

## **Solid Waste Management in Urban and Rural Communities of Santa Cruz Watershed, Laguna, Philippines**

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### **ABSTRACT**

Solid waste management (SWM) has become a continuing hurdle for governments and communities because of its multi-faceted nature. With the worsening SWM problem, the Philippines enacted Republic Act 9003, the *Ecological Solid Waste Management (SWM) Act 2000*, instituting SWM Program. Water quality in water bodies and watersheds is adversely affected by pollution, exacerbated by increasing population and urbanization. This study examined RA 9003 implementation in urban and rural communities of Santa Cruz Watershed (SCW) which drains into Laguna Lake. Knowledge, awareness, and perceptions (KAPs) of communities were elicited using focused group discussions, interviews, and surveys in barangays within the watershed. Municipalities have completed respective 10-year SWM Plans, organized SWM Boards, and SWM committees in villages. Communities showed satisfaction with SWM implementation and monitoring but rural communities had higher overall SWM effectiveness ratings. Both communities were willing to pay for a cleaner environment. Challenges that hamper better implementation of RA 9003 include non-segregation of solid waste by residents attributed to lack of awareness and discipline;

irregular garbage collection; inadequate garbage trucks; lack of functional materials recovery facilities; and limited government resources. Addressing these concerns will further boost RA 9003 compliance and enhance the effectiveness of implementation and monitoring in the communities.

*Keywords:* Philippines, Republic Act 9003, Santa Cruz Watershed, solid waste management in urban and rural communities, willingness to pay (WTP)

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## INTRODUCTION

As a highly-populated country, the Philippines is beset with challenges accompanying the increasing population that exacerbates the problem of solid waste. Under the *Local Government Code of the Philippines 1991* (Republic Act 9003 [RA 9003]), it is expected that Local Government Units (LGUs) perform their role in implementing programs mandated by the national government, including the Solid Waste Management (SWM) program. RA 9003 or the *Ecological Solid Waste Management Act 2000* was enacted to address the worsening garbage problem, along with its environmental and health impacts. Almost twenty years after its enactment, SWM remains to be a major problem.

According to Bueno et al. (2016), fully realizing the policy's objectives is a great challenge, given various local factors. Recent studies show diverse results in communities (Maskey et al., 2016). Atienza (2011) concluded that problems on waste were entirely population dependent. In waste generation, there is a difference of 0.3 kg person<sup>-1</sup> day<sup>-1</sup> at 0.7 kg person<sup>-1</sup> day<sup>-1</sup> and 0.4 kg person<sup>-1</sup> day<sup>-1</sup>, for urban and rural communities, respectively. Irene (2014) mentioned that the implementation of the policy depended on the attitude and perceptions of communities towards waste management. Almazan and Vargas (2016) viewed that success in the implementation of waste management systems in the country specifically at the local level, depended on the level of educational attainment and

proper education and information activities, particularly in reducing generated wastes and segregation at source.

Imposing fines and community service are included in waste policy implementation at the local level (Ancog et al., 2012). A common scheme used by municipalities in the country is segregation-at-source and non-collection of wastes if households fail to segregate (Azuelo et al., 2016). Lack of mechanisms for monitoring the different waste management activities and the absence of materials recovery facilities (MRFs) and sanitary landfills were revealed by Sapuay (2015). Further, most local agencies involved in waste management are undermanned, hence municipalities rely on outsourcing, as this is deemed more cost-effective than providing regular personnel (Almazan & Vargas, 2016).

Management of wastes in urban villages in the country depends on the local translation of RA 9003 as adopted by the city government (Maskey et al., 2016). In Pansol, Quezon City, the provision of waste collection service by the city government and non-collection of unsegregated garbage were effective tools for households' compliance in waste segregation. Households complied because it was mandatory and a means to reduce waste-related risks such as pests and diseases, especially during typhoons and floods (Maskey et al., 2016). Cebu City villages showed high levels of compliance to waste management with at least three local policies being strictly implemented by the city government (Ancog et al., 2012). Turning trash into reusable and marketable

items facilitated the diversion of waste generated by households into functional items and composting biodegradable materials.

On the other hand, most studies on waste management that were conducted in rural areas showed that local policies were absent (Almazan & Vargas, 2016; Azuelo et al., 2016; Vivar et al., 2015). Vivar et al. (2015) revealed that Brgy. Lahug, Cebu City adopted the city-wide policy of “No Segregation, No Collection” with the SWM ordinance not yet enacted. Almazan and Vargas (2016) reported the lack of implementation of RA 9003 in Bayog, Los Baños, Laguna as evidenced by unsegregated wastes and the absence of MRF. Composting of biodegradable wastes was minimally practiced, with kitchen wastes ending up as food for domesticated animals or disposed of within the household’s periphery. However, residents of the village recycle solid wastes, as these are sold to formal and informal waste facilities. An earlier study by Atienza (2011) reported that all villages were compliant with the rigid waste management policies implemented by the municipal local government.

Azuelo et al. (2016) identified six strategies being implemented in Camarines Norte villages which were deemed effective, namely: 1) placing waste bins for each type of waste in a strategic location; 2) conducting livelihood and skills training; 3) providing garbage collection trucks with a regular collection, transport, and final disposal; 4) holding skills training in composting of organic waste; 5) increasing

knowledge and Information, Education, and Communication (IEC) materials on waste segregation; and, 6) adopting an ecological SWM program and promulgating rules and regulations.

**The RA 9003 and Related Policies.** As provided in RA 9003, the State adopted a “*systematic, comprehensive, and ecological solid waste management program*”. It provides for the reduction and minimization of waste at source through composting, recycling, reuse, and recovery, among others. The systematic administration of activities (segregation at source, segregated collection, and transportation, storage, transfer, processing, treatment, and disposal of solid waste) and all other waste management activities that do not harm the environment refers to ecological solid waste management. Private sector involvement in SWM is encouraged with LGU having major responsibility in its enforcement.

Hierarchically, SWM has four levels, namely: 1) At source: reduction and minimization of waste generated; 2) Village level: reuse, recycle, and resource recovery of wastes; 3) City/municipal level: efficient collection, proper transfer, and transport of wastes; and 4) SWM Facility: efficient management of residuals and final disposal sites and/or any other related technologies for the destruction/reuse of residuals.

The LGUs are expected to have established an SWM Board, with an approved 10-year SWM Plan, SWM committee at the village level, and each village or cluster of villages established

an MRF and a centralized MRF at the municipality/city. Aside from RA 9003, there are other policies enacted by the government to ensure a safe and healthy environment for the Filipinos (Table 1). These policies highlight the functions of the Department of Environment and Natural Resources (DENR) and the government in making sure that people reside in a safe living environment.

This study examined the status of implementation and monitoring of RA 9003 in urban and rural communities in Santa Cruz Watershed (SCW); determined the role of various local institutions involved in the policy’s implementation and monitoring; identified problems and difficulties in carrying out RA 9003 at the local level; and

recommended measures to further improve its implementation and monitoring at the local level. With this, the study sought to add to the current knowledge on how SWM was practiced in two types of communities and the necessary improvements as suggested by the participants of the study.

**MATERIALS AND METHODS**

Primary data were gathered through the conduct of a survey among households in six ‘poblacion’ barangays of the Santa Cruz Watershed, particularly in the municipalities of Rizal, Magdalena, Majayjay, Liliw, Nagcarlan, and Santa Cruz (Figure 1). The municipalities were selected because of their proximity to the primary tributary draining into Laguna

Table 1  
*Waste management-related policies in the Philippines*

Policy	Purpose/Scope
<i>Organic Agriculture Act 2010 (RA 10068)</i>	Look after the development as well as the promotion of organic agriculture, carry out a nationwide educational and promotional campaign for use, processing, and adoption of organic agriculture system to reduce pollution and destruction of the environment, and undertake comprehensive program promoting community-based organic agriculture systems.
<i>Climate Change Act 2009 (RA 9729)</i>	Establish a framework strategy and program on climate change, integrate climate change in government policies, and create the Climate Change Commission to coordinate, monitor, and evaluate programs and plans relating to climate change.
<i>Environmental Awareness and Education Act 2008 (RA 9512)</i>	Provides for integrating into school curricula, environmental education encompassing, waste minimization, segregation, recycling and composting, resource conservation, including livelihood opportunities.
<i>Philippine Clean Water Act 2004 (RA 9275)</i>	The State shall pursue economic growth within the framework of sustainable development, but consistent with “protection, preservation, and revival of the quality of fresh, brackish and marine waters.
<i>Philippine Clean Air Act 1999 (RA 8749)</i>	Centers on pollution prevention and provides a comprehensive management program for air pollution with the Department of Environment and Natural Resources (DENR) leading its implementation.
<i>Toxic Substances and Hazardous and Nuclear Waste Act 1990 (RA 6969)</i>	Controls and regulates importation, manufacture, processing, sale, distribution, use, and disposal of hazardous and nuclear wastes with DENR as the principal agency.

Sources: <https://www.da.gov.ph>; <https://www.emb.gov.ph>; <https://www.officialgazette.gov.ph>

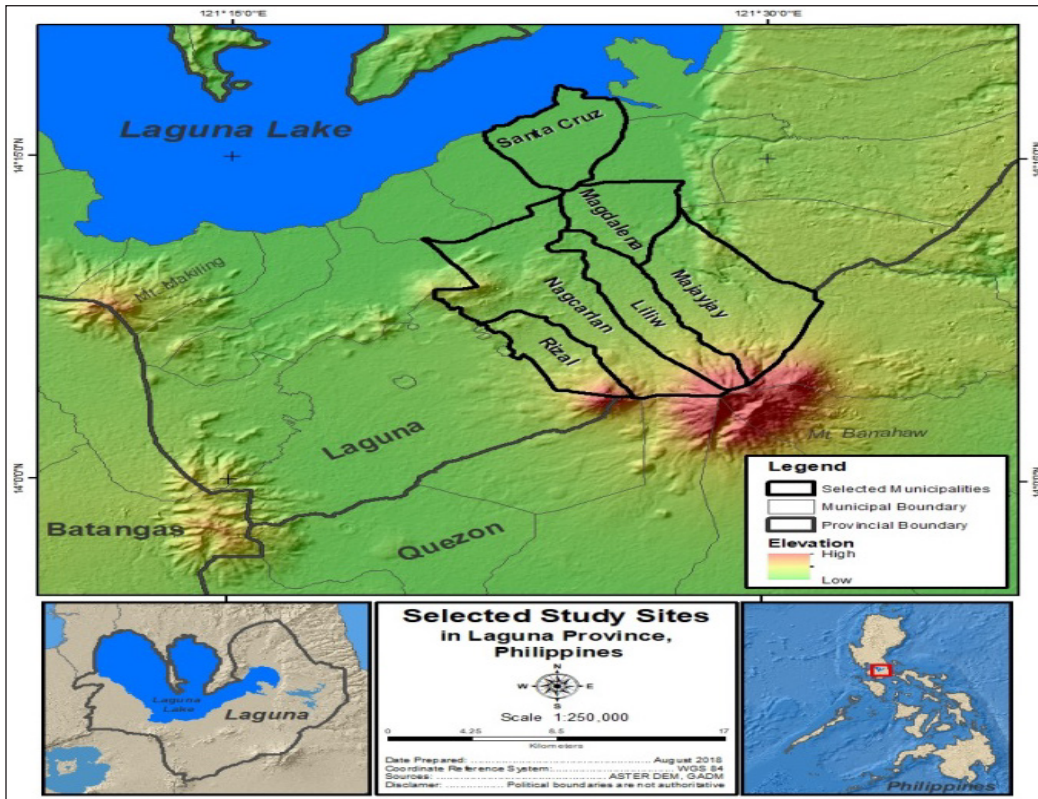


Figure 1. Map showing study sites and the portion of Laguna Lake

Lake and the worsening waste management problems affecting water resources based on studies conducted among its residents. Selected villages were classified into rural or urban communities, according to the level of urbanization, population density, and income class. Classified as rural villages are Poblacion, Magdalena; Origuel, Majayjay; and West Poblacion, Rizal while Rizal, Liliw; Poblacion II, Nagcarlan, and Poblacion IV, Santa Cruz were categorized as urban communities. A total of 180 randomly selected respondents distributed across the different *sitios* of barangays, were surveyed using a semi-structured questionnaire. Key Informant Interviews were undertaken with the village captain,

committee on environment chair (*kagawad*), Materials Recovery Facility (MRF) in-charge, the Municipal Environment and Natural Resource Officer (MENRO), and head of RA 9003 implementation in the village/municipality.

Furthermore, Focus Group Discussions (FGDs) with 10 to 12 participants were done in each study site. Representing a household, each participant should have knowledge of the collection and disposal of garbage at home and community. This methodology was used to uncover community-level concerns and important information that could be elicited within a short period. Secondary information was sourced from reports at municipal LGUs, including

their 10-Year SWM Plans, and other LGU reports. Further, publications and literature from the internet were also utilized.

Analysis of data was mainly descriptive, using frequencies, percentages, means, and others. Chi-square test of independence and t-test were done to determine differences between responses of rural and urban communities. It is hypothesized that the perceptions of respondents in urban and rural communities significantly differ.

**RESULTS AND DISCUSSION**

**Compliance of LGUs in the Santa Cruz Watershed on RA 9003 Provisions**

As provided in RA 9003 implementing rules and regulations, LGUs must comply with 6-point requirements (Table 2). In the study sites, the SWM Board at the municipal and SWM committee at the village level had been formed by LGUs in both types of communities. The required 10-year SWM Plans had also been completed. Previously operating dumpsites in municipalities had

been closed. All urban communities have municipal/central MRFs. The establishment of village MRFs is a major requisite under RA 9003, however, two rural communities have none. One reason is the lack of space to situate the MRF and limited funds for its construction. Among cluster villages, the issue is where to establish the MRF. Urban communities have a higher level of compliance because they have a bigger budget allocation as compared to rural communities.

**Profile of Santa Cruz Watershed, Communities, and Solid Waste Problem**

The Santa Cruz Watershed has an area of 12,445.54 hectares sprawled across several municipalities of Laguna province, namely: Pagsanjan, Rizal, Majayjay, Magdalena, Nagcarlan, Santa Cruz, Pila, and Nagcarlan. The Santa Cruz River contributes about 15% of the Lake’s total water, irrigating 2,185 hectares of farms of Nagcarlan, Liliw, Victoria, Pila, and Santa Cruz.

Table 2  
Compliance of LGUs in Santa Cruz Watershed to RA 9003 provisions, FGDs, and KIIs conducted in 2017

Aspect	Rural				Urban	
	Majayjay	Magdalena	Rizal	Liliw	Nagcarlan	Santa Cruz
SWM board	√	√	√	√	√	√
SWM committee	√	√	√	√	√	√
10-year SWM Plan	√	√	√	√	√	√
MRF established in each village or cluster villages	Municipal: none Brgy: 13%	Municipal: none Brgy: none	Municipal: 1 Brgy: 25%	Municipal: 1 Brgy: none	Municipal: 1 Brgy: 8%	Municipal: 1 Brgy: 3%
Open dumpsites closed	√	√	√	√	√	√
Compliance rating by respondents (%)*	67.13 High	67.0 High	83.25 Very high	83.0 Very high	83.08 Very high	83.03 Very high

Note: \* 81 and above: very high; 61-80: high; 41-40: moderate; 21-40: low; 20 and below: very low

Rural communities in the area are engaged in agricultural activities like the production of rice, vegetables, root crops, and fruit-bearing plants. Urban communities are also engaged in growing those crops, fruit trees, and coconuts. Other major sources of income in urban areas are retail stores, business, transport, and overseas employment. SWM was considered a major challenge in both communities. Rural communities perceived far location or absence of MRF as the primary problem. This finding is similar to that of Azuelo et al. (2016), citing that the lack of MRF contributes significantly to the prevailing attitude in waste disposal. Meanwhile, urban community respondents consider the collection as the worst problem on garbage, e.g. irregular collection, delayed or no collection which worsens when the garbage truck is inoperative, and lack of MRFs.

### **Socio-demographic Characteristics of Survey Respondents**

Majority of the respondents in both rural and urban communities were female (Table 3). Most were married and with an average age of 52 years. In both communities, households had an average of five members with rural households having more members. More than half graduated from either high school or college. Almost all respondents were employed varying from business, agriculture, or employed in government, with the majority having an average monthly income of PhP 8,569.0. Their residence in the village averaged 37 years.

### **Awareness of Respondents on Solid Waste Management and Their WTP**

**Awareness of Local Policies on SWM and Sources of Information.** Respondents were aware of the SWM Program of the local government. Considered as the main source of information, local governments have done their part in disseminating information on the SWM program which can be gleaned from the respondents' level of awareness. Waste segregation was the most mentioned policy being implemented. Moreover, respondents in both communities were mindful of the ordinances on SWM in their locality.

There are ordinances on proper waste disposal, garbage collection, and burning of garbage. Local policies cited are banning the use of plastic and styrofoam, "no smoking", disallowing stray dogs, "no segregation, no collection", and "*Tapat mo linis mo*". This finding is opposed to the reports of Almazan and Vargas (2016), Azuelo et al. (2016), and Vivar et al. (2015), that local policies are absent in rural areas. It was even noted that rural communities had more ordinances on SWM than urban ones.

### **Willingness to Pay (WTP) for Maintaining Clean Environment.**

To determine which community type gives higher importance to a clean environment, respondents were asked whether they were willing to pay or not and how much to safeguard a clean environment. This would have bearing on future strategies to improve RA 9003 implementation, e.g. proper disposal of garbage; clean-ups. More than 80% of

Table 3  
*Demographic characteristics of respondents*

Characteristic	Rural		Urban		Total	
	n	%	n	%	n	%
<b>Age range</b>						
Less than 30	12	13	5	6	17	9
31-40	16	18	11	12	27	15
41-50	12	13	16	18	28	16
51-60	21	23	34	38	55	31
61-70	22	24	18	20	40	22
Greater than 70	7	8	6	7	13	7
Total	90	100	90	100	180	100
Mean age	51		53		52	
<b>Sex</b>						
Male	22	24	27	30	49	27
Female	68	76	63	70	131	73
Total	90	100	90	100	180	100
<b>Civil status</b>						
Married	70	78	63	70	133	74
Widow	13	14	12	13	25	14
Single	6	7	12	13	18	10
Separated	1	1	2	2	3	2
Live-in	0	0	1	1	1	1
Total	90	100	90	100	180	100
<b>Household size</b>						
1-3	32	36	39	43	71	39
4-6	46	51	37	41	83	46
7-9	9	10	12	13	21	12
10-12	3	3	2	2	5	3
Total	90	100	90	100	180	100
Mean household size	5		4		5	
<b>Education</b>						
Elementary undergraduate	0	0	2	2	2	1
Elementary graduate	14	16	3	3	17	9
High school undergraduate	4	4	3	3	7	4
High school graduate	28	31	33	37	61	34
College undergraduate	17	19	13	14	30	17
College graduate	22	24	31	34	53	29
Vocational	5	6	5	6	10	6
Total	90	100	90	100	180	100



respondents in both communities were willing to pay up to PhP 50.0 per month. Three rural community respondents showed higher WTP amounting PhP 250.0 or more per month. Willingness to pay for a clean environment is shown in Table 4. There was no significant difference observed ( $X^2=.928$ ;  $p\text{-value}=.335$ ) in the WTP of urban and rural communities. However, more rural community respondents were willing to

pay even at higher values ( $p\text{-value}=.046$ ) as seen in Figure 2. For the rural community respondents, paying higher fees could be used for garbage disposal expenses and help keep the community and the environment clean. More respondents from rural communities were also in favor of imposing an additional fee for garbage collection. Urban respondents were not in favor of additional fees since the local

Table 4  
Willingness to pay for a clean environment

Willingness to pay <sup>a</sup>				
Type of Community	Willing	Not willing	Chi-square value	p-value
Urban	71	19	.928	.335
Rural	76	14		
Willingness to pay- Value <sup>b</sup>				
Type of Community	Mean		p-value	
Urban	28		.046	
Rural	45			

Note: <sup>a</sup>Chi square test for independence at  $\alpha= 0.05$ ; <sup>b</sup>independent sample t-test at  $\alpha= 0.05$

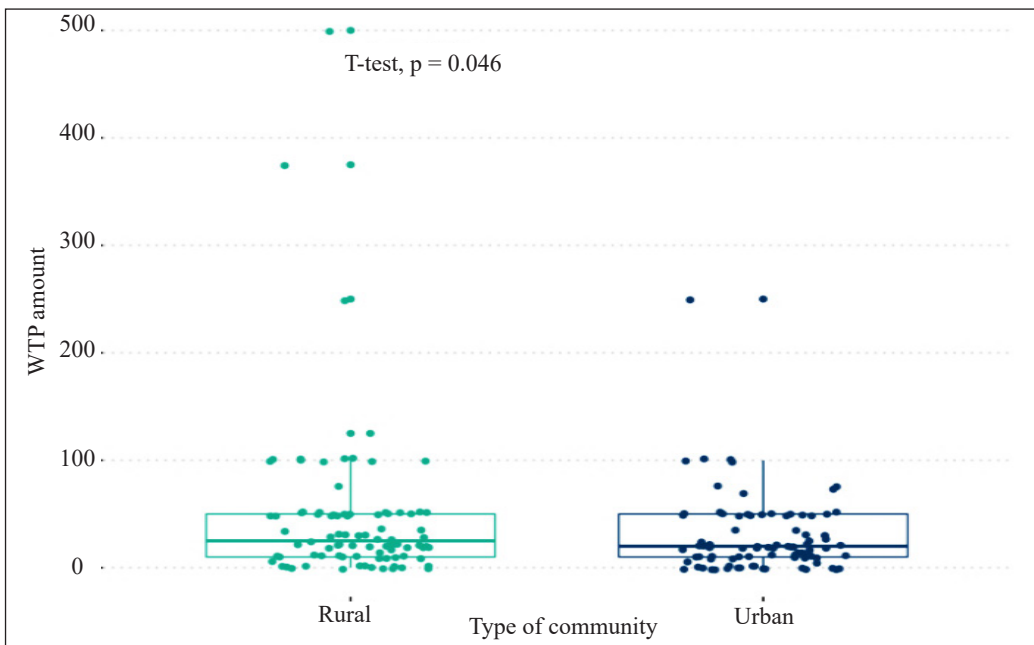


Figure 2. Mean willingness to pay (WTP) for a clean environment

government collects PhP20.0 to PhP60.0 per month for garbage disposal. It can be gleaned that rural communities in SCW give greater importance to a clean environment than urban ones.

**RA 9003 Implementation and Monitoring in the Communities**

Congruent to RA 9003 which provided the SWM program, ordinances are passed by most villages and municipalities, e.g., prohibiting plastic use, burning of waste, and smoking in public places (Table 5). The imposition of a penalty for non-compliance is observed to happen more in urban communities. Fines and community service were forms of penalty cited by Ancog et al. (2012). Segregation at source, collection by garbage trucks of LGU, disposal at MRFs,

or sanitary landfill and monitoring are the main components of SWM at the local level.

**Garbage Segregation and Collection.**

Segregating and following garbage collection schedules were how respondents abide by the SWM program. Segregation was done by having separate garbage containers for recyclables, non-biodegradable, and biodegradable materials. Food items were classified as biodegradable which was used for animal feed or composts. Respondents who failed to segregate their garbage argued that their children prepared their garbage for disposal and that they had a handful of household chores to do.

Biodegradable and non-biodegradable garbage were collected on different days by the garbage truck. The collection was

Table 5  
*Implementation of SWM program*

Response*	Rural		Urban		Total	
	n	%	n	%	n	%
<b>Segregation/Disposal</b>						
Segregation of waste at source	89	56	88	56	177	55.8
Penalty for non-compliance	26	16	41	26	67	21.1
No penalty	19	12	7	4	26	8.2
Not aware if with the penalty	5	3	8	5	13	4.1
Further segregation at MRF	2	1	0	0	2	0.6
<b>Collection</b>						
No segregation, no collection	12	8	6	4	18	5.7
Separate days collection for biodegradable and non-biodegradable	1	1	3	2	4	1.3
Collection by garbage truck	2	1	1	1	3	0.9
Recycling	1	1	0	0	1	0.3
Others (school supplies in exchange for plastic; using sacks in disposing of garbage; banning plastics/burning garbage; cleaning canals; no smoking policy)	3	2	3	2	6	1.8

Note: \*multiple responses

done six times a week in urban communities while in rural, once a week. Along the main roads, the collection of garbage was done daily. It was reported that in some villages, both biodegradable and non-biodegradable wastes were collected during the same day by a single garbage truck, resulting in mixed garbage. A common practice by garbage collectors in both communities was not collecting unsegregated garbage. This was also reported by Azuelo et al. (2016).

The garbage collection scheme being undertaken was rated by more rural community respondents to be “moderately effective” to “highly effective” (Figure 3). They mentioned that garbage was regularly collected and garbage collectors worked very hard. Respondents from urban communities gave lower ratings. This may be attributed to inconsistent and inadequate collection schedules, non-segregated garbage by some residents, and uncollected garbage.

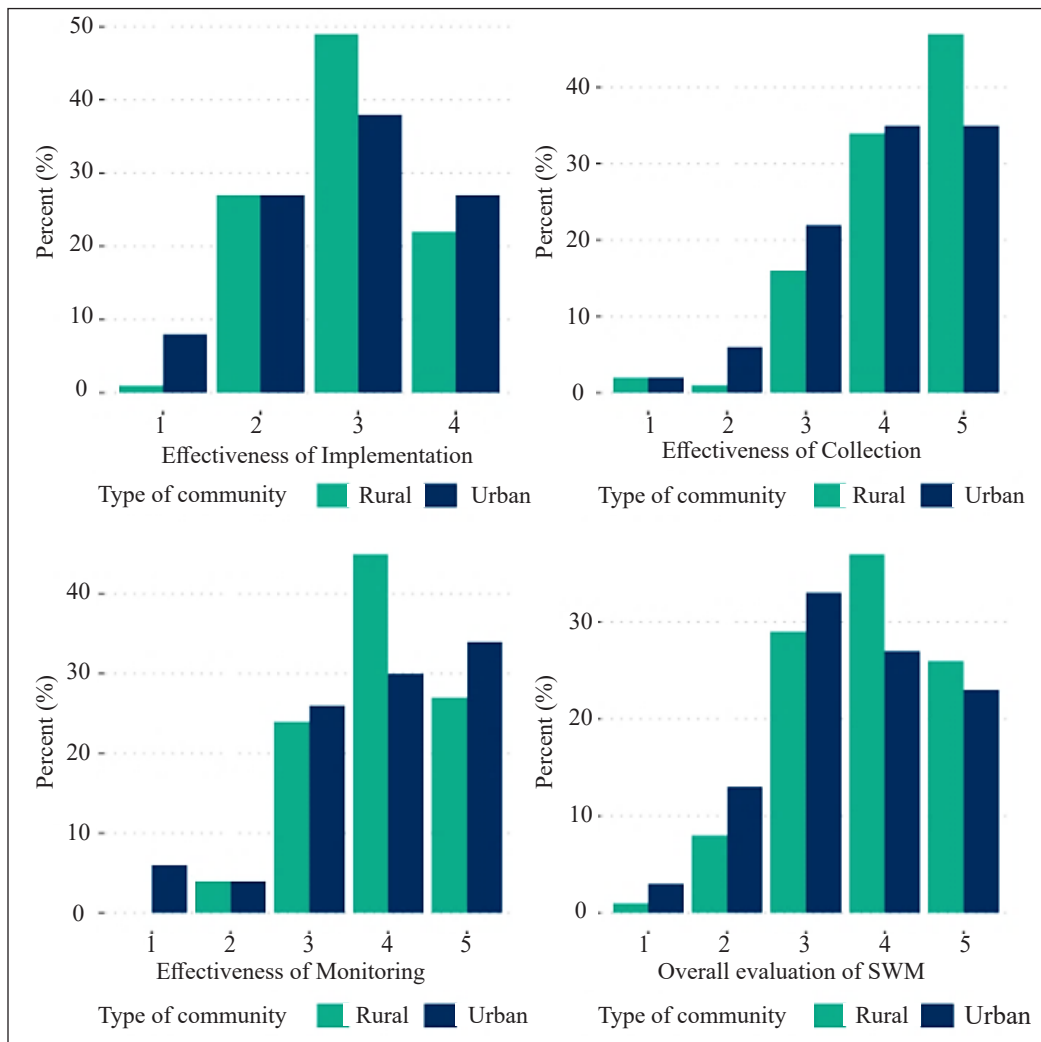


Figure 3. Perception of SWM implementation, waste collection, and monitoring

There are some efforts being done in rural communities worthy to be highlighted. In a rural community, the Vice-Mayor facilitated garbage collection. A municipality distributed sacks labeled to track ownership of garbage while another municipality exchanged school supplies with plastics collected by school children.

**Ratings on the Effectiveness of RA 9003 Implementation.** The respondents were requested to rate the implementation of RA9003 or SWM in their village (Figure 3). Respondents in both types of communities were satisfied with the implementation since they observed improved cleanliness in surroundings and more residents are cooperating or starting to cooperate. Respondents who gave low ratings argued that the SWM program was not strictly implemented and some residents do not cooperate.

**Monitoring Strategies by LGUs.** Generally, monitoring was done by village officials/ inspectors and garbage collectors across study sites. Village officials did random checking if segregation of garbage was done in their locality. Each village *kagawad* (councilman) had an assigned zone for monitoring. In one of the rural villages, there was an employed person tasked to check if garbage was segregated prior to collection. In effect, there was no unsegregated garbage collected. For its part, monitoring was performed by the municipal waste management team.

The effectiveness of monitoring schemes by LGUs got “effective” to

“highly effective” ratings from respondents. However, urban communities received more “ineffective” to “very ineffective” ratings from some respondents than rural ones. This was also raised during the FGD in an urban community where respondents affirmed that there was poor monitoring of SWM implementation.

Several challenges in monitoring SWM implementation were identified. An inadequate LGU budget for SWM might result in a lack of personnel to do the monitoring. The absence or lack of a monitoring system was also noted. The inability of garbage collectors to trace the owners of unsegregated garbage was also viewed as a problem.

There was no difference ( $p=.941$ ) in ratings for SWM implementation of the two communities as both were found effective. Comparatively, collection effectiveness ratings of rural and urban communities were also not significantly different ( $p=.113$ ). SWM monitoring in rural communities is rated to be more effective ( $p=.062$ ) than in an urban setting. The overall SWM effectiveness rating was higher in rural than in urban communities (Table 6).

Table 6  
*Relationship of type of community and SWM activities*

SWM Activities	Mean Rating		p-value
	Urban	Rural	
Implementation	3.66	3.67	.941
Monitoring	2.23	2.78	.062*
Collection	3.78	4.03	.113
Overall	3.22	3.49	.066*

\*significant at  $\alpha= 0.10$

### **Community Participation in SWM Program**

Most of the respondents participated in beautification and clean-up drives that were regularly organized in their communities. Interestingly, they volunteered to participate in these activities even without payment, since this was for the cleanliness of the surroundings and a form of *bayanihan* for a village activity.

About one-fourth of the respondents shared that village officials/4Ps recipients were obliged to participate in the activity. A few others mentioned that participation in community activity would inspire others to cooperate. For some, it was a form of exercise and a good incentive, since in some urban communities, those who participated were being paid, e.g. PHP 340/day or 2 kg of rice. Respondents who did not participate in clean-up drives reasoned that (1) they were swamped with household chores or work or caring for their children/grandchildren; (2) only beneficiaries of 4Ps and village officials were obliged to clean; (3) they were already old and/or ill; (4) they were not informed that there would be a clean-up drive or they were new in the village; and (5) street sweeper was employed to do the cleaning.

### **Institutions Involved in RA 9003 Implementation in the Communities**

The municipal local government is the primary institution for SWM implementation, with an encompassing role in the collection of garbage and maintaining cleanliness, policy implementation, and monitoring,

collection, and disposal of waste. Expectedly, it provides garbage collection trucks even to villages. The village local government also has a major role in SWM implementation. Local institutions participate in SWM-related activities as evidenced by clean-up drives, implementation of SWM, collection of garbage, monitoring, and maintaining the cleanliness of the locality. Cleaning riverbanks, reminding residents, managing the MRF, and teaching school children how to segregate waste are also being done.

Apart from the local governments, the civil society is greatly involved in these activities, e.g., schools and civic organizations (Rotary Club/Riders/Guardians, LIMAS MARINA). The LIMAS MARINA association (Liliw, Majayjay, Santa Cruz, Magdalena, Rizal, Nagcarlan) regularly conducts tree planting and clean-up activities. The 4Ps beneficiaries of the Department of Social and Welfare Development (DSWD) participate in clean-up activities. Private and public colleges and universities, usually under the National Service Training Program (NSTP) extend community service, e.g. clean-up of villages, tree planting, and beautification.

Notably, the provision of waste service, in general, is more pronounced and systematic in urban than in rural communities. Parallel to the findings of Atienza (2011) and Maskey et al. (2016), more stringent implementation of proper solid waste management can be associated with the capacities of LGUs to provide these services.

**Problems in RA 9003 Implementation and Monitoring**

As viewed by respondents, the major problem in the implementation of the SWM program was the lack of discipline among residents, no cooperation, and limited information about SWM (Table 7). These were observed to be more evident among urban communities. Similarly, the irregular schedule of garbage collection was a greater problem for urban than rural communities. The irregular collection schedule as well as late garbage pick-up worsened the situation as stray animals scavenged the piled garbage and scattered them on the streets.

The absence or lack of MRF was mentioned in both types of communities. Worse, the dumping of garbage by some residents from nearby areas in respondents’

village was a problem urban communities face. Unmaintained or clogged canals, presence of scavengers, non-collection of broken glasses, uncollected garbage, and scattered cigarette butts were also cited. Furthermore, piggery waste flowing directly to the river was mentioned in a rural community. These are parallel with the findings of Almazan and Vargas (2016) which altered environmental psychology when it came to proper waste management.

**Suggestions to Improve RA 9003 Implementation and Monitoring**

With these problems, respondents suggested measures to improve RA 9003 implementation and monitoring by local governments and institutions. These suggestions were primarily on

Table 7  
*Problems with RA 9003 implementation*

Response	Rural		Urban		Total	
	n	%	n	%	n	%
Presence of Problems						
Present	54	60	66	73	120	67
Absent	36	40	24	27	59	33
Total	90	100	90	100	180	100
SWM Problems						
	n= 54		n = 66		n = 120	
Lack of discipline, cooperation, and information on SWM by residents/tourists	20	36	35	41	101	54
Some residents do not segregate their garbage	15	27	11	13	26	14
Irregular/late pick-up and inadequate days for the collection of garbage	2	4	14	16	16	9
No MRF/space for MRF/garbage containers	6	11	8	9	14	7
Garbage from nearby places dumped to barangay	0	0	9	10	9	5
Dogs scatter garbage and pooping anywhere	5	9	3	3	8	4
Clogged and unmaintained canals	2	4	2	2	4	2
Foul odor and piggery waste disposed to river	3	5	0	0	3	2
Others (scavengers, cigarette butts, no garbage truck, lack of street sweepers)	3	5	4	5	7	4

Information and Education Campaign (IEC) enhancement activities, budget augmentation, and policy implementation. In terms of the policy, the respondents stressed the need for stricter implementation and monitoring of garbage segregation, collection, and disposal as well as the penalty for non-compliance. An increase in garbage collection frequency and the putting up of MRFs in villages were deemed necessary. Stricter implementation of ordinance on stray dogs was also emphasized. It was also recommended that SWM, particularly proper segregation and disposal of solid wastes, should be integrated into the school curriculum.

It was also suggested that IECs be boosted and lectures conducted to inform residents on RA 9003 and SWM program; post signs and distribute fliers and regular reminders to residents. During village assemblies, it is vital that each household be represented and involved. Following the strategy of one of the rural villages, garbage sacks are labeled with the name of the household for ease of tracing the source of unsegregated garbage. A penalty can also be imposed on those who fail to comply. Further, regular and frequent monitoring must be done, employing additional staff as needed. Allocating additional budget for SWM and providing incentives to collectors/monitors were also suggested.

## CONCLUSIONS

In both types of communities, SWM is being implemented and this is evident in LGU compliance to the RA 9003. Majority of

the respondents practice waste segregation at source largely because of the penalty imposed with non-compliance. RA 9003 implementation is better appreciated by rural communities as garbage is properly disposed of and observed improved cleanliness of surroundings. This is one major reason why the program should be pursued and implemented consistently. Rural communities tended to put more effort into proper garbage disposal and cleanliness given their willingness to provide additional time for various SWM mechanisms such as segregation and clean-ups. On the other hand, urban communities rely on the provision of these services by the LGU since additional fees are being imposed.

Constraints to the full implementation of RA 9003 are not absent, beginning from segregation at source in which many residents still do not abide, even with the prevailing local policies. The sporadic garbage collection causes confusion as to when should the garbage be brought out for pick-up. Lack of garbage collection trucks or dysfunctional trucks worsens this problem. The absence of MRF makes the problem more difficult. The MRFs in urban communities are inadequate vis-a-vis the bulk of garbage from different villages. The absence of monitoring the actual volume and type of waste generated in communities exacerbates the recognition of suitable strategies to decrease volume per waste type. Leniency in policy enforcement is magnified by undisciplined residents. Finally, insufficient budget, personnel, and other machines/equipment result in poor

implementation of the RA 9003 and SWM program.

With the challenges revealed in the study, it is vital to have a stricter policy implementation and monitoring. Local institutions, both public and private, are greatly involved in the policy's implementation and monitoring. The municipal government should provide support to the village government, primarily on sourcing funds and space for MRF. LGUs should grant the necessary equipment and facilities for the collection, disposal as well as processing of solid waste, including providing safety gear to protect collectors from infection and communicable diseases. The critical role of the garbage collector, who inspects the sacks during collection, as well as village *tanod* and *kagawad* in monitoring cannot be undermined.

Given that SWM Boards and SWM committees are in place, more proactive guidelines to formulate and enforce SWM ordinances are needed. Participation of the academe should be further sought especially in the integration of SWM in the curriculum, as provided under RA 9512. School curriculum must include topics on environmental conservation and protection, specifically proper waste disposal, to instill these virtues to the younger generation. Moreover, parents should be encouraged to attend lectures/meetings on how to train children on proper waste disposal. Consistent teaching and reiteration create good habits and virtue among communities.

Across the communities, participation should be further encouraged in clean-up and environment-related activities. Finally, a concerted and harmonized effort by LGUs, the academe, and the community is critical towards full and more effective implementation of RA 9003 or the SWM Act.

Further studies may be conducted on factors and strategies that would motivate communities to comply and enhance stakeholder participation in SWM activities. Relational studies on community health, water quality, and SWM may also be undertaken. A more profound comparative study of communities on SWM is also suggested for policy formulation.

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