

# Development of Mangrove Ecotourism Wonorejo Surabaya Based on Productive Landscape and Community Participation

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**Abstract-** Indonesia has the widest mangrove ecosystem in the world which is about 4.25 million Ha. However, 48% of mangrove forest area in Indonesia is moderate and 23% suffered severe damage. Mangrove ecosystems are scattered in several islands in Indonesia, one of them in Surabaya. Data from the Agriculture Department of Surabaya City shows the depreciation of mangrove forest area from 2010 to 2011 covering an area of 20.47 Ha, centered in Wonorejo Subdistrict, Surabaya. Surabaya City Government tactics to maintain the mangrove ecosystem by making it as ecotourism has not been met. Almost, the mangrove ecosystem in Wonorejo is proclaimed to be the Surabaya City Botanical Garden. This research using tracing analysis and cognitive mapping. Method of research design includes analysis, synthesis, assessment and decision to draft and design schematic.

This study aims to develop EMW into a multifunctional and attractive ecotourism by involving community participation. The results of the context are the factors that influence the development of EMW namely aspects of ecotourism development, productive aspects and aspects of community participation. To meet all that required a facilitative strategy that is able to handle various needs activities. In the aspect of ecotourism development, there are three zones to organize community activities, namely the main conservation zone, the main zone and the supporting zone.

**Index Terms-** Community Participation, Mangrove area development, Mangrove Wonorejo Ecotourism, Productive Landscape.

## I. INTRODUCTION

Indonesia has the largest mangrove ecosystem in the world. The area of mangrove forest in Indonesia is about 4.25 million Ha spread over several islands, such as Sumatra, Java and Bali, Nusa Tenggara, Kalimantan, Sulawesi, Maluku, and Irian. Approximately 48% of mangrove forest area in Indonesia suffered moderate damage and 23% suffered severe damage. Mangrove ecosystem in the city of Surabaya, East Java has been damaged by 40% of the total area of mangrove [1]. Based on data from Surabaya Agriculture Department [2] the amount of depreciation of mangrove area can be described in the following table:

**Table 1. Land area of Mangrove (in acres)**

Districts	Beach		Ponds		Riverside		Amount	
	2010	2011	2010	2011	2010	2011	2010	2011
<b>Mulyorejo District</b>								
- Kalisari	74.47	74.47	17.50	17.50	5.55	5.55	97.52	97.52
- Kejawan Putih	10.12	10.12	28.63	28.63	10.57	10.57	49.32	49.32
<b>Amount</b>	<b>84.59</b>	<b>84.59</b>	<b>46.13</b>	<b>46.13</b>	<b>16.12</b>	<b>16.12</b>	<b>146.84</b>	<b>146.84</b>
<b>Sukolilo District</b>								
- Keputih	24.03	4.03	85.72	85.72	7.16	7.16	116.91	96.91
<b>Amount</b>	<b>24.03</b>	<b>4.03</b>	<b>85.72</b>	<b>85.72</b>	<b>7.16</b>	<b>7.16</b>	<b>116.91</b>	<b>96.91</b>
<b>Rungkut District</b>								
- Wonorejo	23.12	22.65	13.29	13.29	27.86	27.86	64.27	63.8
- Medokan Ayu	24.76	24.76	56.68	56.68	8.30	8.30	89.74	89.74
<b>Amount</b>	<b>47.88</b>	<b>47.41</b>	<b>69.97</b>	<b>69.97</b>	<b>36.16</b>	<b>36.16</b>	<b>154.01</b>	<b>153.54</b>
<b>Gunung Anyar District</b>								
- Gunung Anyar	14.94	14.94	47.64	47.64	11.28	11.28	-	-
<b>Amount</b>	<b>14.94</b>	<b>14.94</b>	<b>47.64</b>	<b>47.64</b>	<b>11.28</b>	<b>11.28</b>	<b>73.86</b>	<b>73.86</b>
<b>East Coast Total</b>	<b>171.44</b>	<b>150.97</b>	<b>249.46</b>	<b>249.46</b>	<b>70.72</b>	<b>70.72</b>	<b>491.62</b>	<b>471.15</b>

The total depreciation of mangrove forest area from 2010 to 2011 is 20.47 hectares. Particularly the depreciation of mangrove forest area occurred in District Rungkut, Wonorejo Village that is shrinkage of 0.47 hectares in just over a period of 1 year. If this continues, then within 5 years there can be a significant decrease of 2.35 hectares.

An ecotourism should have several characteristics: strong local environmental and environmental considerations, positive local environmental and socio-economic contributions, and education as well as a good understanding for service providers or visitors regarding nature and environmental conservation [3].

However, there is a problem on Mangrove Ecotourism Wonorejo so that these characteristics do not materialize. Some of these problems are the unfamiliar area of Mangrove Ecotourism Wonorejo become a tourist attraction or Botanical Garden that attracts and has minimal impact on the environment. The distribution of tourism zones, research, education and other supporting activities is directly adjacent to the main protected zones, which may lead to major protected zones functioning for mangrove conservation disrupted by tourism activities and other activities.

Mangrove Wonorejo Ecotourism area has only a few ecotourism attributes such as parking, mosque, toilets, gazebos, docks, simple map contents, jogging track, fishing gear and street vendors. The existence of this facility is not supported by the shape and condition of the manicured. Thus, as ecotourism looks unattractive and boring. In addition, ecotourism does not have

facilities that accommodate the procurement of special programs for visitors / the public in conducting conservation activities. This research proposes mangrove ecotourism by using the concept of productive landscape. Where a productive landscape means an integration of productivity within a city through a landscape medium. Mangrove Ecotourism Wonorejo has the potential as an active and productive land for the local community. This research has done a lot of research on the mangrove ecosystem which states the need for knowledge for the community to encourage participation in mangrove conservation, but there has been no research that combines the concept of productive landscape and community participation in its development. Therefore, this research will focus on the development of Mangrove Ecotourism Wonorejo Surabaya as an attractive and attractive ecotourism area. The emphasis of the discussion is to develop schematic concepts and design that have minimal environmental impact and become an independent landscape-based landscape supported by community participation.

## II. RESEARCH ELABORATION

### 2.1 STUDY AREA

This research was conducted at Mangrove Ecotourism located at Jl. Wonorejo Timur No.1, Wonorejo, Rungkut, Surabaya City, East Java with an area of 700ha. Mangrove Wonorejo Ecotourism is included in the East Coast Region of Surabaya located at coordinates 7°15'19,60 "S - 7°17'13,25" S 112°48'35,69 "E - 112°48'40,72" East wide area ± 2,503.9 Ha. The soil type is alluvial hydromorph.

**Figure 1. Location map of study area.**



The boundaries of the study area are as follows:

- North : Sukolilo, Wonorejo
- South : Rungkut Medokan Ayu, Pandugo Street
- West : Sea Wonorejo
- East : Lotus Hotel, Regency Housing.

### 2.2 METHOD OF DATA COLLECTION AND ANALYSIS

The primary data in this study included a survey of a group of individuals conducted through a questionnaire. Then proceed with physical and non-physical observation with observation done at the time of working day (Monday-Friday) and weekend (Saturday-Sunday). Data mapping technique is done by behavioral mapping technique. Behavioral mapping is presented in the form of sketches or diagrams of an area where humans perform various activities.

In this study the analysis technique consists of:

#### a. Walkthrough Analysis

Walkthrough Analysis technique is an assessment of urban quality that is done by walking through the area with observation and see the impression that is felt along the way through the recording of images [4]. This analysis purposed to know the internal physical conditions in a region so as to get the aspects of the perceived impressions from the starting point to the end point of observation that can be poured into the criteria of development design Mangrove Wonorejo ecotourism is attractive.

#### b. Cognitive Mapping Analysis

This technique is used to process behavior observation and cognitive map data.

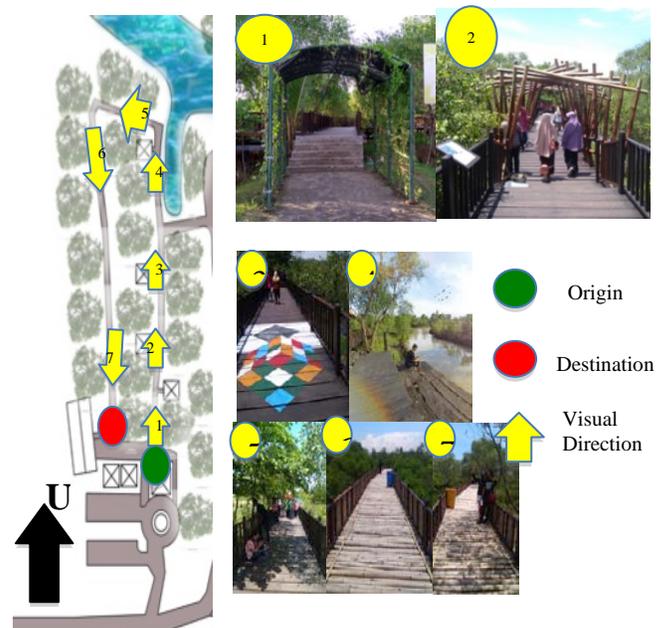
This data is obtained through surveys and observations. The data will be processed into the mental map that contains the linkage of cognitive mapping preference, ie cognition about how humans translate the built environment through spatial signs to remember it, and cognitive distance, that is about how humans have different perceptions about the existing spatial environment.

The purpose of this analysis technique is to get aspects in the design criteria of Mangrove Ecotourism development based on Wonorejo productive landscape as an ideal tourist destination from the perspective of the needs of community space utilization and researchers based on existing factual conditions.

## III. RESULT

### A. Walkthrough Analysis

**Figure 2. Walkthrough Analysis Lane 1**



**Connected:** Overall within the ecotourism area has provided a path with a wooden footbridge that is able to reach every destination point. However, there are only two shortcut lanes. This causes ecotourism visitors to go through a long route to reach each destination point.

**Conspicuous:** No map of where visitors are found on this line. With a considerable route should be able to add the presence of information boards and destination directions for visitors. In addition, there are also no warning signs for visitors not to throw garbage carelessly and how to treat mangroves in the area.

**Comfortable:** On the comfort aspect, found that Line 1 has some features that can make visitors ecotourism comfortable, namely the shelter, gazebo, and shady trees so that visitors do not feel hot. However, there are still some points like in visual direction 6 that have no shade whatsoever.

**Convivial:** On this path, there is no street furniture like lights or chairs for visitors. This is probably due to the path size only 3m. In addition, this path is also not friendly to disable users because it has no ramp and catwalk made of wood that is not tightly arranged to the fullest. However, there are many trash cans along the path, so visitors can throw the garbage in its place. In this path also has been equipped with a wooden railing so that visitors can hold and feel safe. Other things like the mural on the path of the catwalk also add the value of hospitality on this path.

**Convenient:** The line is identified as easy to navigate because it has clear directions and routes. In addition, most of the lanes have used material that is quite easy to pass by visitors. Only in visual directions 6 and 7 that use the bamboo material with different heights. The use of these materials causes ecotourism visitors is quite difficult to pass through and not infrequently there are tripping.

**Connected:** To reach this path visitors must use boat transportation mode first. As the origin point is provided a small dock as an area to raise and lower passengers. On this path from the origin point to the destination point can connect well.

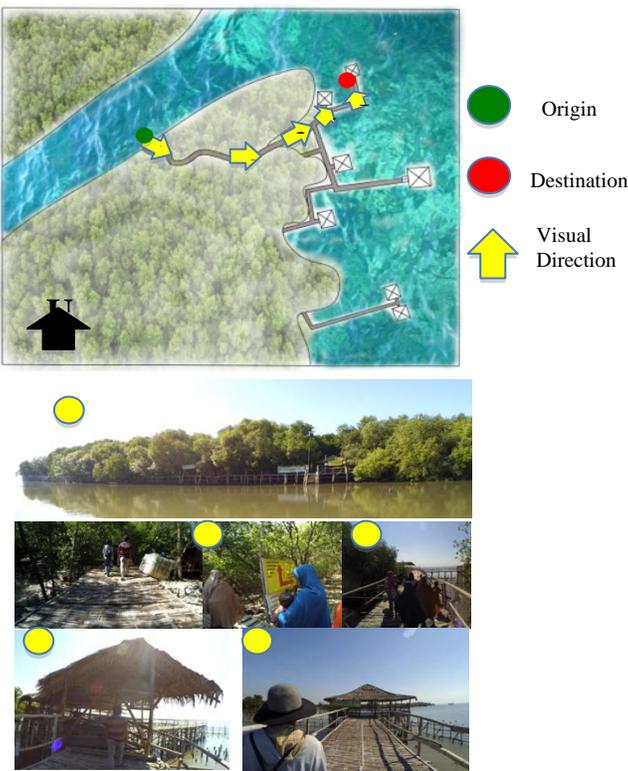
**Conspicuous:** On this path has a signpost to reach a particular destination point. In addition, there are also warning signs to not litter. With the existence of facilities, such information boards make this path is considered to have a fairly good clarity.

**Comfortable:** All the way from the point of origin to the visual direction 2 has lush mangrove trees so pedestrians can comfortably pass through when the weather is hot. At the visual point 3, the mangrove population is reduced and no shelters are available so pedestrians become less comfortable as they pass through the path. However, there are many shelters along the visual direction 4 to the destination point. Shelter and gazebo contained in this path using wood material that does not contaminate the mangrove ecosystem.

**Convivial:** Condition of the bridge along this path using wood and bamboo materials so that the structure is less sturdy and endangers visitors who are through it. On this path is also not available street furniture and attractions so that the journey to the destination point was tiring and boring. There is a railing made of bamboo material but not designed optimally. Thus, the railing is not the maximum and dangerous for visitors who are still children. This path also does not have facilities for disabled users. Based on the analysis, this path is considered less friendly to ecotourism visitors.

**Convenient:** The journey to this path requires a certain fee and different modes of transportation. When compared with the extent of the path in this area to the physical condition of the bridge that is less friendly to the visitor it can be concluded that this path still does not meet the aspect of ease.

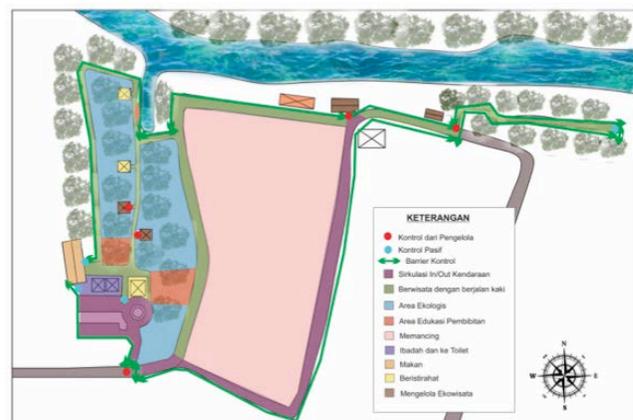
Figure 3. Walkthrough Analysis Lane 2



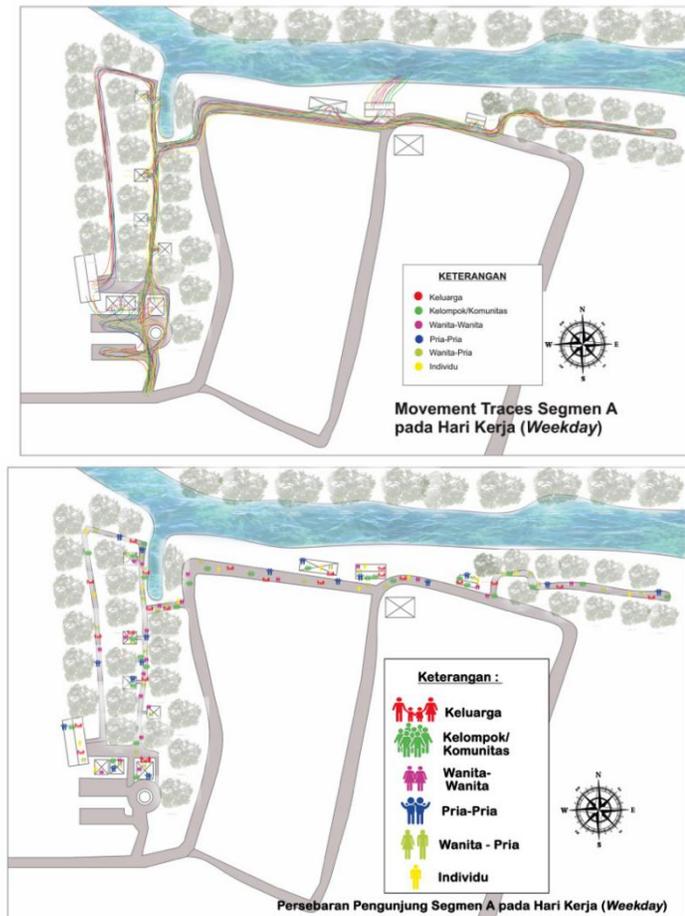
B. Cognitive Mapping

There are several activities on the ecotourism of mangrove wonorejo spread in several areas. The spread of the activity can be described in the following figure:

Figure 4. Spread of Activity Map on Segmen A



**Figure 5. Movement Traces Segmen A on Weekday**



User movement on weekdays usually begins by entering at the main entrance on the south side of the area. In the middle area, there are some facilities such as photo studio and gazebo or management office. Visitors will usually stop at the facility to take pictures and take a break. Then, visitors will continue the journey which is divided into 2 directions. The first direction leads to the culinary center 1 and the second direction to the main dock and main track jogging area.

In the first direction, visitors will usually enjoy spot views on a small dock located near the center area. Then the movement continues towards the culinary center. However, the movement towards that direction is rarely done by visitors. Instead, visitors usually choose to move back and move on to the next destination.

Meanwhile, the movement towards the second is more often done because visitors are usually interested to browse the area of Mangrove Ecotourism Wonorejo further and want to travel along the river to ecotourism area in the segment B. In addition, there is a culinary center and jogging track area which became the destination point from the direction this.

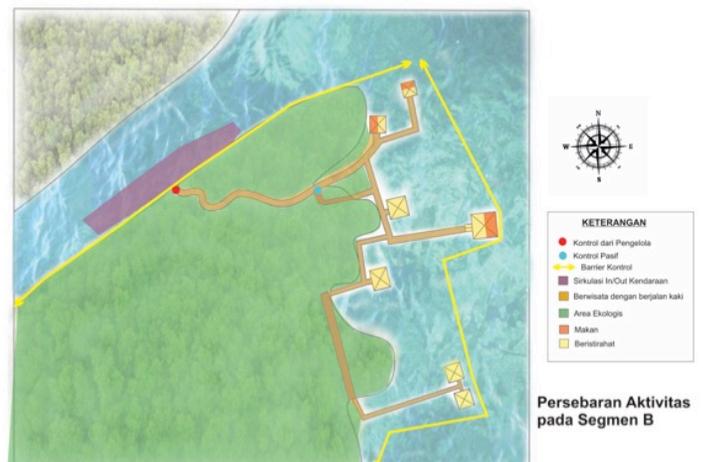
Visitors who go through the second direction are usually dominated by certain families and groups/communities. Only a handful of female visitors-men, women, men, and individuals will move up to the end of the jogging track.

After going through the destination each visitor will usually move towards the beginning of the movement in the south of the ecotourism area. Before leaving the ecotourism area visitors will

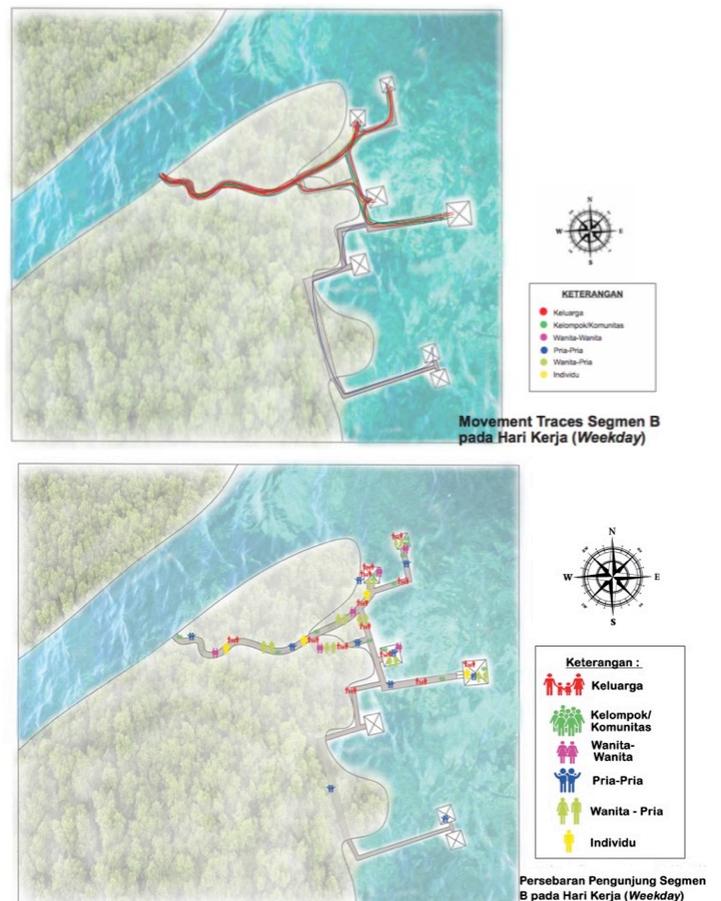
rest for a moment on a large gazebo located near the parking area. Then visitors will leave the Mangon Wonorejo Ecotourism through the main entrance / out.

Visitors with family and community categories are scattered throughout most ecotourism areas. The presence of visitors with this family category dominates the number of ecotourism visitors. Family visitors are usually happy to be at points that have stopover facilities such as culinary centers, gazebos, and jogging tracks.

**Figure 6. Spread of Activity Map on Segmen B**



**Figure 7. Movement Traces Segmen B on Weekday**



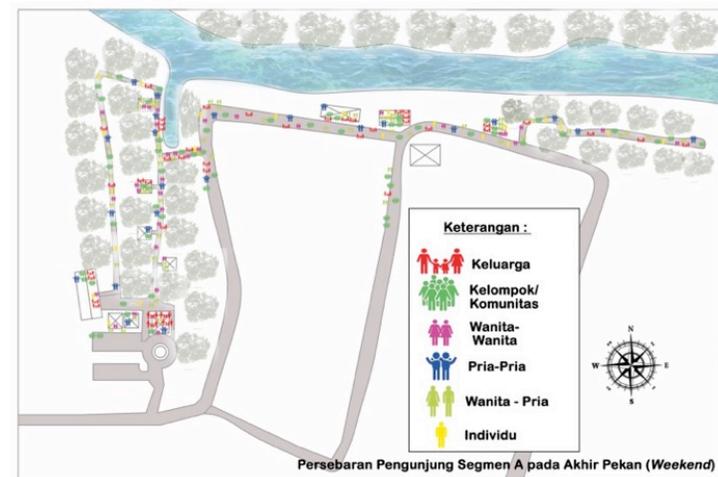
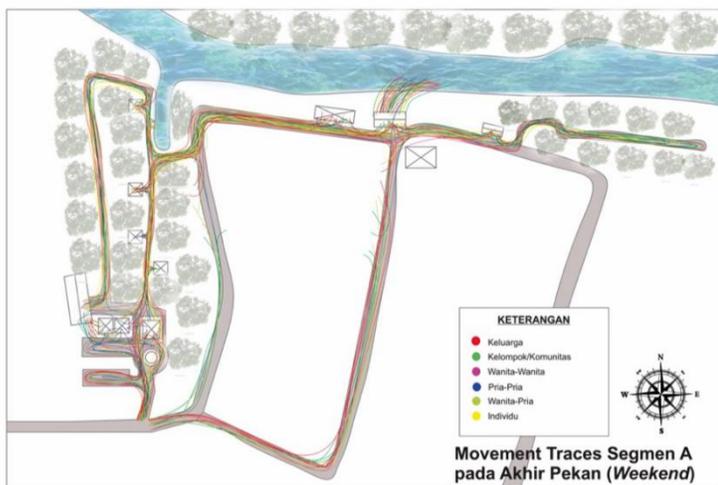
The entire movement towards this segment starts from the dock which will then proceed to the path of the wooden pavement. There is an intersection that divides the flow of movement into two kinds. Direction 1 towards the gazebo located on the north side of the area. Visitors will usually choose to move in this direction compared to direction 2. So that the movement contained in the direction 1 along with the gazebo located in the north of the area is usually more crowded with visitors.

While the direction 2 is the path that makes visitors move to the gazebo located in the middle of the area and the gazebo located in the south of the area. However, only gazebos in the middle of the area are more often the destination visitors. Movements to the gazebo located on the south side of the area are very rare and usually only done by individuals and categories of male visitors.

Visitors with the family category still dominate in segment B. However, it will only be found in the gazebo located in the north of the region and the middle of the area. This is because of the path to each gazebo far enough. And usually, visitors will not move around the destination.

Visitors with categories of groups/communities have characteristics similar to family visitors. However, group visitors can usually move from one gazebo to another gazebo.

**Figure 8. Movement Traces Segmen A on Weekend**



Visitors start the movement from the south of the area which is divided into 2 directions. The first direction enters the main

parking area located in the reception area of Mangrove Wonorejo Ecotourism. While the direction 2 will go directly to the main dock that will connect segment A to segment B. The second direction is an alternative condition if the 1st direction is not able to meet the capacity of vehicles and visitors.

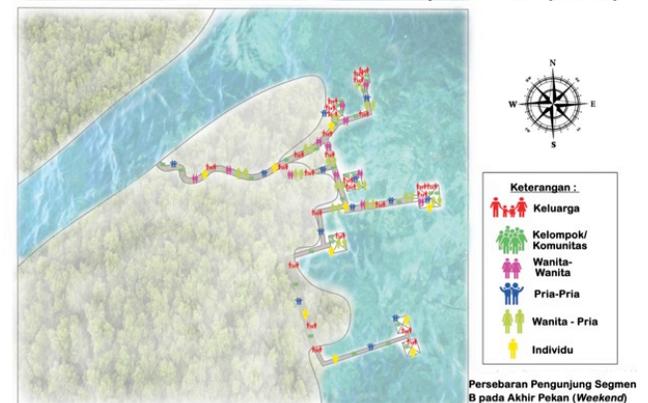
The majority of visitors entering from the 1st direction tend to move towards the middle area of ecotourism. Although the middle area will be split into two directions towards the culinary center and towards the main pier. Unlike the conditions during weekdays (weekday), visitors have a similar quantity of movement towards both directions.

Visitors moving towards the main pier often pause in the culinary center area before continuing their movement towards the main dock and jogging track area. Following from the area there are some visitors who rest in the area around fishing. Then, leave the Mangrove Ecotourism Wonorejo through the main in/out circulation.

Meanwhile, visitors who start the movement through an alternative pathway directly to the main dock tend to go directly to segment B or enter the jogging track area. After doing tours in segment B or jogging track area, visitors will move towards ecotourism area located on the west side of segment A.

Because segment A is also divided into 2 directions then there are visitors who will do the movement around the path to the new main culinary center and then back to the starting point of the movement. Then there are also visitors who move towards the middle area then immediately back to the starting point of the movement.

**Figure 9. Movement Traces Segmen B on Weekend**



All visitors will start the movement from the dock. The movement of visitors will be divided into 2 directions leading to

the main gazebo or towards the central and southern gazebos. The majority of visitors will move towards the northern gazebo then continue moving towards the central gazebo then return to the starting point of the movement of the dock.

The second line of movement tends to make the visitor towards the middle gazebo. However, there are some visitors who are moving towards the southern gazebo though with less quantity. After resting and enjoying the nature tour, visitors will move towards the starting point of the movement on the dock.

Visitors to the family category are visitors who dominate on segment B. However, the presence of visitors of this type only crowded the area of the north and central gazebos. Visitors in the family category are rarely encountered in the southern gazebo of the area.

Meanwhile, visitors with categories of group/communities crowded almost in the entire region. The quantity of group/community visitors is equivalent to the family category visitors. The presence of visitors with the male-female category is generally spread in the direction to the northern gazebo and central gazebo. However, the presence of visitors of this type also spread to the southern gazebo. Visitors of this type are the third most visitors after family and group/community.

The results of the analysis of aspects of research will be linked to the factors that influence in the research described in the following table :

**Table 2. Assessment of Research Aspects**

No.	Evaluation Factor	Research Aspects			Total Value	Information
		Development of Natural Ecotourism	Productive Lanscape	Community Participation		
1.	Natural Beauty	5	4	3	12	Excellent
2.	Culture	4	4	4	12	Excellent
3.	Education	3	3	3	9	Good
4.	Attractiveness	3	2	1	6	Medium
5.	Accessibility	2	3	3	9	Good
6.	Infrastructure	3	2	3	8	Good
7.	Promotion	3	2	2	7	Medium
8.	Extension program	3	3	4	10	Good
9.	Facility	3	2	2	7	Medium
10.	Aesthetic form	4	4	4	12	Excellent
11.	Conservation of ecosystem	5	4	4	13	Excellent
12.	Economics	3	3	3	9	Good
13.	Accomodation	3	2	2	7	Medium
14.	Thermal	2	3	3	8	Good
15.	Urban ecology	5	3	3	11	Excellent
<b>Score Point</b>		<b>51</b>	<b>44</b>	<b>44</b>	<b>140</b>	-

Description: The assessment is done in the range 1-5. Where the rating is 1 = Horrible, 2 = Bad, 3 = Medium, 4 = Good, 5 = Excellent

**Table 3. Scoring Analysis Results**

No.	Factors	Quality	Rate	Score
<b>Attractiveness</b>				
1.	As Ecotourism that relies on natural conditions	30	5	Excellent
2.	As a recreational / tourism facility (including attractive tourism attributes)	30	3	Medium
3.	Availability of infrastructure	10	2	Bad
4.	Management as an ecotourism facility	30	3	Medium
5.	Promotion	15	2	Bad
<b>Productive Landscape</b>				
6.	To support the conservation of mangrove ecosystem (referring to community participation in managing ecosystem)	20	3	Medium
7.	To support people's productivity	15	3	Medium
8.	As an educational tourism facility	20	2	Bad
9.	Capital support from government/certain parties	10	3	Medium
10.	Availability of flora and fauna vegetation.	20	4	Good
<b>Total</b>		<b>200</b>	<b>30</b>	-

Description: The assessment is done in the range 1-5. Where the rating is 1 = Horrible, 2 = Bad, 3 = Medium, 4 = Good, 5 = Excellent

Based on table 2 and table 3 can be identified that aspects that need attention are the availability of infrastructure, accommodation, promotion, and educational tourism facilities. Other factors that can be further developed are recreation facilities, ecotourism management facilities, strategies to encourage community participation in managing ecosystems and supporting community productivity, and capital support from government / certain parties.

The only factor that has a good score is ecotourism conditions that have excellent quality as the main attraction in the region. The mangrove ecosystem within the area has the potential to increase the productivity of the landscape and become a habitat for flora and fauna.

#### IV. CONCLUSION

From the research that has been done, it can be concluded several things:

Some of the influential aspects of this research are aspects of ecotourism development which include ecotourism management facility of mangrove Wonorejo, productive landscape aspect and community participation aspect which includes tourism education facility, conservation supporting facility of the mangrove ecosystem. The availability of an infrastructure capable of accommodating all these aspects creates an 'ecological community'.

Based on synthesis theory and field analysis results indicate that a facilitative strategy is needed to promote an attractive ecotourism development and as a productive landscape supported by local community participation.

To support the ecotourism development aspect, it is necessary to divide the zoning of the area into 3 which is the main conservation zone, transition zone, and the support zone. The benefit of the zone division is 'organizing community activities' that take place within the region so as to be sustainable with each other.

To support the area into a productive landscape, some facilities are needed to improve the landscape capability to be more productive ie laboratory facilities that are used as a place to research mangroves in order to review the techniques of planting or researching the quality of mangrove processed products. In

addition, a productive garden is needed which contains various other productive crops that can grow on adjoining land to the mangrove ecosystem.

The area becomes more productive by providing facilities that involve community participation. One of them is to provide gallery facilities, workshops for community development programs on how to mangrove processing and sales outlets.

To increase the attractiveness in the area it is also necessary alternative transportation modes such as bicycles and the cable car that can connect between zones. The existence of such infrastructure can also be one of the attractions within the region.

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