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 Indonesia: Water Scarcity and Water Sanitation

Indonesia: In search of a second chance for the Citarum River.

Indonesia is a maritime country located in the Indian and Pacific Oceans. It is well-known as the largest archipelago in the world, with an extension of 1,916,907km² of land. It has 17,504–18,110 islands, with only 6,000 inhabited. The major islands are Sumatra, Papua, Java, Kalimantan, and Sulawesi. Java, the most populated island, is where the capital, Jakarta, is located. With a population of one hundred thirty million people, 60% of Indonesia's total population, making Java the economic hub of Indonesia. The climate is predominantly tropical but varies due to different geographic locations, such as high mountains, coastal plains, and inland mountains. The tropical environment benefits the growth of vegetation, plants, and trees. The two seasons that are mainly noticed are winter and summer. Winter starts in November and ends in March. Summer begins in July and ends in October. As of 2023, the population is 277,534,122 million, with 56% residing in urban areas and 44% in rural areas.

Of 1,916,907km², 26% or 476,000km² is classified as an agricultural area. The main crops and products manufactured and exported in Indonesia are the following: soybeans, milk powder, fresh fruit, feed and fodder, wheat, cotton, dairy products, and beef products. The most common farm size, 34%, is less than 0.25 ha, about 2500m². Then, 25% is 0.5 ha, which is 5000m².

Indonesia became independent of the Netherlands in 1945 but faced an independence crisis. They tried to be a federalist country, but this did not last long. In 1950, “federated governments unanimously decided to return to a “unitary” or more centralized form of government” (Britannica 2024). This change in governance could be compared to paternalistic leadership and described as a mix of discipline and authority. However, the democratic government has prevailed throughout time,

People in Indonesia will have relatively better or worse housing depending on their social status, the area in which they live, and their ethnicity. People who still live traditionally will live in differently-named houses. Some examples are Bolons, Gadangs, Bale Sakenems, and many others. Indonesian citizens who live in urbanized areas live in apartments. Famous or rich people live in exclusive areas and have their own big houses. The typical size of a family, as of 2022, is from four to five people per household, which is 44.65%. On the other hand, 39.16% have around two to three people living in each house.

Families get their food in different ways, such as producing it on their farms, while others buy it in a grocery store. The most common diet is steamed rice, accompanied by protein, which can be fish, beef, or chicken. These dishes are frequently made on gas stoves. But in inner towns, they still use wood-burning stoves and ceramic stoves.

Indonesian citizens commonly face many barriers when trying to earn a living and have access to healthy food for many reasons. The first problem presented is that many Indonesian people cannot afford nutritious food for themselves, or buy their food from a sanitized place that is legally acceptable. In this way, they expose themselves to an endless number of diseases. Like diarrhea and malnutrition, both illnesses are the cause of death in children all around the world. And sadly, both occur when they don't have access to food security, and water security.

From what I have seen in my own country, sometimes people want and desire to progress, and have a better life for themselves and their families. But the circumstances don't help at all, a lot of social problems end up interfering with their plans, they get stuck, and finally, they give up and try migrating out of the country, and it's sad to see that, and I don't know if this is the case in Indonesia, but insecurity, corruption, injustices, politics, and everything related to this could be affecting the way

people see the opportunities of improving their lifestyle. Because when you see this type of thing, you get discouraged about developing economically, and it wouldn't surprise me that these people felt the same way.

The jobs that Indonesian people have in their majority are manufacturing, tourism, agriculture, and service industries. Agriculture has an average wage of \$122.52 per month, or \$1,470.33 every year. Manufacturing workers have an average wage of \$188.66 per month, so in a year the quantity earned would be \$2263.92. A tourist worker could earn around \$72.28, up to \$207.13 monthly. Annually, the income of these workers will be \$867.36 to \$2,485. Finally, the service industry workers win from the lowest, \$81.26 every month. In a year, their total earned income would be \$975.12. The highest salary is \$163.20 per month, equal to \$1958.4 annually.

Indonesia has one of the largest education systems globally, having almost 300,000 schools, three million teachers, and fifty million students in the country. Even so, the lack of schools is a reality and the quality of teaching is not the best. Since 2015, the government has been looking for solutions, like improving the knowledge of teachers on islands that are less developed. But it's difficult due to the location, because some islands can only be reached by traveling by boat, so the labor to make education equal for every student becomes harder.

Citizens enjoy universal health coverage, which means that public health services have a variety of tools for people to make use of. Sadly, as in almost every public area, the health system leaves much to desire. Similar to the situation with education, isolated regions of the country also lack adequate health systems. The same with infrastructure, they have left a lot behind.

According to Statista, around 91.05% of Indonesian people in households do have access to improve drinking water, which means that it has been highly protected from biological and chemical materials. Water sanitation is a big preoccupation in Indonesia because most of the water resources are contaminated. Another problem is that 1 in 3 persons in this country don't have access to a flush toilet, latrine, or septic system. When a community does not have access to a septic system, you're putting yourself and others in danger because you're possibly contaminating with mortal bacteria, underground water.

Indonesia is a large country, with a large population, and a large demand for natural resources. Water is one of the most important. Without a good water source, it's impossible to complete most of your daily tasks. And it's even harder when the water you're using is not safe, or when you must travel a far distance to get water. This is not fair, because the United Nations recognized that humans have the right to have access to water and sanitation. "Article I.1 states that "The human right to water is indispensable for leading a life of human dignity. It is a prerequisite for the realization of other human rights" (United Nations, 2010).

The Citarum River is located in West Java. Five million people live in the basin of the Citarum, and "About 27 million people rely on the river – the longest in West Java province – for irrigation, drinking water, and other daily needs" (Al Jazeera, 2018) This river has been cataloged as one of the most contaminated in the world, due to all the contaminants that have been deposited in it, and that are still being deposited. The Citarum River is contaminated by around 2000 fabrics, most of which are textile fabrics. Even so, throughout time, many campaigns and donations have been made. Citizens and these giant companies don't seem to care at all. Or at least, see the damage they are doing to themselves, the environment, and their community. Trends seem to be getting worse because every plan made to change the situation seems to be not making that much of a change. One of the main causes of this situation is the lack of knowledge from the community. This problem is just increasing and increasing, and so the consequences are also rising.

The pollution of the Citarum affects mainly the rural areas because they are the ones that make direct use of the river, especially for irrigation and domestic uses. From the Citarum around 170.832 ha, it is an agricultural area. People who make use of this water for agrarian activities will be exposing their

crops to absorbing the contaminants of the water and creating soil pollution. On the other hand, citizens who use this water for domestic labor such as washing their food, cooking, taking showers, and just living in the basin becomes a high risk for their lives, and for their health. They expose themselves to multiple diseases like bronchitis, dermatitis, renal failure, and intestinal infections, and children suffer from delays in their development. Stunting is also a problem that children suffer from. 21.6% is the rate of stunting in children. This is because they don't have access to food that contributes to nutrients and vitamins to have adequate growth. People who are dedicated to catching fish from this river, and selling them, will be exposing others to the contaminants and plastics that fish contain. These represent how exposed Indonesians are to multiple insecurities in different ways.

For the urban area, it's a little bit different. There exists a system of piped water from where they get water from the river. The difference is that in this case the water is already "treated", but how sure can you be that this water is safe? This problem does not necessarily affect a gender specifically but could especially affect people of older age and children, due to their immune systems that usually are weaker than an average adult one. The pollution of this river, and the problems that come after this, could make more vulnerable minorities, who don't have access to a well-paid job that could let them buy water that comes from a decent provenance, to get a system of piped water to their homes, or to find good access to medical needs in case they suffer with any disease caused by the Citarum.

The environment is the number one affected. Whenever we humans make bad decisions, the consequences are assumed by nature, and in my opinion, it's so unfair because they are the reason why we still have life on our planet. The extreme pollution in the river is contaminating the water and the soil, it is causing deforestation, and wildlife is disappearing. This unbalance in the environment will eventually create a larger problem in West Java.

The two main problems with the Citarum River are the following: the number of toxic contaminants that are in the water, and the lack of knowledge existing in the communities living near the river. People are in their whole right to speak up for the injustices that are happening between the river and the fabrics, but they seem not to know that they actually can. The chemical contaminants include manganese, chromium, iron, lead, cadmium, mercury, and cobalt. The biological contaminants are E. coli bacteria, fecal coliform, and organic waste. All this waste ends up here due to human activities, such as agriculture, cattle raising, and the textile industry.

To improve this situation, it is necessary to make use of an action plan. To start, it would be of great help to develop a promotion campaign to get the support of other organizations like the UN, the UNEP, UNESCO, or Greenpeace, which is an environmental organization that has spoken a few times about the Citarum situation. With the help of a "head" organization, we could localize the previously mentioned organizations more easily. To get extra help from citizens, other countries, companies, and the government. Then, it would be suitable to make some deals with the fabrics that deposit their waste in the river, because this is the main problem.

Many fabrics dare to use "ghost drains", which are illegal drains that conduct their waste into the river, making people and authorities believe they are using septic tanks. Many bans have been made on fabrics, but there's a problem also with authorities. This is a serious and difficult problem to solve because how can you be sure which fabrics are doing these illegal actions? And which ones aren't? The same with knowing which authorities are doing their job correctly. I believe that natives will know which authorities aren't doing their job as they should, so maybe creating a massive protest from part of the citizens, and the project group, against corruption could be an option. For factories, it should be required that they get an inspection, to see if they have septic tanks, or if they make use of ghost drains or any hidden drains. Environmental authorities have access to take different actions, to make sure laws are being enforced, conducting inspections if there is any suspicion, suspending permissions, creating criminal prosecution, and imposing administrative sanctions. These indicators can be employed in case factories continue to misbehave.

After that, I thought that making workshops for Indonesians to have some environmental education would be the best thing, but I don't want to have the traditional way of teaching, because, from my point of view, as a student I am, is that sometimes it is boring to be copying from a whiteboard, and I would prefer to learn while doing it. The method that Zamorano's University teaches is learning by doing, and I believe this is the best way to learn something. When you learn something the right way, there's no way you can forget it. I would like to use this same method to teach citizens about the environment. If we make people part of the project, they'll learn more than just giving them seminars. Including kids and teens in this learning process is very important, because it's easier to inculcate this culture of eco-friendship to the smaller ones. Creating community gardens, and introducing, or even learning together new agricultural methods that suit their situation better could be an option. The point of this is that they'll learn from us, and us from them. Transmitting confidence to the community that lives in the watershed of the river is important so we can work together in peace and order.

To complete the third step, we would need to relocate the people's houses temporarily, a little bit far from the river. Just for the time that we will be working with the wastewater treatment plant. The following step would be to install the plant, a wastewater treatment process using a mix of different methods, which are a physical process, a biological process, and a physiochemical process. All of them will have a direct impact on water filtration. A new modern and innovative way of cleaning water is with carbon nanotubes. They can complete multiple tasks in water filtering, such as separating oil from water, desalination, and filtration. This is due to their tiny composition, in which only water molecules can pass through, leaving behind all other molecules that aren't water.

To address the problem of illegal dumping of waste into the river, it is possible to add sensors and pH meters to the river. The sensors could detect any abnormal force of water being thrown into the river. The pH meter can tell when the level of acidity is not normal, which means that the water could have the presence of bacteria or any other pollutants. Both the sensors and the meters could be linked to different reference centers. It will be located in the various locations that the river passes through. And like this, the levels of volume and pH can be monitored.

The last step was that once everything was finished, and houses were already relocated, houses could have a system of piped water installed and connected to the river. With this, people will have access to good water to take showers, irrigate their crops, and wash their food and clothes. In this way, we would be taking good advantage of the river. This plan would be complete approximately in three to four years, taking in account every part of the process.

I do believe these solutions will meet the needs of Java's population. The recuperation of the Citarum is a necessity, for the country, for the environment, and for the people. I see a good future for this river, but this can only be accomplished if we put effort and heart into it. If we get the help of authorities and organizations such as The World Food Prize, the United Nations, and the World Bank, to spread awareness, to gather all of those communities together, and to get the governments attention. Then the possibilities of recovering will elevate. If the river manages to recover, it could generate around 280 million dollars per year, and this income will progress each year. At the same time, the loan asked to the World Bank would be paid from the money generated. Not only that, but many jobs would be created, and the rate of food insecurity in this huge region will totally decrease. As time passes, all of these benefits will make the river sustainable. Let's look for a second chance for the Citarum and its people!

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