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URBAN STUDIES PROGRAM

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Alan Dino E. Moscoso, Rhodella A. Ibabao, and Brian C. Ventura

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Telephone: (02) 8981-8500 loc. 4266 to 4268 / (02) 8426-0955
Email: cidspublications@up.edu.ph
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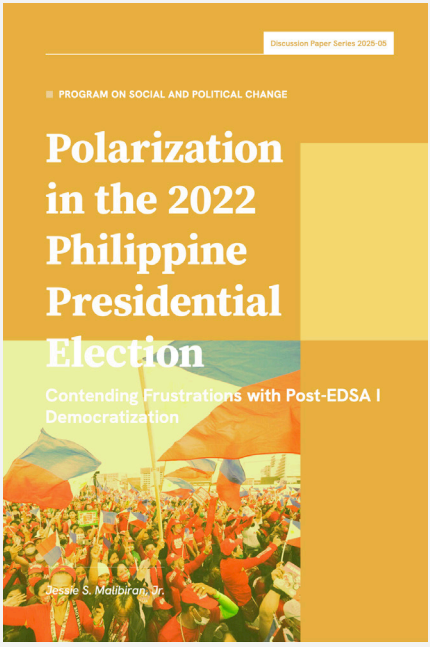

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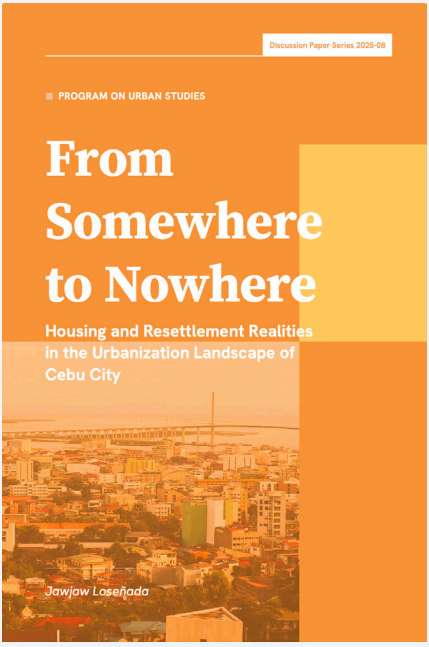

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ENHANCING THE INSTITUTIONAL ARRANGEMENT TO IMPROVE THE MANAGEMENT OF THE ILOILO-BATINO RIVER SYSTEM WATER QUALITY

Alan Dino E. Moscoso,[1] Rhodella A. Ibabao,[2] and Brian C. Ventura[3]

1 School of Technology, University of the Philippines Visayas, Miagao, Iloilo

2 Department of Management, College of Management, University of the Philippines Visayas, Iloilo City, Iloilo

3 Division of Social Sciences, College of Arts and Sciences, University of the Philippines Visayas, Miagao, Iloilo

ABSTRACT

This study delves into the multifaceted significance of the Iloilo–Batiano River System, highlighting its ecological importance, economic contributions, and persistent challenges related to water quality and pollution. Despite progress made by the Iloilo–Batiano River Development Council, issues such as poor water quality, solid waste accumulation, and inadequate sewage management continue to jeopardize public health and the river's ecosystem. The research emphasizes the crucial roles of various stakeholders, including water providers, local government units, nongovernment organizations, and community members, in addressing these challenges through collaborative governance and sustainable practices. Effective regulatory frameworks and public-private partnerships are also underscored as essential for ensuring long-term river management and rehabilitation efforts. Key findings highlight the need for sustained commitment to enhancing the health of the Iloilo–Batiano River System, balancing urban development and environmental sustainability. Compliance with existing laws and regulations, such as the Clean Water Act and the Iloilo City Septage Management Program, is crucial. Lessons learned from septage management initiatives in other local government units are also discussed. Recommendations include revitalizing the Iloilo–Batiano River Development Council's role in promoting the river's conservation and sustainability.

SIGNIFICANCE AND UTILIZATION OF THE ILOILO–BATIANO RIVER

The Iloilo–Batiano River System (IBRS) has an important role in providing ecosystem services in the city of Iloilo and the neighboring town of Oton. Historically, the river supported a harbor that cater to the once-important international trading of textiles and sugar. Thus, Iloilo City first earned the city the title "Queen City of the South" in the 1800s (IBRDC 2023). In recent years, it has provided the impetus for economic activity by serving as a major port for domestic ships as well as roll-on/roll-off vessels for both passengers and cargo. In 2022, the port reported around 61,000 domestic ship calls, 5.7 million passengers transported, and 1 million metric tons of cargo throughput (IBRDC 2023). Restaurants also proliferated along its banks after it was cleared

of illegal settlers and old wooden boats during the implementation of the Iloilo River Masterplan in the early 2000s. The esplanade project provided recreation for walking, jogging, and biking in a nine-kilometer linear park. The river also receives drainage and stormwater outflow mitigating flooding events considering that much of the city is subsiding at the rate of eight to nine millimeters per year (Sulapas et al. 2024). The river provided much-needed blue and green spaces as the water and mangroves alleviate the urban heat island effect by absorbing the sun's heat resulting in a much better thermal comfort in the surrounding community (Cruz et al. 2021).

The Iloilo-Batiano River System is an estuary:

> a partially enclosed coastal body of water that is either permanently or periodically open to the sea and which receives at least periodic discharge from a river(s), and thus, while its salinity is typically less than that of natural sea water and varies temporally and along its length, it can become hypersaline in regions when evaporative water loss is high and freshwater and tidal inputs are negligible. (Potter et al. 2024).

The brackish water in the river is influenced by the salt water from the Iloilo Strait and the freshwater from the Dungon Creek, Calajunan Creek, and other tributaries. Based on the approved cadastral survey, the Iloilo River has a length of 26.7 km while the Batiano River is 27.4 km long (IBRDC 2023). DENR Administrative Order No. 2009-11 designated the Iloilo-Batiano River System Water Quality Management Area (WQMA) and its Governing Board to ensure water quality for present and future generations. The Governing Board is chaired by the Environmental Management Bureau (EMB) Regional Director of Region VI with members coming from the National Water Resources Board; Province of Iloilo; mayors from the City of Iloilo and the municipalities of Oton, Pavia, San Miguel, and Santa Barbara; regional offices of government agencies; and representatives from concerned sectors (DENR 2009). The identified WQMA covers an area of around 9,928 ha comprising the Iloilo and Batiano rivers, their tributaries including the land within the identified hydrologic unit (see figure 1). The IBRS is home to 54 species of fauna and 23 species of plants, particularly mangroves. Fishing in the river produces around 3–5 kg/capita/day that includes the catch of *gusaw, sapsap, bangus,*

managat, bulgan, alimusan, bulan bulan, and *tilapia* with the use of *pukot, laya, panggal, tanggab,* hook and line, and *lambat* as fishing gears (IBRDC 2023).

■ **Fig.1.** The Iloilo-Batiano River System Water Quality Management Area (WQMA)

The Iloilo City Planning and Development Office treats the Iloilo–Batiano River as a catalyst of other developments in the city, with the help of private-public partnerships and national government agencies (CPDO 2024). One of these organizations is CityNet, an "association of urban stakeholders committed to sustainable development in the Asia Pacific region" (CityNet 2024). Recently, the Iloilo River Esplanade Project has earned the city the 2024 Asian Townscape Awards, one of the leading models for urban landscape construction in Asia. On the same occasion, during the 3rd CityNet-UNESCAP Sustainable Development Goals (SDG) City Awards as part of the CityNet Execom meeting, Iloilo City was conferred the Livable City Award for its outstanding efforts in enhancing urban livability through innovative programs and sustainable urban planning (Panay News 2024c). Previously, the Iloilo–Batiano River Development Project was named a Galing Pook Awardee in 2018 for championing ecological sustainability and fostering a sense of security and livability (Galing Pook 2018).

IBRDC STEPS UP TO THE CHALLENGE

In 2002, the Iloilo River Development Master Plan was crafted and it identified the critical issues confronting the Iloilo River:

> 1) poor water quality, 2) presence of solid wastes and other floating debris, 3) siltation or persistent sediment loading, 4) laxity on the issuance of Environmental Compliance Certificate and the monitoring and regulation of environmental and sanitation requirements of industrial and commercial establishments, 5) deficient garbage disposal system/non-segregation of organic and inorganic solid waste, 6) encroachment/reclamation, 7) lack/inadequate infrastructure facilities for public access to and from the river that otherwise could draw public interest, create awareness and appreciation of Iloilo River, 8) worn-out buildings/structures, 9) presence of informal settlers, 10) high incidence of respiratory diseases among residents near Iloilo River, 11) seasonal unpleasant odor emanating from the river, 12) absence of sanitary facilities and water supply for the majority of informal settlers, 13) some Barangay officials are not keen on protecting territorial boundaries, 14) lack of data/information on the economic valuation of the different industrial and commercial activities and businesses along Iloilo River, 15) illegal fishing practices, and 16) absence of proper administrative boundaries and legal easements. (Iloilo Business Club 2002)

Twenty-two years after the establishment of the plan, many of these problems and issues were already minimized, if not eliminated. Foremost is the provision of public access to the river environment with the implementation of the Iloilo River Esplanade project, a nine-kilometer-long promenade with a four- to eight-meter-wide road, with paving blocks, landscaping, view deck, and berthing area. Esplanade 1 was completed in 2013 while Esplanade 12 is currently near completion (IBRDC 2023).

Also in 2002, the Iloilo River Development Council was created through Executive Order 234 by then-Mayor Jerry Treñas with the intention of providing management of the river. Later, in 2010, it was renamed the Iloilo–Batiano River Development Council (IBRDC) to reflect the coverage of the river system. The council constitutes the national government agencies, the local government units, the private sector, and the academic community (IBRDC 2023).

Since then, there has been a significant improvement in the Iloilo–Batiano River when compared to its status two decades ago, earning accolades and admiration from both locals and tourists. Yet there are still issues that need to be addressed. These are the concerns for the water quality of the river and how it affects the health of the people. Although there was a substantial decrease in pollutants compared with the quality prior to development of the Iloilo River, the values barely pass the water quality guidelines set by DENR (1990) for class C waters or water bodies that can be used for the propagation of fishing and other aquatic resources, for secondary recreational activities (boating) and for manufacturing processes. This is particularly true for Fecal Coliform where it did not pass the 200 MPN/100 ml standard since 2011. Coliform bacteria are microorganisms that usually occur in the intestinal tract of animals including humans, and a high count suggests sewage pollution. The results of other water quality parameters such as dissolved oxygen (DO) and biochemical oxygen demand (BOD) have similar trends in the last decade. DO and BOD are measures of how much oxygen is available in the water for living organisms that require them, and the amount of oxygen needed by aerobic biological organisms to break down organic material, respectively. These unseen pollutants are a major concern since they may affect the health of those eating the fish caught from the river as well as those engaging in physical activities in contact with the water like dragon boat racing in the Iloilo River and *baroto* race in the Batiano River (Panay News 2024b; Bugsay Suba 2024). It also affects the businesses along the river as an unpleasant smell is observed once in a while. According to DENR-EMB and CENRO, the main culprit in the Iloilo River pollution is the waste from septic tanks or sometimes the absence of septic tanks from residents along the river (Panay News 2018, Representative of CENRO, Interview, 29 November 2024). The Iloilo City Health Office records show only 80 to 85 percent of houses in the city had septic tanks in 2018. Another aggravating circumstance is when the septic tanks do not conform to standard design requirements or are not cleaned or desludged regularly (Panay News 2018; 2021).

In response to the pollution problem caused by sewage, the Iloilo City government passed two important ordinances: (1) Establishing an IBRDC Management Program in Iloilo City (Regulation Ordinance No. 2017-127) and its Implementing Rules and Regulations (IRR) (Resolution No. 2023-831), and 2) the Commercial Wastewater Management Ordinance of Iloilo City (Regulation Ordinance No. 2022-247). It is important to note that the septage

ordinance took some time (six years) before its IRR was crafted, perhaps an indication that septage management was not a priority then of the Iloilo City government.

In support of Regulation Ordinance 2017-127, the Office of the Mayor created the Iloilo City Septage Management Authority (ICSMA) and formed a technical working group to effectively implement the septage management program of the city. The ordinance requires that all buildings should have an approved excreta septic tank unless it is connected to a sewerage system with an off-site treatment or connected to an onsite wastewater treatment facility (section 4). Thus, new building permit applications are required to submit an approved design of the Sanitary/Plumbing and septic tank (section 7). The design and construction shall be in compliance with the National Building Code, National Plumbing Code, Code on Sanitation of the Philippines, and DOH AO No. 2019-0043 (National Standard on the Design, Construction, Operation, and Maintenance of Septic Tank Systems) (section 8) (DOH 2019). The ordinance also allows the installation of communal septic tanks for those subdivision and residential dwelling units where septic tanks or other modes of treatment are absent or lacking (section 7). All septic tanks in the city shall be desludged by an accredited hauler/pumper/desludger when half-full or every three to five years, whichever comes first.

The Commercial Wastewater Management Ordinance of Iloilo City (Regulation Ordinance No. 2022-247) complements the Septage Ordinance by dealing with wastes such as oil, fat, grease, and petroleum generated from commercial, recreational, industrial, and manufacturing buildings with a total water use of more than 200 m^3 per day (section 6). These types of waste can block sewer lines, pumps, and treatment plant operations by inhibiting the activity of sludge-digesting microorganisms (Wallace et al. 2017). Those commercial and industrial establishments that are required by DENR to secure a discharge permit need to show proof of compliance or authority to discharge before the city government renews their business license.

Commercial and Industrial Sewage

The monitoring of water quality in the IBRS lies on the DENR-EMB, and their data shows it is not meeting the required standards for a Class C water body. It seems that there is a need to identify and penalize commercial and industrial

polluters. However, there are reports of commercial establishments that are willing to pay the penalties instead of putting up a working sewage treatment facility. The commercial facilities also need to comply with the pollution regulations of the LGUs to renew their business and health permits. It is important to note that according to CENRO (2024), the IRR of the Iloilo City Septage Ordinance applies only to septic tanks and not to sewage treatment facilities (STPs). This suggests that the DENR–EMB, which has the regulatory functions on STPs has to step up on its mandate.

Household/Community Sewage

Government agencies, through the IBRDC, have taken steps to improve the water quality in the IBRS by addressing issues related to solid waste and wastewater management. With the implementation of the Dungon Creek Rehabilitation Project, the DENR–EMB, DPWH, and the Iloilo City government installed four drainage interceptors and five modular sewage treatment plants (MSTP) along Dungon Creek, a major tributary to the IBRS. The installations were handed over by the DENR–EMB to the Local Government of Iloilo City on 15 November 2024 (DENR 2024c). These MSTPs shall be operated by the barangay where the facility is located. Water quality measurements were taken on the outfall of the MSTPS during the commissioning of the facilities. While some of the effluent measurements passed the Class C water quality guidelines, there seems to be little effect on the water quality of Dungon Creek as it still failed to meet the water quality standards values (DENR 2024b). This implies that clean water leaving the MSTPs is not enough to dilute the dirty water of Dungon Creek.

The challenge then is how to implement these laws, ordinances, and regulations to address water pollution in the IBRS. What are the roles and responsibilities of other LGUs outside of Iloilo City, the private sector, civil society, and other players in ensuring that the river water quality will meet the required standards of DENR-EMB? To answer these questions, the researchers interviewed the key players in the management of the IBRS—the Environment and Natural Resources Office and the Planning Office of Iloilo City, and the Municipality of Oton—particularly taking notice of the experiences of senior members who were involved in the early planning of the river system. The initiatives of the local government units were also gathered from secondary

data. Furthermore, a roundtable discussion was conducted to elicit concerns and issues from other stakeholders of the IBRS.

THE LEGAL FRAMEWORK ON RIVER MANAGEMENT

The United Nations Sustainable Development Goal 6 is to "ensure availability and sustainable management of water and sanitation for all" (UN 2024). The national government, as well as the local government units, have a set of laws that respond to this challenge. Three national government agencies, namely, the Department of Environment and Natural Resources (DENR), the Department of Public Works and Highways (DPWH), and the National Economic and Development Authority (NEDA) took the helm in implementing the septage program of the country to the level of the Local Government Units (DPWH 2013). On top of these environmental laws are Republic Act (RA) Nos. 9033 and 9075.

The Ecological Solid Waste Management Act of 2000 (RA 9003)

According to this Act, the local government unit must have a mandatory solid waste diversion starting at 25 percent (section 20) and the mandatory segregation and collection of solid waste (sections 21 and 22) (RA 9003 [2000]). In Iloilo City, such segregation is not religiously followed at the household level as unsegregated wastes are collected by its primary collector—the JS Layson and Co., Inc. fleet. As such, the residents are not compelled to segregate their waste at source resulting in a landfill with a high amount of organic waste that eventually decomposes and leaches its way to the soil and adds to the organic load in the IBRS.

In support of RA 9003, the National Solid Waste Management Commission (NSWC) was established to oversee the implementation of the waste management plans and prescribe policies to achieve the objectives of the Act. One of NSWMC's guidelines is the Resolution Adopting the National Plan of Action for the Prevention, Reduction, and Management of Marine Litter (NPOA-ML) (NSWMC No. 1441, s. 2021). This resolution provides strategies to reduce and manage marine litter. Marine litter is an important consideration

in managing waste in the IBRS considering that the Iloilo River is a major harbor in Panay island.

The Clean Water Act of 2004 (RA No. 9275)

The Clean Water Act of 2004 (RA No. 9275) mandates that DPWH, in coordination with local government units, prepare a National Sewerage and Septage Management Program (NSSP) which was released in 2010. The purpose of NSSP is to serve as a mechanism to scale up septage management starting in highly urbanized cities, including Iloilo City.

Under the Act, all possible dischargers are required to put up an environmental guarantee fund (EGF) as part of their environmental management plan. The EGF will finance the conservation of watersheds and aquifers, and the need for emergency response, cleanup, or rehabilitation. It was not clear if the government had implemented this provision; otherwise, it could be a fund source for septage management programs.

The Clean Water Act also mandates the local government units to establish a septage management system. In the case of Iloilo City, buildings in the city primarily use septic tanks, but these are not regularly desludged. Septage eventually contaminates the groundwater or flows its way to the Iloilo River or the Iloilo Strait. Section 7 of the Clean Water Act authorizes LGUs to raise funds to subsidize the expenses for the operation and maintenance of sewage treatment facilities through local property taxes and enforcement of a service fee system. Desludging and transfer of septage shall be performed by a duly accredited hauler/pumper to duly accredited treatment facilities following the Department of Health guidelines, except those that are operating under the authority and supervision of the MIWD.

Section 8 of the Clean Water Act also requires agencies and concessionaires that provide water supply in highly urbanized cities to connect the existing sewage line of housing units, commercial and industrial complexes, and similar facilities to available sewerage systems. These water supply utilities shall be responsible for the sewerage utilities and the main lines pursuant to Presidential Decree (PD) No. 198 (1973) and other relevant laws (DAO 2005-10).

National Standard on the Design, Construction, Operation, and Maintenance of Septic Tank Systems

The Department of Health (DOH) issued the National Standard on the Design, Construction, Operation, and Maintenance of Septic Tank Systems (AO No. 2019-0047) as a major component of basic sanitation facilities to address sanitation-related diseases and environment-related problems. It details the technical aspects, sets out the requirements, and guides before the septic tank designs are approved. The AO drives the LGUs to implement the order through building officials and local health officers (DOH 2019).

Policy and Guidelines on Sewage Treatment and Sewage Management System

Similarly, the Department of Interior and Local Government (DILG) issued Circular No. 2019-62—a Policy and Guidelines on Sewage Treatment and Sewage Management System. The purpose of the policy is to reiterate the roles of LGUs in the delivery of basic services relative to the implementation of sewage treatment and septage management systems within their respective territorial jurisdiction (DILG 2019). In addition, DILG reiterates its former policy on waste segregation through Circular No. 2018-112, or the Organization or Reorganization of the Barangay Ecological Solid Waste Management Committee (BESWMC). This circular informs and reminds local government officials and members of the Barangay Ecological Solid Waste Management Committee of their functions and responsibilities to oversee the solid waste management program at the barangay level, particularly on waste segregation and establishment of a barangay Material Recovery Facility, among others (DILG Circular No. 2018-112).

The availability of these laws, guidelines, and standards provided a direction to pursue a cleaner environment. However, its implementations are dependent on the leadership, priorities, and resources of the local government units.

THE IBRS MANAGEMENT ECOSYSTEM: KEY PLAYERS AND PARTNERS

Iloilo–Batiano River Development Council (IBRDC)

Aside from the Regulation Ordinances mentioned earlier, the Iloilo–Batiano River Development Council (IBRDC) was instituted earlier in 2002. The IBRDC manages the IBRS whose focus for the past two decades was on riverbank development, particularly the Iloilo River Esplanade project. The innovations accomplished by the council include the improvement of the ferry terminals, construction of the Iloilo Freedom Grandstand, Civic Center, Iloilo River Esplanade, Iloilo Riverplains Subdivision, sports and recreations facilities, road network improvement, dredging and mangrove rehabilitation, removal of illegal fish pens, derelicts (ships) and obstructions in the river, slaughterhouse relocation, and fish stock enhancement (IBRDC 2023). The latest esplanade expansion is the 4.99 km Sunset Boulevard that connects Mandurriao district to the municipality of Oton on the north bank of the Iloilo–Batiano River. The project involves the construction of a road from Barangay Tabucan in Mandurriao to Barangay Cagbang in Oton with bike paths and walkways similar to the Iloilo River Esplanade project (Panay News 2024d). Between the two rivers, the Iloilo River has been given much importance in terms of infrastructure projects, mainly because it runs in the heart of the city. Batiano River, on the other hand, lies on the periphery receiving less attention resulting in it getting shallower and narrower in comparison.

Like in previous undertakings, the trend on IBRS projects is mostly on infrastructure development and the activities of the IBRDC are getting less active in recent years. In one of the interviews, one respondent mentioned that "the council (IBRDC) seemed to have died down because they think that they have already reached the best for the river and there's nothing else to do." Perhaps one of the factors why IBRS projects are not as rapid as in the previous years is the retirement in service of Senator Franklin Drilon, who has been a champion of economic development in the province of Iloilo, bringing in national funds and programs that support the establishment of facilities to promote the province and city of Iloilo. Although projects are still coming in at present, they are not as enormous as when Senator Drilon was still in the Senate. The issue of water quality seems to be neglected behind the more

conspicuous river beautification projects primarily because they are gaining awards and attention from outside communities. Yet this issue will remain an impediment to sustainable development as it does not address the more important concern of water sanitation.

Iloilo City Septage Management Authority

Another entity that focuses on water pollution in the IBRS is the City Septage Management Authority (CSMA), the implementing arm of the Septage Ordinance of Iloilo City. It is chaired by the City Mayor, and its Technical Working Group is headed by the City Environment and Natural Resources Officer. While the MIWD/Metro Pacific Iloilo Waters and Balibago Waters are working on the sewerage system of their consumers, the CSMA has been negotiating with private companies on septage desludging and treatment. On June 27, 2022, Iloilo City Mayor Jerry P. Treñas signed the MOA with EnviroKonsult, a sewage treatment company, to implement the City's Septage Management Program wherein all septic tanks of households and commercial establishments should be desludged once every five years. The facility was inaugurated in October 2024, and it can process sewage at a rate of 100 m^3 per day with plans to expand to 200 m^3 per day (Panay News 2024a). Prior to EnviroKonsult, residents who needed septic tank cleaning and desludging services went to other advertised service providers like Malabanan, a household name in septic tank siphoning services. A major concern in the implementation of the septage ordinance is the payment of the desludging services. One suggestion is to include the desludging fee in the real property tax collection, similar to what is being practiced with the garbage fee of the city residents. However, the additional cost may not be acceptable to real property owners as they are in a way targeted to pay more tariffs than those who do not own a real property. Another consideration is giving subsidies from the government to those who volunteer to desludge their septic tanks (CENRO 2024).

LGUs in the IBRS WQMA

Environmental issues transcend political boundaries such that the problem of water pollution is not only a concern of the five municipal/city LGUs within the IBRS WQMA (Iloilo City, Oton, Pavia, San Miguel, and Santa Barbara) but also the nearby towns of Iloilo and Guimaras provinces. As such, the requirement

of the NSSP for a septage ordinance must be enacted by these municipalities as well. Yet the focus would be on the municipality of Oton which shares the Iloilo and Batiano rivers in its jurisdiction. Oton has three tributaries that empties into the IBRS: Caboloan River, Mambog Creek, and Calajunan Creek. The municipality has several pro-environment programs and resolutions such as the anti-dumping and littering ordinance (Ordinance No. 2009-12), regulating the use of plastic bags as packaging material (Ordinance No. 2014-257), prohibition of single-use plastic straws and stirrers in the municipal hall (Executive Order 2018-50), Ten-year Ecological Waste Management Plan for 2017–2026 (Resolution No. 2019-057), and the establishment of a solid waste collection system (Ordinance No. 2018-330), among others. The LGU has regular river/creek clean-up and mangrove planting activities. It also removed fish pens and other obstructions along the IBRS and provided livelihood assistance to the affected fishers (Oton 2022). In terms of septage management, the Oton LGU may consider the actions of the Iloilo City LGU, such as the enactment of a septage ordinance, to have a significant impact on the IBRS water quality.

LEARNINGS FROM OTHER LOCAL GOVERNMENT UNITS (LGUs)

In 2010 NEDA approved the National Sewerage and Septage Management Plan (NSSP) developed by the DPWH (Cabral 2015). The early adopters of this program were Metro Manila and Dumaguete City. The reason for this is that Metro Manila had an existing sewerage network, and Dumaguete was the first to respond immediately to the program by crafting a city ordinance on septage management (Robbins 2017). The initial rollout of NSSP to the LGUs was met with several problems including the cost-sharing mechanism, the technical capability of the implementing agencies, and the lack of support funds. There are a few models that can be implemented by Iloilo City from the experiences of other cities. One is the concessionaire service delivery model, which is based on the Clean Water Act. In this model, water utility providers should provide sewage treatment services to their consumers. The second is the co-management/ownership of the LGU and the water district model. Other schemes include sole ownership and operation of the sewerage utility by the LGU or a combination of ownership and/or operation of the facilities. The first model is practiced by Metro Manila and Boracay Island, while the second

model is implemented by Dumaguete City which is considered to be replicable in other smaller cities of the country (Robbins 2017). Examples of septage management models are given below.

Metro Manila

The water and sewerage services in Metro Manila are provided by Manila Water Company and Maynilad Water Services, Inc. under a concession agreement with the Metropolitan Waterworks and Sewerage System. These companies provide water, sewerage, and septage management services and operate fecal sludge treatment plants. Desludging is on a scheduled basis for about 30 percent of its customers while everybody can avail of its on-demand service. In terms of tariff, the users avail themselves of the service through an environmental fee of 20 percent of their water bill, which covers one desludging every five to seven years (Robbins 2017).

Boracay Island, Malay, Aklan

The research team visited the Malay LGU on 4–5 September 2024 to learn from their experiences in sewage management. Boracay Island operates a concessionaire model where two water service providers, Boracay Island Water Company, Inc. (BIWC) and Boracay Tubi Systems Inc., provide sewage treatment to their own respective consumers. The process was expedited through the closure of the island for rehabilitation by President Rodrigo Duterte from April to October 2018. As a result, resorts and hotels with 50 rooms and above have to have their own sewage treatment plant (STP) while those who have 49 rooms and below are required to have a clustered STP or connect to the sewerage system of the water concessionaires. The residential units were also obliged to connect to the sewerage system (Bermejo 2018). As a result, the water providers operate the most expensive tariff in the Philippines, which is ₱350 for the first 10 m^3 in the case of BIWC. In return, the company offers a free connection charge to the residential sector (Representative of BIWC, interview, September 2024).

Dumaguete City, Negros Oriental

In Dumaguete City, the desludging of septic tanks is carried out by a fleet of desludging vehicles which are maintained and operated by the Dumaguete City Water District (DCWD), and the wastewater is dumped at the septage treatment plant which is owned and managed by the city government. The sewage treatment utilizes a low-cost treatment lagoon and a decentralized wastewater treatment system (DEWATS) (Claudio 2015). The system operates on a demand-based model where house owners call to request that their septic tanks be desludged within a five-year cycle. In 2017, the tariff was set at ₱2.00 per cubic meter of water consumed as an add-on to the monthly water bill (Galing Pook 2012, Robbins 2017). The arrangement of cooperation between the water district and the LGU generated revenue and showed that "the program could be a money maker and not a burden to the city coffers" (Robbins 2017).

San Fernando, La Union

The San Fernando Septage Management is considered to have an efficient management system as the city itself takes care of everything from implementing rules of septic tank designs and plans, to the collection, treatment, and disposal of septage (Baltazar et al. 2021). Empowered by the city's 2010 Septage Management Ordinance, San Fernando operates a desludging service in 2013 with a five-year cycle and treats the wastewater in a city-owned treatment facility. Payment for desludging services is in fixed amounts and added to their annual real property tax. Owners of residential buildings pay ₱600/year while commercial and industrial establishments pay ₱1,000/year and ₱2,000/year, respectively (Baltazar et al. 2021). The move to separate the regulatory and executory roles between San Fernando City and the Metro San Fernando Water District is also being pursued (CDIA 2021).

Baguio City, Benguet

The Baguio City experience has one of the ideal situations in septage management with the LGU owning and maintaining its own sewerage network and treatment plant under the office of City Environment and Parks Management Office, the Waste Water and Hazardous Waste

Management Division (ICF 2016). However, in compliance with the Clean Water Act, with Baguio being an urbanized city, there are discussions to transfer wastewater management responsibilities to Baguio Water District (CDIA 2019). The citizens benefitted from the LGU-owned facility as there was no sewerage levied on households, only on commercial premises. However, there are plans to bill the households either by the city through user charges, or by Baguio water district through water tariff surcharge (ICF 2016).

Calamba, Laguna

The City of Calamba crafted a septage ordinance in 2009 that was supposed to give a significant role to the water district in managing the septage management system. However, the system did not materialize due to insufficient funds. This situation prompted the residents to avail of the services of private desludging firms to clean up their clogged septic tanks which cost around ₱3,000 to ₱4,500. Unfortunately, the desludging firms do not have waste treatment facilities and use drainage canals and other water bodies to dispose of the collected septage (Baltazar et al. 2021). In 2023, Calamba City established its own Septage Treatment Facility, and it was complemented by the desludging services of the Calamba Water District (CWD). The desludging service charges the customers ₱3 per cubic meter of monthly water consumption (CWD 2023).

In the instance of Iloilo City, the Metro Pacific Iloilo Water/MIWD, Balibago Waters, and other water service providers are required by law to have sewage treatment facilities for their clients. Yet, they are not complying with the requisites of the law, and nobody is penalizing them. The main reason for the noncompliance of these water concessionaires is the cost of the installation of the sewage network. Instead of a sewerage system, the company first has to deal with its potable water distribution network as the existing piping system is old and not complete. For example, the 20 km pipeline of the Metro Iloilo Water District (MIWD) that connects Mandurriao District to downtown Iloilo City was installed in 1978 with even older pipes in its network that were laid in 1928 (MIWD 2018). Although newer pipes are being installed through the joint ventures of MIWD with MetroPac Water Investment Corporation (MPW) which started in 2016, they can only cater to 30–40 percent of the households in Iloilo City (CENRO 2024). As a result, households who have clogged septic

tanks would avail themselves of assistance from private septage servicing providers like Malabanan. Yet it is not known how the septage is disposed of by these companies.

The arrangement in Baguio City and San Fernando City, where the respective LGUs owns and operates their own wastewater treatment facilities, may not be currently applicable to Iloilo City, considering the limited resources and constraints that the city has. It is observed that the current direction of the septage and sewage management in the city is towards partnership with private companies, like EnviroKonsult, to provide the collection and processing of septage in households while requiring commercial and industrial companies to install a sewage treatment facility. In such a case, Iloilo City would need additional STP facilities to cater to its growing population and this arrangement may not be sustainable in the long run. Perhaps, the officials, particularly CSMA could come up with a more permanent solution for managing the septage pollution.

The above examples lead to question the provisions of the Clean Water Act where water providers are supposed to deliver sewage treatment services. There are instances where the system works better when a different entity—the LGU or a private company—provides sewage treatment services. The current system of mixed management that works in some LGUs could perhaps be retained rather than compel the transfer of sewage management to water providers.

KEY PLAYERS ON RIVER MANAGEMENT IN THE PHILIPPINES

Table 1 shows the key players that could help improve water quality in the IWRMS. The IBRDC played a pivotal role in the improvement of the river and the public expects that it will continually perform the same function in the years ahead.

TABLE 1. INSTITUTIONS RESPONSIBLE IN MANAGING WATER QUALITY IN THE ILOILO–BATIANO RIVER SYSTEM

INSTITUTION	ENACTED LAWS AND POLICIES	ROLES AND FUNCTIONS WITH REGARD TO IBRS WATER QUALITY IMPROVEMENT
National Government	■ Republic Act 9275—Philippine Clean Water Act of 2004 ■ Republic Act 9003—Ecological Solid Waste Management Act of 2000	■ Provides enabling laws to protect the water bodies from pollution ■ Provides comprehensive and integrated strategy to prevent and minimize pollution
Department of Environment and Natural Resources–Environmental Management Bureau (DENR–EMB)	■ DAO 2005-10. Implementing Rules and Regulations of the Philippine Clean Water Act of 2004. ■ DAO 34-1990, Revised Water Usage and Classification/Water Quality Criteria ■ NSWMC Resolution No. 1441, Series of 2021. Resolution Adopting the National Plan of Action for the Prevention, Reduction, and Management of Marine Litter (NPOA-ML) (NSWMC 2021)	■ Implements and enforces the Clean Water Act, the Ecological Solid Waste Management Act, and other environmental laws and regulations

INSTITUTION	ENACTED LAWS AND POLICIES	ROLES AND FUNCTIONS WITH REGARD TO IBRS WATER QUALITY IMPROVEMENT
Department of Health (DOH)	■ DOH AO No. 2019-0043: National Standard on the Design, Construction, Operation and Maintenance of Septic Tank Systems ■ DOH AO No. 2017-0010: Philippine National Standards for Drinking Water of 2017	■ Issues of Environmental Sanitation Clearance ■ Sets and enforces Drinking Water Quality Standards
Department of Public Works and Highways (DPWH)		■ Prepares and implements of the National Sewerage and Septage Management Program ■ Designs and constructs facilities (MSTPs and drainage interceptors) in the Dungon Creek Rehabilitation Project
National Economic Development Authority (NEDA)		■ Considers sewerage and sanitation projects for inclusion in national infrastructure programming ■ Reviews sewerage and septage project proposals costing at least ₱500 million ■ Prepares the Philippine Water Supply and Sanitation Master Plan ■ Provides subsidies for sewerage, septage, and combined sewerage-septage projects

INSTITUTION	ENACTED LAWS AND POLICIES	ROLES AND FUNCTIONS WITH REGARD TO IBRS WATER QUALITY IMPROVEMENT
Department of Interior and Local Government (DILG)	■ DILG Circular No. 2019-62: Policy and Guidelines on Sewage Treatment and Sewage Management System ■ DILG Circular No. 2018-112: Organization or Reorganization of the Barangay Ecological Solid Waste Management Committee (BESWMC)	■ Sets guidelines on sewage management ■ Organizes the LGUs in their roles in waste management
Department of Science and Technology (DOST)		■ Develops and disseminates pollution prevention and cleaner production technologies
Department of Education (DepEd), Commission on Higher Education (CHED), and Philippine Information Agency (PIA)		■ Prepare and implement continuing public education and information programs
Philippine Coast Guard (PCG)		■ Enforces water quality standards in marine waters
Department of Agriculture		■ Formulates guidelines, for the re-use of wastewater for irrigation and other agricultural uses ■ Prevents, controls, and abates pollution from agricultural and aquaculture activities

INSTITUTION	ENACTED LAWS AND POLICIES	ROLES AND FUNCTIONS WITH REGARD TO IBRS WATER QUALITY IMPROVEMENT
Iloilo City Local Government	■ Regulation Ordinance No. 2017-127: Establishing a Septage Management Program in Iloilo City ■ Regulation Ordinance No. 2022-247: Commercial Wastewater Management Ordinance of Iloilo City ■ Resolution No. 2023-831: Implementing Rules and Regulation (IRR) of Regulation Ordinance No. 2017-127, otherwise known as the Septage Management Program of Iloilo City	■ Fully implements the septage ordinance ■ Crafts the Implementing Rules and Regulations of the Ordinance ■ Takes the lead role in the Iloilo Batiano River Development Council and City Septage Management Authority ■ Provides of lands and rights-of-way
Other Local Government Units within IBRS WQMA	■ Municipal Ordinances, resolutions, executive orders	■ Implement environmental laws and ordinances (improvement of solid waste management programs, river dredging/clearing, relocation of informal settlers, enforcement of a river buffer zone) ■ Provide lands and rights-of-way
Iloilo–Batiano River Development Council		■ Prepares and implements plans for the IBRS
Metro Pacific Iloilo Water/ MIWD, Balibago Waterworks and other water providers		■ Provide connection to existing sewer lines subject to sewerage services charges/fees

INSTITUTION	ENACTED LAWS AND POLICIES	ROLES AND FUNCTIONS WITH REGARD TO IBRS WATER QUALITY IMPROVEMENT
Sewage Desludging/ Treatment Service Providers (e.g., EnviroKonsult, Malabanan, etc.)		■ Provide desludging and treatment of septage
Civic Organizations, NGOs, Business Groups		■ Participate and contribute valuable puts during community discussions and planning about river rehabilitation
Academe		■ Provides technical assistance to the Iloilo City government ■ Researches IBRS water quality and management
Barangay Officials	■ Barangay Ordinances	■ Implements regulations related to the Philippine Clean Water Act and Ecological Solid Waste Management Act ■ Operates the modular STPs (in the case of barangays along Dungon Creek)
Households and Individuals		■ Participate in the Septage Ordinance of the city

■ Sources: RA No. 9275 and National Sewerage and Septage Management Program (DPWH 2013)

CONCLUSION

Learning from other LGUs with already existing septage management systems, Iloilo City's institutional arrangements are already in place with regard to the management of the water quality in the IBRS. The questions now are: how can these arrangements be enhanced, and who will take the lead on the tasks ahead? Seen at the helm are the City Septage Management Authority (CSMA)

and the Iloilo–Batiano River Development Council (IBRDC). CSMA oversees the regulations pertaining to septage and sewerage while the IRBDC takes charge of the rehabilitation of the water quality of the IBRS. IBRDC has no regulatory power, but it can make endorsements to projects that pertain to IBRS (CPDO 2024). A leader from either CSMA or IBRDC can take the role of championing the urgent need to clean up the river. Other agencies like the DENR–EMB, DPWH, DOH, and NEDA are in the support role. The DENR–EMB provides monitoring of the river water quality and regulation of the industrial/commercial effluents while DOH, DILG, and NEDA provide standards for the design and operation of septage facilities. DPWH through NEDA provides a 50 percent subsidy for sewerages, septage, and combined sewerage-septage projects to LGUs (DPWH 2018).

The major water concessionaire in the city, MIWD/Metro Pacific Iloilo Waters, has no clear indication of implementing a sewerage system sometime soon. Its main concern seems to be the reduction of nonrevenue water and the provision of sufficient drinking water supply to its members. To supplement its own main water sources, the company even connects to bulk water suppliers—Flowater Resources (Iloilo), Inc. and PrimeWater Ventures Corporation (MIWD 2018). Meanwhile, while waiting for actions from water concessionaires, the city could pursue the accreditation of more service providers for septage collection and treatment to ensure that septage is not illegally disposed of somewhere and the pollution in the IBRS is minimized.

A major concern for the implementation of the septage ordinance is the corresponding tariff rates that will be collected from the users. The fee will depend on the technology that will be used such that the system will earn enough revenue to be sustainable. The prevailing rate of private desludging companies, which is ₱3,000 to ₱5,000 per desludging service on an on-demand basis, may not be affordable to all. Thus, an alternative rate could be agreed upon such that it maximizes participation, particularly for residential buildings. The city may learn from the experiences of other LGUs or conduct its own feasibility study about the user's willingness to pay for the septage services. DPWH, CDIA, and JICA were able to fund the feasibility studies of septage management of the LGUs mentioned in this paper. Among the LGUs discussed, the Dumaguete City septage treatment system seems to be less expensive to construct and operate. It employs a decentralized wastewater

treatment system or DEWATS. DEWATS is gaining prominence due to its low cost, flexible design, and adaptability (Ventura et al. 2024).

Other smaller sectors also play an active role in the preservation of the Iloilo–Batiano River System. For example, the barangay LGUs are in the forefront. They are the first to notice the activities that are going on in their vicinity such as waste disposal on the river, operation of pigpens beside the river, cutting of mangroves, improper sewage disposal, house construction/encroachment in the river, etc. The Sangguniang Kabataan and other youth organizations can serve as watchdogs in safeguarding the sanitation of the IBRS. Commercial establishments such as restaurants along the Batiano River should be trained in proper waste disposal and be required to comply with the septage ordinance of the city.

Going forward in technology adoption, the city may also consider water reuse from these septage treatment facilities in the light of water scarcity problem in the city and province of Iloilo. Treated water may be used for irrigation and other industrial processes rather than disposed directly to water bodies. In addition, septage contains organic waste which can generate bio-energy. Employing septage treatment technologies that have energy generation capacity could significantly reduce its operating costs and would have lower tariff rates.

POLICY RECOMMENDATIONS

The following are recommended to implement a program that would help in the improvement of the water quality in the Iloilo–Batiano River System.

I. Institutional Strengthening

- Iloilo–Batiano River Development Council to reconvene and discuss pressing water quality issues and their resolutions. Develop a clear organizational structure, roles, and responsibilities. Work seamlessly with the Iloilo City Septage Management Authority.

- Set up a timeline and goal when to achieve a certain level of attainment in terms of water quality criteria.

- Involve the barangay officials of the communities situated along the river to oversee the compliance of environmental laws and ordinances. Strengthen their capacity through training programs on enforcement and reporting.

- Partner with academic institutions for technical assistance.

II. Regulatory Framework

- Establish a permitting system for septage haulers and private treatment facilities.

- Enforce compliance of water providers to collect and treat the septage of their consumers as mandated by the Clean Water Act.

- Develop a system of reporting and responding to septage-related complaints and incidents.

- Conduct regular inspections and enforcement activities to ensure compliance with the Septage Ordinance.

- Implement a payment system for desludging services that is based on the customer's ability to pay.

- Develop a GIS-based database to map septic tanks, monitor pumping schedules, and prioritize high-risk areas.

III. Public Education and Awareness

- Implement a social media campaign to inform the barangay residents along the river about the water pollution problem and the existing septage management program of the city.

- Involve more environmental groups in the activities and programs of the Iloilo-Batiano River Development Council.

- Integrate Iloilo River health in the elementary curricula and field trip activities.

IV. Infrastructure Development

- Establish decentralized waste treatment plants near populated barangays that are resilient to flooding.
- Explore more public–private partnerships with sewage treatment industries.
- Iloilo City LGU to develop a master plan for septage infrastructure development in harmony with the infrastructure plan of the water providers.

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Telephone (02) 8981-8500 loc. 4266 to 4268
(02) 8426-0955

Email cids@up.edu.ph
cidspublications@up.edu.ph

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