Chapter 8: Conclusion

This study provides information and insight about water management practices in industrial ecozones in the Philippines. While ecozones as economic centers have the promise to promote improved water management practices, they may also lead to worse outcomes for water use and water quality. They hold promise because they have the potential to lower the costs of water use and treatment through economies of scale; they may allow for easier regulatory enforcement of water use and pollution control because ecozones can be treated as a single source; and finally, they offer the opportunity for strategic placement of industry away from congested population centers where pressures on water resources are already high. On the other hand, they may produce worse outcomes because they are fundamentally a means of promoting economic development, and as such, they are often subsidized and promoted in ways that may not be the best for management of water resources. The concentration of industry in ecozones can also lead to more degradation of water quality in a particular region due to concentrated output of toxic / hazardous wastewater, particularly if regulations are not well defined and enforced. Although very little is known about the actual effect of ecozones on water management to date, this study suggests mixed evidence on the effects of ecozones on water use and water quality.

While there is evidence of innovative water management and pricing strategies in some zones, we see little effort in others. This study examines some of the factors that explain these differences. It is clear that there is great variation in the resources available both to regions and ecozones across Philippines. Thus, water management and pricing solutions are not uniform across all locations.

Part One of this chapter provides a review and summary of the findings. Part Two then suggests directions for future work, data collection, and analysis. Finally, Part Three draws some policy conclusions.

8.1 Findings

Philippine policymakers continue to use the ecozone model as an important building block in national economic development plans. Additional ecozones already have begun operations since the completion of these research study and more still are slated for development. This study examines aspects of Philippine ecozones to determine which features are more likely to drive water conservation, water re-use, and wastewater treatment efforts.

8.1.1 Characteristics Affecting Intensity of Water Use

This study concludes that several factors affect the intensity of water use in Philippine ecozones. Such factors include tariff levels and pricing strategies used by water vendors, local hydrological conditions, industrial specialty, and the business models used by ecozone owner/managers.

a. Water Tariffs and Scarcity

Water use in the ecozones has been influenced by hydrological conditions and different pricing schedules—as one would expect. Ecozones in areas of water scarcity tend to impose higher tariffs. Subsequently, locators facing higher and/or increasing block water tariffs tend to use water less intensely than other zones.

Population density, water availability, and other local conditions tend to drive up the price of water, resulting in situations where customers may "vote with their feet" and leave jurisdictions imposing high prices. From the perspective of water quality protection, this is an entirely appropriate behavior. From the perspective of a government official responsible for local economic development, however, such a scenario may be decidedly less tenable. Using public policy to protect local water resources will definitely result in some trade-offs.

b. Industrial Specialty

Next, although the Philippine economy has shied away from extremely "heavy industry" such as steel making, decision-makers involved in the recruitment of ecozone locators still have an opportunity to attract even less-intensive users of water. Zones featuring traditionally heavy water users (chemical, metal finishing, textile, and food & beverage manufacturers) tend to use water more intensely than mixed-use zones or zones dominated by assembly operations.

Here again "location matters." Policymakers may want to steer industries that are heavier water users into locales with relatively abundant resources. One way to accomplish such this may be through resource pricing. Thus, areas with more available water and faster rates of groundwater recharge should reflect these conditions with lower tariffs.

c. Ownership

Ecozones with ties to family conglomerates tend to sell water to their locators as part of their business model; this is because sibling companies provide—for a fee—additional services such as utilities, security, transport, etc. This imposition of water tariffs seems to curb locators' use of water. By contrast, two-fifths of ecozone owners who are also located

in the zone as manufacturers (i.e., owner-locators) supply water to their locators for free and, hence, tend to use water more intensely.

In the Philippines, it appears that public ecozones have not performed as well as private zones, employing less efficient water management practices as well as lower tariffs that result in higher volumes of water use. Although the study originally hypothesized that publicly owned ecozones will tend to provide subsidized water, resulting in the highest water intensities of all ecozones, this hypothesis was impossible to test, as only a few ecozones provided water supply and water tariff data—and none of these manage their own systems. Two (Clark and Subic) have privatized their water systems using concessionaires, and one (MEZ I) allows locators to purchase directly from the local water district.

We can conclude from the case studies, however, that privatization of once-public water systems has proven to be politically difficult in the Philippines because of the resulting increase in tariffs. Traditionally, the public water systems of Clark and Subic were heavily subsidized and very inefficient. New concessionaires have increased tariffs in an attempt to reflect the actual (scarcity) costs of local water supplies, as well as raise revenues for much-needed infrastructure upgrades and service expansions. For water customers accustomed to lower, subsidized prices, these necessary changes have resulted in an unwelcome increase in their monthly bills.

8.1.2 Characteristics Affecting Provision of Wastewater Treatment

Just as there are factors that affect water use, there are also some that seem to affect the provision of wastewater treatment. Such factors include the age, size, ownership, and regulatory jurisdiction of the zone.

a. Age, Size, and Ownership

First, public zones seem to perform less well than private zones with regard to wastewater, providing less in both the extent of wastewater treatment and in compliance with wastewater regulations. It may be because other public agencies are unwilling to regulate their peers. Or, it may because the publicly owned zones are older, and were grandfathered into wastewater management laws with out-of-date systems. The regression analysis is consistent with this interpretation. Because of this poor performance, government officials interviewed for this study indicated that the Philippine government is not inclined to initiate any more public zone projects in the future.

Private ecozones, on the other hand, are more likely to provide wastewater treatment to locators—particularly if the zones are new and large. This may have more to do with newer regulations and economies of scale than any specific recruitment design. Large private ecozones are also more likely to facilitate the recycling and re-use of water. Further differentiating among private zones, the study concludes that OECD-based owners are more likely to provide centralized wastewater treatment, and zones with ties to family conglomerates are more likely than zones run by owner-locators to provide such treatment.

b. Regulatory Jurisdiction

Perhaps the strongest indicator that "location matters" has been the creation of the Laguna Lake Development Authority (LLDA) as a special district, with an environmental regulatory mandate far more powerful than any other environmental regulatory body in the Philippines. Established to combat the poor surface water quality conditions in the National Capital Region and Region IV, it has imposed user fees that make it much more expensive

for industry to pollute. This fee reflects the reality of Regions IV and NCR—that water quality conditions have become so poor that remediation and protection of surface waters has become exponentially more expensive because of the increasing marginal damages by each unit of pollution.

Ecozones under the jurisdiction of the LLDA have shown a greater tendency to provide centralized wastewater treatment. There seem to be two phenomena at work in this case. First, LLDA, as a special district, has more resources and powers than other environmental regulatory agencies in the Philippines (See Appendix 10.3 for more details). These include a combination of both development and environmental mandates, the use of an environmental user fee program on top of the traditional regulatory program, and a dedicated environmental fund comprised of industry fees.

The second phenomenon at work is LLDA's more aggressive interaction with economic zones than other regulatory agencies'. In the late 1990s, LLDA approached ecozone managers and negotiated agreements that place responsibility for wastewater treatment with the ecozone itself. Similar to US EPA's "bubble theory," this approach means that ecozone managers have begun to collect, treat, and release effluent from all locators from one central discharge point, which can then be more easily monitored and regulated. DENR's subsequent and similar move toward programmatic compliance is one such policy upon which some ecozones already have begun to structure themselves.

8.1.3 Applying the Results to Future Ecozones

Adelman and Jaret (1999) used quantitative analysis—specifically, regression analysis—in their poverty research to identify those factors that have the strongest effects on

a region's wealth in the United States. They subsequently created a "utopian" model, drawing upon those factors most likely to produce wealth. This study, by comparison, draws upon both quantitative and qualitative analysis to attempt to identify significant factors that affect water management in Philippine ecozones. Following the Adelman and Jaret approach to policy analysis, it would be interesting in this study to surmise that the characteristics described in Sections 1.1 and 1.2 comprise an "ideal" ecozone in terms of water management. Were policymakers to design a brand new ecozone with water management as a high priority, they may find it helpful to build in some of the characteristics mentioned above. Section 8.3 describes possible policy options in more detail.

8.2 Need for Further Research

This study highlights the need for future additional engineering, hydrological, economic, and pricing research in this field. As the study progressed, it was clear that very little data are available to evaluate ecozone performance related to water supplies and water quality. Such data would have been helpful to explain the impact ecozones have on water use and wastewater treatment, and the factors affecting why some use better practices than others. Following are some suggestions for future research.

8.2.1 Engineering and Hydrological Data

David (2002) says policymakers have not closely scrutinized the industrial water situation in the Philippines; this research has remained the domain of engineers. Future research in the area or engineering and hydrological data is needed, not just at the national level, but at the ecozone level too. Hydrological and groundwater re-charge data in this

study came from the most recent, national-level statistics available—collected in the 1970s under President Ferdinand Marcos and published in the 1980s.

Recharge Rates. As one tropical hydrologist noted in Chapter Three (Section 3.2.1), the ability for groundwater aquifers to recharge changes over time with the deforestation and urbanization of an area. Thus, Philippine officials need to update national hydrological surveys in order to have an accurate accounting of groundwater scarcity. These measurements could provide the underpinnings of any "real cost" economic models in the future.

Water Quality and Enforcement Conditions. DENR officials were unable to produce comprehensive and current records for water quality conditions in Philippine surface waters. Only the largest urban waterways (Laguna de Bay and the Pasig River in Manila) have data publicly available. Similarly, DENR officials were unable to produce effluent statistics with regard to ecozones. Neither effluent composition nor enforcement data were available. As a result, it is impossible to track over time the effects of domestic and industrial pollutants from Philippine ecozones lakes and rivers.

Industrial Water Practices. More specifically, researchers know very little about the overall water management practices of industry in the Philippines. With regard to industrial water use, Renzetti (2002) suggests a need to "combine econometric and engineering process models of industrial water use…This combined approach would be especially useful for an integrated examination of firms' water intake, re-circulation, and discharge decisions." He continues by noting that such industrial data currently available to researchers in developing economies are typically 20 to 30 years out of date.

At the other end of the industrial process, researchers need better information regarding the composition of wastewater and wastewater by-products (sludge). There is very little understanding—or very little transparency—with regard to waste composition and its destination in the Philippines. Ecozone officials surveyed for this study tend to process sludge in three different ways—leaving responsibility to individual locators, storing it on site, or shipping it to third-party facilities. At these third-party facilities, admitted some respondents, ecozone officials have no idea what happens to the sludge. DENR officials noted that much of it—hazardous and toxic in nature—is shipped out to sea and dumped (Alcances interview 2002). Madani (1999) suggests a need for better qualitative and quantitative understanding of industrial wastes and suggests: 1) undertaking site and industry specific analysis of refuse composition, as well as 2) identifying "how and how much EPZ industries impact their environment—in terms of absolute versus incremental damage, toxic versus non-toxic levels of pollution, and long-term versus short term impacts."

8.2.2 Economic and Pricing Data

In addition to better information regarding water intake and outflow, there is also a serious need for more transparency with regard to water pricing strategies. Renzetti (2002) argues that "all facets of industrial [water] use appear to be sensitive to economic forces, including input prices, and government taxes and charges." However, he continues, the degree to which industrial water management—water intake, re-circulation, and discharge—is sensitive to these forces "is a particularly understudied area."

In the Philippines, national-level agencies such as NEDA criticize policymakers and water vendors alike for their largely rock-bottom pricing of water—without regard for the true economic costs of water extraction and use. Beyond that, there is very little information

available to researchers about the actual calculations that do go into ecozone water prices. Some ecozone officials have merely tailored their pricing structures to models already in use by their peers. Others claim their pricing strategies are proprietary, including which costs are covered by user fees and which are subsidized.

Pricing issues remain difficult because without more data, no one knows the true of cost of water supplies in the Philippines. It is not clear that ecozone water tariffs accurately reflect scarcity, which differs from locale to locale. Compounding the problem, evidence of subsidies and cross subsidies means that firms can threaten to move around, and refuse to pay. One important step for the government to take would be to try to calculate full costs of water supplies by region, determine what that means for pricing, and who may be subsidizing supplies. Subsidies may not be a bad idea in theory, but this study clearly indicates that pricing is an important issue, with both water use and wastewater treatment quite responsive to prices.

Without more information, it is difficult to ascertain whether conservation signals could be greatly strengthened by increasing water tariffs, without chasing customers away from the formal, documented water system. Additional cost data may also help future researchers construct more robust tests for the effect of economies of scale on wastewater treatment.

8.3 Further Implications for Policymakers

A water policy study of this type in the Philippines is rare; several interviewees were surprised to find I was not an engineer, but a public policy analyst. Interviewees from national agencies, the Philippine Congress, think tanks, universities, and ecozones alike expressed interest in reading and using the results of this study in future decision-making.

Themes encountered during the course of this study also suggest some policy options that decision-makers should keep in mind, as ecozones and water regulations continue to evolve in the Philippines[1].

8.3.1 Role of Government in Establishing New Ecozones

Despite a growing preference for the efficiency of privately owned ecozones, governments still have a role to play in the clustering of industries. They can provide the necessary legal framework, and potentially, the initial bureaucratic efforts such as launching a feasibility study, providing recruiting incentives, providing or upgrading infrastructure, and marketing the zone abroad (Madani 1999).

a. Recruiting Owners and Locators with an Eye on the Environment

Results from this study indicate that certain ecozone owners (private, OECD, and family conglomerate owners) and locators (mixed-use industries) may manage water better than others. More research on this topic would be helpful to determine why this might be, and whether it would be useful to take these factors into consideration when recruiting participants for new ecozones. Working from the Adelman and Jaret idea of "utopia," it may be possible for policymakers to methodically recruit ecozone owners and approve

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[1] About 90 additional economic zones are still in development in the Philippines. Sixty-one await presidential proclamation, while another 30 have already been proclaimed (but have not yet begun operations).

In addition, the Philippine Congress is in the final stages of designing a *Clean Water Act*, a move toward the nationwide use of industrial user fees. This legislation moves forward, despite demonstrated persistent shortfalls in national and local enforcement capabilities. Thus, environmental officials need a way to prioritize their regulatory efforts, or otherwise marshal their resources.

ecozone designs that are more apt to ensure better water management practices. In particular, there are three types of approaches that policymakers may want to consider.

The first activity is "advertising" the ecozone to specific ecozone owners and locators. One potential target among owners would be the private sector, since the private sector has demonstrated more success in water management—particularly with regard to wastewater treatment. Potential targets among locators would be a diverse set of locators in each ecozone, since mixed-use zones have demonstrated a tendency to use water less intensely. However, some of these advertising techniques may provide mixed results. For instance, mixed-use zones may be less water intensive, but their wastewater streams are also more diverse, requiring individual locators to pre-treat much of their effluent in separate, decentralized facilities. The solution may be to continue to develop mixed-use zones, but regulate their industrial wastewater systems more closely by using bubble policies to assist regulatory efforts.

The second activity would be to offer financial incentives that reward desired water management practices. An example would be subsidies and grants toward the construction of water recycling and water treatment infrastructure. Or, such incentives could build upon traditional ecozone incentives, in the areas of tax holidays, labor allowances, etc.[2]

Third, this study's findings with regard to owner-locators suggest that it may be best to maintain a separation between owners and their locators. That is, the owner-locators in

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[2] One note of caution—as they go about facilitating the development of new ecozones, policymakers may want to better balance short-term recruiting incentives with long-term environmental results. Among current its incentives, the Board of Investments (BOI) allows zones to import consigned equipment at lower tariffs. However, a review of the literature notes these second-hand and older pieces of equipment may result in less efficient use of water and more polluted water discharge. Policymakers might want to take this possibility into consideration as they strike a balance between recruitment and environmental protection.

this study were relatively more intensive in their use of water and less successful at providing centralized wastewater treatment. This is likely because their business model for earning revenue is through manufacturing, not providing service-for-fees to ecozone locators. Hence, policymakers may want to consider steering manufacturers away from the role of "owner-locator," and toward the role of "locator" in ecozones that are owned by more service-oriented companies.

The concept of "family ties" is instructive in the context of ecozone water management. While this study certainly does not mean to imply that family conglomerates should be permitted to continue their stranglehold on land and water resources, there are several useful lessons contained in the family conglomerate business model. First and foremost is the entrepreneurial approach such conglomerates take to water management. Historically, these conglomerates have had an opportunity to diversify and to develop holding companies that contain a range of service-provider companies. Providing both water supplies and wastewater treatment to ecozone locators for a price has driven down the intensity of water, while simultaneously ensuring that wastewater treatment infrastructure gets constructed—and used.

An important second lesson is that these conglomerates have deep pockets that provide an initial outlay of capital to construct water and wastewater infrastructure. Very few private investors in the Philippines—aside from these family conglomerates—can afford such massive outlays of capital. As such, policymakers might consider opening the door more widely to other significant sources of private investment, such as U.S., European, and other OECD investors. This could be accomplished through further liberalization of foreign investment laws in the Philippines.

b. Setting Prices to Reflect Costs

Calculating Water Tariffs. Water supply tariffs should reflect the real costs of water wherever possible. To ensure this, water vendors should use increasing block pricing systems, although actual price levels may differ by region. Increasing block prices reflect the increasing scarcity of water supplies (i.e., there are increasing marginal costs to provide water). Despite this, several ecozones are still using uniform prices or even decreasing block prices to sell water to their locators.

Among ecozones that do employ increasing block prices, some are using what this study calls "marginal cost increasing block pricing," while other use "one block increasing block pricing." With marginal cost pricing, the first block of water costs little, the second block of water costs more, and so on. The individual blocks and their prices are then totaled to determine the monthly bill. With "one block" marginal cost pricing by comparison, the total volume of water is multiplied (as one block) by a single fee that is the cost of the last unit provided.

While both methods reflect the cost of the last unit consumed at the margin, they differ greatly in the resulting monthly bill. In principle, the increasing block marginal cost pricing, or "lifeline" pricing, provides water at the lowest economically efficient cost possible to customers—i.e., water is provided at cost. By contrast, the one-block pricing method results in all users paying the same for each unit, or at the high marginal cost rate for all water they consume. This enables water vendors to raise more revenues that can be used for water-related infrastructure and services, but may price-out certain locators or cause them to behave in illegal ways. These are trade-offs that will be important for ecozones managers and regulators to consider.

Calculating Wastewater Treatment Fees. The calculation of wastewater treatment fees can vary as well, although this study did not examine these differences very closely. It may be instructive to conduct tests on the effluent from two different kinds of ecozones—those structuring wastewater treatment fees according to volume only, versus those structuring according to both volume and quality. Theoretically, fees based on both quantity and quality will be more effective at curbing both water use and concentrations of water pollutants.

Triggering Conservation and Recycling Behavior. The literature suggests that combining water and wastewater bills may push prices high enough to trigger water conservation and recycling practices. Unfortunately, the few zones that engage in this practice were at a loss to explain: 1) how they actually calculated wastewater treatment fees, and 2) what proportion of incoming revenues are set aside for operations and maintenance of wastewater treatment systems. There were too few ecozones reporting combined bills to determine if these have an effect on water use or re-use. Policymakers who are interested in using combined utility bills to encourage conservation may want to gather more data on those zones that already have such systems in place.

Revisiting Royalty Payments. One on-going debate in the Philippines is "who owns the water?" While the law says that "the state" owns ground and surface waters, it remains unclear whether rights and responsibility lie with local governments or the national government. This has significant ramifications, for the ultimate "owner" of a natural resource bears responsibility for its protection.

Currently, self-supplying ecozones are extracting water for domestic and industrial use, and in most cases paying no tariffs to any government body. This absence of payment

allows them to ignore the realities of any regional water scarcity. Water tariff systems must be established in order to reflect this scarcity, particularly for groundwater. Some say that the local governments or local water districts should play this role, and indeed some water districts already have begun to demand royalty payments for water extracted from local aquifers.

Others, however, charge that local governments are not actually advocates of the water scarcity perspective and are simply engaging in rent-seeking behaviors. Policymakers may want to establish local environmental funds to ensure that royalty fees are plowed back into the local water management system. One potential model would be LLDA's environmental fund. Funds of this nature typically are dedicated to the building and maintenance of community water infrastructure.

c. Improving the Regulatory Environment

The more policymakers know about the characteristics of ecozone owners, the better they should be able to predict the business models in use—together with their inherent weaknesses—and thus better anticipate and shape ecozone behavior through regulatory and other public policy functions.

Focusing on Public Ecozones. As part of learning more about ecozone owners, it is probably worth determining why public zones are doing so poorly with regard to wastewater treatment. Even if there are no more public zones slated for development, policymakers may want to try to create policy pressures that encourage improved performance now. These public zones average 554,000 cubic meters of water extraction and 60,000 cubic meters of water discharge on a monthly basis.

Designing Jurisdictions. As the Philippine Congress moves forward with its drafting of the *Clean Water Act*, it may want to seriously consider the benefits of creating more jurisdictions and spatial models designed to help with enforcement efforts. One example would be the creation of additional special districts along the LLDA model. Another example would be the use of bubble policies to better ensure centralized wastewater treatment and water recycling infrastructure.

To predict which local jurisdictions may use these constructs most successfully, policymakers may want to visit the thorny issue first presented in Chapter Three—corruption. A closer look at corruption at the local level would entail developing basic metrics to gauge the local atmosphere of corruption (e.g., number of public officials indicted for corruption during the past year). We might then hypothesize that local governments with high incidence of corruption will do less well enforcing industrial wastewater regulations, administering environmental funds, etc. Such an exercise could serve to predict those locales in which some water-related public policies may work better than others.

Chapter 9. Appendices

Appendix 9.1 Acronyms and Terms

ADB ..... Asian Development Bank
ARMM ..... Autonomous Region of Muslim Mindanao
AWWA ..... American Water Works Association
CAR ..... Cordillera Autonomous Region
BCDA ..... Bases Conversion Development Authority
BOI ..... Philippine Board of Investments
BOD ..... Biological Oxygen Demand
BOT ..... Build-Operate-Transfer
CALABARZON ..... the provinces of Cavite, Laguna, Batangas, Rizal & Quezon (Region IV)
CDO ..... Cease and Desist Order
COD ..... Chemical Oxygen Demand
CUSW ..... Cebu Uniting for Sustainable Water
DAO ..... Departmental Administrative Order
DENR ..... Philippine Department of Environment and Natural Resources
ECC ..... Environmental Compliance Certificate
EIA ..... Environmental Impact Assessment
EO ..... Executive Order
EPZA ..... Export Processing Zone Authority (precursor to PEZA)
EPZs ..... Export Processing Zones
EU ..... European Union
EUF ..... Environmental User Fee
FDI ..... Foreign Direct Investment
GDP ..... Gross Domestic Product
GNP ..... Gross National Product
IEAT ..... Industrial Estate Authority of Thailand
ISO ..... International Organizations for Standards
JICA ..... Japan International Cooperation Agency
JTC ..... Jurong Town Corp.
LGU ..... Local Government Unit
LLDA ..... Laguna Lake Development Authority
LWUA ..... Local Water Utilities Administration
MBI ..... Market-Based Incentive
MCWD ..... Metropolitan Cebu Water District
MWSS ..... Metro Manila Water and Sewerage System
NCR ..... National Capital Region
NEDA ..... National Economic and Development Agency
NGOs ..... Nongovernmental Organizations
NWRB ..... National Water Resources Board

[continued]

OECD ..... Organization for Economic Cooperation and Development
PCO ..... Pollution Control Officer
PD ..... Presidential Decree
PEENRA..... Philippine Economic-Environmental & Natural Resources Accounting
PEZA ..... Philippine Economic Zone Authority
Php ..... Philippine Peso
PIDS ..... Philippine Institute of Development Studies
RA ..... Republic Act (law)
RAFI ..... Ramon Aboitiz Foundation Inc.
SACRED ..... San Cristobal River Enhancement Defenders
SBMA ..... Subic Bay Metropolitan Authority
SBWRB..... Subic Bay Water Regulatory Board
SEZ ..... Special Economic Zone
SEPZ ..... Special Export Processing Zone
SMEs ..... Small-and-Medium Enterprises
TSS ..... Total Suspended Solids
US-AEP ..... United States-Asia Environmental Partnership
US EPA ..... United States Environmental Protection Agency
WB ..... World Bank
WEF ..... Water Environment Federation
WTP ..... Wastewater Treatment Plant

Appendix 9.2 Types of Economic Zones (Ecozones)

Industrial Estate—land subdivided and developed with provisions for basic infrastructure and utilities, with or without pre-built standard factory buildings and community facilities for the use of a community of industries.

Export Processing Zone—a specialized industrial estate located physically and/or administratively outside the customs territory and predominantly oriented to export production.

Free Trade Zone—an isolated and policed area adjacent to a port of entry, where imported goods may be unloaded for immediate transshipment or stored, repacked, sorted, mixed, or otherwise manipulated. Movement of these imported goods from the free-trade area to a non-free trade area in the country shall be subject to customs and internal revenue rules and regulations.

Tourist/Recreational Center—an area where tourist facilities such as hotels, resorts, sports and/or recreational facilities are provided to render tourism services for both local and foreign tourists, travelers and investors.

Agro-Industrial Economic Zone—a tract of land subdivided and developed with basic infrastructure and utilities for primarily agricultural and/or natural resource-based export-oriented processing activities.

Information Technology (IT) Park—an area hosting support facilities and amenities for the IT industry in order to develop and export IT software products and services and other IT related activities.

Source: PEZA (2001)

Appendix 9.3 LLDA Background and Evaluation

Located on the Philippine island of Luzon, Laguna de Bay—also known as Laguna Lake—is the largest freshwater lake in the Philippines and the second largest in Southeast Asia. Industrial development in the Laguna de Bay watershed has boomed in the last 25 years, producing approximately 30 percent of the country's total manufacturing output and providing about 7 percent of the country's gross national product growth. There are more than 39 (documented) types of industry subsectors in the watershed.

9.3.1 Background—The Need for an Environmental User Fee

Laguna de Bay provides a source of water for agriculture, industry, fisheries, hydropower, transportation, navigation, recreation, and domestic usage. 1,141 million cubic meters are extracted from the lake and its 21 tributaries each year for irrigation, water district supplies, and electric power generation. Industry uses another 2,448 million cubic meters for industrial cooling. Officials plan to begin drawing upon the waters of Laguna de Bay for Manila's primary source of drinking water beginning in the year 2006.

Laguna de Bay also serves as the receiving waters for the discharge of wastewater for all these activities; none of its 51 municipalities or 10 cities—except Manila—are equipped with sewerage systems. According to the Asian Development Bank (ADB 2001), "major river systems in Metro Manila and Laguna Lake receive the untreated effluent of an estimated 2,000 industries. Approximately 60 percent of the solid and liquid wastes of almost 10 million people end up in Laguna Lake." This overwhelming use of the lake and its tributaries has resulted in massive fish kills and polluted water. The abuse has required drastic cleanup efforts and policy interventions.

The Philippine Republic Act of 1966 created the Laguna Lake Development Authority (LLDA) as an independent, quasi-governmental agency under a special charter. The government owns 94 percent of LLDA assets and private investors own the rest. As a special district, LLDA has exclusive authority over the entire watershed of Laguna de Bay. LLDA has a range of developmental and environmental legal capabilities, unique to it as a special district. Coordinated and supervised by DENR, LLDA reviews and approves development plans, issues permits, and collects fees for both the use and discharge of lake water. LLDA is the only existing basin authority created by Philippine law, and it is the only development authority with oversight over environmental activities.

Its jurisdiction includes portions of five provinces referred to in aggregate as CALABARZON, plus the capital of Manila. Within this area, LLDA has identified fifteen economic zones housing approximately 3,200 facilities, as well as about 10,000 stand-alone manufacturing facilities, such as food and beverage, piggeries / slaughterhouses, dye and textiles, and pulp and paper mills.

9.3.2 Criticisms of the LLDA Environmental User Fee

Regulators and corporate officials interviewed for this study criticize the LLDA user fee system on three fronts: the structure and amount of fees, the wastewater quality parameters, and the implementation / enforcement of the EUF system.

a. Structure and Amount of Fees

With polluters who are more responsive to higher fees, say Speck et al (2001), MBIs may effect a real change in environmental behavior. But, he continues, the environmental

effectiveness of economic instruments are obviously quite limited wherever charge rates have been set too low to provide strong incentives to change behavior.

Bluffstone and Larson (1997) note that in practice, governments tend to focus on collecting information about abatement costs only. They know that polluters will put in place abatement programs and technologies if it will be less costly than paying government fees. According to Speck et al (2001), the four highest wastewater effluent chargers in Central and Eastern Europe are Slovenia, the Czech Republic, Poland, and the Baltic countries. The primary drivers behind such high rates are EU accession requirements. Because of these high levels in the Czech Republic, says Klarer, "the effluent charge is considered an effective instrument, stimulating environmental improvement, because rates are [actually] set close to the level of marginal abatement costs."

Industry observers, while crediting LLDA as one of the few public agencies attempting to place an economic value on the use of water resources, are concerned that the economic assumptions underlying the fees levels were arbitrary (Flor interview 2002). Both public and private sectors interviewees reported no discernable improvement in industrial pollution abatement among the ecozones and factories with which they have contact, causing them to conclude the fees are too low to actually change industrial behavior toward wastewater treatment (Montalban interview 2002 and Alcances interview 2002). In addition, LLDA officials themselves concede that the fee structure (fees emphasize concentration of BOD in mg/l, and water supplies are often free) encourages polluters to merely dilute their wastewater, without increasing treatment levels (Nepomuceno interview 2002).

Earmarking Environmental Funds. One primary issue related to the success of pollution charges—or environmental user fees—is whether collected fees will stay in the environmental sector or not. Klarer, McNicholas, and Knaus (1999) argues that

"environmental funds, as long as their revenue base is income from environmental charges, recycle revenues from polluters in general to the polluters responsible for activities requiring remedial action…In this way, in fact, the combined charges/subsidies system may retain the efficient property of an economic instrument."

Ten of the 13 Central and Eastern European countries in a recent study place fees into earmarked funds (Speck et al 2001)[1]. Speck suggests that earmarked funds not only help to improve the environment by subsidizing new environmental infrastructure, but can also improve collection rates, because the regulated community knows officials will plow these funds back into the same sector. However, polluters may only apply for subsidies if they are up-to-date with their pollution fee payments; it works this way in the Czech Republic, Estonia, and Lithuania, where the collection efficiency for wastewater discharge permit fees is greater than 90 percent, compared to very low collection rates everywhere else in Eastern Europe. Such a use of environmental fees to subsidize environmental infrastructure can, according to Anderson (2002) leave the taxpayer burden unchanged. Not establishing a fund means that monies revert to the national (or state) treasury and become unavailable for pollution abatement technologies and enforcement programs.

LLDA receives no funds from the national budget. Instead, it retains, invests, and uses collected fees without turning them over to the national treasury. With this revenue, LLDA maintains a dedicated environmental fund, which it then uses to recover the costs of

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[1] Lithuania historically has taken funds earmarked for environmental purposes and used them exclusively for the construction of wastewater treatment plants, according to Klarer (1999). He notes that in recent years these sums amounted to almost three percent of Lithuania's national budget. This is in stark contrast to large cities like Belgrade without any waste treatment plants at all.

administering the LLDA system or to subsidize factory owners' investments in clean technology.

b. Targeting the Right Polluters and Pollutants

In a water policy analysis for USAID/Sri Lanka, DeCosse et al (1997) studied BOD and chromium contamination of the Kelani River, and found that even though industries were the target of government regulations, it was the households that accounted for the majority of the BOD load. Anderson (2002) reinforces the notion that if BOD is the government's primary concern, then neighborhood / household sources really should be the primary policy target. The corollary issue is that industry is indeed responsible for other types of pollution, to which economic instruments should also be directed.

In Malaysia, the environmental user fee focuses on one pollutant in one industry only—BOD standards among crude palm oil producers (Vincent et al in Angel and Rock 2000). This approach has decreased BOD from Malaysian CPOs to less than 1 percent of pre-program levels. In Eastern Europe, by comparison, effluent charges take into account anywhere from five pollutants in the Czech Republic to 51 pollutants in Lithuania at any one time (Klarer, McNicholas, and Knaus 1999).

The LLDA EUF pilot program only takes account of BOD, to the exclusion of all other effluent parameters included in DAO 35, including total suspended solids and heavy metals. All LLDA water quality tests conducted for the environmental user fee program and regulatory enforcement are processed through the same LLDA lab; it would be a relatively simple process to build additional parameters into the EUF program. Further, the requirements stop short at the BOD standards set forth in DAO 35; some argue the BOD standards should be even more stringent than 50 mg/liter. In the United States, for

example, BOD levels for secondary treatment at wastewater treatment plants are about 30 mg/liter.

c. Implementation / Enforcement

To monitor compliance with these standards, LLDA follows the same two-pronged monitoring schedule used by DENR. First, enterprises must submit to LLDA a self-monitoring report for their effluent on a quarterly basis. Second, inspectors conduct their own inspections once a year as part of the process to renew discharge permits and accredit facilities' pollution control officers. LLDA has access to the same kinds of regulatory tools as DENR, including notices of violation, fines, and cease and desist orders. However, the actual implementation of the EUF pilot program has critics on all sides—chief among them LLDA officials, who would like to increase numbers of inspection staff and fee collection rates. Currently, program monitoring and analysis is a manual process, which introduces a high degree of error; LLDA would like to computerize its record-keeping. There are about 30 inspectors and laboratory personnel dedicated to the EUF program, and as such LLDA relief heavily on the self-monitoring reports sent in by industries. Companies are required to send in quarterly wastewater quality reports, and LLDA randomly tests their accuracy. As a result, the EUF program has largely overlooked small- and medium-sized enterprises (SMEs). Industry representatives have complained of an uneven/irregular application of standards by LLDA officials.

9.3.3 Nationalizing the User Fee System—The Clean Water Act

The Philippine Congress is currently in the midst of writing a national D*raft Clean Water Act* that will for the first time acknowledge the role that industrial point sources play in

the pollution of the nation's water supplies (Philippine Congress 2002). Three key goals of the *Draft Clean Water Act* are to: 1) nationalize a water discharge "user fee" system like the one currently in pilot-test phase by the Laguna Lake Development Authority; 2) document the status and use of national water resources, as most studies of this type date back to the 1970s, under President Ferdinand Marcos; and 3) implement a system of national watershed management areas.

Nationalizing a system of discharge permits that would grant permission to industry for the use of surface waters means that fees will be calculated according to volume of water used and waste load. This system would: 1) make the acquisition and use of clean technology more feasible than paying fines; 2) encourage industry to use less water by rewarding re-use and recycling; and 3) require industry to discharge fewer pollutants into the nations waterways. In interviews with industries throughout the Philippines, the researcher found differing views with regard to the use of national environmental user fees. These conversations were largely in the context of the D*raft Clean Water Act*.

a. Ongoing Concerns

Other interviewees identified potential problems with a nationalized system of discharge permits. Industries outside the LLDA jurisdiction are more apprehensive about incorporating a new system of fees into their businesses. Industry wants to see DENR focus more of its attention on domestic and agricultural sources of BOD. Finally, diverse user groups are interested in having DENR scrutinize the non-BOD content of industrial effluent more closely.

However, the ADB (2001) poses several reasons why MBIs have not yet effectively taken hold in the Philippines. First, regulators fear a loss of control or unpredictability of

environmental outcomes under an EUF system. This stems from a lack of concrete evidence that past MBIs have actually worked elsewhere. The second concern is the lack of information in the public sector needed to formulate, implement, and monitor the management of a large MBI portfolio. Finally—at the institutional level—there are legislative restrictions placed on regulators for taxing pollution. However, the 1999 *Clean Air Act* does explicitly provide for the use of economic incentives as part of environmental policy, so there is a precedent for such methods (Krupnick et al 2002).

Other implementation challenges include program administration, internal accounting procedures to ensure earmarks, compliance education, and widespread political support (ADB 2001 and Krupnick et al 2002). The latter two items face the same challenges as the traditional regulatory system, according to the ADB, because of "the existing attitude of open access to land and water resources and uncertain property rights."

b. Cautious Optimism

Those already operating under the supervision of LLDA understandably are more comfortable with how the additional fee structure may look, as they are accustomed to the formulas used in the calculation and the extra layers of bureaucracy and fees. Some predict that payment amounts will increase, as future requirements will cover a broader range of pollution parameters. Because of their high-tech foreign clientele, some of the industries already have the technology and capital available to meet the new and higher standards.

The ADB (2001) believes that market-based incentives (MBIs) can provide the kinds of tools the Philippine government will need as it pursues its goals of deregulation. This is because many MBIs use a permitting system as their foundation, which provides access to already existing monitoring and reporting infrastructure. Krupnick et al (1999)

note that effluent/emissions fees "have political support in the [Philippine] government, as they can both improve domestic incentives regarding pollution and raise revenues."

Even observers who welcome additional attempts at environmental protection express cautious optimism at the impending arrival of a new *Clean Water Act*. They fear that this program will go the way of other environmental protection legislation and administrative orders—undercutting strong legal language with weak enforcement[2]. These observers note that the *Draft Clean Water Act* has no real component to ensure strict enforcement of industrial pollution standards, and it continues to avoid the fundamentals of monitoring and enforcement. One ongoing challenge remains DENR's capacity to enforce such a program, in part because of these responsibilities have devolved to the local level, without concomitant budget and technical allocations. Thus, DENR lacks the legal authority to assess water discharge fees, while LGUs have the legal authority but no capability to assess such fees. Only LLDA, as a special district, has both the legal mandate and capacity.

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[2] As further proof of ongoing regulatory weaknesses, ADB (2001) writes that cease and desist orders have been issued "only for the most egregious and obvious offences. Penalties and fines for noncompliance with air and water quality standards are low and ineffective. Regulatory loopholes also provide ample opportunities for industries to bypass requirements, and the chances of getting caught are usually slim."

Appendix 9.4 Questionnaire for Philippine Ecozone Officials

Type directly into the gray boxes (don't worry about how it changes the page formatting), and RETURN AS AN E-MAIL ATTACHMENT to: brenda_bateman@yahoo.com

— OR —

You may fill this out by hand and return:

Locally, to Advisor Dr. Alma Madrazo:

BY FAX (632-524-0563) or
BY REGULAR MAIL to:
Dr. Madrazo/School of Engineering
De La Salle University, 2401 Taft Ave.
Manila, Philippines
(Tel. 632-524-4611, loc. 232)

Internationally, to Ph.D. Candidate Brenda Ortigoza Bateman:

BY REGULAR MAIL to:
Brenda Ortigoza Bateman
7606 Nutwood Ct.
Rockville, MD 20855, USA
(Tel. 1-301-208-8958)

Date Survey Completed: _____ (mm/dd/yy)

1. Name of ecozone: _____

2. Your Contact Information
   (This information is for correspondence purposes only and will not be released.)

   a. Name: _____

   b. Title: _____

   c. Complete Mailing Address: _____

   d. Telephone Number: _____

   e. Fax Number: _____

   f. E-mail Address: _____

Background

3. **Decision-makers**	Name of Company	Nationality	Ultimate Parent Company
a. Original owner	_____	_____	_____
b. Current owner	_____	_____	_____
c. Original developer	_____	_____	_____
d. Current manager	_____	_____	_____

4. **Age of Ecozone**

a. Year Ecozone was proclaimed: _____

b. Year Ecozone began operations: _____

5. **Size of Ecozone**

a. Revenues in pesos in 2001 _____

b. Land area in hectares in 2001 _____

c. Number of tenants (locators) in 2001 _____

d. Number employed in 2001 (including locators) _____

6. **Industries in this Ecozone:**

Name of "anchor," or primary, tenant if there is one: _____

What industries were in this zone in 2001?
(Check all that apply, **or** check here ☐, and attach a list of locator/tenants and their specialties.)

a. ☐ automotive. # of facilities: _____ d. ☐ metal finishing. # of facilities: ____

b. ☐ electronics. # of facilities: _____ e. ☐ chemicals. # of facilities: _____

c. ☐ "other". # of facilities: _____ f. ☐ textiles. # of facilities: _____

Specify "other" _____

(Total should equal the number of tenants in 5c.)

7. **Owners of Locator/Tenant Facilities in this ecozone.**

What nationalities were represented by tenants of this ecozone in 2001?
(Check all that apply, **or** check here ☐, and attach a list of locator / tenants and their nationalities.)

a. ☐ majority-owned by Filipinos. # of facilities: _____
b. ☐ majority-owned by Americans. # of facilities: _____
c. ☐ majority-owned by Japanese. # of facilities: _____
d. ☐ majority-owned by "other" nationalities. # of facilities: _____
Specify "other": _____
e. ☐ majority-owned by Europeans. # of facilities: _____
f. ☐ majority-owned by Koreans. # of facilities: _____
g. ☐ majority-owned by Taiwanese. # of facilities: _____
h. ☐ majority-owned by Singaporeans. # of facilities: _____

8. Percent of lots that were OCCUPIED in this ecozone in 2001: _____
+
Percent of lots that were AVAILABLE in this ecozone in 2001: _____
= (Should total 100 percent)

9. The next closest eco-zone is: (Choose the most accurate answer.)

a. ☐ two km or less from here
b. ☐ more than two km from here
c. ☐ more than 10 km from here
d. ☐ more than 50 km from here

10. Does this ecozone receive any public financial support, in addition to Philippine Board of Investments / Philippine Economic Zone Authority recruitment packages?
☐ No
☐ Yes. Describe: _____

11. Amount in local taxes (in pesos) paid during 2001 _____

12. Does this ecozone participate in any voluntary programs related to the environment?
(Check all that apply.)

a. ☐ PRIME eco-industrial project
b. ☐ Environmental Mgt Systems (EMS)
c. ☐ ISO 14000
d. ☐ none
e. ☐ other (specify): _____

13. Please indicate which of the following are the most powerful drivers behind this ecozone's environmental policies. (Choose as many as you like, ranking "1" as the strongest, "2" as the next strongest, etc.)

☐ mandate from corporate headquarters
☐ compliance with national laws
☐ pressure from neighbors/community
☐ pressure from local government
☐ it's good for marketing
☐ personal leadership from company officials
☐ leadership / pressure from locator/tenants
☐ helps keep up with competition
☐ other (specify): _____
_____

Water Supplies

The Local Water Situation

14. Where does the water supply from this ecozone originate? (Check all that apply.)
    a. ☐ rainwater
    b. ☐ hauled source (boat, truck, etc.)
    c. ☐ groundwater / aquifer. Name of aquifer if possible: _____
    d. ☐ surface water. Name of body or bodies of water if possible:
    _____

15. What is the quality of the water that comes from these sources?
    a. ☐ very clean c. ☐ dirty
    b. ☐ somewhat clean d. ☐ very dirty

16. Does this ecozone have problems getting sufficient quantities of water?
    a. ☐ no, never b. ☐ yes, occasionally c. ☐ yes, most days of the year

17. Who are the other major competitors for / users of this water body? (Check all that apply.)
    a. ☐ other ecozones
    b. ☐ manufacturing industries outside of ecozones
    c. ☐ farms or plantations outside this ecozone
    d. ☐ residential neighborhoods
    e. ☐ tourist sites (hotels, golf courses, etc.)
    f. ☐ other (specify): _____

18. This ecozone is physically located within the jurisdiction of what water district / water provider?
    _____

19. Does the ecozone use any of the following policies with regard to water supply? (Check all that apply.)
    a. ☐ ecozone-originated fines for excessive use
    b. ☐ pricing that does not cover system costs
    c. ☐ pricing that just covers system costs
    d. ☐ pricing that more than covers system costs
    e. ☐ water allocation
    f. ☐ voluntary programs
    g. ☐ public-private partnerships
    h. ☐ targets for volume of use

20. What year will the ecozone (re) build or upgrade its water supply infrastructure? _____

21. How would the ecozone finance such a project?
    _____
    _____

22. What model of water supply does this ecozone use? (Check all that apply.)
    a. ☐ the park extracts water and sells directly to locator / tenants (Go to Question 23.)
    b. ☐ a third party extracts water then sells via the ecozone to locator / tenants (Go to Question 24.)
    c. ☐ a third party extracts water and sells it directly to locator / tenants (Go to Question 25.)
    d. ☐ other (Specify: _____; Go to Question 26.)

23. **Supply Model 1: The Ecozone Itself Extracts and Sells Water Directly to Locator / Tenants**

a. Water Extraction

1) National Water Resources Board (NWRB) water extraction permit requests are filed by: ☐ ecozone ☐ other: _____

2) Number of wells in ecozone: _____

3) Depth of deepest well in meters: _____

4) Type of wells: _____

5) Average volume of water extraction per per month in cubic meters: _____

6) Water extraction equipment is sourced from:

a. ☐ the Philippines
b. ☐ Japan
c. ☐ Europe
d. ☐ U.S.
e. ☐ other: _____

b. Water Supply Infrastructure

1) How does the ecozone store water? (Check all that apply.)
   a. ☐ dams / reservoirs
   b. ☐ holding tanks
   c. ☐ other. Specify: _____

2) Capital costs of all water supply infrastructure in pesos: _____

3) Average monthly operations & maintenance costs in pesos: _____

c. Water Sales and Distribution within the Ecozone

1) What water distribution infrastructure is in place? _____

2) Describe any allocation policies the ecozone uses to distribute water: _____

_____

3) Does the ecozone charge a fee for water supply? ☐ Yes ☐ No

(If "no," and the if the ecozone uses no other water supply models, please go to Question #26. Otherwise, go to Question #24.)

4) What price in pesos does this ecozone charge tenants for water per month? _____

5) Do the rates (pesos per cubic meter)—
   ☐ increase the more water tenants buy
   ☐ stay the same no matter how much water tenants buy
   ☐ decrease the more water tenants buy

6) Are the fees combined with other utility bills? ☐ No ☐ Yes (Specify) _____

7) What year were these fees established? _____

8) NWRB certificates of public convenience are filed by: ☐ ecozone or ☐ other: _____

If the ecozone uses no other water supply models, please go to Question #26. Otherwise, continue with Question #24.

24. **Supply Model 2:**
A Third Party Extracts the Water Then Sells via the Ecozone to Locator / Tenants

a. Name of Third Party: _____

b. Water Sales to the Ecozone

1) What price (in pesos) does the 3rd party charge this ecozone for per unit of water? _____

2) How does this price compare to what other neighbors in the vicinity pay?
   a. ☐ higher than ☐ same as ☐ lower than agricultural neighbors
   b. ☐ higher than ☐ same as ☐ lower than residential neighbors
   c. ☐ higher than ☐ same as ☐ lower than other industrial customers

3) Average volume of water in cubic meters purchased by the ecozone/month: _____

c. Water Supply Infrastructure

1) How does the ecozone store water? (Check all that apply.)
   a. ☐ dams / reservoirs
   b. ☐ holding tanks
   c. ☐ other. Specify: _____

2) Capital costs of all water supply infrastructure in pesos: _____

3) Average monthly maintenance and admin costs in pesos: _____

d. Water Sales and Distribution within the Ecozone—

1) Average volume of water in cubic meters sold by the ecozone per month: _____

2) What water distribution infrastructure is in place? _____

3) Describe any allocation policies the ecozone uses to distribute water: _____

4) Does the ecozone charge fees for water supply? ☐ Yes ☐ No.

(If "no," and the if the ecozone uses no other water supply models, please go to Question #26. Otherwise, go to Question #25.)

5) What price in pesos does this ecozone charge tenants for water per month? _____

6) Do the rates (pesos per cubic meter)—
   ☐ increase the more water tenants buy
   ☐ stay the same no matter how much water tenants buy
   ☐ decrease the more water tenants buy

7) Are the fees combined with other utility bills? ☐ No ☐ Yes (Specify): _____

8) What year were these fees established? _____

9) NWRB certificates of public convenience are filed by: ☐ ecozone or ☐ other: _____

If the ecozone uses no other water supply models, please go to Question #26. Otherwise, continue with Question #25.

25. **Supply Model 3:**
A Third Party Extracts the Water and Sells it Directly to Locator / Tenants

a. Name of Third Party: _____

b. Water Sales to the Ecozone Locator / Tenants

1) a. What price (in pesos) does the 3rd party charge tenants for per unit of water? _____

b. Is this price the same for all tenants? ☐ No ☐ Yes

2) Are prices imposed by the 3rd party—

a. ☐ higher than ☐ same as ☐ lower than agricultural neighbors
b. ☐ higher than ☐ same as ☐ lower than residential neighbors
c. ☐ higher than ☐ same as ☐ lower than other industrial customers

3) Do the rates (pesos per cubic meter)—

☐ increase the more water tenants buy
☐ stay the same no matter how water much tenants buy
☐ decrease the more water tenants buy

4) Are the fees combined with other utility bills? ☐ No ☐ Yes (Specify): _____

5) Average volume of water in cubic meters entering the ecozone per month: _____

c. Water Distribution Infrastructure within the Ecozones—

1) What distribution infrastructure is in place? _____

2) Capital costs of all water supply infrastructure in pesos: _____

3) Average monthly maintenance and admin costs in pesos: _____

Wastewater

	Local Wastewater Standards (Check all years that apply.)	**2002**	**2001**	**2000**	**1999**
26.	Years during which the ecozone has had its own pollution control officer (PCO).	☐	☐	☐	☐
27.	The PCO monitored and reported water quality to the local government (including local DENR or LLDA).	☐	☐	☐	☐
28.	Local government inspectors (including local DENR or LLDA inspectors) came to the ecozone to collect water quality samples	☐	☐	☐	☐
29.	Local government complained about water pollution from this ecozone	☐	☐	☐	☐
30.	Local government imposed any water related fines on this ecozone	☐	☐	☐	☐
31.	Local government issued any notices of violation to this ecozone	☐	☐	☐	☐
32.	Local government issued cease and desist orders (CDOs) to this ecozone.	☐	☐	☐	☐
33.	Are there waste water-related ordinances enacted by the local government that apply to this ecozone?	☐ Yes	☐ No		

Wastewater Policies Created by the Ecozone

34. Does the ecozone use any of the following policies with regard to wastewater? (Check all that apply.)

a. ☐ ecozone-originated fines for poor water quality
b. ☐ pricing that does not cover system costs
c. ☐ pricing that just covers system costs
d. ☐ pricing that more than covers system costs
e. ☐ voluntary programs
f. ☐ trading permits for water quality
g. ☐ water quality standards
h. ☐ public-private partnerships

35. What year will the ecozone (re) build or upgrade wastewater/sewerage infrastructure? _____

36. How would the ecozone finance such a project? _____

_____

37. Does the ecozone set and enforce any water effluent standards for locator tenants?
☐ Yes ☐ No
If yes, please elaborate: _____

38. Is there any centralized MEASUREMENT system that enables the park to determine the water quality of effluent coming from the locator /tenants? ☐ Yes ☐ No

39. Where does wastewater from this ecozone go after treatment? (Check all that apply.)

a. ☐ into a neighboring wetland. Name of wetland if any: _____

b. ☐ re-injected into an aquifer. Name of aquifer if any: _____

c. ☐ into groundwater. Name of rivers, lakes, etc: _____

d. ☐ to a municipal treatment plant. Name of plant: _____

e. ☐ Other. Specify: _____

_____

40. What model of wastewater treatment does this ecozone use? (Check all that apply.)

a. ☐ the ecozone has a central sewerage system (Go to Question 41.)

b. ☐ the ecozone has a central wastewater treatment plant (Go to Question 42.)

c. ☐ the ecozone has no central wastewater system (Go to Question 43.)

d. ☐ other (Specify: _____; go to Question 43.)

41.

Wastewater Model: The Ecozone Provides a Central Sewerage System

a. Sewerage Infrastructure

1) What was the cost (in pesos) of the sewerage infrastructure in this ecozone?

_____

2) How was the sewerage infrastructure paid for?

a. ☐ grants
b. ☐ leasing agreement
c. ☐ bonds (specify): _____
d. ☐ a governmental environmental fund
e. ☐ public taxes
f. ☐ loans
g. ☐ other (specify): _____

3) What year was it originally built? _____

4) What is the system's volume capacity in cubic meters? _____

5) What is the average volume processed per month in cubic meters? _____

6) Sewerage equipment is sourced from:

a. ☐ the Philippines
b. ☐ Japan
c. ☐ Europe
d. ☐ U.S.
e. ☐ other: _____

b. Pricing Sewerage Services

1) Are tenants / locators charged for sewerage services? ☐Yes ☐No (If no, go to bottom of page.*)

(If "no," and the if the ecozone uses no other wastewater treatment models, please go to Question #43. Otherwise, go to Question #42.)

2) If yes, what were the 2001 revenues in pesos brought in by sewerage fees?

_____

3) What pricing structure is used for sewerage in this ecozone?

a. ☐ fee based on volume
b. ☐ fee based on water quality
c. ☐ fee based on a combination of volume & quality
d. ☐ other (specify): _____

4) Who sets these fees? _____

5) Are the fees combined with other utility bills? ☐ Yes ☐ No (If yes, specify which ones.)

_____

6) What year was this price established? _____

** If the ecozone uses no other wastewater treatment models, please go to Question #43. Otherwise, continue with Question #42.*

42. **Wastewater Model: The Ecozone Provides a Centralized Wastewater Treatment System**

a. Processing Wastewater in this Ecozone

1) What type of treatment does the ecozone make available to tenants? (Check all that apply.)

a. ☐ primary (removal of large solids)
b. ☐ secondary (removal of dissolved organic and inorganic material)
c. ☐ additional physical separation
d. ☐ chemical (specify): _____
e. ☐ biological (specify): _____
f. ☐ other (specify): _____

b. Wastewater Infrastructure

1) What was the cost (in pesos) of the wastewater treatment infrastructure in this ecozone?

_____

2) How was this infrastructure paid for?

a. ☐ grants
b. ☐ leasing agreement
c. ☐ bonds (specify): _____
d. ☐ a governmental environmental fund
e. ☐ public taxes
f. ☐ loans
g. ☐ other (specify): _____

3) What year was it originally built? _____

4) What is the system's volume capacity in cubic meters? _____

5) What is the average volume processed per month in cubic meters? _____

6) Wastewater treatment equipment is sourced from:

a. ☐ the Philippines
b. ☐ Japan
c. ☐ Europe
d. ☐ U.S.
e. ☐ other: _____

c. Pricing Wastewater Treatment Services

1) Are tenants / locators charged for wastewater treatment services?
☐ Yes ☐ No (If no, go to Question #43.)

2) If yes, what were the 2001 revenues in pesos brought in by wastewater treatment fees?

_____

3) What pricing structure is used for wastewater treatment in this ecozone?

a. ☐ fee based on volume
b. ☐ fee based on water quality
c. ☐ fee based on a combination of volume & quality
d. ☐ other (specify): _____

4) Who sets these fees? _____

5) Are the fees combined with other utility bills? ☐ Yes ☐ No (If yes, specify which ones)

_____

6) What year was this price established? _____

Wastewater Sludge

43. What volume of sludge comes from this ecozone per month? _____

44. Who treats wastewater sludge coming from the ecozone? (Check all that apply.)

a. ☐ ecozone
b. ☐ independent facilities/plants
c. ☐ local utility
(Utility Name) _____
d. ☐ none / natural
e. ☐ other (specify): _____

45. How is wastewater sludge from this ecozone ultimately treated? (Check all that apply.)

a. ☐ sent to landfill
b. ☐ sent to lagoons
c. ☐ applied to land (e.g., as fertilizer)
d. ☐ recovered/recycled
e. ☐ incinerated
f. ☐ other (specify):
g. ☐ stored
h. ☐ do not know

_____

Water Re-Use

46. Is there any water re-use / recycling taking place inside this ecozone?

☐ Yes ☐ No (If no, go to the bottom of this survey*)

47. If yes, who uses the recycled water? _____

_____

48. What is the recycled water used for? _____

_____

49. What is the rate of re-use? (Average amount of water in cubic meters re-used per month that would otherwise be supplied by freshwater during 2001) _____

50. Does the ecozone use any of the following to encourage water re-use?

a. ☐ information exchange
b. ☐ re-use infrastructure
c. ☐ water re-use for general park operations
d. ☐ subsidies to tenants
e. ☐ other incentives for tenants, specify:

_____

51. Were any special changes (special permits) in water, wastewater, or solid waste regulations and ordinance required for this re-use program to take effect?

☐ No ☐ Yes. If yes, describe: _____

_____

*** Please remember to attach any extra documentation**
(lists of locators/tenants, specialties & nationalities) necessary to complete Question #s 6 and 7.
Thank you for your participation!

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10.2 Personal Communications

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