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# Challenges in collecting primary data for environmental research purposes: a case study in Parangtritis sand dune, Yogyakarta

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**Abstract.** *Gumuk Pasir* (Sand dune) Parangtritis, which is located in Bantul Regency, Yogyakarta Special Province, is unique to compared with several sand dunes located in Southeast Asia. This site faces many environmental problems as the result of anthropogenic interference. Landuse change practices have been done for several years now which change the general presentation of this area. Other than that, violation of the zonation also severe. Some of the core zones has been altered to tourism spots. Some area has also been altered into agricultural land. The impact of the changes needs to be monitored by installing several measuring staffs. Socialization of the research and administrative permit has been cleared before the installation. This research was a part of sand sedimentation research in Parangtritis Sand Dune. This research was conducted as the result of several disturbances in our staffs. The aim of this research was to understand the challenge in collecting primary data, notably in collecting sand sedimentation rate data in Parangtritis Sand Dune. During the research, by interviewing the local people, we can conclude that many were still unaware of the research which were resulted in the missing of several staffs. Information and identity of the researcher have been applied in each staff which was ineffective in preventing disturbance to the staff. Based on that, several efforts have to be done in order to minimize the disturbance in the future. So that, reliable data could be achieved for decision support mechanism in solving environmental problem.

## 1. Introduction

Data collection is one of the crucial roles in every research. Most resources will be applied in this data collecting stage only in order to obtain the desired data. There are known phrase such as “garbage in-garbage out”, which means that if the data we use was low in quality, it will be meaningless, the result of the study will as such. That phrase shows us the importance of data collection stage in every research, because it is the life of our research itself.

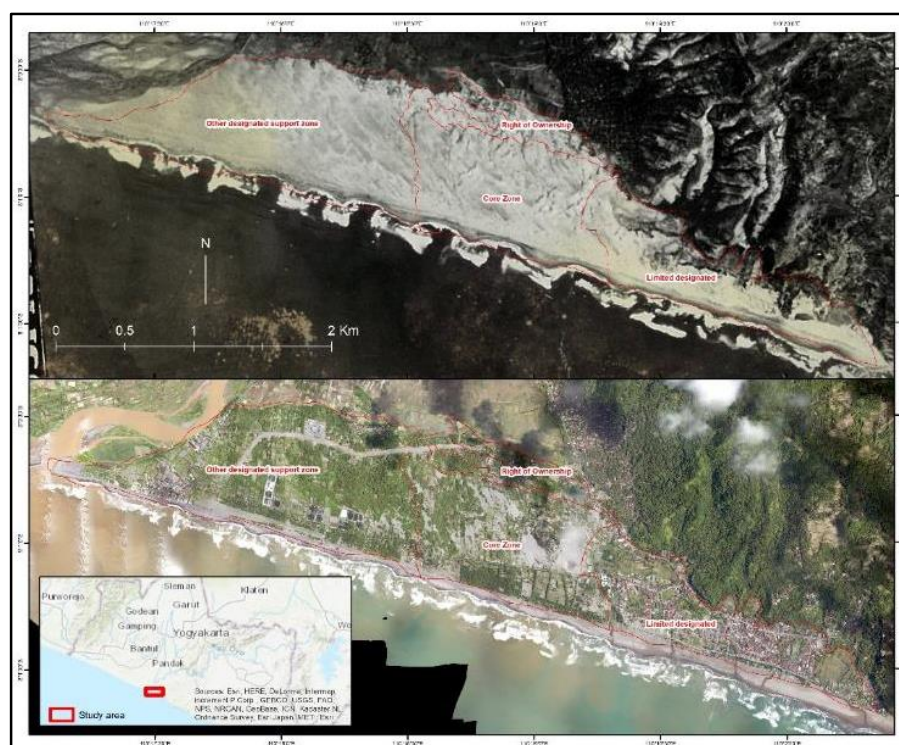
Data collection is the first stage in the research process (Rimando, Brace, Namageyo-Funa, Parr, & Sealy, 2015), therefore the quality of the data in the collection process had to be appropriate in order to produce a high quality and reliable research. Limited information on the challenges of data collection for environmental research purpose had lead us to write this manuscript. Not only describing the challenge in data collecting in our research but we also provide recommendations for researcher on strategies to address these identified data collection challenges they would met in the future.

This research is part of our study of Sand Dune Sediment Monitoring, conducted in the Gumuk Pasir Parangtritis that located in the Eastern part of the coast of Southern Bantul Region, Yogyakarta Special Province, Indonesia. According to local regulation (Perda) Number 4 year 2015, sand dune classified as In-Situ natural habitat. Another regulation namely Presidential Decree number 51 in 2016, coastal border should be justified using provision regarding protection of coastal ecosystem such as wetland, mangrove, coral reefs, seagrass, sand dunes, estuary, and delta. Those regulation indicate the importance and the essence of sand dune as an ecosystem that need to be protected.

Coastal Sand dune in Yogyakarta is one of unique aeolian landform that only located in Asia. It plays an important role as part of ecosystem which provide us with “ecosystem service”. Several works by researcher discussing the function of coastal sand dune to provide hazard mitigation had been



summarized that it can minimize the impacts of tropical cyclones, storm surges, wave action, coastal floods, tsunami, control coastal erosion, as well as mitigate climate change-related impact like sea level rise and salt water intrusion (Nehren, et al., 2016) by providing barricade/obstacle for them, so the energy is reduced. Not only providing barricade for hazard event, coastal sand dune can be addressed by its function as aquifer and water purificator as well as their unique biodiversity. Under natural development and zero disruption from anthropogenic factor, any ecosystem will provide maximum ecosystem service including coastal sand dune. Despite their value, many coastal sand dune around the world is having severe pressure by urbanization (Martínez, Maun, & Psuty, 2004), sand mining (Sridhar & Bhagya, 2007); (Miththapala, 2008); land use conversion to agriculture land (Nuraini, Sunarto, & Santosa, 2016), also with shrimp aquaculture. By that, the ecosystem service of coastal sand dune, especially the one in Parangtritis, will be reduced.



**Figure 1.** Study area and land use comparison between aerial photograph in 1978 (above) and 2017 (below). Aerial photograph credited to: Badan Informasi Geospasial

Pressure to coastal sand dune in Parangtritis is so severe that it changes the face of the landscape drastically. It can be seen from Figure 1 that since 1978 - 2017 the landscape is very contrast. In 1978, most area are inhabited and dominated by sand dune with a little cover of shrubs, meanwhile in 2017, the area was covered mostly by vegetation of various kinds and built up area such as settlement and recreation sites. regulation also play plays the main role in the development of an area. Around 1980's, agriculture and forestry service in Bantul started to plant various kind of vegetation. That decision was made due the paradigm that time that sand dune is one of the critical land that needs to be save by regreening it. Since than the growth of the vegetation had cause the development of sand dune to form is depleted until none. Sand dune area especially, and the coast as generals mostly was property of Yogyakarta Kingdom known as "Sultan Ground". Based on that, no right of ownership belongs to individuals. The land use conversion has led to the deterioration of sand dune and its function. Temporal and continous data for coastal sand dune sedimentation in Parangtritis is very important to understand the process and evolution of the sand dune in this area, respectively due to the land use changes in the area. Unfortunately, those data have not existed yet.

In order to understand more about natural processes and its contribution to sand dune formation and evolution, study of sand dune monitoring was done. The study about sand dune sedimentation was aimed to understand the current condition of the sand dune through various kind of landuse occupied the area. The study was only limited to the sand sedimentation process by wind which develop the dunes by installing monitoring station in the vicinity. During the sedimentation rate data collection were done, several measuring staffs were disturbed. According to that condition, we tried to find the reasons behind the disturbance of the staffs by conducting this research. This research was mainly aimed to understand the reasons of the disturbance of the measuring staffs as a challenge in primary data collection, especially in Parangtritis Sand Dune. This research can be used as an example to understand the difficulties and challenges in collecting primary data, even though the result may differ from place to place.

## 2. Methods

### 2.1. Study Area

The study area was located approximately 28 km south of Yogyakarta Municipality (see figure 1). The study area divided into three parts, it is core zone (141,1 Ha), limited designated zone (95,3 Ha), and other designated support zone (176,4 Ha). The total area is 412,8 Ha. Mostly in present condition, the area is used for tourism designation site spreading in each zone with the main attraction are: beach, photo and selfie spots, sea turtle hatching site, and sand dunes with its sub attraction such as sand boarding, selfie area, offroad riding through the sand dune and gazeboes.

Mostly, the area is covered by vegetation and shrubs. The vegetation occupied the area are: *Casuarina equisetifolia*, *Acacia*, and *Anacardium occidentale*. In addition, several parts of sand dunes are used for agricultural practices by local villagers, even in the core zone (Figure 2). In some spots, narrow area for rice field was found. The other landuse occupied the area is aquaculture for shrimp. The area administrative boundary was shared with several “Dusun”, that later each Dusun has their own tourist spot management for each area they have.

### 2.2. Data Collection

Before conducting the research, several attempts were done to collecting information for research permit due to local community sensitivity regarding the issue of sand dune regulation. Sedimentation data was collected by installing measuring staff throughout the sand dune area (Figure 3). The data collected was the height of sand in each measuring staff weather parameters such as: temperature, humidity, wind speed, wind direction, and light intensity. The location for placing the staff was determined by analysing the landcover and wind tunnel. So then, for the following study, can be correlate between the sedimentation rate and the landcover. There are 20 staffs installed throughout the area (

Table 1 and Figure 4) considered by the fund available during research. The staff than monitored frequently. In the early time after the installation, the data was collected less than a week period, after that, the period is a week or more.

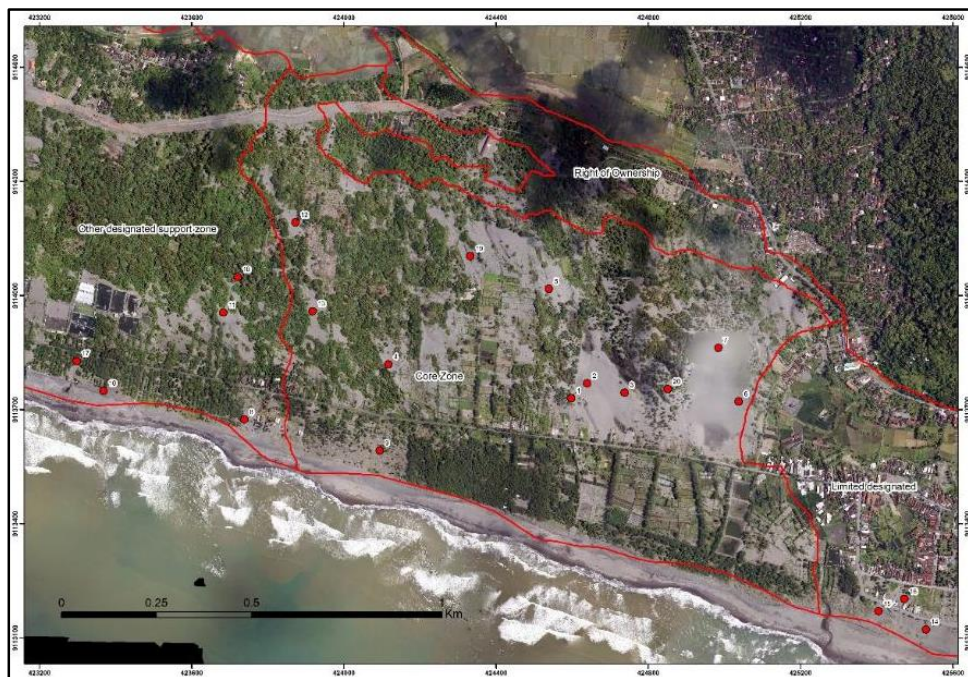


**Figure 2.** Oblique Aerial Photograph of Agricultural practices (right side) in Parangtritis Sand Dune





**Figure 3.** Measuring Staff Installation



**Figure 4.** Location of the installed measuring staff

**Table 1.** Distribution of measuring staff throughout the area

Number	Zone	Number of measuring staff
1	Core (141,1 Ha)	12
2	Limited designated (95,3 Ha)	5
3	Other designated support zone (176,4 Ha)	3
<b>Total</b>		<b>20</b>

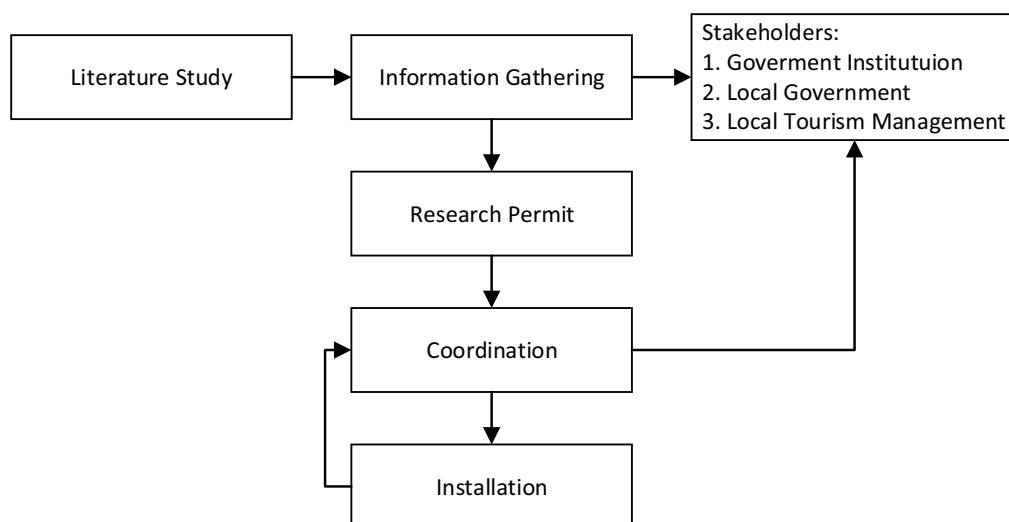
Source: Research Preparation in 2018

### 3. Result and Discussion

The research work was done by doing several steps (**Figure 5**). The first step was literature study, followed with information gathering related to local authorities who is responsible for managing Parangtritis Sand Dune. This information is important due to the tension built in the area because of

site arrangement made by the government as the understanding of the value of coastal sand dune is increased. The tension built up because of several cases such as sand illegal mining, and cleaning of illegal settlement and illegal business place. The tension was also built by the emergence of tourism sector which occupied zones in sand dunes including the core zone. And by the information we had gathered, the tourism spot and attraction were without permission so were the agriculture practices on the sand dune. To summarize them all, there are conflict of interest between the stakeholders, as the result, Parangtritis sand dune has become a great issue among institution and locals. The main focus was on the tourism and conservation issue. Tourism has produce high income for tourism activist operated in the area.

The information gathering stage resulted in the information of current condition as we had described in the previous paragraph above. According to the information gathered from PGSP (Parangtritis Geospatial Laboratory, owned by *Badan Informasi Geospasial*), in order to successfully installed and doing the research, communication to each tourism spot manager operate in sand dune. Formal and informal communication was done in paraller. The formal one was by asking for research permission, which is granted by Regional Plannig and Development Agency (Bappeda Bantul). The permission than followed to the lower level in the district and village administrative. The permission letter also handed to the local tourism manager operated in sand dune.



**Figure 5.** Preparation works during the study

Based on our monitoring, several locations had experience disturbance that cause the equipment gone, damaged, and altered. After the installation on the first day, we found that there was a disturbance in our staffs. Staff number 2 was pulled by force and took damage (**Figure 6**), number 14 was gone and number 15 was disturbed. The next monitoring on August 4<sup>th</sup>, we found disturbance in staff number 1, 10, 15, 16, 18. Several staff that were missing before then replaced they were staff number 1, 15, and 16. The indications of disturbance were seen by the position of the staffs, the dirt around the body of the staffs and the firmness of the staffs. Several staffs were found tilted, loose, and dirty (as an indication its already fell and picked up). The dirt in the body of the staff also as the result of grabbing by the hand, seen from the handmark left by the person. Several also found loosen as an indication of replugged by someone. The summarized of data collection is shown in **Table 2**.

**Table 2.** Height Changes during the monitoring (cm)

Staff	Date						
	24-07-18	26-07-18	04-08-18	11-08-18	29-08-18	12-09-18	16-09-18
1	31	1	-	-1,5	1,5	-0,5	-0,5
2	26	-10	-2	-0,5	-1,5	-	0
3	47	-1	0	2,5	-16,5	2	-1
4	37	2,5	0,5	-1	1	0	-0,5
5	63	0	0	-1	1	1	-0,5
6	39	-0,5	-2,5	-0,5	11	-15,5	1
7	45	0	0	3	0	-0,5	0
8	60	-1	0	-1	-2	-0,5	-0,5
9	67	0	0	-1	0	1	-0,5
10	50	-6	1	-1	0	0,5	-0,5
11	53	-0,5	1,5	-0,5	1	0,5	-1
12	53	-1	0	-1,5	3,5	0	-1
13	50	-1	0	-0,5	-1,5	1	-
14	34	-	-	42	-	-	-
15	63	2	19	42	-	-	-
16	30	1	-3	-3	-3	-0,5	-0,5
17	53	-2	-0,5	-1,5	1	1	-0,5
18	54	-2	1,5	-1,5	-2	3	0
19	55	2	0,5	-1	1,5	-0,5	-1
20	42	-1	2	0,5	0,5	1	-1

**Red box indicate disturbance on the staffs**

Source: Fieldwork in 2018

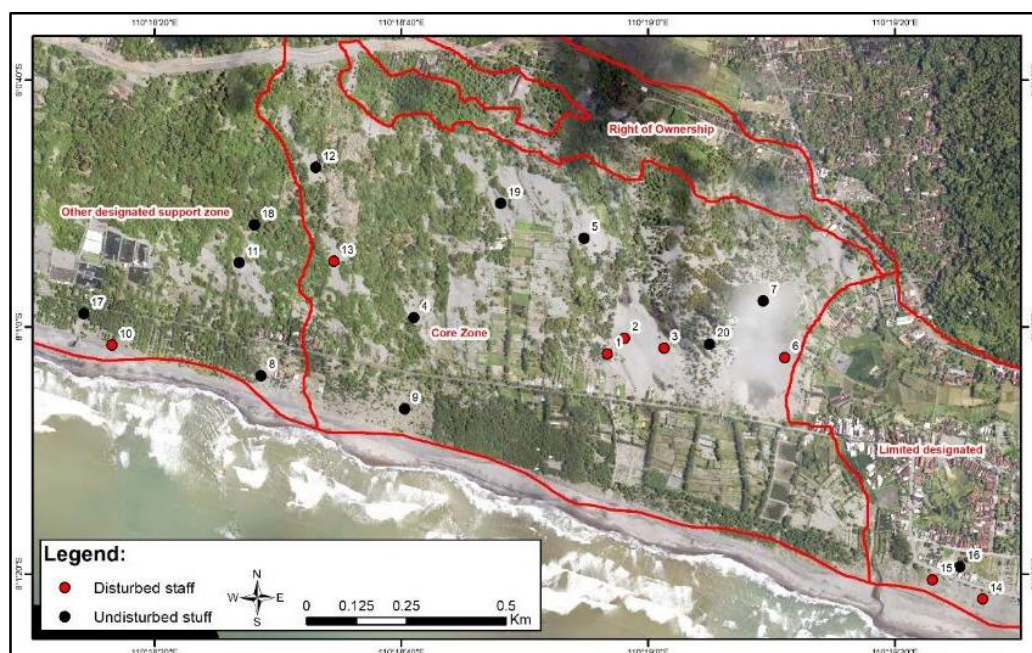
Monitoring in August 11<sup>th</sup> resulted in the disturbance in staff number 14 and 15 where the staffs were stolen. The staffs then replaced with the new one made with simple bamboo sticks (**Figure 6**). On August 29<sup>th</sup>, there are disturbance in staff number 2 and 3 which seems to be unplugged, number 6 and 10 disturbed with tilted and dirt condition on the staffs. The staffs number 14 and 15 were also stolen again and replaced. On September 12<sup>th</sup>, the staff number 2, 14 and 15 were stolen, with staff number 6 was disturbed. Staff number 2 then replace, except number 14 and 15. On September 16<sup>th</sup>, 3 staffs remain gone, they were staffs number 13, 14 and 15.

As described before, this research was preceded by communication and administrative permit arrangement had been made. Although they had already done, the information regarding the research had not reached the local villagers. That condition leads to the anxiety to the neighborhood. The main fear of the neighborhood was the expulsion that followed by eviction by the government, so that they not only lose their home but also earnings. The information about that anxiety was known by communication with the villagers.





**Figure 6.** The damaged staff number 2 (left) and replacement for the missing staff number 14 (right)



**Figure 7.** Spatial distribution of staff disturbance

According to the map and evaluation, it can be seen that most staff disturbance occur in core zone. Staff number 1, 2, 3 and 6 is located in the tourism area. The disturbance in tourism area mostly done by tourists which accidentally remove the staff and try to put it back. Meanwhile, staff number 13 located deep inside the core zone and need high effort to go there by foot. Staff number 15 and 14 located in Parangkusumo Beach, according to our observation, this place has a high sand transport blown from the southeastern side of the area. Staff number 14 was located in the location where sand illegal mining took place.

Staff number 15 was located near the shore, place in the depression where the wind scours the area. Staff 14, 15 and 16 actually was located in the highly important location where it was located in wind tunnel. The loose of measurement device in a research will leads to the significant reduction of data quality and continuity. Continuous data Staff number 10, located in other designated support zone actually far from tourist spot, but since the plantation and growth of *Casuarina equisetifolia* near the staff location. People often stop and enjoy the cool atmosphere in this zone and take their way up to the beach.





**Figure 8.** Staff number 14, located in sand illegal mining (shown in the background)



**Figure 9.** disturbance in staff number 10 where tourist hold the staff, steps and taking photograph in the location

The installation of the measuring staff was chosen and determined by the accordance of resources available during the research. Resources in this term including funding, man power, and time. All research method have their advantages and disadvantages (Potter, Von Hellens, & Nielsen, 2010), including this research. This research is simple regarding the method taken, it can be count as the advantages. In the other hand, that simple method as installing and monitoring the measuring staff is prone to loss of the data, it can be count as the disadvantages. As a scientific research, a research has to match the common principles: systematic, reproducible, reliable and valid (Cohen & Arieli, 2011). The loss of data continuously can lead to the collapse of this principle.

Conducting research in conflict environment will cause complexity and the occurrence of distrust and suspicion as the challenges (Cohen & Arieli, 2011). The conflict will also leads to difficulties in accessing data also difficulties in analze and interpretation of the data (Cohen & Arieli, 2011). Based on our observation, the society in the study area, which are in the conflict, is internally bounded/united and self -protective. This condition was the type of society in conflict area (Bar-Tal, 2000). The main conflict in the study area mainly is about sand dune conservation and socio-economic interest (tourism, agriculture, aquaculture, etc).

The challenge and recommendation in this research was based on the uniqueness of the research area. Different challenge and recommendation may be generated for the same research under different location and condition. It is said that case study research as this one is somehow lack of rigour (Yin,

2014), it may as the result of the uniqueness of each site. The recommendation in this research may will not suited applied in the other area due to its different condition.

Observation and evaluation of the research resulted that the main reason the measuring device was lost and disturbed were due to lack of communication between local government and the staff below to the level of neighbourhood. This condition leads to the anxiety of the neighbourhood regarding the installation of the staff. The second reason was the lack of knowledge and etiquette of tourist in facing research device found in the field. Mostly the reason was education and culture of the people. In order to fix this issue, further precautions need to be done to eliminate communication gap between researcher with local authorities, researcher with neighbourhood and researcher with tourist. Material choice for the staff or stakes need to be concerned further to prevent loss.

The vast area which the instruments were installed was one of the several challenging factors which become a limitation in this research. The vast area makes the safety monitoring of the instrument difficult. Each instrument separated from each other and needs time and man power to check one by one. The instruments safety check will also need budget addition in order to hire someone to check the instrument in the frequent manner.

The other challenging factor was communication and rural socio, economy, and cultural character. The communication among stakeholder is important to maintain the stability during research. The other challenging factor which leads to the anxiety of the locals was land tenure issue. Which as mentioned before, the land is belong to the Yogyakarta Palace. Means, the utilization right of the land is belong to the owner, not to the locals, even though many locals utilize the land according to their needs such as agriculture and tourism.

#### 4. Conclusion

The main challenge in this research was the vast research area and socio, economic and cultural aspect of the community. The strategies to coup with these challenges are communication and measuring staff material choice. Communication plays an important role in the success of a research. The communication among researcher, neighbourhood, local authorities, government, and tourist needs to be established. The choice for measuring staff is also important, in the future, the wooden staff needs to be change into something difficult to be pull out easily so it will be more difficult to be stolen. It can be made using concrete. More description to the staff or stake needs to be left on the field so tourist can understand the use and importance of the staff. So, it will not be disturbed. Socialization needs to be done in the neighbourhood in order to minimize the anxiety and suspicion among stakeholder. At least knowledge improvement for community play a significant role in order to make sure measurement device left on the field works to its best to provide reliable data for the researcher.

#### Acknowledgement

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#### References

- [1] Bar-Tal D 2000 *Political Psychology* **21**(2) 351–365. <https://doi.org/10.1111/0162-895X.00192>
- [2] Cohen N and Arieli T 2011 *Journal of Peace Research* **48** (4) 423–435. <https://doi.org/10.1177/0022343311405698>
- [3] Martínez M L, Maun M A, and Psuty N P 2004 *Geomorphological , Ecological , and. Ecological Studies* **171** 354–369
- [4] Miththapala S 2008 *Seagrasses and Sand Dunes* **3** IUCN. Retrieved from <https://portals.iucn.org/library/sites/library/files/documents/CES-003.pdf>
- [5] Nehren U, Thai H H, Marfai M A, Raedig C, Alfonso S, Sartohadi J & Castro C 2016 Ecosystem Services of Coastal Dune Systems for Hazard Mitigation: Case Studies from Vietnam, Indonesia, and Chile. In F. G. Renaud, K. Sudmeier-Rieux, M. Estrella, U. Nehren, & U. Nehren (Ed.), *Ecosystem-Based Disaster Risk Reduction and Adaptation in Practice* (Switzerland: Springer International Publishing)
- [6] Nuraini F, Sunarto, and Santosa L W 2016 *Geomedia* **14** (2) 1–11
- [7] Potter L E, Von Hellens L, & Nielsen S 2010 The practical challenges of case study research: Lessons from the field. *5th International Conference on Qualitative Research in IT and IT in*

*Qualitative Research, QualIT 2010.*

- [8] Rimando M, Brace A M, Namageyo-Funa A., Parr T L, and Sealy D A 2015 Data Collection Challenges and Recommendations for Early Career Researchers. *The Qualitative Report*, 20(12), 2025–2036. Retrieved from <http://nsuworks.nova.edu/tqr/vol20/iss12/8>
- [9] Sridhar K and Bhagya B 2007 *Livestock Research for Rural Development* **19** (6) 1–10 Retrieved from <http://www.lrrd.org/lrrd19/6/srid19084.htm>
- [10] Yin R K 2014 *Case Study Research. Design and Methods* 5th Edition (California. London: Sage)