Challenges in Governance and Implementation of the Philippines’ Solid Waste Management Programs: Focus on Plastics

Agnes C. Rola

Social Science Division, National Academy of Science and Technology Philippines
College of Public Affairs and Development, University of the Philippines Los Baños

ABSTRACT

Despite the law, solid waste management (SWM) is still a challenge in the Philippines. Plastics form an increasingly significant portion of solid wastes and is a source of surface water pollution. Hence, surface water governance (such as river governance) should address plastics pollution.

This paper discusses governance mechanisms to minimize solid wastes, especially plastics in surface water. Using secondary data sources, the paper discusses the trends in plastic pollution, its nature and causes; the laws on plastic pollution in the Philippines and other countries, and the challenges in the current institutional mechanisms and implementation of these laws. It describes a model of SWM at a watershed level, that can potentially sustain the SWM activities. This adaptive collaborative governance model has four components: establishing partnerships, planning strategic actions, developing the SWM plan, and implementing an investment plan. The model was tested in the Sta Cruz, Laguna River Basin, and is operational even as the academe project is completed. Lessons learned for its sustainability include the following: 1) There must be capacity building, 2) SWM should be crafted in a participatory manner, especially involving the grassroots communities, 3) Define incentives to make the collaboration active, and 4) Committed leadership in the river council was an important sustainability factor.

Email: acrola@up.edu.ph

Plenary paper presented during the 41st Annual Scientific Meeting (July 2019) of the National Academy of Science and Technology Philippines.
Abbreviations: adaptive collaborative governance (ACG), Environmental Management Bureau (EMB), Laguna Lake Development Authority (LLDA), local government unit (LGU), material recovery facilities (MRF), National Solid Waste Management Commission (NSWMC), (SCRW), solid waste management (SWM), University of the Philippines - Emerging Interdisciplinary Research (UP-EIDR)

INTRODUCTION

Solid waste management (SWM) in developing countries such as the Philippines will remain to be a critical social problem, if no drastic behavioral and institutional changes occur. The drivers of solid waste production increase are population growth, urbanization, and the general cultural practices including use of sachets. Particularly in most developing countries where packaging caters to what the poor can afford, sachets have become popular. But these are the sources of millions of tons of plastic waste, needing a management solution. Plastic pollution has become a “public bad”, and government now has the responsibility to render solutions to the problem. Globally, plastics compose 10% of the total waste, but there is no data available for the Philippines.

This paper discusses and analyzes the following: (1) Trends in plastic pollution, its nature and causes. (2) The laws on plastic pollution in the Philippines other countries. (3) Challenges in the current institutional mechanisms and implementation. (4) A model of SWM governance that can potentially sustain the SWM activities. Conclusions and lessons learned are offered in the last part.

MATERIALS AND METHODS

Secondary data are used in the analysis of trends in plastic pollution, its nature and causes. Laws on plastic pollution and SWM from different countries and the Philippines, and the implementation challenges of the Philippine law are discussed using secondary sources. A case study of sustainable SWM using adaptive collaborative water governance in Sta. Cruz River, Laguna, Philippines is presented using the data from the UP EIDR project on water governance.

RESULTS AND DISCUSSION

Trends in Plastic Pollution, Nature and Causes

Overall, data show that 10% of global waste composition is from plastics (Figure 1) and this is observed to be increasing (Figure 2). Organic materials compose 40% while paper wastes contribute 17% to the total wastes. However, available information also shows that plastic waste volume has increased from about 3.1 million metric tons in 2008 to about 3.5 million metric tons in 2013 (Figure 2).

The Philippine situation mirrors the global trend in increasing waste generation and even at a faster rate (Figure 3).

In terms of waste volume, available Philippine data reveal that the highly urbanized places have greater amount of wastes than the rural areas.
Figure 2. Trends in global plastic waste volume. Source: Plastic Institute of Thailand.

Figure 3. Waste generation in the Philippines, 2012-2016 (in 1000 tons per day). Source: SEPO 2017.
(Table 1). This supports the contention that the more urbanized a place is, the more wastes are generated and thus, the more challenges in waste management by their local governments.

The Philippines’ Environmental Management Bureau (EMB 2018) further projects that waste generation will increase significantly and that Metro Manila will contribute about one fourth of the total projected wastes (Figure 4). World Bank (2012) estimates that solid waste in the Philippine cities will increase by 165% to 77.78 tons/day from 29.3 tons per day by 2025, due to projected increase in population.

Table 1. Waste volume, Philippines 2016 (in 1000 Metric Tons/day).

<table>
<thead>
<tr>
<th>Region</th>
<th>Highest</th>
<th>Least</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCR</td>
<td>9.2</td>
<td>CAR</td>
</tr>
<tr>
<td>Region 4A</td>
<td>4.4</td>
<td>Region 13</td>
</tr>
<tr>
<td>Region 3</td>
<td>3.8</td>
<td>ARRM</td>
</tr>
<tr>
<td>Region 4B</td>
<td>0.97</td>
<td></td>
</tr>
</tbody>
</table>

Source: SEPO 2017

Figure 4. Projected waste generation 2008-2020 (metric tons per year). Source: EMB 2018.
The other factor affecting the increasing volume of solid waste in the country aside from population growth and urbanization is the “sachet culture” that has been perpetuated by manufacturers. Evidence shows that Filipinos throw away 164 million pieces of sachet packets daily. This means sixty billion sachets are sold and discarded in the Philippines per year. Per capita use of sachet is 591 pieces and 174 plastic shopping bags per year. If there are 57 million plastic bags used daily in the Philippines, then this totals to a whopping 20.6 billion plastic bags used annually (Global Alliance for Incinerator Alternatives, GAIA nd). These sachet based products meet the household needs especially of the poorer segments of Philippine society. While there may be laws on pollution, there seems to be no regulatory policies for the manufacturers that merchandize sachet packaged products.

Laws on Plastic Pollution and Solid Waste Management

A recent report from the UN Environment Program (UNEP) and the World Resources Institute (WRI) found that at least 127 countries (of 192 reviewed) have adopted some form of legislation to regulate plastic bags, as of July 2018 (Excell 2019). These policies range from outright bans in the Marshall Islands to progressive phase-outs in places like Moldova and Uzbekistan to laws in Romania and Vietnam that incentivize the use of reusable bags. However, it is observed that plastic pollution still continues. Part of the reason plastic pollution continues is that the regulation of plastic bags is extremely uneven worldwide, and many loopholes exist.

According to Excell (2019) some of the reasons for continued plastic pollution are as follows:

1. Most countries fail to regulate plastic through its lifecycle. In the case of China, it bans plastic bag imports and mandates that retailers charge consumers for plastic shopping bags. However, it does not restrict production or exportation. Ecuador, El Salvador and Guyana only regulate the disposal of plastic bags, but not their importation, production and retail use.

2. Countries favor partial bans over full bans. For instance, France, India, Italy, Madagascar and other countries do not ban on all plastic bags. They ban or tax plastic bags depending on their thickness.

3. No countries restrict plastic bag manufacturing/production. Only one country in the world, Cape Verde, includes an explicit production limit. It has imposed a percentage reduction on plastic bag production, starting at 60 percent in 2015 and growing to 100 percent in 2016. Since then, it enforced its full ban on plastic bags; and only biodegradable and compostable plastic bags are allowed for use.

4. Exemptions are numerous. These exemptions include handling and transport of perishable and fresh food items, carrying small retail items, use for scientific or medical research, and garbage or waste storage and disposal. It was noted that fourteen African countries have explicit exemptions in their plastic bag bans; twenty-five of the 91 countries that have plastic bag bans include exemptions. Even in the Philippine setting in areas where plastic bags are banned, some exemptions are made especially for wet products.

5. Incentives are not offered for alternatives to single use plastic bags. Only 16 countries that were reviewed had some rules regarding use of reusable bags or plastic alternatives. These include bags made from plant-based materials. Most governments however, do not have subsidies in places for reusable bags.

There are countries however that attempt to shift the responsibility for plastic pollution from consumers and the government to the companies that produce plastic. As examples, Australia and India enacted laws requiring “Extended Producer Responsibility” (EPR), a policy approach where producers must be responsible for the clean-up or
recycling of their products (Excell 2019). India has already banned all plastics use.

In the USA, the Resource Conservation and Recovery Act (RCRA) gives the Environmental Protection Agency (EPA) the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. To achieve this, EPA developed regulations, guidance, and policies that ensure the safe management and cleanup of solid and hazardous waste, and programs that encourage source reduction and beneficial reuse (EPA nd). EPA has largely focused on building the hazardous and municipal solid waste programs, and fostering a strong societal commitment to recycling and pollution prevention. Ensuring responsible waste management practices is a far-reaching and challenging task that engages EPA headquarters, regions, state agencies, tribes, and local governments, as well as everyone who generates waste.

In the case of the EU, it has agreed to slash single-use plastics, and promote the green growth and circular economy (Figure 5). The Commission has adopted a package of measures and legislative proposals to boost sustainable growth and help Europe make the transition towards a more circular economy. The framework for the circular economy included the following: 1) Resource Efficiency-Using resources more efficiently for a greener, more competitive economy; 2) Raw materials- Ensuring use of raw materials does not deplete the planet's resources; 3) Consumption-Providing transparent information to consumers enabling them to make greener choices; 4) Eco innovation-Enabling green growth and the transition towards a more circular economy; 5) Promoting greener products and supporting greener companies and organizations; and 6) Reducing waste and improving waste management. (Source: http://ec.europa.eu/environment/green-growth/index_en.htm)

The Philippines’ RA 9003- Ecological Solid Waste Management Act

Despite the serious problem of plastic pollution, there is no national policy that regulates its use. Some municipal and city governments have indeed started to implement plastic ban, but with several loopholes as discussed above.

However, at the national level, the passage of RA 9003 (or the Ecological Solid Waste Management Act) in 2001 was a landmark policy because of its integrated approach to solid waste management, including plastics, almost similar to the US policy framework. Based on this law, solid waste management refers “to the systematic administration of activities which provide for segregation at source, segregated transportation, storage, transfer, processing, treatment, and disposal of solid waste and all other waste management activities which do not harm the environment.” (RA 9003, Art 2.Sec.3, I)
Institutional mechanisms of SWM as provided in RA 9003

The institutional mechanism used in the implementation of the law is multilevel: from national agency to barangay level committee (Table 2).

The National Solid Waste Management Commission (NSWMC) under the Office of the President has 14 members from government, 3 from private sector and with the DENR as chair. It has 20 responsibilities among which are to: 1) Prepare the national solid waste management framework, 2) Approve local solid waste management plans, 3) Review and monitor the implementation of local solid waste management plans, and 4) Manage the Solid Waste Management Fund.

The National Ecology Center (NEC) aims to: 1) Facilitate training and education in integrated ecological solid waste management; 2) Establish and manage a solid waste management information database, in coordination with the DTI and other concerned agencies; and 3) Promote the development of a recycling market through the establishment of a national recycling network that will enhance the opportunity to recycle. It is headed by EMB Director and composed of a pool of multi-disciplinary, multi-sectoral experts.

Also provided by law is the creation of the Regional Ecology Center, headed by the EMB Regional Director in ex officio capacity. It shall maintain a multi-sectoral, multi-disciplinary pool of experts, including those from the academe, business and industry, practicing professionals, youth, women and other concerned sectors and facilitate training and education on integrated solid waste management. Like the NEC, it also does not have the staff support and adequate budget needed to operate.

At the provincial level, the Provincial Solid Waste Management Board is composed of all the mayors of its component cities and municipalities with the Governor as Chair. The board’s responsibilities are to, among twelve others: 1) Develop a provincial solid waste management plan from the submitted...
solid waste management plans of the respective city and municipal solid waste management boards; 2) Provide the necessary logistical and operational support to its component cities and municipalities; and 3) Oversee the implementation of the Provincial Solid Waste Management Plan.

On the other hand, the City and Municipal Solid Waste Management Board is composed of the city or municipal mayor as head and 7 representatives from public and private sector. Examples of its responsibilities are to: 1) Develop the City or Municipal Solid Waste Management Plan; 2) Monitor the implementation of the City or Municipal Solid Waste Management Plan; 3) Adopt specific revenue-generating measures to promote the viability of its Solid Waste Management Plan.

The Barangay SWM committee as mentioned in SEPO (2017) (Senate Economic Planning Office (SEPO 2017), chaired by the barangay captain is tasked to formulate SWM programs consistent with the City/municipal SWM plans to segregate and collect biodegradable, compostable, re-usable wastes, and to establish a Materials Recovery Facility (MRF).

Among the salient provisions of RA 9003 are the provision of the mandatory segregation of waste at the household level with collection vehicles having the appropriate compartments for the sorted wastes; the establishment of recycling centers (MRFs) at every barangay nationwide; the preparation of 10-year solid waste management plans by all local government units; and the creation of a municipal and a provincial solid waste management board with functions as provided for by the law.

During the national consultation, issues that were pointed out included exclusion of some relevant agencies in the membership of the NSWMC, such as the Department of Education; lack of long term SWM plan at the LGU level; no room for private sector participation and no data base management provisions that can help synchronize SWM at all levels.

The next section will use secondary data to illustrate the progress in the local level implementation of the law.

**RA 9003 Implementation Challenges**

At the national level, it was observed that the law is not as adequately implemented. Some of the reasons for this were the lack of budget, no personnel, no organizational structure for the NEC at the EMB. In addition, the current institutional arrangement does not allow for the establishment of the NSWM funds.

At the provincial level, most of the created SWM boards are also active (Figure 6). More provincial boards are located in the Luzon regions than in the Visayas and Mindanao regions. In regions 3, 6 and 10, most boards were recorded to be not active.

On the other hand, in the cities and municipalities, most boards were created but some regions have inactive city and municipal boards (Figure 7). In CAR and region 6, most created boards are active. One of the reasons for the high number of boards and the more active status is maybe because there are projects in these areas that facilitate in the formation of these institutions. If none, there will be no board creation, as funds may not be available for such activity.
Figure 6. Created Provincial SWM Boards.

Figure 7. Created City and Municipal SWM boards.
Lowest performance of SWM committees is observed at the barangay level. Several reasons may have triggered this inaction, from the time the committees were created. For instance, region 6 has the highest number of barangays with created SWM committee (Figure 8). However, very small percentage is active. It could be that the committee was created as a project and when the project was completed, no action was forthcoming among the community members. The foremost reason could be the lack of funds. Thus there is non-sustainability in the SWM activities around the country.

Analysis from a study (SEPO 2017) also showed that the local level implementation of the RA 9003 lacked the grit to have an impact (Table 3). Based on the salient provisions of the law, the accomplishments showed low performance. Results showed that in terms of garbage collection, 85% was gathered in Metro Manila and only 40% outside of Metro Manila. In terms of waste disposal, open dumping is still popular and LGUs with access to sanitary landfills (SLFs) was below 15%. For diversion and recovery, only 31% of all barangays in the country have Materials Recovery Facilities (MRFs).

The Philippines is administratively divided into 81 provinces. As of June 30 2019, there are 145 cities (33 highly urbanized, 5 independent component, 107 component) and 1,489 municipalities and 42,045 barangays encompassing the entire nation (DILG 2019). As of 2017, 68% have provincial boards, 38% have city/municipal boards; and 13% have barangay committees. And as of Sept 2017, 1460 SWM plans were submitted to the EMB as the NSWMC Secretariat, but only 318 SWM plans or 22%, have been approved.

![Figure 8. Created Barangay SWM Committees.](https://doi.org/10.57043/transnastphl.2019.1672)
Table 3. Score card in the local level Implementation of RA 9003.

<table>
<thead>
<tr>
<th>Provision of RA 9003</th>
<th>Accomplishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection</td>
<td>85% in Metro Manila; about 40% outside MM</td>
</tr>
<tr>
<td>Waste Disposal</td>
<td>Open dumping is still popular; controlled dumpsites and sanitary landfills are limited.</td>
</tr>
<tr>
<td></td>
<td>LGUs with access to SLFs is below 15%</td>
</tr>
<tr>
<td>Diversion and Recovery</td>
<td>31% of all barangays in the country have Materials Recovery Facilities (MRFs).</td>
</tr>
<tr>
<td>Local SWM boards</td>
<td>As of 2017, 68% have provincial boards, 38% have city/municipal boards; and 13% have barangay committees.</td>
</tr>
<tr>
<td>Local SWM plans</td>
<td>As of Sept 2017, 1460 SWM plans were submitted to the EMB as the NSWMC Secretariat, but only 318 SWM plans have been approved.</td>
</tr>
</tbody>
</table>

Data Source: SEPO 2017.

What could be the reasons for such low performance in the salient provisions of the law and the unsustainable institutional mechanisms that were created?

Based on previous studies by Lizada and Ibabao (2013) and the SEPO (2017), some of the reasons for this low performance are lack of capacity building in understanding the provisions of the law and formulating SWM plans; lack of fund generation activities and technical assistance needed to access credit facilities and to connect to the private sector; too many members of the PSWMB such as it is difficult to have a quorum; difficulty to agree on important policy decisions due to diverse group with different worldviews; unclear delineation of the various members in the provincial board; and lack of enforcement of ordinances in support to the MRFs. Barangays also do not have enough funds to establish MRFs.

The barangays seem to have the utmost responsibility in implementing the law. Barangay officials can influence communities and households to act collectively for successful solid waste management programs. However, capacities and funds may not be present for the barangays to be effective and sustainable in what they need to do.

On the other hand, there are some models in the literature (i.e McDougall et al. 2013) that can be used at the barangay and municipal levels that can potentially promote more sustainability in SWM programs. These models were applied in community forest governance and other resource-based governance. Since solid waste is a public “bad”, its management can also be treated as a resource management issue, and hence participatory and adaptive collaborative governance may also be an appropriate model for use. The next section describes the model and discusses its application in managing solid wastes at the small basin or sub-watershed level.

Sustainable SWM in the context of adaptive collaborative water governance in Sta. Cruz River, Laguna, Philippines

The model adaptive collaborative governance (ACG) is an approach to the governance of socio ecological systems in which groups of actors
purposefully base their decision making on social learning and critical reflection, emphasize inclusion and equity and strive for balanced and strategic collaboration with other actors (McDougall et al. 2013). There are at least four steps in the protocol that was developed under the UP-EIDR project (Figure 9), and as discussed in David et al. 2016.¹

The first step is to build partnership and assess the initial conditions. This implies getting commitment of the various actors by creating a technical working group and by coming up with information especially on the existing policy instruments that may guide the SWM program. Planning strategic actions is the second stage of the process. This involves agreeing to a shared vision, mission, objectives and ground rules as the ACG process progresses. This application of participatory approach is also about coming up with the group rules. Once the group has identified a shared vision and mission, actors are now ready to develop SW management plans. In this stage, the actors also prepare investment plans based on the prioritized common problem among the municipalities. The last stage is the implementation of the investment plan. This requires implementing the SWM plan through a developed investment plan. This stage of the ACG also sees the enactment of the local laws in support of the SWM plan.

The protocol just described was initially applied on water governance with actors along the Sta. Cruz River in Laguna Philippines. Using the problem tree tool in the strategic planning exercise, the participants present have identified solid waste management as the prioritized common problem of the six municipalities where the river traverses. Therefore, the project activities focused on SWM plan development together with the stakeholders.

The Model Application: The Case of the Sta. Cruz River Watershed

The Santa Cruz Watershed (SCW) has a drainage area of 148.35 sq. kilometers that straddles six municipalities ranging in elevation from 215 meters above sea level (masl) to 2,149 masl (Source: LLDA 2012). The Santa Cruz River (SCR) system includes 13

¹ This project was one of the activities of the UP Emerging Interdisciplinary Research Program (EIDR), entitled “Towards water governance for development: a multi-case analysis”.

Figure 9. A Protocol for Adaptive Collaborative Solid Waste Management. Source: David et al. 2016.
rivers that drain into Laguna de Bay at the eastern portion of the lake, through the municipality of Sta. Cruz. The SCR system is one of 21 river systems that drain into Laguna de Bay (Figure 10). According to the 2011 Water Quality Assessment of the Sta. Cruz River (WQASC 2011), the system contributes 15% of the total water in the lake. There are other minor springs that contribute to the surface water supply. These springs constitute the major sources of water for domestic use by households in the villages through local or barangay water systems. Surface water is also used by the tourism sector and the livestock and poultry sectors as well. Therefore, competing uses of water are expected as the watershed communities urbanize. The literature does not offer any definition of urbanizing communities; however, midstream and downstream communities in the Sta. Cruz watershed can be characterized as urbanizing as they are in that pace of development where population increase is faster than in the purely rural areas; access to social services is easier; and non-farm employment opportunities are easily available. The upstream communities of this watershed remain to be rural.

It has an estimated total area of about 15,000 hectares covering the municipalities of Liliw, Nagcarlan, and part of the municipality of Magdalena in the upstream, most of Nagcarlan in

Figure 10. The Sta. Cruz Watershed.
the midstream and Sta. Cruz, Pila, part of Nagcarlan and part of Liliw in the downstream area (Figure 11). However, in some towns, such as Nagcarlan, some barangays were considered as representatives of the three streams, given their location in the watershed.

Within the SCW are secondary forests, arable and cultivated lands dominated by coconut plantations and irrigated rice, as well as built-up areas. Among the selected municipalities, Nagcarlan has the greatest land use cover of 8,286 hectares. Majority of the land of the municipality (83.6%) is being used for agricultural purposes (WQASC 2011). In the three municipalities studied, land is mainly used for agriculture, particularly for rice, vegetables, and coconut.

Based on LLDA (2012) Report, among the municipalities within the SCW, downstream Sta. Cruz has the highest population and number of households, followed by Nagcarlan and Liliw at the upstream section. The annual population growth rate in the SCW ranges from 1.9 in Rizal, to 2.3 percent in Liliw and Nagcarlan. As of 2010, Sta. Cruz was the most populous in the province, with a population density index at 2,874.9. Its poverty incidence by 2012 was at 5.3 percent, or lower than that of Liliw and Nagcarlan. Liliw was the next most populated at 865.8 density index with 9.9 percent poverty incidence. Next to Liliw, Nagcarlan’s population density was 764.7. Nagcarlan also had the highest poverty incidence among the 3 municipalities at 10.0 percent. With the higher growth rates in these communities, population is expected to increase by at least 2.3 percent annually, and solid wastes are expected to increase. The population growth rates in these municipalities, the intensification of agriculture and the growth of other emerging industries such as poultry, piggery, food processing and tourism lead to the problem of increasing solid wastes. This was recognized in one of the brainstorming sessions convened with representatives of the towns present.

The Major Stakeholders

The major actors or stakeholders that participated in the ACG were the following:

- River council: Sta Cruz Integrated Management Association, Inc. (mostly from LGUs)
- 6 municipalities: Sta Cruz, Magdalena, Majayjay, Liliw, Rizal, Nagcarlan
- Laguna Lake Development Authority
- Provincial & Community: Environment & Natural Resources Offices (PENRO,CENRO)
- Academe: UP Los Baños (as facilitator)
Below is a description of the ACG protocol application in the Santa Cruz River:

1. Stakeholders’ Commitment and Creation of a Technical Working Group

“The Technical Working Group for the Rehabilitation of the Santa Cruz River Watershed” was created on November 26, 2014 to address issues related to water resource management and governance at the SCRW. Prior to this event, on November 9, 2014, more than 80 individuals representing various stakeholder groups gathered in a forum organized by UPLB with the cooperation of the Laguna Lake Development Authority (LLDA) and LIMAS MARINA (which was the former name of the River Council) (Figure 12). The forum was a venue for stakeholders to become aware of SCRW’s current state through UPLB’s presentation of research results. Opinion exchange was enriched after this knowledge sharing part of the forum which resulted to the identification of issues related to the management of SCRW and governance of its water resources. One of the issues that was highlighted was the problem of solid waste management. The forum ended with the stakeholders’ manifestation of their commitment to uphold solving identified issues (Figure 13).

2. Strategic Planning and Activities of the Technical Working Group

Water resources management of SCRW has been aligned to the overall approach of the LLDA in using the “four planning systems” i.e. protection, disaster risk, development, and institutional (LLDA 2016). Specific to what this plan wants to achieve, the four planning systems focus on seven areas, namely: river protection (protection), pollution incidence (disaster risk), water quality management (development), stakeholder engagement, institutional coordination, financial mechanism, and monitoring and information (institutional) (Pegram et al. 2013). Essentially, overall planning has followed a process starting from the conduct of research particularly on assessing water management undertakings by institutions and understanding SCRW’s present challenges to addressing the issues/problems to building partnerships with a common vision and mission, and lastly to agreeing on processes to undertake simple rules of self-governance.
Waste management was not only identified as a major problem in SCRW during the stakeholders’ forum. During the training-workshop on watershed and water resource planning sponsored by UPLB on March 10-12, 2015, waste management problems were a common concern identified by the six municipalities.

Using the problem tree approach in analyzing water resource problems, there were six factors the forum participants identified that caused the pollution problem of the river system, to wit:

a) uncollected garbage disposed to the canal, drainage and creeks/rivers,
b) direct flushing of human wastes to water bodies,
c) direct dumping of animal wastes to rivers,
d) uncontrolled use of chemical fertilizers and pesticides, and
e) uncollected liquid wastes and used oil from business establishments.

Uncollected garbage is caused by the non-functioning material recovery facilities at the municipal and barangay levels, limited knowledge on garbage disposal, and weak enforcement of the law and ordinances by concerned local government units. Aimed to understand more the problem on solid waste management particularly related to the establishment of the material recovery facilities (MRF), meetings with the six Associations of Barangay Council (ABC) were scheduled with LLDA, LIMAS MARINA, PENRO Los Banos, and UPLB. SCRW consists of a total of 186 barangays. The MRF inventory however shows that only 13 or about 7% of total number of barangays had functional MRFs. The MRF were found in Nagcarlan, Sta Cruz, and Rizal. No MRF was reported in Magdalena and Majayjay. Liliw, Nagcarlan, Sta Cruz, and Rizal had established their municipal MRF. There were five MRF stationed at Majayjay and Rizal, but considered non-functional.

Direct flushing of human wastes to water bodies is caused by the absence of proper toilets and/ or septic tanks by some residents. There was an absence of a centralized sewerage system in the areas particularly where the informal settlers reside. Also the direct dumping of animal wastes, such chicken and swine, to the water bodies is caused by the weak enforcement of the law and lack of waste treatment facilities.

The pollution of the SCRW is also brought about by the uncontrolled use of chemical fertilizer and pesticides. This is so due to the intensified agricultural activities especially in the upstream and people’s limited knowledge on the use of inorganic fertilizer and pesticides.

All the cited factors have consequential effects. Firstly, the water quality of river system has deteriorated. This in turn has negative impact to the habitat of fishes and consequently to farmers’ catch and of course, their income and supply of food. Polluted river also affects irrigation canals. Clogged irrigation canals are a maintenance problem to rice farmers. Lastly, water sourced from a polluted SCRW is already contaminated that affects people’s health. All this has been the current water quality situation of SCRW.

It was in the same training-workshop in 2015 where the six municipalities agreed to prioritize the problem on solid waste management at the watershed level. However, it was also recognized that further analysis of the solid waste management problem situation at the barangay and community levels had to be done.

3. Developing the SW management plan

The goal of the technical working group was as follows: To rehabilitate the Santa Cruz River System, strategies will be implemented to properly dispose and manage solid wastes. The goal of rehabilitating the SCRW can be done through four ways. Solid wastes should be disposed and managed well by establishing functional MRF and strictly enforcing the laws. The LGUs concerned at the municipal and barangay levels with communities should have knowledge of the proper management of solid wastes. Direct human wastes disposal to rivers can
be prevented if households without proper toilets will be encouraged to have septic tanks. In areas with a great number of households without septic tanks, a centralized sewerage system can be established. For animal wastes, concerned authorities should strictly enforce the law and ordinances. Households and business owners engaged in hog-raising and poultry enterprises should have treating facilities for their waste water before disposing to the river and canals. Rivers are also affected by inorganic chemicals (fertilizer and pesticides) used by farmers. Non-use or controlled use of inorganic chemicals should be implemented particularly in the upstream. Farmers and others who use inorganic chemicals should be knowledgeable of its application.

It is the goal of TWG to lead in the rehabilitation of the SCRW until 2025.

Accordingly, the communities involved agreed on the following action and strategies to address the rehabilitation of SCRW:

a) Proper disposal and management of garbage
b) Proper disposal of human wastes
c) Proper disposal of animal wastes
d) Non-use or controlled use of chemical fertilizer and pesticides

Of the above-cited problems pressing the need to rehabilitate SCRW’s river system, the TWG opted to prioritize disposing and managing solid wastes by collaborating with one other. The planning officers and MENRO/MAO officials agreed to prioritize the strategy as it is a common problem to the six municipalities of SCRW. The problem on the use of inorganic chemicals was more observed in the upstream and midstream where vegetable farming subsists. On the other hand, more prevalent cases of human wastes disposal are at the downstream where areas of informal settlers are located. The six towns of SCRW, with a total of 48,072 households or 269,561 individuals, will benefit from the solid waste management project.

4. Investment Planning

A solid waste management plan and an ordinance should reflect systems of segregating wastes at source, collecting, composing, recycling, reusing, and devising penalties and incentives schemes in consultation with various sectors and communities. Some of these need investment plan. For instance, establishment of a functional MRF and the purchase of equipment to process wastes into reusable forms will need some investment planning. Below are the experiences of the participants/actors in their aim to sustainably manage their solid wastes.

a) Establishment of functional systems of MRF (segregation, reuse, recycle, composting, etc)

An MRF is a solid waste management station for further sorting (first level of sorting is at the households), a composting facility, and a recycling facility. A constructed MRF is not enough but requires a system for it to become functional. An MRF system (of a barangay or cluster of barangays or municipality) should have corresponding draft policies – the products of well-thought-off decisions by the local solid waste management board (SWMB). Another consideration for a functional MRF is the manpower requirement, for example, attending to organic gardens, vehicle and equipment maintenance, driver, etc. In the construction of MRF, the location, budget, size, and bill of materials are determined during the SWMB meetings.

b) Linkage with junkshops and companies as wastes recipients

One scheme to reduce solid wastes is to establish linkage with private companies (e.g. cement manufacturers) or LGUs (e.g. Teresa, Rizal has established partnership with Republic Cement and Building Materials Inc.). It is an opportunity to partner with companies that have high demand for plastic materials and
at the same time derive income. It was found out that wastes are lost in the system once used in the manufacture of cement. A system of collection at the watershed level will be established to gather together at least 10 tons volume of wastes.

Also, agreement with junk shops may be pushed by the LGUs to lessen collected wastes, which could be reused and sold. Both schemes could provide income to LGUs which may be used to fund incentive-providing projects.

c) Purchase of equipment to process wastes into reusable forms

As a system consists of processes (sorting, composting, etc), LGUs should consider the equipment requirement in producing saleable products, for example, coconet, throw pillows. Raw materials should be most available in the locality for example coconut wastes for producing coconet. Pulverizer (in the case of selling wastes to cement manufacturers) may also be considered as a need.

Sustainability of activities following the protocol

In addressing the identified water management and governance problems and solid waste management issues confronting SCRW, the TWG has followed an iterative process of the four-phase protocol on adaptive collaborative governance (ACG) developed by UPLB. UPLB helps in facilitating the collaboration process particularly in the continuous planning and decision-making particularly in the monitoring and evaluating of projects, documenting processes, and planning information and educational communication (IEC) or extension strategies. The UPLB-EIDR project ended in 2017; however, the TWG still operates to this date. This is still quite early to claim effectiveness of the protocol, but continuous monitoring and identifying possible bottlenecks are suggested.

The ACG protocol presented in Annexes 1 to 4 describe according to its purpose (i.e., phases), procedure and guideline (recommendation) of each of the four protocol phases (David et al. 2016).

CONCLUSIONS

Two conclusions come to mind. First, there are solid waste management laws but these must be implemented by building capacities at the local level and by providing necessary funds. Second, sustainability of SWM plans’ implementation depends on the commitment of the local institutions and stakeholders to change behaviour.

LESSONS LEARNED

The following were some of the lessons learned in sustaining the local level efforts for SWM:

1. Institutional strengthening through the adaptive collaborative governance (ACG) is needed to sustain the solid waste management activities

The river council that was formed during an earlier project needed to be strengthened by defining its reason for being. When the UPLB project personnel first arrived in the area, the activities of the river council were limited to planting trees and river clean up. These were just considered as social activities. However, institutional strengthening involved defining of vision and mission statements and their goals. The members were taught to be systematic in documenting their activities; to take minutes of their meetings; to agree on the agenda for each meeting and most importantly, to be punctual during meetings. The actor and his/her permanent alternate were identified for accountability. During this year 2019, the river council members agreed to weigh the solid wastes they collect so they will have an empirical basis for the effectiveness of their program.

Currently, regular meetings are held and venues are rotated among the six municipalities. The snacks are being provided by the host municipality. Transportation
expenses are shouldered by the LGU or the person concerned.

2. Solid waste management plan should be crafted in a participatory manner.

   The participation of all actors was crucial in agreeing on the problem and the strategies to solve the problems. The prioritization on what project to do first was also done in a participatory manner, thus transparency and good governance in general was followed.

3. Focus on achieving incentives should keep spirit of collaboration always active.

   The end result of the solid waste management activities is for a cleaner river system. This was the incentive that everyone would like to achieve. All appreciate the SW programs as there are initial results being reported during the regular meetings. For instance, in one of the meetings, downstream Sta. Cruz representatives claimed that the solid wastes collected from their part of the river has reduced through time. This was good news for people upstream who have been serious in collecting solid wastes from surface waters.

4. Leadership is an important factor for a committed river council.

   The river council leader is very committed, passionate and with a very environment friendly stance. He is not part of any LGU, but a private person who is a lawyer by profession. He understands that cleaning up the river means cleaning up the lake and eventually cleaning the Manila de Bay. The council is lucky to have this lawyer as its leader.

5. Academe is an effective facilitator in an ACG approach.

   The role of the academe as the facilitator of this whole process was acceptable to the various actors. The academe does not have any vested interest; it has the science to share to the community and tools and techniques of participation that was well appreciated. However, there must also be some continuity in the intervention of the academe. After the project, the project personnel still attend meetings but at their own expense. Maybe the university can include this type of monitoring as part of its extension program.

ACKNOWLEDGEMENT

The author would like to thank the National Academy of Science and Technology (NAST)-Department of Science and Technology (DOST) for the research fellowship to prepare this paper and to the Emerging Interdisciplinary Research (EIDR) program of the University of the Philippines System (OVPAA- EIDR-2-003-121010), for the use of the project data.

REFERENCES


---

2 The Sta Cruz watershed is under the purview of Administrative Order 16-Expediting the Rehabilitation and Restoration of the Coastal and Marine Ecosystem of the Manila Bay and Creating the Manila Bay Task Force. This Task Force aims to fast track compliance by the concerned agencies on the continuing writ of the Mandamus, where Laguna de Bay with its rivers and streams are a part of.


Annex 1. Building partnerships with stakeholder groups and assessment of water management undertakings

Procedure:

- Identification of key water-user and water decision-making groups
- Assessment of water user groups’ pattern of decision making and contexts of interaction or how decisions pertaining to water use are agreed upon
- Review of local policies or rules and regulations related to water governance; assessment of how local policies affect institutions’ management functions
- Review existing management instruments/plans e.g., watershed management plan, comprehensive land use plan
- Assessment of current status of resources and their functional processes
- Characterization of a watershed’s physical features
- Creation of a technical working group (TWG) representing government, nongovernment, and private institutions

Some guidelines:

- Building partnerships and assessing water management undertakings (using secondary data gathering) in a watershed are two major processes which may be applied simultaneously.
- Primary data may be gathered in the course of building partnerships with stakeholder groups to better understand how water is managed by water users and water decision-making groups.
- Tapping an existing river council, active or not active, of a watershed for any ACWG project ventures will be helpful to assist in smooth building of partnerships. ACWG process endeavors to build up inactive river councils.
- Conduct of a stakeholders’ forum may be an initial means to build partnership among stakeholders.
- TWG membership should be inclusive, but inclusion of any groups or individuals, should be agreed upon by the core members (original member-institutions) depending on the identified needs to address a particular concern. As the TWG meets regularly, various concerns may surface, e.g., meeting hosting, funds, etc.
Annex 2. Strategic action planning

Procedure:

- Identification of appropriate management approach to undertake to address environmental issues of a watershed
- Establishment of shared vision, mission and objectives of the TWG
- Establishment of some ground rules
- Application of social processes, among others, participatory action research, facilitative leadership and mediation skills, consensus building, dialectic decision-making, to discuss mutual gains and incentives out of the ACWG process

Some guidelines:

- Identification of a management approach to undertake should be agreed within a TWG. The TWG in Santa Cruz Watershed opted to develop a water resource management plan to rehabilitate the watershed’s river system – a common priority among stakeholder groups. As discussed earlier, other management approaches include legislation, agreements, market-based strategies, institutional changes, and education.
- The TWG’s vision and mission may be established during this phase when environmental problems had been discussed.
- Some ground rules have to be instituted within the TWG membership. Sometimes, ground rules are not necessarily initially agreed, but practiced and modelled out by those people espousing ACWG, for instance is the rule on tardiness and documentation of the meetings.
- As ACWG process is participatory in nature, it is important to determine at this point of the ACWG process the capability needs of the TWG members and others involved in preparation for undertaking an identified management approach. For instance, the Santa Cruz Watershed TWG members identified their need for a training on water management plan preparation.
- An outline of water management plan may already be discussed in meetings in preparation for the development process of a water resource plan. The TWG members coming from different municipalities of Santa Cruz Watershed tried to accomplish a municipal-based water resource plan prior to the development of a watershed-based water management plan.
Annex 3. Water resource management plan development and investment planning

Procedure:

- Development of a water resource management plan by putting together the individual municipalities’ prepared plans.
- Validation of data in the draft water resource plan by the TWG members.
- Preparation of an investment plan based on prioritized common problem among municipalities.

Some guidelines:

- The outputs of earlier review of water management undertakings are important inputs to the development of a water management plan.
- An investment plan out of a drafted water management plan may be pursued as an intermediate outcome out of ACWG collaborative platform. An investment plan may be treated as project plan in which institutions are involved particularly in the implementation process.

Annex 4. Implementing an investment plan using social learning approaches

Procedure:

- Implementation of the water management plan through a developed investment plan
- TWG members learn while implementing the investment plan
- Enactment of local laws to support the water management plan and investment plans

Some guidelines:

- An inflexible implementation of a water resource plan may take years for the TWG members to see concrete accomplishments. But by experiencing and learning in the process as an investment plan is being implemented, it enables accomplishing the bigger plan through small collaborative efforts. Learning together takes time as it is done in an iterative process of social experimentation, but seeing things happen through collaborative means, connotes accomplishments by itself.
- The ACWG process follows a continuous engagement of stakeholders.
- The strategy not only provides a focused approach to addressing an environmental concern, but also addresses the limitation of funds by implementing an investment plan.