

Wastewater production, treatment and use in the Philippines

*Engr. Gerardo Mogol
Engr. Teresita S. Sandoval
Engr. Marcelino Rivera, Jr.*

Wastewater production and treatment

The data on the total volume of wastewater generated by municipal and industrial sectors is not readily available from concerned agencies. Hence, this data was estimated using the available data as shown in Table 1 for year 2010 and 2011 for municipal and industrial sector, respectively. The estimated total annual volume of wastewater produced from both municipal and major agricultural industries is about 7,465 million cubic meters. This data may be considered inadequate because there are other industries that are producing wastewater but their data are not readily available. The dominant wastewater treatments are primary and secondary treatments depending on the physical and chemical constituents of the wastewater and the standard quality of effluents prior to discharge to surface water or land. The major constraints to wastewater treatment include: a) capital cost; b) operating and maintenance cost; c) space requirements; and d) available technology.

Table 1. Estimates of wastewater production and treatments

Sources	Raw Production	Unit	Factor	Annual wastewater produced (cum)	Dominant Treatment
Municipal	103,476,574 ^{a/}	no. of people	50 gal/day*	7,081,678,033	Primary
Industries					
1. swine production	9,401,896 ^{b/}	no. of head	6 cum/hd**	56,411,376	Primary & secondary
2. poultry processing plants	404,898,534 ^{b/}	no. of birds	37.5 cum/1000**	15,183,695	Primary & secondary
3. sugarcane milling company	2,244,131 ^{b/}	MT	139 cum/MT**	311,934,209	Primary & secondary
GRAND TOTAL				7,465,207,313	

a/ 2010 data

b/ 2011 data

*IRR sewage disposal of PD 856

** Assessment of Sources of Air, Water and Land Resources, Part One: Rapid Inventory Techniques in Environmental Pollution, WHO, Geneva, 1993

Wastewater use/disposal

With regard to wastewater use/disposal, the Department of Agriculture (DA) through its Administrative Order No. 26 approved on 2007 is implementing safe use of wastewater in agriculture such as irrigation, fishery production and fertilizer. With this AO, the wastewater must be treated first prior to application to ensure the safety of the farm workers and community. Based from the incomplete reports of the regional offices of the DA as shown in Table 2, the total volume area irrigated with treated wastewater is only 1,904 ha and wastewater applied as liquid soil conditioner is 1,424 ha. The major crops irrigated with treated wastewater are sugarcane, banana, pineapple, assorted vegetables, maize, cassava, mango and coconut. According to other regions, there are industries (e.g. piggery farms) that allow the use of their wastewater for irrigation and nutrient enhancement but did not apply for certification to DA, hence no available records. There are also reports on the use of domestic or municipal wastewater in backyard gardening, ornamental plants, and landscape grasses but no figures or values are available on the hectareage from the concerned agencies.

Table 2. Wastewater use/disposal in agriculture

A. Treated wastewater - with certification from the Department of Agriculture in compliance with DA-Administrative Order No. 26

Region	Irrigation		Land application*		Treatments
	Area (ha)	Major crops	Area (ha)	Crops	
I	6	rice, tomato	n/a		mechanically operated treatment lagoon with bio-agents added
VI	85	sugarcane	n/a		anaerobic digester plant, reverse osmosis, effluent collection pit, pre-discharge lagoon, irrigation lagoon
X	1,813	corn, banana, assorted vegetables, cassava, coffee, pineapple, sugarcane coconut, mango	1,424	banana, pineapple	Primary, secondary and tertiary
Total	1904		1,424		

B. Untreated wastewater - no available data

* Land application - wastewater are applied to the farm with no growing crops or during fallow period. The application of wastewater intends to improve soil physical structure and water holding capacity.

Policies and institutional set-up and needs for wastewater management.

The Department of Environment and Natural Resources (DENR) spearheads the activities related to management of wastewater in the country. These activities include: compliance monitoring, regulating wastewater discharge, issuance of discharge permit, monitoring of effluent and ambient water quality. With regard to use in agriculture, the DA was tasked per

RA 9275 (also known as Clean Water Act of 2004) to develop guidelines for the issuance of certification to wastewater generators in compliance with the set limits as to quality, quantity and irrigation distribution methodology. Any industry that generates wastewater must integrate their intent to use their wastewater in agriculture in their application or renewal for discharge permit in the DENR. Their application for certification goes to the concerned regional field units of the DA for processing and approval subject to the provisions in the Guidelines.

The Department of Health (DOH) likewise developed the Implementing Rules and Regulations of Chapter XVII (Sewage collection and disposal, Excreta disposal and Drainage on Dec 21, 1995 and Supplemental IRR (Rules and Regulations Governing the Collection, Handling, Transport, Treatment and disposal of Domestic Sludge and Septage) on May 4, 2004 under the DOH Sanitation Code.

Recent research/practice on different aspects of wastewater

One of the researches related to wastewater use in agriculture is the study of Dr. Raul Alamban titled “Environmental assessment of farm household wastewater for vegetable production in Maria Paz, Tanauan City, Batangas, Philippines”. In this study, the use of wastewater for irrigation has improved the farmers’ productivity and income in terms of water saved. Another notable practice for wastewater use is the case of Absolut Distillers in Lian, Batangas wherein they are using their treated wastewater as liquid fertilizer to their sugarcane farms through fertilization truck. The high organic content of the wastewater has proven to be useful in the production of sugarcane at reduced cost of fertilizer requirements with an annual savings of Php 23,272,970 or US\$ 541,231.86

The Busco Sugar Milling Co., Inc. located at Brgy Butong, Quezon, Bukidnon practiced “Zero Discharge Program” or a “Close-Loop System” through recycle and re-use. Their sugar mill employs primary and secondary treatment and its effluent is re-used in irrigating the sugarcane farm previously 95 ha but now they are irrigating about 400ha through a hand-move sprinkler system. The value of average nitrogen and phosphorous content in wastewater effluent is 2.5 mg/L and 3.8 mg/L, respectively that reduces fertilizer requirements to their sugarcane farm.

Status and need for the knowledge and skills on the safe use of wastewater

Per review of the DA on the implementation of AO No. 26, it was found out that some of the assigned staff within the regional field units of DA do not have appreciation on the use of wastewater in agriculture; they do not have the necessary level of knowledge and skills to ensure that provisions in the Guidelines are properly complied with. This holds true for the local government officers and staff who are responsible for the use of municipal wastewater management.

Generally, staff who are assigned in wastewater use have minimal or no knowledge on basic treatment methods and no adequate understanding on the effects on health and safety of the community. They need to be capacitated on: a) different treatments methods for wastewater to ensure safety not of people but also for crops; b) proper handling and application; and c) interpretation of laboratory analysis.