



Clean-up Drive System as Watershed Conservation at Saran River, Laguna, Philippines : Implications for Perception of Residents

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Abstract

Barangay Malinta has a regular garbage waste collection schedule. Biodegradable wastes are collected on Mondays, Wednesdays, and Fridays while non-biodegradable wastes are collected on Saturdays. The barangay is compliant to the RA 9001 (Solid Waste Management) however, they do not have a Material Recovery Facility (MRF). The absence of MRF is due to geographical location of the barangay which prohibits the establishment of the MRF facility due to its proximity to Laguna bay. The study aims to determine the perception of the respondents regarding the Clean-up Drive activities at the Saran River and to integrate it with the recommendations to aid in the improvement of the cleaning efforts for the said river, particularly at Barangay Malinta, Los Baños, Laguna, Philippines. Random sampling was used to identify residents to be included in the survey. The data were analyzed using percentage and mean. The results showed that the level of awareness among respondents residing Saran river is high. In terms of attitude, most of them strongly agreed that there will be a clean-up in the river and penalized those who will throw their waste in the river, most of the respondents are satisfied with the on-going river clean-up and optimistic that the river can still be cleaned and revived, and most of the respondents are willing to contribute amount and will be paid in the barangay as funding to river clean-up.

Keywords: clean-up drive system, perception of residents, saran river, watershed conservation, waste

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INTRODUCTION

The Manila Bay is one of the most popular bays in the world due to its picturesque sunset. Located in the western part of Luzon, the bay is surrounded by Metro Manila and Cavite in the east, Bulacan and Pampanga in the northern part and Bataan province in the west (Alejo and Ella, 2019). It lies at 120° 14' and 121° 24' E and 13° 58' N and 16° 8' N and has an area of 1,994 square kilometers and a 190-

kilometer coastline which runs across three provinces (Manila Bay Coordinating Office, 2019; Beckett et al., 1991).

The Manila Bay is also one of the busiest ports in the country because of its proximity to Manila. It is also the country's major center of economic activity ranging from shipping, industrial, commercial, fishing, aquaculture and tourism activities. These land-based human activities mostly caused the wide range of environmental threats which includes the discharge of municipal, industrial and agricultural wastes; soil runoff and air emission (Cadondon et al., 2022). Environmental threats to the Manila Bay include the deterioration of water quality, coastal erosion and siltation, loss of biodiversity, the appearance of harmful algal blooms (HABs), subsidence and groundwater extraction, overexploitation of fishery resources, habitat conversion and habitat degradation (Jacinto et al., 2006). In 2008, the annual Biological Oxygen Demand (BOD) load from the 58 sub-basins at point source in Manila Bay and Laguna Lake was estimated at 232,764 MT/yr (IWA, 2018).

Moreover, Claudio (2015) mentioned that the major sources of pollution in the Philippines are inadequately treated domestic wastewater or sewage (48%) – eighty percent (80%) of water provided to households becomes wastewater, agricultural wastewater (37%), industrial wastewater (15%), non-point sources such as rain and groundwater run-offs from solid waste or garbage deposits (also known as leachates) (Sanchez et al., 2012) and about 21 percent of the organic pollution load to Manila Bay came from the Pasig River basin, with 70 percent of this load derived from households added by PEMSEA (2020).

In Metro Manila, only 11% of the total population is directly/ indirectly connected to a sewerage system, 85% are served by over 2 million ill-maintained septic tanks and 4% of the population has no toilet (Claudio, 2015). Much of the population uses flush toilets connected to septic tanks and since sludge treatment and disposal facilities are rare in the country, domestic wastewater is discharged into the environment without treatment.

Due to the increasing environmental problems in the Manila Bay, the Supreme Court issued a Writ of Continuing Mandamus which orders 13 agencies to clean, rehabilitate, preserve, and restore Manila bay and to maintain its waters to SB level (DENR, 2019). In response to this, the Department of Environment and Natural Resources (DENR) launched the Manila Bay Clean Up Program which covers 8 provinces and 178 municipalities in Regions III, IV-A and NCR. The cleanup program of DENR focuses on the major and minor rivers which contributes waste to Manila bay. The program has three phases: first is the Clean Up and Water Quality Improvement, second is the Rehabilitation and Settlements phase, and last is on the Education and Sustainment phase (Vejano et al., (2021).

DILG Memorandum Circular 2019-09 or the "Observance of the weekly conduct of Clean-up Drive relative to the Manila Bay Clean-up, Rehabilitation, and Preservation Program" dated January 24, 2019, has directed 178 Local Government Units and 5,714 barangays covering the Manila Bay area to hold weekly clean-ups and follow existing environmental laws in their respective terrains starting on the Manila Bay Rehabilitation Project's launch date. Moreover, DENR (2019) stated that the entire area of Manila bay will be the focus of cleanup efforts including a total of 199,400 hectares drainage area, 190 km coastline, and 17 river systems. A total of 233,000 illegal settlers are expected to be affected by the rehabilitation efforts for reviving the Manila Bay (Ernest, P., 1977).

In January 29, 2019, various barangays in the Province of Laguna conducted simultaneous clean-up drives, in support of the rehabilitation program of the Manila Bay (Gabrido, 2019). The clean-up drive at the Saran River was led by the Department of Environment and Natural Resources Region 4A (DENR 4A) and participated by Barangays Anos and Malinta (Gorme et al., 2010).

The Provincial Environment and Natural Resources Office (PENRO) Laguna located all the major rivers and tributaries of the Laguna lake, which, for the case of Los Baños, is the Saran River. The Saran River is a stream located in the Province of Laguna, Philippines and has an estimate terrain elevation above sea level of 2 meters (Saran River, 2019). The river starts from Magnetic Hill in Makiling and traverses barangays Anos and Malinta down to Laguna lake.

Barangay Malinta has a regular garbage waste collection schedule. Biodegradable wastes are collected on Mondays, Wednesdays, and Fridays while non-biodegradable wastes are collected on Saturdays. The barangay is compliant to the RA 9001 (Solid Waste Management) however, they do not have a Material Recovery Facility (MRF). The absence of MRF is due to geographical location of the barangay which prohibits the establishment of the MRF facility due to its proximity to Laguna bay (Herrera et al., 2015).

Based on the monitoring data of Saran River Clean-up provided by the PENRO, there is a reduction in solid waste collected in Saran river from January to May 2019. However, from June-September there is an increase in waste collected (**Figure 1**). This increase is quite alarming since it is expected to go down due to information campaign and regular cleanup of the river. In order to know the factors which could have affected these results, a survey of households surrounding the river regarding the clean-up was deemed necessary (Maruyama and Kato, 2017).

The study aims to determine the perception of the respondents regarding the Clean-up Drive activities at the Saran River and to integrate it with the recommendations to aid in the improvement of the cleaning efforts for the said river, particularly at Barangay Malinta, Los Baños, Laguna (Qian et al., 2000). Specifically it aims to: Determine the perception of the respondents living near the Saran River regarding the Clean-up Drive activities at the said river and provide recommendations for the improvement of the current Clean-up Drive activities at the Saran River.

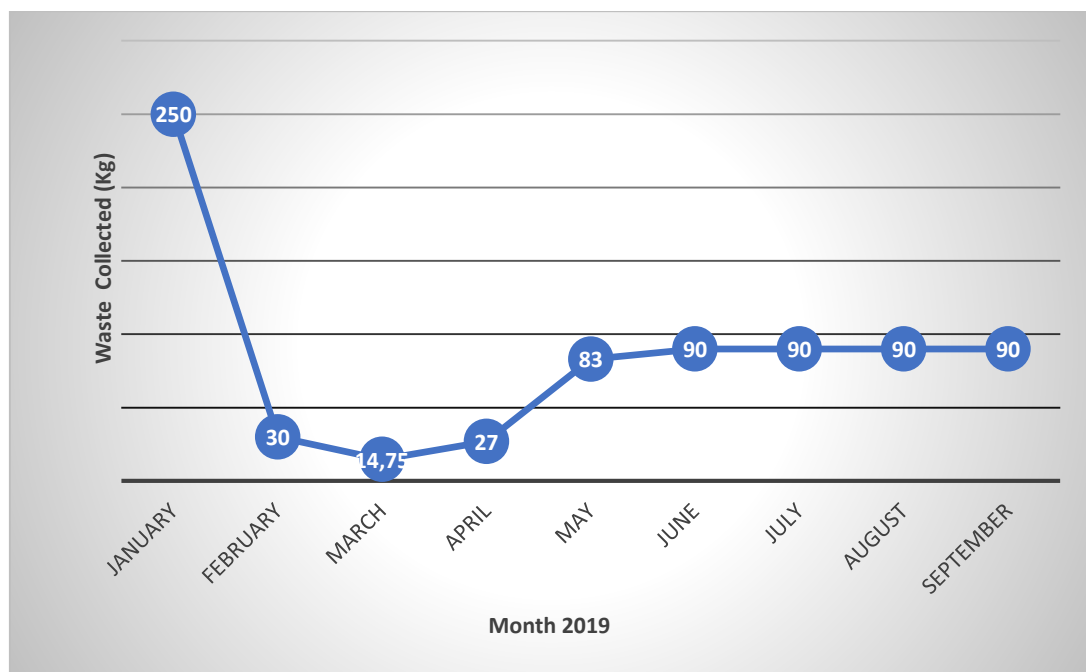


Figure 1. Monthly average solid waste (kg) collected in Saran River (data provided by the Laguna PENRO, Department of Environment and Natural Resources (DENR)).

METHOD

Selection of the Study Area

Initial discussions with the PENRO were conducted last September 12, 2019 where the PENRO proposed suggested that the group conduct a study in barangay Malinta, Los Baños, Laguna where they have on-going clean-up program as part of Manila bay clean up. Last September 14, 2019, the group met with the PENRO and barangay officials of Brgy. Malinta (**Figure 2**) to discuss the proposed study. During the discussion, the barangay officials raised the issue of continuous throwing of waste in the river despite the on-going cleanup. It was also mentioned that the waste seemed to be coming from barangay Anos where the midstream of the river can be found.



Figure 2. Initial meeting with PENRO official and staff, Brgy. Councilor Ebron and SAMAECO organization. September 19, 2019

Study Area

Barangay Malinta, which is composed of five puroks (zones), houses part of the Saran River. The barangay is situated along the coastline of Laguna de Bay, bounded by Barangays Anos in the north, Mayondon in the east and Baybayin in the west (Malabayabas and Bacongus 2017). Among the five puroks, the study focused on Purok 1 and 2 (Figure 3) where the Saran river is situated. The selected puroks were also identified among the most problematic in terms of solid waste problem disposal.

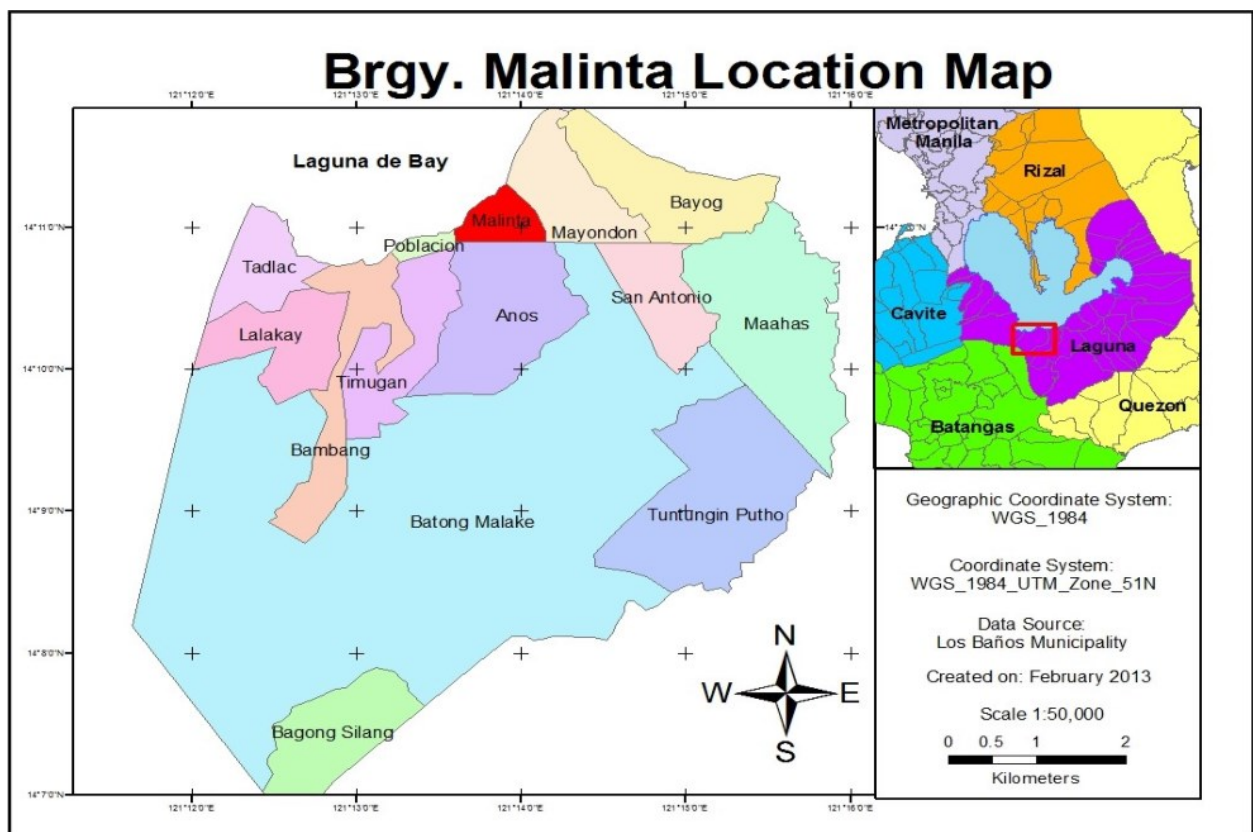


Figure 3. Location map of the study area (Malabayabas and Bacongus 2017)

Conduct of Survey

The survey was conducted last November, 2019, with the supervision of Barangay Councilor Ebron. The barangay officials were informed prior to the conduct of the survey. The selected puroks were identified by Coun. Ebron as sampling areas during the briefing prior to the conduct of the

survey. The households included in the survey are located approximately 5-30 meters away from the river. The given distance was deemed enough for the residents to affect the disposal of wastes onto the river, hence they were chosen.

Data Collection Method and Analysis

Random sampling was used to identify residents to be included in the survey. A total of thirty-nine (39) households from Purok 1 and 2 were selected. One representative per household was chosen for the face-to-face interview using the structured survey questionnaire. The households' respondents were chosen by the Barangay Health Workers (BHW) namely; Fatima Royena, Edna Reboton, Jinny Jumawid and Petra Estrellado. The data were analyzed using percentage and mean

RESULTS AND DISCUSSION

Barangay Malinta has implemented its weekly clean-up drive for years and has been continuing to improve the environmental status of the community. While some progress has already been noticeable to the residents of the barangay, downstream inhabitants along the river are still suffering from the indifference of the community in the upstream area with regards to keeping the river clean.

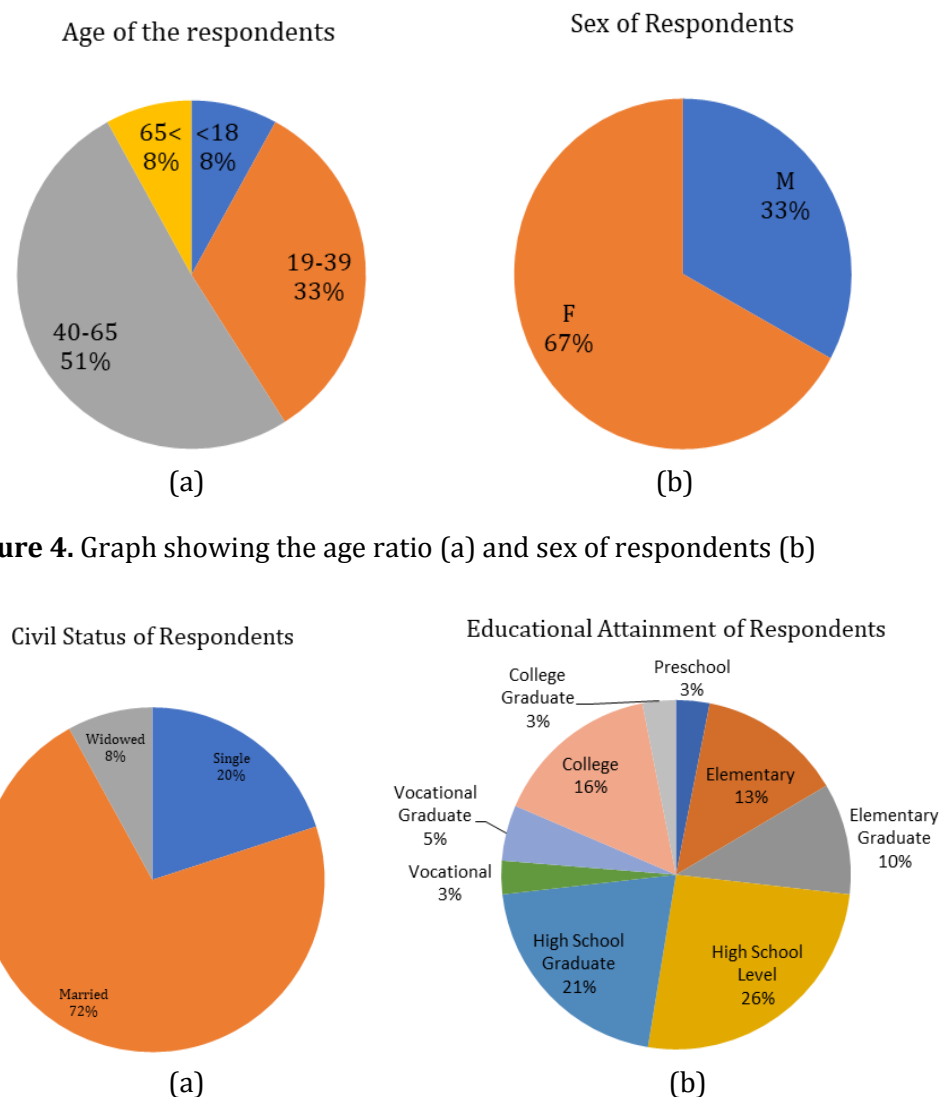


Figure 5. Graph showing civil status (a) and educational attainment of respondents (b)

Figure 4 and 5 showed that majority of the respondents are in the age group 40-65 (51%). Most of the respondents are also females (67%) who are married (72%). The average household size in the area surveyed is 5 members with an average of 2 males and 3 females. Majority of the respondents either have reached high school level (23%) or have graduated from high school (21%), with an average of 11 years of formal education. Respondents with children have an average of 2 children, with 1 male and 1 female.

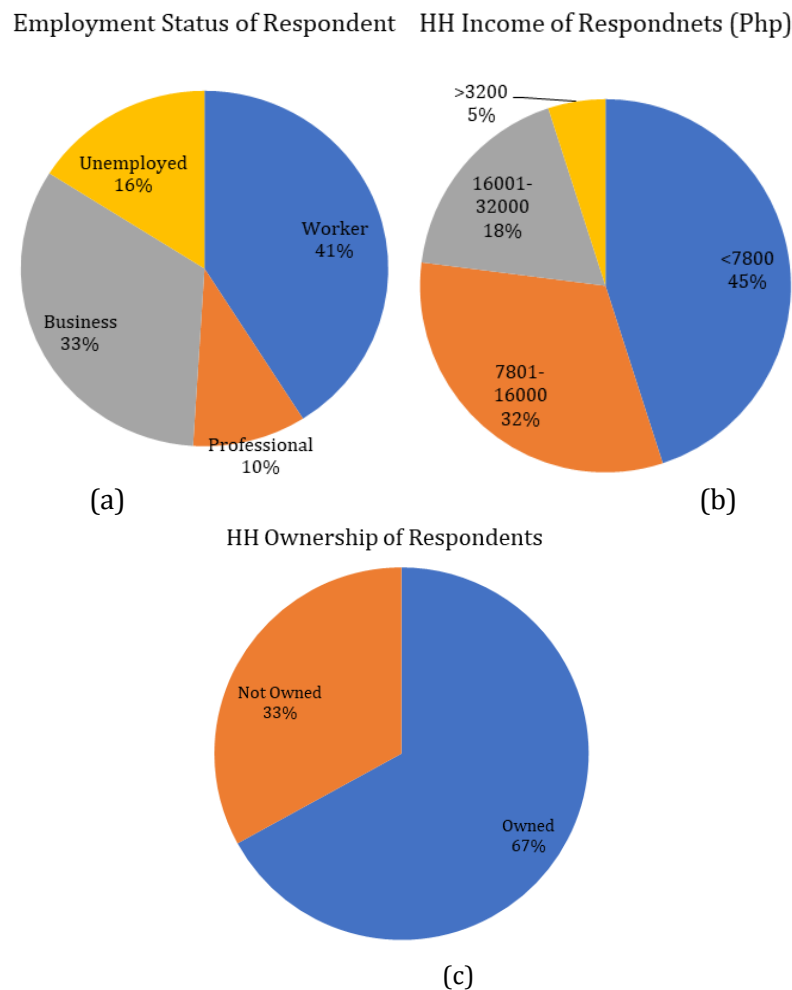


Figure 6. Graph showing Employment status (a), Household income (b) and Household ownership [c] of respondnets

Figure 6 showed that Majority of the respondents are workers (41%) with only 15% responding as unemployed. Most of the respondents (44%) fall below the poverty line indicated by the [PIDS \(2018\)](#) of monthly household income less than Php 7800. Most of the respondents (67%) apparently own their current residence.

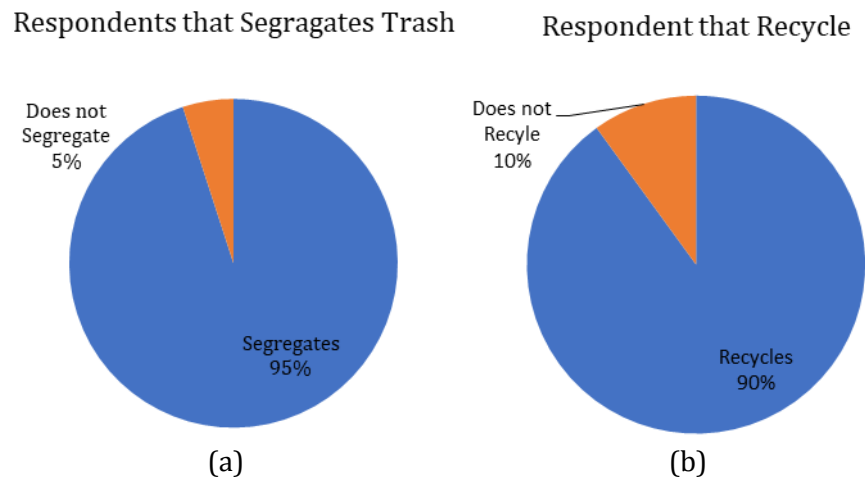


Figure 7. Graph showing respondent that segregates (a) and recycle (b) their trash

Figure 7 showed that in terms of sanitation, the residents of Barangay Malinta generally seem to have good waste management practice. Majority of the respondents (95%) segregate their trash and collect their wastes. Most of the respondents (90%) have indicated that they recycle their trash through selling it to recyclers. Most households have also responded that they utilize a septic tank.

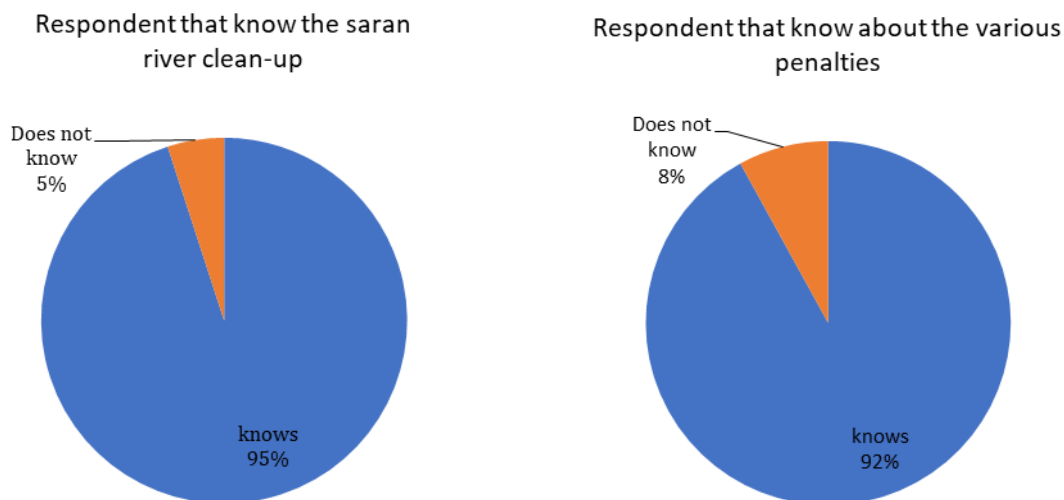


Figure 8. Graph showing the awareness of respondents

Figure 8 showed the information about the river clean-up seem to be widely disseminated throughout the households of Purok 1 and 2 along the river. Most of the respondents (95%) indicate that they are aware of the efforts of cleaning the Saran river and the reason it is being done. Surprisingly, not everyone (only 92%) of the respondents were aware of the penalties imposed about hindering the clean-up efforts. Eighty-two percent of the respondents indicate that they receive information about the Saran river through the barangay.

Although the river is still far from being totally free from pollution generated by households, the residents seem to have a positive attitude towards the rehabilitation of the river (Peña et al., 2021). All of the respondents agree with the river clean-up, prohibition of throwing trash into the river, imposing fees for the clean-up, and joining the efforts of the clean-up. Respondents were also asked about the minimum and maximum monetary contributions they would be willing to give for the efforts to clean the Saran river. Results show that they prefer to give a minimum of 10 php and a maximum of 200 php for this initiative.

CONCLUSION

This research concludes that the residents have reacted positively to the clean-up project. We classify the positive response of the residents into four indicators, namely the level of cleanliness, level of awareness, level of attitude, and level of perception. The level of awareness among respondents residing Saran river is high. They are fully aware of the clean-up program in the river and the reason why there is clean up activity. Also, they know the consequence once they will be caught throwing their waste in the river. In terms of attitude, most of them strongly agreed that there will be a clean-up in the river and penalized those who will throw their waste in the river. They are more than willing to help voluntarily if given the time and chance in cleaning the river. Most of the respondents are satisfied with the on-going river clean-up and optimistic that the river can still be cleaned and revived. Surprisingly, most of the respondents are willing to contribute amount and will be paid in the barangay as funding to river clean-up.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest concerning the publication of this article. The authors also confirm that the data and the article are free of plagiarism.

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