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## Resolving the Water Pollution Crisis in the Philippines: the Implications of Water Pollution on Public Health and the Economy

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## Introduction

Imagine being told that the water in all your faucets, the water you drink and use to bathe, contains toxins such as mercury and feces. Now imagine that your local government knew about these dangers but actively refused to share them until most of the people you knew and loved had fallen ill.

This hypothetical scenario is the current reality in the Philippines. An eighth of the country's rivers are considered too toxic for human and animal ingestion or contact and are unable to support most forms of life.<sup>1</sup> Moreover, fewer than half of the total number of rivers in the Philippines have water safe enough for consumption.<sup>2</sup> In recent years, contaminants found in large and small bodies of water contributed to one third of the reported illnesses in the Philippines.<sup>3</sup> More surprisingly, the response by the Filipino government to combat this epidemic remains limited.

This paper supplies an in-depth description of the water crisis in the Philippines, its implications and effects on the health of local people, and its impact on the local and national economy. It will next provide four potential actions for the Filipino government to pursue and will explain potential drawbacks of these actions. From these options, this paper will select a policy recommendation that will require the government to acknowledge the concerns of international environmental organizations, namely, funding for educational intervention programs that promote awareness of the crisis. These programs would inform citizens on how to find safe drinking water and on the necessary steps to take to combat a water-borne illness. Such

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<sup>1</sup> "The Problem," Greenpeace Philippines, September 29, 2010, accessed 2018, <http://www.greenpeace.org/seasia/ph/What-we-do/Toxics/Water-Patrol/The-problem/>.

<sup>2</sup> Ibid.

<sup>3</sup> Rhonda Marrone, "Water Pollution in the Philippines: Causes and Solutions," *BORGEN*, October 2, 2016, <http://www.borgenmagazine.com/water-pollution-in-the-philippines/>.

action allows for the Filipino government to take steps toward protecting their people while limiting the financial burden of the endeavor.

## Literature Review

### Background

The Philippines, a Southeast Asian nation, is a collection of 7,107 islands surrounded by the Luzon Strait, South China Sea, Sulu Sea, Celebes Sea, and Philippine Sea.<sup>4</sup> The tropical climate of the islands allows for the growth of corn, sugar cane, root crops, and rice.<sup>5</sup> Agriculture uses approximately 32% of the total land in the Philippines.<sup>6</sup> The Philippines is only a small exporter of agricultural goods and livestock. The islands export live fish, processed fish, seafood, bananas, tree nuts, and tropical fruit, such as coconuts.<sup>7</sup> Though agriculture occupies one third of the total landmass, most exported goods come from the manufacturing sector. Top exported goods of the Philippines include integrated circuits, computers, wood carpentry, semiconductor devices, and insulated wire.<sup>8</sup> Major importers of Philippine products include Japan, the United States, Hong Kong, China, or Singapore.<sup>9</sup>

Even though trade has helped to develop the economy in the Philippines, the country has also experienced some negative impacts of globalization; pollution of the lakes and rivers has become a serious topic of concern. Currently, manufacturers are openly dumping hazardous chemicals into Laguna Lake and the Pasig River.<sup>10</sup> An article published by Greenpeace states that 50 out of 421 rivers in the region are considered biologically dead, meaning that the rivers

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<sup>4</sup> Ibid.

<sup>5</sup> Ibid.

<sup>6</sup> Ibid.

<sup>7</sup> "Philippines," *OECD – Philippines (PHL) Exports, Imports, and Trade Partners*, 2017, <https://atlas.media.mit.edu/en/profile/country/phl/>.

<sup>8</sup> Ibid.

<sup>9</sup> Ibid.

<sup>10</sup> "The Problem."

do not contain any oxygen and are unable to support most species of life.<sup>11</sup> The Environmental Management Bureau (EMB) determined that only 47% out of the Philippines' 127 freshwater bodies retain good water quality.<sup>12</sup> Also, 58% of groundwater reserves tested positive for coliform contamination.<sup>13</sup> Even the Marilao River, which runs through the capital city, Manila, was featured on Soapboxie's list of Top 10 Most Polluted Rivers in the World.<sup>14</sup> The water pollution crisis within the Philippines has been estimated to cost \$1.3 billion USD annually.<sup>15</sup> The abundance of pollutants in the local water supply has negatively impacted the standard of life in this Southeast Asian country.

Sources of water in the Philippines suffer from a range of contaminants. Industrial water waste contains chemical pollutants such as chromium, cadmium, lead, mercury, and cyanide.<sup>16</sup> These pollutants persist over long periods of time and are often referred to as stock pollutants, but their origins from industrial sources also allow them to be characterized as point-source pollution.<sup>17</sup> Other harmful wastes, such as decayed plants, livestock manure, dead animals, soil runoff, and residue, are organic wastes that have contributed to the Philippines' pollution problem.<sup>18</sup> Because they do not originate from industrial sources, these specific pollutants are commonly called nonpoint source pollution.<sup>19</sup> Other water pollutants, which exacerbate the

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<sup>11</sup> Ibid.

<sup>12</sup> Ibid.

<sup>13</sup> Marrone, "Water Pollution in the Philippines."

<sup>14</sup> K. "What Are the 10 Most Polluted Rivers in the World?" *Soapboxie*, August 03, 2017, <https://soapboxie.com/social-issues/What-Are-the-10-Most-Polluted-Rivers-in-the-World>.

<sup>15</sup> Ibid.

<sup>16</sup> "The Problem."

<sup>17</sup> R. Quentin Grafton, *The Economics of the Environment and Natural Resources* (Malden, MA: Blackwell Pub., 2004), <http://site.ebrary.com/id/10158663>.

<sup>18</sup> "The Problem."

<sup>19</sup> Grafton, *The Economics*.

Philippines' water crisis are accidental oil and chemical spills and illegal dumping of waste.<sup>20</sup> The presence of these pollutions has deeply impacted the daily lives of Filipino people.

### Implications of Water Pollution

As time passes, the health of the Filipino people continues to suffer. Within a five-year span, exposure to waterborne contaminants were the cause of approximately one third of illnesses in the Philippines.<sup>21</sup> An abundance of waterborne viruses and bacteria in drinking water leads to the contraction of afflictions such as diarrhea, cholera, and various skin diseases.<sup>22</sup> People, as well as other animals, also experience the buildup of toxins over time within the fatty tissue of their bodies, known as bioaccumulation.<sup>23</sup> In urban areas with inadequate sewage systems, cancer mortality rates are high.<sup>24</sup>

Aside from its impacts on public health, water pollution also causes irreversible damage to the environment. A common problem is eutrophication, which occurs when organic materials deposited within the water deplete the oxygen available, causing anaerobic algae blooms.<sup>25</sup> Other pollutants stimulate the consumption of oxygen, which creates stress on specific organisms, while decreasing the overall ability to survive.<sup>26</sup> The lack of oxygen available within the lakes, rivers, ponds, and streams causes river-dwelling creatures, such as fish, to decrease, and species who rely on streams to become endangered.<sup>27</sup> Pollutants can also change the physical properties

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<sup>20</sup> "The Problem."

<sup>21</sup> Marrone, "Water Pollution in the Philippines."

<sup>22</sup> "Philippines: Providing Sewerage and Sanitation Services to Over 3 Million People," *World Bank*, April 8, 2013, accessed April 10, 2018, <http://www.worldbank.org/en/results/2013/04/08/philippines-manila-third-sewerage-project>.

<sup>23</sup> John M. Shandra, Eran Shor, and Bruce London, "Debt, Structural Adjustment, and Organic Water Pollution: A Cross-National Analysis," *Organization & Environment* 21.1 (2008): 38-55.

<sup>24</sup> C. Maurer Wu, Y. Wang, S. Xue, and D. L. Davis, "Water Pollution and Human Health in China," *Environmental Health Perspectives*. 107.4 (1999): 251-256.

<sup>25</sup> *Ibid.*

<sup>26</sup> Shandra, et al., "Debt, Structural Adjustment, and Organic Water Pollution."

<sup>27</sup> D. Evans, "The Formation of a River-Basin Authority Through Local Participation: A Case Study from the Southern Philippines," *Water and Environment Journal* 18.1 (2004): 36-38.

of water itself. Certain pollutants shift the pH of the water, which causes many plants and animals to die because they are unable to adapt to the new pH balance.<sup>28</sup>

Local economies are severely impacted by water pollution, and the Filipino economy is no exception. When citizens experience a decrease in hygiene due to the lack of clean water for bathing, they become less productive.<sup>29</sup> This is because bathing is a basic need that must be met in order for an individual to focus proper amounts of energy and time on greater responsibilities such as those at work, school, or in the home. Women and children, in particular, are required to travel farther distances and work harder to collect clean water, taking away from time that could be dedicated to other work, education, and focusing on personal health.<sup>30</sup> Deteriorating water quality also negatively impacts the growth of crops and livestock and overall soil quality, leading to reduced agricultural yields.<sup>31</sup> A decrease in productivity, a smaller crop yield, and missing work due to illness, all result in a lower household income. Polluted water in the Philippines increases the possibility that living in the Philippines may become a poverty trap. A decrease in household earnings will likely pressure children to leave school to help increase household income; but a lack of schooling produces inadequate wages and limits opportunity, creating a perverse cycle of poverty.

Large amounts of water pollution have caused an overall depreciation of public health in the Philippines. Poor health reduces labor efficiency while simultaneously decreasing life expectancy, thus creating a health-induced poverty trap.<sup>32</sup> The reduction in life expectancy leads to a decrease in efficiency, because less workers are in the labor market, and each worker must

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<sup>28</sup> Shandra, et al., "Debt, Structural Adjustment, and Organic Water Pollution."

<sup>29</sup> "Philippines: Providing Sewerage and Sanitation Services to Over 3 Million People."

<sup>30</sup> Ibid.

<sup>31</sup> Ibid.

<sup>32</sup> Pierre-Richard Agénor, "Public Capital, Health Persistence and Poverty Traps," *Journal of Economics* 115.2 (2015): 103-131.

now take on more responsibility, leading to a decrease in the quality of work. This decrease in efficiency then slows economic growth. Lower efficiency also leads to a decrease in wages, ultimately generating shorter life expectancy in the oncoming years.<sup>33</sup> A reduction in life expectancy occurs because lower wages correlates to less necessary goods purchased, such as food, clothing, and hygiene products, thus leading to the deterioration of health. These negative environmental impacts typically begin before birth. Inadequate nutrition *in utero* can cause cognitive and physical impairments or disabilities.<sup>34</sup> If an expecting mother is without access to clean water, not only is she subject to dehydration and pollutants, but her unborn offspring is also subject to harm. Access to clean water is an important component of preventing malnutrition and decreasing infant mortality.<sup>35</sup> Governments can be of assistance by increasing their spending on health and/or infrastructure. This spending may move the economy towards an increase in health and labor efficiency in the short run while escaping the health-induced poverty trap in the long run.<sup>36</sup> In the example of the Philippines, environmental organizations have taken the lead on improving water infrastructure while the government has chosen to limit its involvement.

#### Current Policy

The Philippines passed the Clean Water Act of 2004 to help prevent further pollution of natural clean water sources.<sup>37</sup> Through these reforms, the Filipino government attempted to create a sense of accountability within the region by levying fines on polluters. Severity of the fine is dependent on the type of pollutant found—such as organic, inorganic, and stock pollutants—as well as the classification of the body of water the pollution was found in, such as

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<sup>33</sup> Ibid.

<sup>34</sup> Ibid.

<sup>35</sup> Ibid.

<sup>36</sup> Ibid.

<sup>37</sup> “Asia-Pacific Information Platform on Agricultural Policy,” *Republic Act No. 9275: The Philippine Clean Water Act of 2004*, 2004, [http://ap.fftc.agnet.org/ap\\_db.php?id=281](http://ap.fftc.agnet.org/ap_db.php?id=281).

rivers, streams, and so forth.<sup>38</sup> The Clean Water Act leaves the responsibility of charging fines and executing water guidelines to the local governments.<sup>39</sup> However, private corporations may choose not to adopt water-conscious practices despite consistently paying pollution fines. The accumulation of pollution fines from lakes and rivers may equal a fraction of the cost of implementing proper water treatment and disposal of water waste within a corporation. As long as the fines are less expensive than proper disposal of pollutants, corporations will choose to continue to pollute. Global organizations have offered aid to the Philippines, but government measures fail to prevent the continuation of water pollution.

International organizations have attempted to mitigate the consequences of water pollution in the Philippines. From 2004-2010, the Manila Third Sewerage Project (MTSP) was introduced as an effort to reduce the pollution accumulating within the Philippines, while also increasing access to safe drinking water and sanitation.<sup>40</sup> MTSP implemented a number of practices that would help complete their goal. This effort included the creation of water treatment facilities, which then led to a spike in communal urban renewal activities such as riverbank clean-up initiatives.<sup>41</sup> Other successes included improving facilities, utilizing a combination sewer-and-drainage system, decentralizing sewage delivery, the construction or expansion of small treatment facilities more evenly dispersed in the targeted region, and the promotion of safe disposal of treated septage.<sup>42</sup> This project was considered highly successful for the metropolitan Manila area. MTSP increased sewerage coverage in the area from 3% to 30% in 2012.<sup>43</sup> More importantly, this program increased public awareness, impacting 3.7 million people by the end of

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<sup>38</sup> Ibid.

<sup>39</sup> Ibid.

<sup>40</sup> "Philippines: Providing Sewerage and Sanitation Services to Over 3 Million People."

<sup>41</sup> Ibid.

<sup>42</sup> Ibid.

<sup>43</sup> Ibid.

the project .<sup>44</sup> However, the success of MTSP was geographically limited, as millions more Filipinos outside of the capital have yet to see any improvements in the quality of their water.

Action must be taken sooner rather than later concerning water pollution within the Philippines. As more contaminants accumulate, the costs of removing toxins and treating water increase.<sup>45</sup> Higher-income Filipino trading partners can influence environmental changes by promoting wealth through trade and trade agreements. There is a belief that “income gains with freer trade may increase both an individual country’s well-being, as well as global utility, and, in this way, lead to an increasing demand for environmental quality.”<sup>46</sup> Essentially, higher income will lead to new levels of environmental consciousness and environmental preservation. If the Philippines does nothing in hopes of one day becoming a higher-income nation, the cost of reversing the damages done by water pollution will be impossible to pay. Luckily, plenty of options are available for the Filipino government to pursue in the near future in order to reduce the impacts of water pollution.

### **Analysis**

To compare policy options, this analysis sets forth four criteria. The first criterion is that the best solution must be relatively inexpensive to implement. The budget limitations on implementation must be acknowledged. Second, The plan must also be cost-effective in the long term. This is to reduce long-term costs, more potential waste, and further implications from the lack of available clean water. Third, the ideal option must attempt to reach the majority of, if not all, citizens affected by the problem. The inability to access clean water is a national problem, and therefore all citizens are affected and deserve relief. Finally, the option chosen must strive

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<sup>44</sup> Ibid.

<sup>45</sup> Grafton, *The Economics*.

<sup>46</sup> Ibid., 368.

for longevity, meaning that the option must seek a permanent solution to the current problem. These criteria will help assess which option is the most effective solution for the current crisis.

The first policy option is for the government to take action now by expanding the current water sanitation system to include more water treatment plants. This will increase the scope of sewage plant coverage while decreasing the amount of water processed by each plant. Reduced volume would allow for a more thorough completion of the water treatment process and would ensure that more Filipinos are able to access clean drinking water. Another benefit of this option is that the increase in water treatment plants would create jobs, both high skill and low skill, in the local economy. Increased quality of septage management would also be included with this option. Septage management includes, but is not limited to, care of septic tanks, the process of removing sludge buildup, and tank replacement.

This option would meet many of the criteria of an ideal plan. Replacing the current water sanitation system is an effective way to achieve a long-term solution to the problem. Proper water care would also prevent the need for another replacement of the water sanitation system in the future. Replacing the current system would potentially be a one-time financial burden that would improve access to safe water for all citizens. The major trade-off of this option is the present cost. This multi-billion-dollar idea would cause a huge increase in the national debt, which could turn the Filipino government away from pursuing this policy option. Instead of spending a large amount of money on this one potential solution, there are other cost-effective solutions that can reduce the impact of water pollution.

A second policy option is to increase fines for pollution and to deposit the revenue from the fines into a fund designated for water pollution prevention. This is a very similar option to the current water policy implemented in the Philippines. However, increasing the fines placed

upon polluters would provide more funds to help clean up the current buildup of sludge within the septic tanks. A dramatic increase in fines could also encourage private manufacturing firms to adopt water-conscious practices as a long-term cost saving investment to the company.

Many of the criteria are satisfied by the option of increasing pollution fines, but there are also significant drawbacks attached. Increasing water-pollution fines is a relatively inexpensive option, and the revenue generated may lead to the implementation of other beneficial long-term solutions that reach the masses, if successful. However, the effectiveness of this option is not guaranteed. The timeframe to accumulate enough money to fund progress in water sanitation is unknown. Relying on this option also has the potential to be an unreliable method of change, which is this option's biggest trade-off. Due to its potential ineffectiveness, this option would not impact the majority of citizens, thus failing to meet that criterion. A smaller trade-off from this option is that saving money to replace the septic system does not promote methods of safe waste water disposal. This stagnation in the amount of water conscious efforts may cause this problem to rise again in the future.

The third policy option for the Philippines is to leave this problem for international organizations. This does not necessarily unburden the Filipino government of its environmental responsibilities. Instead, the government would fund environmental programs through grant initiatives as a means of educating people of the Philippines about the water crisis. Since many Filipinos are currently using the contaminated water in their daily lives as drinking and bathing water, education would help individuals understand the complexity of this problem. Aside from understanding the problem, education provided by these organizations would inform the people of ways to obtain clean drinking water, and practices to limit pollution. Prevention methods, including safety measures, would be discussed to prevent the further contraction of water borne

illnesses across the Philippines. The dependency on outside organizations by the government does have trade-offs that should be assessed.

This option places the Filipino government in the position of becoming dependent on non-government agencies to assist in the epidemic. However, this option reduces the amount of government spending on the problem because government funds are limited to the amount the government has chosen to donate to the cause. This method has the potential to reach the masses, whether or not a majority of citizens go through the educational experience. Social media posts, and news articles on the program produced by environmental agencies, will gain traction and be able to spread messages regarding the current state of the contaminated water. The information given by the organizations can promote long-term change in the actions of Filipino citizens. This option fails to address short-term solutions to the high levels of toxins currently found in the water, however, long-term change will be most beneficial for the future of the nation. At this point in time, it may be too late for preventative measures, and this option does not address any positive short-term solutions to water pollution.

The last policy option for the Philippines is to use economic incentives for responsible water use. Under this option, the Philippines can offer tax incentives for households and private manufacturers to adopt water safe technology. Companies and households will likely adopt water conscious techniques that limit the emission of water pollutants because they will pay less in taxes for their environmentally friendly reforms by introducing these techniques. In the long run, these incentives will become cost saving techniques for those who can afford to adopt them. Though tax incentives for undertaking positive actions are enticing, there are some trade-offs concerning this policy option.

There are several drawbacks to providing tax incentives for houses and manufacturers who adopt clean water practices. One of the drawbacks of this option is that it is unclear how many people and manufacturers will choose to qualify for these tax incentives. If a majority chooses to participate, the Filipino government could very well be losing a large portion of their tax revenue. Tax incentives for water conscious techniques may lead to tax increases in other sectors as a way to make up the difference in revenue. On the other hand, it is likely that the only households who are eligible for these tax incentives are wealthy. In order to receive this long-term cost saving method, a household must first spend money on changing their current water sanitation systems. This financial burden is unrealistic for many of the lower income citizens, of which the Philippines is largely comprised. Though this option does meet the effectiveness criterion, it fails to meet the other criteria of being a long-term solution and fails to reach the majority of citizens. These trade-offs could potentially be reasons for the Philippines not to pursue this option, but all options must be compared.

### **Conclusion**

Though all policy options have their own specific drawbacks, the most practical solution is to limit government involvement and leave the majority of the responsibility to international organizations such as Greenpeace, EarthFirst!, or the World Business Council for Sustainable Development. The Filipino government has already provided limited assistance in reducing the water pollution crisis. They should make an effort to provide grants to the international organizations that promote environmentally-conscious practices but specify that the grants are to be used for educational resources for the Filipino people. Currently, the government does not have the resources to change all water sewage systems or provide economic incentives, but promoting transparency and education may save millions of lives. Leaders in government should

approach these organizations with the idea for them to lead the reforms with supplementary government funding. Meetings should be held to discuss scheduling, progress, and so forth. This will instill trust between the entities involved, while publishing the meeting minutes will promote transparency. It is likely that this process will yield the desired results.

Through these actions, people will learn how they can access clean drinking water close to their homes and how their actions may be impacting the water conditions. Citizens will learn how improper practices on their small farms or in their homes have contributed to the poor water quality, and how the large factory in close proximity to their town may impact their family's health and income. Through intervention initiated by these organizations, smart water practices will be spread across the region. Resources for individuals who have contracted waterborne diseases will be made available. These organizations will promote knowledge of the diseases, as well as what measures to take in order to become well once more. The people of the Philippines have a right to clean water because it is a necessity. It is important for the Filipino government to act now, before the damage done to their water sources becomes irreversible.

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