of human and capital resources and land ownership status, (7) socialization, and (8) licensing authority.

Based on the results of the SWOT data tabulation obtained Strength with a weight of 201, the relative weight of 0.48, and a score of 1.78. Detailed explanation about Strength’s score calculation can be seen in table 3.

Table 3. Strength Matrix

SWOT Element	Indicator to	Weight	Relative Weight	Rating	Score
Strength	1	31	0.07	4	0.30
	2	30	0.07	4	0.29
	3	28	0.07	3	0.20
	4	28	0.07	4	0.27
	5	28	0.07	3	0.20
	6	28	0.07	4	0.27
	7	28	0.07	4	0.27
Sub Total		201	0.48		1.78

Weakness element with a weight of 219, relative weight of 0.52, and a score of 1.82. Detailed explanation about Weakness’s score calculation can be seen in table 4.

Table 4. Weakness Matrix

SWOT Element	Indicator to	Weight	Relative Weight	Rating	Score
Weakness	1	29	0.07	4	0.28
	2	29	0.07	4	0.28
	3	27	0.06	4	0.26
	4	26	0.06	3	0.19
	5	28	0.07	3	0.20
	6	28	0.07	3	0.20
	7	29	0.07	3	0.21
	8	23	0.05	4	0.22
Sub Total		219	0.52		1.82

Opportunity element with a weight of 288, relative weight of 0.53, and a score of 2.12. Detailed explanation about Opportunity’s score calculation can be seen in table 5.

Table 5. Opportunity Matrix

SWOT Element	Indicator to	Weight	Relative Weight	Rating	Score
Opportunity	1	35	0.06	4	0.26
	2	29	0.05	4	0.21
	3	30	0.06	4	0.22
	4	34	0.06	4	0.25
	5	35	0.06	4	0.26
	6	29	0.05	4	0.21
	7	33	0.06	4	0.24
	8	31	0.06	4	0.23
	9	32	0.06	4	0.24
Sub Total		288	0.53		2.12

Threats element with a weight of 256, relative weight of 0.47, and a score of 1.77. Detailed explanation about Threats's score calculation can be seen in table 6.

Table 6. Threats Matrix

SWOT Element	Indicator to	Weight	Relative Weight	Rating	Score
Weakness	1	34	0.06	4	0.25
	2	31	0.06	3	0.17
	3	31	0.06	3	0.17
	4	36	0.07	4	0.26
	5	33	0.06	4	0.24
	6	32	0.06	4	0.24
	7	34	0.06	4	0.25
	8	25	0.05	4	0.18
Sub Total		256	0.47		1.77

If the strength score is 1.78 and the weakness score is 1.82, the coordinate abscissa is -0.04. If the score of opportunity is obtained 2.12 and the threat score is 1.77, the ordinate coordinates are 0.35, so the coordinate value (-0.04; 0.35). Based on its location, the coordinates (-0.04; 0.35) are in quadrant IV.

This position in quadrant IV means that SMKN 4 in Probolinggo Municipality has many weaknesses but has the opportunity to improve its perception and participation in the management of Probolinggo Municipality mangrove forest. The alternative strategy that can be done by this Vocational High School is turn around, which means turning around in carrying out activities that support the management of Probolinggo Municipality mangrove forest so far, by minimizing the weaknesses, by reaching all available opportunities to support strategies that support change. SWOT coordinate position to determine alternative development strategies can be seen in figure 3.

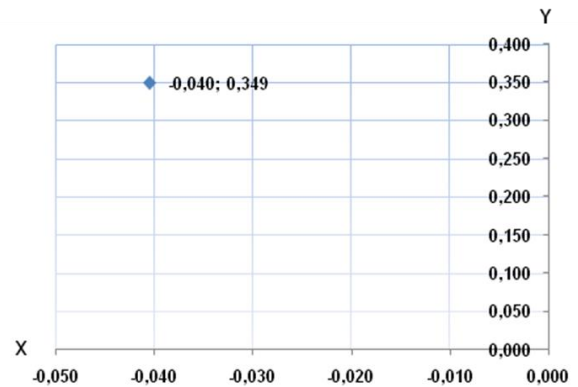


Figure 3. Chart of SWOT Coordinate

SMKN 4 in Probolinggo Municipality is a Vocational High School that has 6 majors, including: (1) APHPi (Fisheries Product Processing Agribusiness) with a total class of 3 starting from grades 10<sup>th</sup> to 12<sup>th</sup>, (2) NKPI (Nautics Fishing Vessels) with a total class of 8 starting from 10<sup>th</sup> to 12<sup>th</sup> grade (3) TKPI (technique of fishing vessels) with a total of 4 classes starting from 10<sup>th</sup> to 12<sup>th</sup> grade, (4) TKR (Light Vehicle Engineering) with a total of 3 classes starting from grades 10<sup>th</sup> to 12<sup>th</sup>, (5) NKN (Merchant Ship Nautics) with a total class of 3 starting from grades 10<sup>th</sup> to 12<sup>th</sup>, and (6) MM (Multimedia) with a total of 6 classes starting from grades 10<sup>th</sup> to 12<sup>th</sup>.

If it is reclassified from 6 major, 3 major are directed to the marine and fisheries majors, including APHPi, NKPI, and TKPI as much 15 classes (56% of the total classes), and another majors covering TKR, NKN and MM as much 12 classes ( 44% of the total classes). Based on this, it is reasonable that SMKN 4 included the content of marine and fishery substances (mangrove forests) in the curriculum or student extracurricular activities. In addition, the inclusion of mangrove forest substances will support adiwiyata activities carried out by SMKN 4 in the form of increasing environmental knowledge and awareness to preserve the environment, which is carried out with a participatory and sustainable basic principle. Adiwiyata activity is an opportunity that can be used as a vehicle for the implementation of the conservation of mangrove forests in Probolinggo Municipality.

Based on the results of an unguided interview with Coordinator of Adiwiyata and the notes given by Adiwiyata Team stated that it has been realized that SMKN 4 is a marine or maritime-based vocational high school which has made participatory efforts to pay attention to and care

for mangrove forest management, but the intensity is still minimal. This is because mangrove has not been a priority for school programs. Efforts that have been made in relation to mangroves include: (1) attending a workshop on the strategy of managing mangrove ecosystems in Probolinggo Municipality, (2) being involved in mangrove planting activities carried out by related agencies and NGOs, and (3) organizers international seminar on mangroves.

Participation in the form of concern for mangrove forest management is one of the prerequisites for sustainable management of mangrove forests. Participation can be done in the form of transfer of information related to mangrove forests or action activities for conservation, rehabilitation and utilization of mangrove forests. The smoothness of the activity of transferring information on the importance of mangrove forests can be realized if the parties who provide information have sufficient understanding regarding mangrove forests, both understanding ecological functions of mangrove forests, understanding the causes of destruction of mangrove forests, and understanding the important functions of mangrove forests socially. economic [15]. The implementation of information transfer can be done in formal and non-formal settings such as seminars, workshops, FGDs, meetings, and daily discussions.

Conservation activities can be carried out by maintaining the existence, availability and sustainability of mangrove forests while maintaining and improving the quality of values and diversity [16, 17]. Biodiversity has a very strategic function in preserving ecosystems [18, 19, 20] and efforts to support the welfare of the community, especially in coastal areas [21, 22, 23].

Rehabilitation is done by restoring and improving the condition of the ecosystem or population that has been damaged even though the results can be different from the original conditions. Rehabilitation of mangrove forests is carried out by means of biological resources enrichment, habitat improvement, mangrove protection to grow and develop naturally, and be environmentally friendly [24]. Rehabilitation practices can be carried out on abandoned ponds [25], mangrove forests that have been damaged by the implementation of coastal development or damage caused by natural disasters such as volcanic eruptions... ..#!

Understanding of mangrove forests function, the introduction of the implementation of

conservation, rehabilitation, and utilization of sustainable mangrove forests are part of the efforts that must be done by SMKN 4 in order to improve the perceptions of students and employees to increase participation in Probolinggo Municipality mangrove management. Based on the results of the SWOT of SMKN 4 in Probolinggo, if it is associated with the perception condition of SMKN 4, then strategic steps can be taken to improve the perceptions of students and their employees, namely:

- Incorporating the content of mangrove forest material in the learning process carried out by SMKN 4 of Probolinggo Municipality to increase the knowledge of students and employees.
- Enriching mangrove forest material with the results of the latest research on mangrove forests and harmonizing them with the needs for mangrove management in Probolinggo Municipality.
- Disseminate and internalize the results of the material enrichment of mangrove forests in the learning process, as well as explore and collaborate with relevant parties in the management of Probolinggo Municipality mangrove forests, such as the Probolinggo Municipality Fisheries Agency, Probolinggo Municipality Environmental Agency, Probolinggo Municipality Development Planning Agency, Culture and Tourism Agency of Probolinggo Municipality, Agency of Women's Empowerment, Child Protection, and Family Planning in Probolinggo Municipality, Province Forestry Agency in Probolinggo Municipality, and Province Fisheries and Maritime Agency in Probolinggo Municipality.
- Encouraging innovative and productive activities that support the improvement of students and employees' perceptions of the management of Probolinggo Municipality mangrove forests, among others by encouraging the writing of scientific papers on mangrove forest management, encouraging energy-saving habits, clean living, and reducing waste, especially household waste the stairs to the river with the sewer to the sea of Probolinggo Municipality. These activities will increase the effectiveness of carbon absorption by mangrove forests, reduce damage to the ozone layer, and reduce the level of damage



to mangrove forests due to the entry of domestic waste into the area of the Probolinggo Municipality mangrove forest.

#### **CONCLUSION**

Students' perception of SMKN 4 on the existence of the Probolinggo Municipality mangrove forest was in sufficient adequate condition. Employees' perception of SMKN 4 on the existence of the Probolinggo Municipality mangrove forest was in adequate condition. SWOT Coordinates at SMKN 4 (-0.04; 0.35) in quadrant III. Alternative strategies that can be done to be developed in order to improve the perception and participation of SMKN 4 to mangrove forest management is turn around strategy, which means minimizing weaknesses by reaching for all opportunities.

In order to improve the perception and participation of SMKN 4 in the management of the Probolinggo Municipality mangrove forest, it is recommended to include the content of mangrove forest material in the learning carried out by SMKN 4 in Probolinggo Municipality.

#### **ACKNOWLEDGEMENT**

The author's deepest gratitude to the Headmaster of SMKN 4 in Probolinggo Municipality, Coordinator and Adiwiyata Team of SMKN 4 in Probolinggo Municipality, and all those who helped smoothly carry out this research.

#### **REFERENCES**

- [1]. Kadhapi, Mu'ammam, dan Hardiansyah, Gusti, dan Zainal, Sofyan. 2015. Persepsi Masyarakat Desa Sungai Awan Kanan terhadap Keberadaan Hutan Mangrove di Kawasan Pantai Air Mata Permai Kabupaten Ketapang. *Jurnal Hutan Lestari*, Vol. 3, No. 1, Hal. 108-116, 2015.
- [2]. La Sara. 2014. *Pengelolaan Wilayah Pesisir*. Alfabeta. Bandung.
- [3]. Riniwati, Harsuko, dan Harahab, Nuddin, dan Abidin, Zainal. 2016. Loss Estimation of Protected Forest Damage and Its Impact on Fishery Sector in Goa Cina Beach, South Area of Malang Regency. *Jurnal Wacana*, Vol. 19, No. 3, 2016.
- [4]. Alizamar dan Couto, Nasbahry. 2016. Psikologi Persepsi & Desain Informasi: Sebuah Kajian Psikologi Persepsi dan Prinsip Kognitif untuk Kependidikan dan Desain Komunikasi Visual. Media Akademi. Yogyakarta.
- [5]. Sumampouw, Oksfriani Jufri, dan Harahap, Nuddin. 2016. Persepsi Kesehatan Masyarakat Pesisir. Deepublish. Yogyakarta.
- [6]. Setiawan, Heru, Rini Purwanti, R. Garsetiasih. 2017. Persepsi dan Sikap Masyarakat terhadap Konservasi Ekosistem Mangrove di Pulau Tanakeke Sulawesi Selatan. *Jurnal Penelitian Sosial dan Ekonomi Kehutanan*. 14. 1:57-70.
- [7]. Irawan, Arif, Iwanuddin, Jafred E. Halawane, Sulistya Ekawati. 2017. Analisis Persepsi dan Perilaku Masyarakat terhadap Keberadaan Kawasan KPHP Model Poigar. *Jurnal Penelitian Sosial dan Ekonomi Kehutanan*. 14. 1:71-82.
- [8]. Subhan, Mohammad, Made Antara, Ida Ayu Astarini. 2014. Analisis Tingkat Kerusakan dan Strategi Pengelolaan Mangrove di Kawasan Suaka Perikanan Gili Ranggo Teluk Seriwe Kabupaten Lombok Timur Nusa Tenggara Barat. *Jurnal Ecotrophic*. 8. 1:86-92.
- [9]. Nababan, Evi Juita K., dan Qurniati, Rommy dan Kustanti, Asihing. 2016. Modal Sosial pada Pengelolaan dan Pelestarian Hutan Mangrove di Kecamatan Labuhan Maringgai Kabupaten Lampung Timur. *Jurnal Sylva Lestari*. 4. 2:89-100.
- [10]. Faizal, Muhammad Izzuddin, Luchman Hakim, Nuddin Harahap, 2017. Factors Affecting Level of Participation in the Management of Mangroves as Ecotourism Attraction: Lesson Learned from Cengkong Watulimo, Trenggalek. *Journal of Indonesian Tourism and Development Studies*. 5. 1.
- [11]. Partelow, Stefan, Marion Glaser, Sofia Solano Arce, Roberta Sá Leitão Barboza, Achim Schlüter. 2018. Mangroves, fishers, and the struggle for adaptive comanagement: applying the social-ecological systems framework to a marine extractive reserve (RESEX) in Brazil. *Journal of Ecology and Society*. 23. 3.
- [12]. Soriano, Cristina Quintas, Jodi S. Brandt, Katrina Running, Colden V. Baxter, Dainee M. Gibson, Jenna Narducci, Antonio J. Castro. 2018. Social-ecological systems influence ecosystem service perception: a Programme on Ecosystem Change and Society (PECS) analysis. *Journal of Ecology and Society*. 23. 3.
- [13]. Muryani, Chatarina, Ahmad Setya Nugraha, Trisni Utami. 2011. Model Pemberdayaan Masyarakat dalam Pengelolaan dan

- Pelestarian Hutan Mangrove di Pantai Pasuruan Jawa Timur. *Jurnal Manusia dan Lingkungan*. 18. 2:75-84.
- [14]. Hoshino, Eriko, Ingrid van Putten, Wardis Girsang, Budy P. Resosudarmo, Satoshi Yamazaki. 2016. A Bayesian belief network model for community-based coastal resource management in the Kei Islands, Indonesia. *Journal of Ecology and Society*. 21. 2.
- [15]. Lagbas, Arthur J., dan Habito, Consuelo DI. 2016. Ecosystem services of coastal and fisheries resources: Perspectives of high school students in Municipality of Panukulan, Polillo Island, Quezon, Philippines. *Journal of Marine and Island Cultures*. 5. 145-158.
- [16]. Peraturan Pemerintah Republik Indonesia Nomor 60 Tahun 2007 tentang Konservasi Sumber Daya Ikan.
- [17]. Kementerian Kelautan dan Perikanan Republik Indonesia. 2008. Peraturan Menteri Kelautan dan Perikanan Republik Indonesia Nomor 17 Tahun 2008 tentang Kawasan Konservasi di Wilayah Pesisir dan Pulau-Pulau Kecil.
- [18]. Liqueste, Camino dan Cid, Nria dan Lanzanova, Denis dan Grizzetti, Bruna dan Reynaud, Arnaud. 2016. Perspectives on the link between ecosystem services and biodiversity: The assessment of the nursery function. *Journal of Ecological Indicators*. 63. 249-257.
- [19]. Diz, Daniela dan Johnson, David dan Riddell, Michael dan Rees, Sian dan Battle, Jessica dan Gjerde, Kristina dan Hennige, Sebastian dan Roberts, J. Murray. 2017. Mainstreaming marine biodiversity into the SDGs: The role of other effective area-based conservation measures (SDG 14.5). *Journal of Marine Policy*. 93. 251-261.
- [20]. Sandifer, Paul A., Ariana E. Sutton-Grier, Bethney P. Ward. 2015. Exploring connections among nature, biodiversity, ecosystem services, and human health and well-being: Opportunities to enhance health and biodiversity conservation. *Journal of Ecosystem Services*. 12. 1-15.
- [21]. Kementerian Kelautan dan Perikanan Republik Indonesia. 2016. Peraturan Menteri Kelautan dan Perikanan Republik Indonesia Nomor 47 Tahun 2016 tentang Pemanfaatan Kawasan Konservasi Perairan.
- [22]. Sihasale, Daniel Anthoni. 2013. Keanekaragaman Hayati di Kawasan Pantai Kota Ambon dan Konsekuensi untuk Pengembangan Pariwisata Pesisir. *Journal of Indonesian Tourism and Development Studies*. 1. 1:20-27.
- [23]. Sukara, Endang. 2014. Tropical Forest Biodiversity to Provide Food, Health and Energy Solution of the Rapid Growth of Modern Society. *Journal of Procedia Environmental Sciences*. 20. 803-808.
- [24]. Kementerian Kelautan dan Perikanan Republik Indonesia. 2016. Peraturan Menteri Kelautan dan Perikanan Republik Indonesia Nomor 24 Tahun 2016 tentang Tata Cara Rehabilitasi Wilayah Pesisir dan Pulau-Pulau Kecil.
- [25]. Duncan, Clare, Jurgenne H. Primavera, Nathalie Pettorelli, Julian R. Thompson, Rona Joy A. Loma, Heather J. Koldewey. 2016. Rehabilitating mangrove ecosystem services: A case study on the relative benefits of abandoned pond reversion from Panay Island, Philippines. *Marine Pollution Bulletin*. 109. 772-782.