Soundscape and Smellscape Analysis in Desa Wisata Penting Sari

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Abstract: Desa Wisata Penting Sari (Sleman, Yogyakarta) located below the slopes of Gunung Merapi; this benefits the village to have diverse vegetations and animal inhabitants. Desa Wisata Penting Sari also attracts many visitors, its diversity on cultures, and indigenous communities that have amicable characteristics of courtesy. Java Gamelan instrument also plays roles in the culture of Desa Wisata Penting Sari. It is one of the tourist attractions for visitors. This study aims to identify the soundscape and the smell scape in Desa Wisata Penting Sari, the method used in this study are spatial mapping based on geographic information systems with Arc Gis software, where the sound and aroma data, measuring ranges and threshold. Observation is also done by looking at existing land use data, perception maps, and behavior of the village communities. The results of identification and mapping show that sound sources are dominated by natural sounds such as insects, water flow, or livestock that inhabitants in the village. The northern region of Pentingsari Village has a distinctive sound, namely the sound of a wood cutting machine, while the central area of Pentingsari Village dominated by chickens, goats, and cows and the south region dominated by water, insects, and birds. Human activities also contribute to the soundscape, such as vehicles, human voices during outbound activities. The sources of the odor are identified as coming from natural odors such as from livestock, moist soil, and fruits. In the northern and central regions of Pentingsari, there is a smell of *zalacca*, the smell of livestock, and the smell of garden soil. The South region has the smell of garden soil and the smell of livestock. In terms of sound and smell coverage, it has reached all areas of the village, which can be maintained to improve the sustainability of tourist villages.

Keywords: Desa Wisata Penting Sari; livestock; sustainability

1 Introduction

The presence of the 2014 Village Law (Pemerintah Republik Indonesia, 2014), requires that each village be able to carry out autonomy in managing village funds independently. One of the focuses of developing village funds by optimizing the potential of community-based village tourism. Pentingsari tourism village as one of the best tourist villages in Indonesia has no natural and cultural potential (site) and is one of the worst points in the 2010 Mount Merapi Eruption disaster.

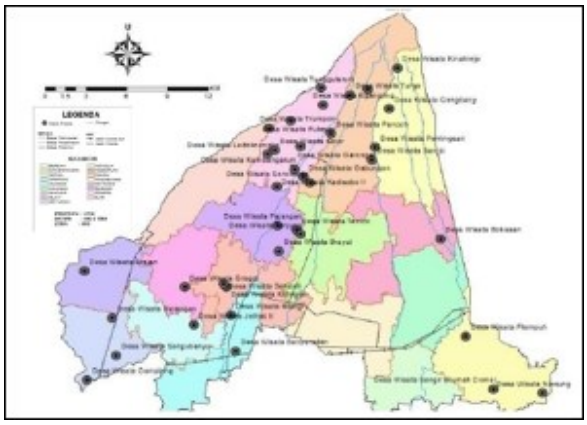

Figure 1. Distribution map of tourism potential in sleman district 2015
(Source: Fauzy,2015)

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Tourism villages are generally based on the potential of nature, crafts, and culture/tradition. Sleman Regency is one of the districts in the Special Province of Yogyakarta (DIY), which has many tourist villages (Kurniawati, Nurkukuh, Tinggi, & Nasional, 2018). There are 31 tourist villages in Sleman Regency, where 21 villages are nature-based, ten are tradition-based, four are craft-based, and three villages are based on nature and tradition (Vitasurya, Hardiman, & Sari, 2012).

The difference between tourism village and village tourism lies in the subject of the manager. Tourism Village is managed by the local community and invites tourists to take part in enjoying life together. Village tourism is managed by certain legal materials formed within and or outside the village. In the presence of tourism village and village tourism, it is directed to the welfare of the community and the independence of the source of income for the local community.

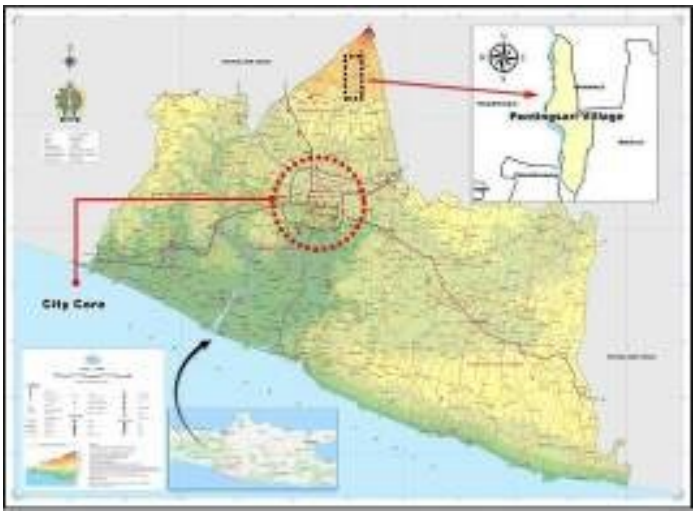


Figure. 2. Study of Area
(Source: Authors' Analysis, 2019)

The position of Pentingsari tourism village located on the slopes of Mount Merapi. The landscape effect makes the village flanked by the Kuning River on the east, and on the west, there is Pawon River. The existence of beautiful nature, supported by vegetation and animals both wild and domesticated, which are maintained as part of village tourism. Animals and plant vegetation, as an attraction for visitors to enjoy these services, also supported by the culture of the local community through traditional music and natural sounds, can increase the length of stay of tourists.

Based on the results of the interview with Doto Yogantoro (Chair of Pentingsari Tourism Village Manager), said that

> *"... Our village does not have any potential that is attractive for sale, 2010 we experience sorrow 60 of our citizens died due to the Merapi Eruption, 25 ha of rice fields were lost, the natural potential is still the same as other villages, but now the number of tourist visits in our village is 3000 people/month. "*

The potential of natural tourism that is the same as other villages causes creativity from citizens by providing education to tourists on the activities carried out. Planting rice, patrolling on the night, gardening, playing in the river, making coffee, playing gamelan, and various attractions created by the community in reviving villages that died in 2010, until now become independent tourism village. The participation of the community in the activities of the villagers made the community want to back to Pentingsari again, not only because of their activities but the beautiful village atmosphere.

The beauty of the village atmosphere, supported by environmental elements that are maintained, to cause human sensory sensation (tourists), will remember the experience experienced directly in a place. Spirits from a place can be formed from natural or artificial environments, known as genius loci(Schulz, 1976). Elements of the natural environment at Pentingsari, supported by sound and smell, form a virtual and real space, resulting in human perception of place.

Sounds and smells, produce space identities, make perceptions of the recipient of the place visited. Reactions to sound and smell effects can be either acceptance or rejection. Several factors cause the perception of sound and smell namely (Quercia, Schifanella, Aiello, & McLean, 2015); first, the type of source of sound and smell produced, the second is the reception effect of the sound and smell produced (reflection and reflexes of the recipient), third, environment (landscape)/cultural identity.

The factor that caused a large number of tourists visiting Pentingsari Tourism Village and caused the sustainability of this village is sound and smell. Identification of sound and smell through mapping spatially can accommodate various natural potentials, to improve regional identity.

The development of spatial-based tourist tourism villages was carried out by making village maps with spatial references using Geographic Information System (GIS) (Aminu, Nazri, & Muhamad, 2013). The use of mapping technology can help in the process of planning, structuring, monitoring, and evaluating development.

Information and technology can also be the direction of tourist movement which inside and outside of the village. The purpose of this study was to identify the soundscape and smellscape that existed in the study location. The mapping process aims to conserve objects that reflect sound and aroma, to add uniqueness in a tourism village area.

2 Method

2.1 Data Collection Method

Retrieval of data related to sound and smell was performed manually or by using a tool. A sound measurement used a sound meter on an Android-based device. Smell measurement was performed by marking the location of the smell source with GPS and giving it a scale; high, medium, low (on the professional judgment of the researcher), based on the smell range.

Figure 3. Example of sound measurement using Sound Meter
(Source: Authors' Analysis, 2019)

The duration of data collection was carried out for three days, starting from 05.00 to 22.00. Determination of the sound and smell location used a grid system. The grid method is a survey method by forming grid boxes with the same area in the area to be surveyed. Then a survey is carried out on each grid that has been made. The grid method is good enough to be used to produce spatial images evenly in an area. The data enumeration team recapitulated the data for sound and smell, then further analyzed with Quantum GIS (QGIS) software.

The population used in this study was the entire area of Pentingsari Tourism Village, while the sampling technique was using incidental sampling, namely the technique of determining the sample based on a specific location where the aroma and sound were found. The survey conducted found several 63 points scattered throughout the Pentingsari Tourism Village.

2.2 Data Analysis Method

Data analysis was performed by recapitulating source data, range of sound, and smell. Recapitulation results then processed in QGIS software. All coordinates of the survey results and range were mapped. The results of the analysis were then carried out using the nearest neighbor analysis method. This nearest neighbor analysis method can be used to assess the spread patterns of other phenomena such as patterns of landslides, patterns of distribution of Puskesmas, patterns of distribution of water sources (Nurekawati & Santosa, 2016). The closeness between objects will cause regional patterns and characteristics. Every material object that is either living or immovable has a distance factor that can give rise to a specific structure (Hoffmann & Tietje, 2015).

3 Results and Discussion

3.1 Spatial Planning of Pentingsari Tourism Village

Pentingsari Tourism Village is at an altitude of 550-600 masl. The contours of the region are hilly and lowlands. Located at 12.5 km from the summit of Mount Merapi, the distance from the center of Yogyakarta City is ± 22 km, from the center of Sleman Regency it is 20 km, from the center of Cangkringan District is 8 km away, and from the center of Umbulharjo Village is 3 km.

The Pentingsari Hamlet landscape is shaped like a peninsula, on the west, there is a very steep valley, Kuning River, and to the south, there is a valley in the form of Ledok or Ponteng and Gondoran Caves. To the

east, there is a steep valley of Pawon River, and on the north is a plain that is directly related to the land surrounding the Umbulharjo Village through to the courtyard of Mount Merapi. The environment of the Pentingsari Hamlet is fresh and has a beautiful panorama.

Table 1: Number of Tourist Visits at Pentingsari since the last ten years

Years	Domestic Tourism	International Tourism	Total
2008	989	9	998
2009	5,332	-	5,332
2010	9,575	6	9,581
2011	19,861	71	19,932
2012	30,389	511	30,900
2013	26,249	436	26,685
2014	28,649	411	29,060
2015	22,302	127	22,429
2016	32,178	350	32,528
2017	20,273	144	20,417
2018	14,932	160	15,092
Total	210,729	2,225	212,954

Source: Pentingsari Tourism Village, 2019

The number of tourists in Pentingsari villages has increased for the last ten years. Table 1 shows that 98.96% of visitors came from domestic tourists, while foreign tourists of 1.04%. The average number of visitors per year is 13,359 people with the highest visit in 2016—the average growth of 20%/year for the last ten years.

Table 2: Land use in Pentingsari Tourism Village in 2019

Land use	**Hectare**
Agriculture	69.00
Field / field	2.58
Rice fields	8.56
Settlements and Activities	20.00
Meadow	1.20
Shrubs	1.92
Total	103.27

Source: Authors' Analysis, 2019

The success in attracting tourists is supported by activity factors with the concept of ecotourism, in a participatory manner (Susilo & Herastuti, 2017). The concept of Ecotourism at Pentingsari is supported by a population of 339 people (2011), with 49.3% men and 50.7% women. Closeness to nature is taught to tourists, love, and respect for the environment emphasized in every activity, the thing that is always expressed by managers is the value of sustainability is more important than wealth (Kusumastuti, 2018).

The pattern of utilization of the Pentingsari Tourism Village space is shown in the overall pattern of the Pentingsari Village space. Settlements developed in the middle to the south of this village. This area is now developing into Pentingsari Tourism Village. In the northern part of the village, it can be found several residential areas, but its function is as a farm, not a settlement as it developed in the middle to the south. Based on the results of interviews with the village community and monitoring of aerial photographs with uncrewed aircraft, it is known that this condition occurs because the population is disturbed by the quite large scent of the farm so that almost no housing develops in the north. This is also one of the reasons for the development of Pentingsari Tourism Village from the middle to the south. Percentage of land use in Pentingsari, 70% is an agricultural area, 20% is a residential area, while the other 10% is open land, either bush, grassland, or moor/fields on a small scale.

The center of tourism activities in this area is Camping Ground, or each homestay spread in residents' housing. Camping Ground is a large field that can be used as a large-scale camping area; around it, there are small platforms and pavilions for the appearance of works of art and other event activities. A homestay is a place of residence that is provided in a tourist village that is integrated into the residence of the villagers.

Each tourist attraction has a relationship with each other. The connection can apply based on tourism themes (history and nature) or based on their position that is close to each other, making it easier for visitors to reach them. Based on the theme, the village tourism manager has also divided it based on the packages offered to visitors. There are 55 homestays with 130 rooms that cater to tourists. The criteria for the house to be used as a homestay, at least provide two rooms with clean toilet facilities and others.

Based on observations, three objects can be used as centers of activity, namely: Robusta Coffee Processing Post. Through this tourist attraction, visitors can reach other tourist objects located in the north, such as Watu Umbrella, Watu Gendong, Pancuran Sendang Sari, and Plant Cultivation. The second center of activity is Joglo.

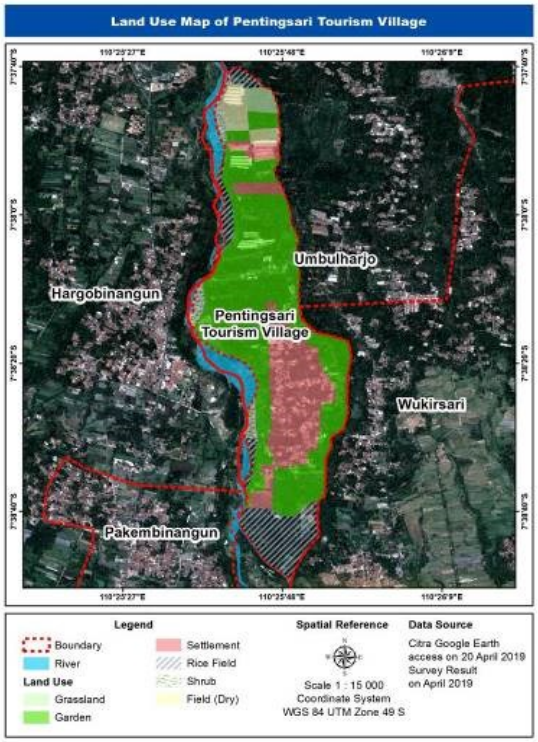


Figure 4. Land Use Map of Pentingsari
(Source: Authors' Analysis, 2019)

Figure. 5. Smell and Sound Sources at Pentingsari
(Source: Authors' Analysis, 2019)

Joglo is a center for traditional art performances and can connect other attractions such as Luweng, Janur Creation Post, and Bathing Area. The third activity center is the Coffee Processing Post, located in the south. This post connects visitors to tourist objects found in the southern region, closer to the farms and plantations owned by residents. Attractions in the south include wayang, offerings, and ponteng caves. Pentingsari also works with surrounding villages in terms of; Collaboration with tourist villages around Pentingsari village. The utilization of tourist attractions in the Merapi Mountain area, Provision of attractions from the city of Yogyakarta.

3.2 Soundscape Analysis

Pentingsari Tourism Village has a variety of sounds, both natural sounds from nature and sounds from human activities. The voice in Pentingsari village is dominated by natural sounds such as the sounds of insects, water, or livestock that live in the village. Soundscape can integrate humans and the environment to provide character from the region (Pijanowski, Farina, Gage, Dumyahn, & Krause, 2011).

Based on observation, the highest sound source comes from the sound of ladybug (Hemiptera/ladybug) insects, heard from morning until 18.00 in the southern region of the village. The smallest sound comes from the human voice, where there is 2% of the total sample surveyed. Village communities generally prioritize service to tourists, so that they rarely make a sound with a large enough range, human voices are generally in the camping ground area, rice fields and some residential areas in the middle of the village.

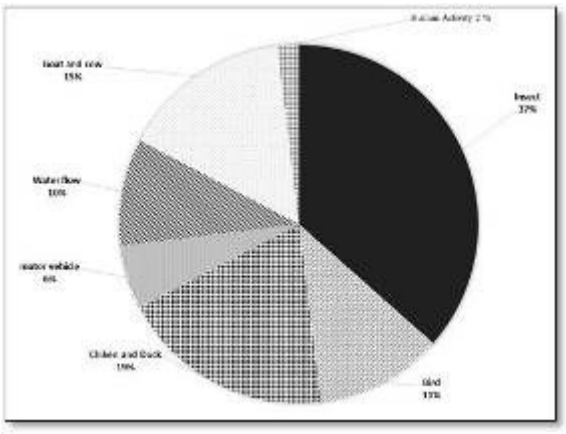


Figure 6. Percentage diagram of sound distribution in Pentingsari Tourism Village in 2019
(Source: Authors' Analysis, 2019)

The sound of insects that dominate the village area, supported by Pentingsari land use, where 70% is dominated by agricultural areas. Based on the results of interviews of researchers with visitors, the sound of insects provides calm and mood from the busyness of daily routines. Generally, insects live in natural locations that are still maintained, and with clean water quality.

The environment, as a sound source in soundscape analysis, will receive a response from the recipient of the meaning of the sound being heard(Wrightson, 2000). Below is a map of the distribution of voices in Pentingsari Village.

There are 52 sound points, and the sound distribution is clustered from the center to the south of the Pentingsari tourist village.

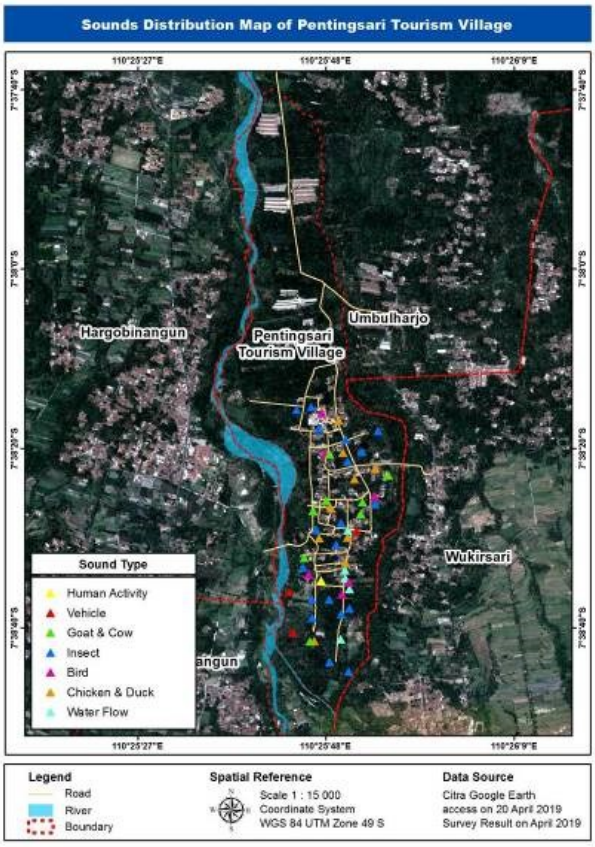


Figure 7. Sounds Distribution map of Pentingsari
(Source: Authors' Analysis, 2019)

Based on the picture above, the northern area of Pentingsari Village has a distinctive sound, namely the sound of a wood cutting machine. The central area of Pentingsari Village sounds a lot of livestock sounds like chickens, goats, and cows. The South region has many sounds of water, insects and birds. The sound of activities from human activities such as outbound or vehicle noise is also heard in the southern region of Pentingsari Village. Figure 8 is a graph of the analysis of the distribution of sounds in Pentingsari Village.

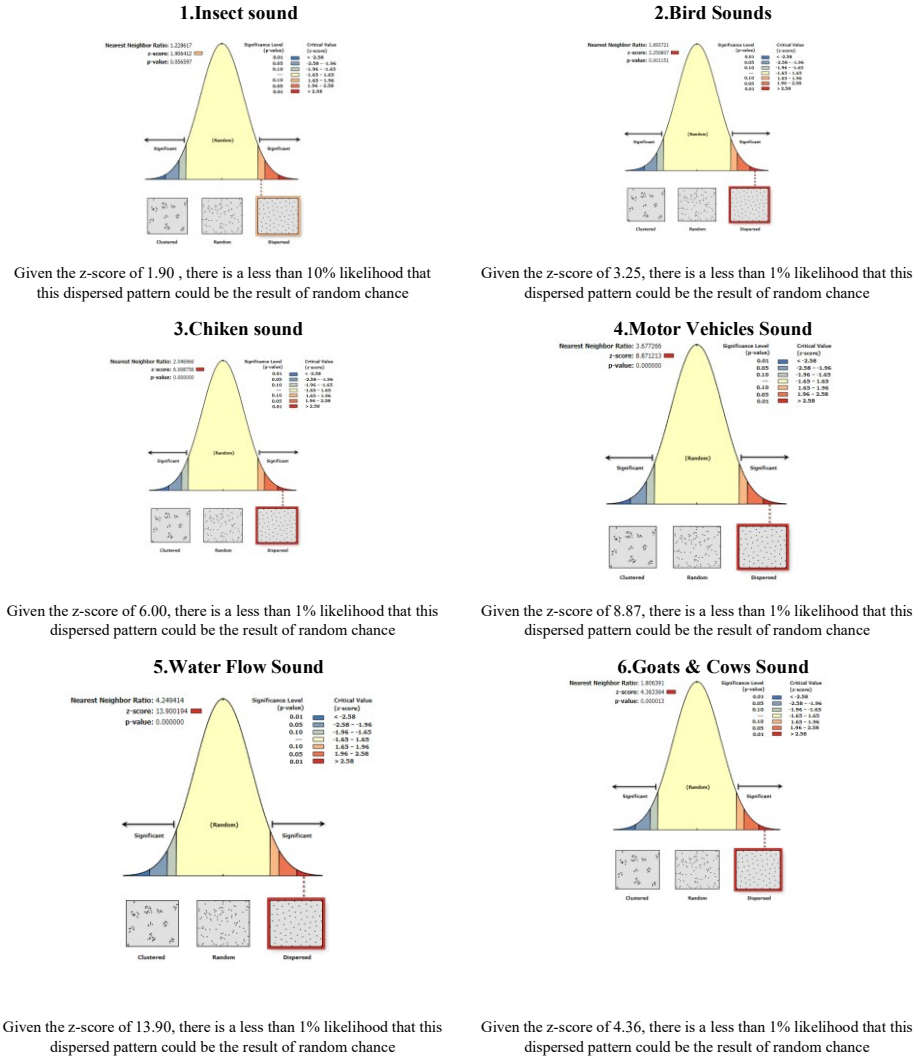


Figure 8. Spatial Sound Distribution Pattern/Distinctive Sound of Pentingsari Tourism Village (Source: Authors' Analysis, 2019)

The picture above is a graph of sound distribution in the Pentingsari village analyzed using the nearest neighbor method. Graph 1 shows the results of insect sound distribution analysis. The results of the analysis show a value of z-score of 1.90, which means that the pattern of sound distribution of insects is evenly distributed throughout the Pentingsari Village area. Graph 2 shows the results of bird sound distribution analysis. The results of the analysis show a z-score of 3.25, meaning that the pattern of bird sound distribution is evenly distributed throughout the village. Graph 3 shows the results of an analysis of chicken sound distribution, the results of the analysis show the value of z-score 6.00, which means that the pattern of chicken distribution is evenly distributed throughout the village. Graph 4 shows the results of the analysis of the distribution of motorized vehicles, the results of the analysis show a z-score of 8.87, which means that the pattern of sound distribution of motorized vehicles is evenly distributed throughout the village. Graph 5 shows the results of the analysis of the sound of water flow, the results of the analysis show a value of z-score of 13.9, which means that the pattern of sound distribution of flow is evenly distributed throughout the village. Graph 6 shows the results of the sound distribution analysis of village communities, namely goats and cattle, the results of the analysis showed a value of z-score of 4.36, meaning that the distribution pattern of goats and cattle was evenly distributed throughout the village.

The highest z score is the sound of water, while the lowest z score is the sound of an insect. The high and low z score is influenced by the distance between the survey points where the sound is heard. If the distance between adjacent or distant points is not uniform, the z score will be smaller, meaning that the spread of the point can be scattered randomly or clustered. The z score is getting more prominent if the distance between points is found in a uniform sound and spreads in the village area. Even though the distance between points is close or far

apart, if the distance has a uniform length and is spread over the village area, the result of the z score will be even greater. Based on the sound distribution analysis using the nearest neighbor method, it can be concluded that the sounds in Pentingsari Village are spread evenly throughout the village area.

2.3 SmellsScape Analysis

Smell affects our behavior, attitudes, and health. The hawker food market, for example, has dramatically changed the way we view all roads in global cities (Quercia et al., 2015). The smelly phenomenon is a chemical reaction that is caused naturally or artificially (Hutchison, 2013). There are two types of smells from 63 observed sample points, namely soil smell and animal waste smell. Animal waste smell dominates the smell in the Pentingsari area.

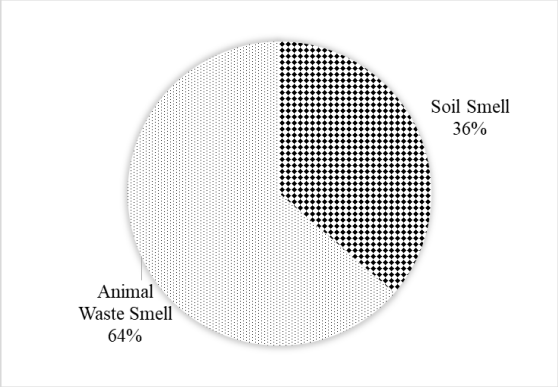


Figure 9. Typical Aroma Percentage Chart in Pentingsari Tourism Village
(Source: Author,2019)

Smellscape in Pentingsari Tourism Village consists of natural smells such as livestock, moist soil. The natural smell percentage of livestock dominates with a value of 64%, while soil smell has a smaller percentage of 34%. Below is a map of the distinctive smell or aroma that is present in Pentingsari Village.

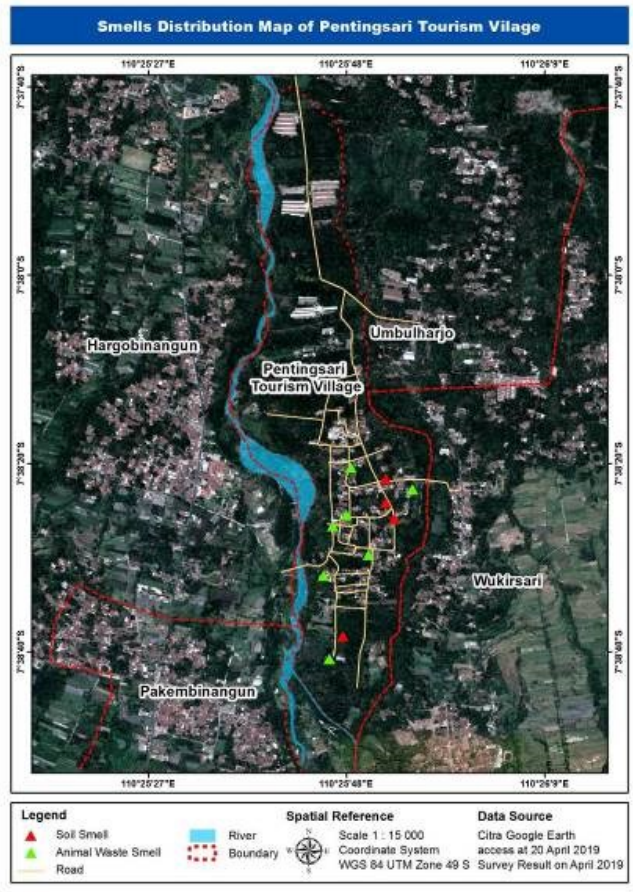
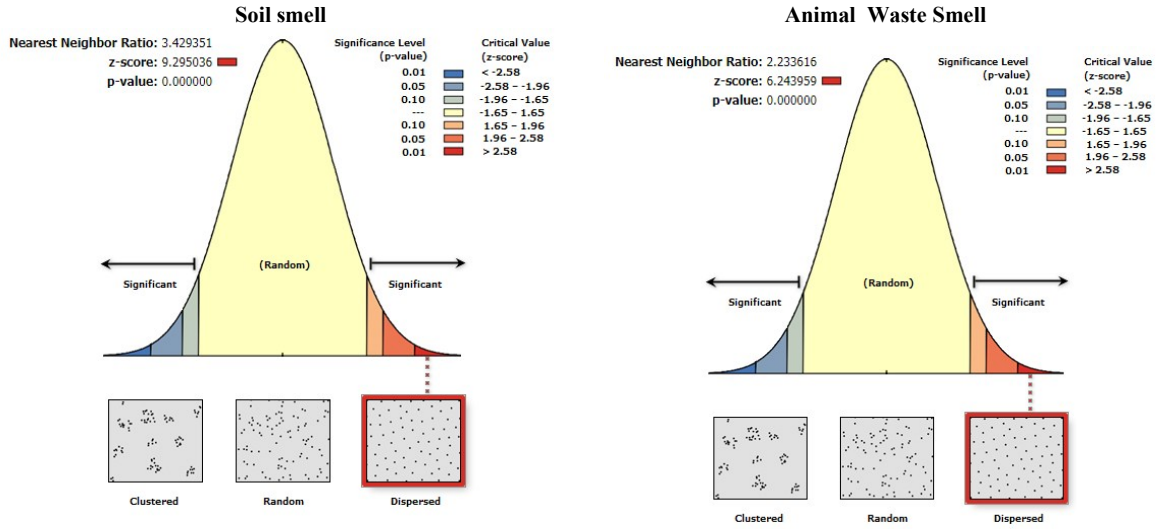


Figure 10. Smells Distribution Map of Pentingsari
(Source: Authors' Analysis, 2019)

Based on the picture above, in the northern and central regions of Pentingsari village, there is a smell of livestock and smell from the garden soil. The South region has the smell of garden soil and the smell of livestock. Below is the result of an analysis of the distinctive smell or aroma that is present in Pentingsari Village.



Given the z-score of 6.24, there is a less than 1% likelihood that this dispersed pattern could be the result of random

Given the z-score of 9.29, there is a less than 1% likelihood that this dispersed pattern could be the result of random chance

Figure 11. Spatial Smells Distribution Pattern/Distinctive Sound of Pentingsari Tourism Village (Source: Authors' Analysis, 2019)

The picture above is a graph of the distribution of distinctive smells or aromas at Pentingsari village, which analyzed using the nearest neighbor method. Graph 1 shows the results of the analysis of soil smell distribution; the results of the analysis show a z-score of 6.24, which means that the pattern of soil smell distribution is evenly distributed throughout the Pentingsari Village area. Graph 2 shows the results of the analysis of the distribution of animal waste smell; the results of the analysis show a z-score value of 9.29, which means that the pattern of the spread of animal feces is evenly distributed throughout the Pentingsari Village area. Based on the smell distribution analysis using the nearest neighbor method, it can be concluded that the distinctive smell or aroma in the Pentingsari Village is spread evenly throughout the village area.

4 Conclusion

Based on the analysis of soundscape and smellscape in Pentingsari tourism village, the spread is evenly distributed throughout the village area. The area of agricultural land by 90% causes insects to be heard from morning to evening. Soundscape in Pentingsari village is formed from the smell of soil and animal feces that are evenly distributed. From this research, it can be shown that elements that are closest to perception tourists to spread throughout the tourist village area make a living, homestays are free to choose and enjoy a different atmosphere for daily activities.

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