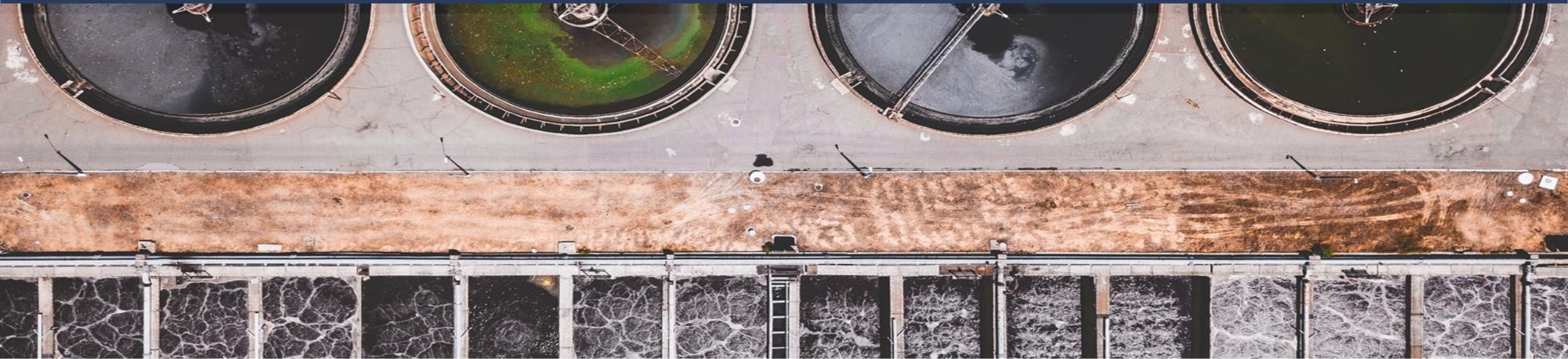
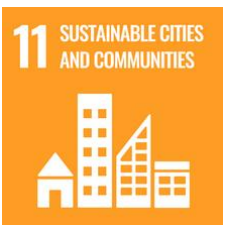




Sustainable Wastewater Sanitation

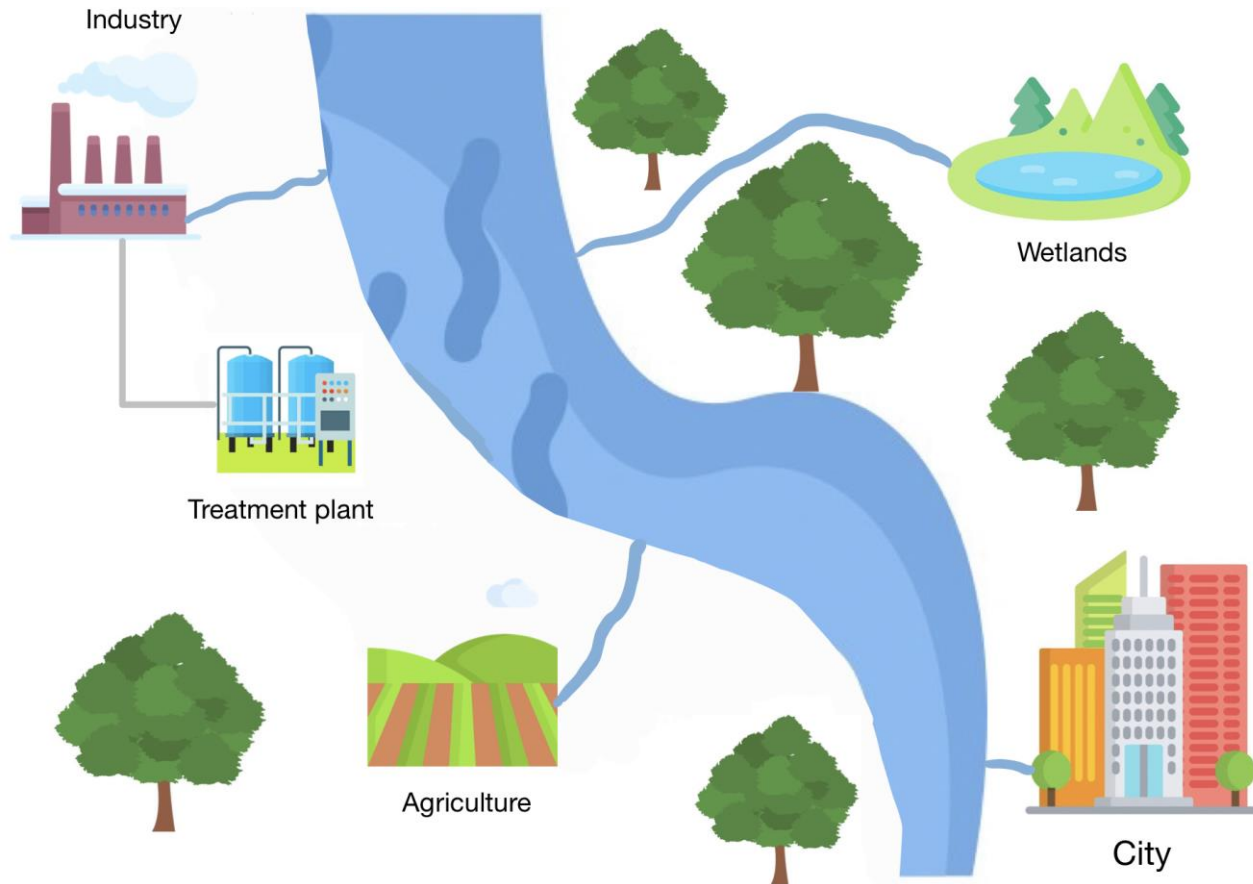


Team Ultimate Diamond – Thailand
Kamnoetvidya Science Academy
Phakin Chonglerkngam, Supakorn Vachirapaneekul



Waterway creates wastewater

Wastewater comes from industry, domestic, and agriculture



By 2050, water demand will
increase by **20-30%.**



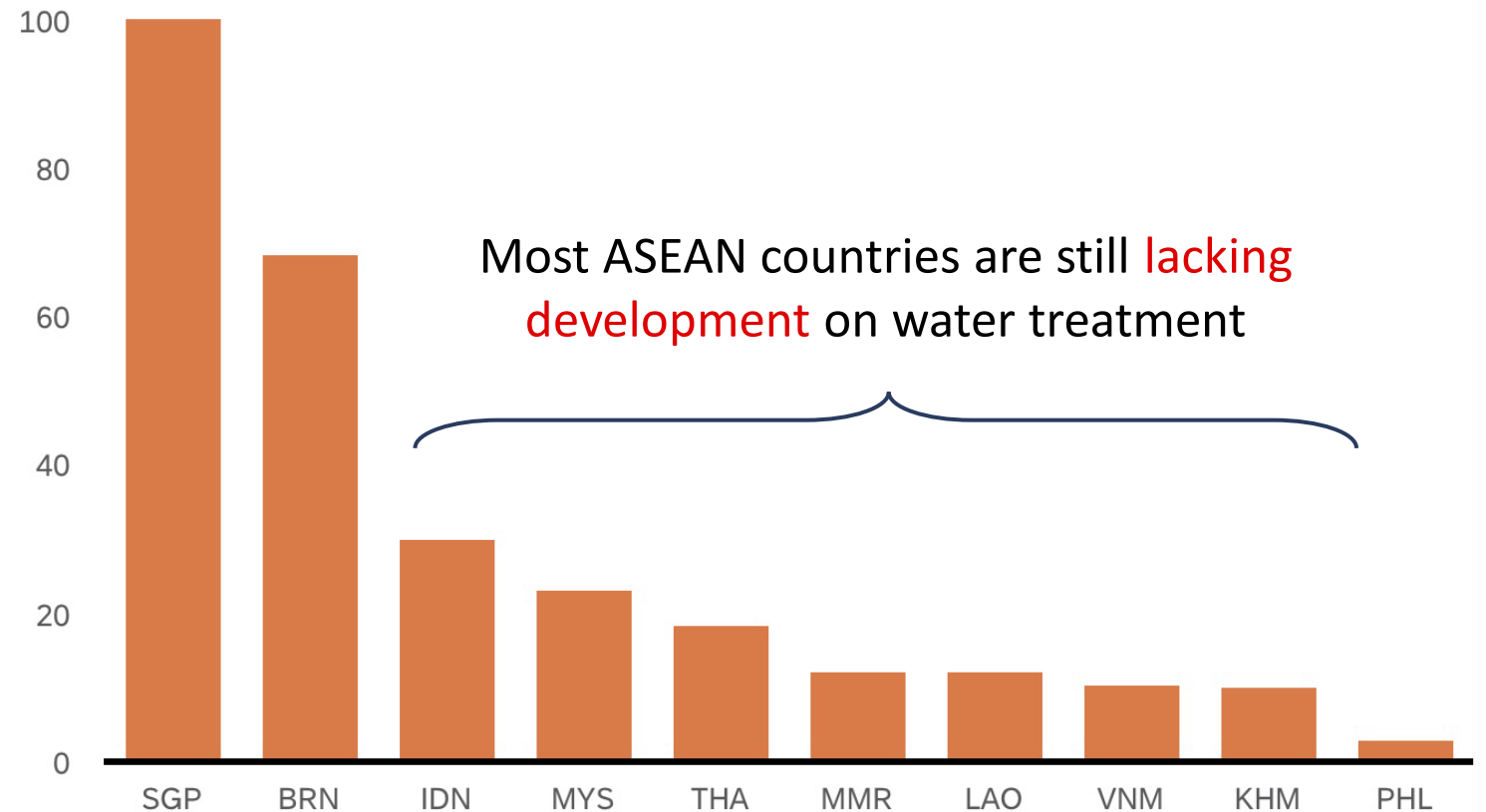
More wastewater generated

Unsustainable wastewater system in ASEAN

80%

of wastewater is released
without treatment in Asia
and pacific region

Percentage of **wastewater treated** in 2015



Unsustainable wastewater systems' consequences



People's Well-being

More than **3.4 million people** die each year from a waterborne disease



Ecosystems Health

The area around **30 million hectares** is affected by wastewater



Economical Impact

\$9 billion losses every year in Cambodia, Indonesia, Lao PDR, Philippines, and Viet Nam due to **poor sanitation**

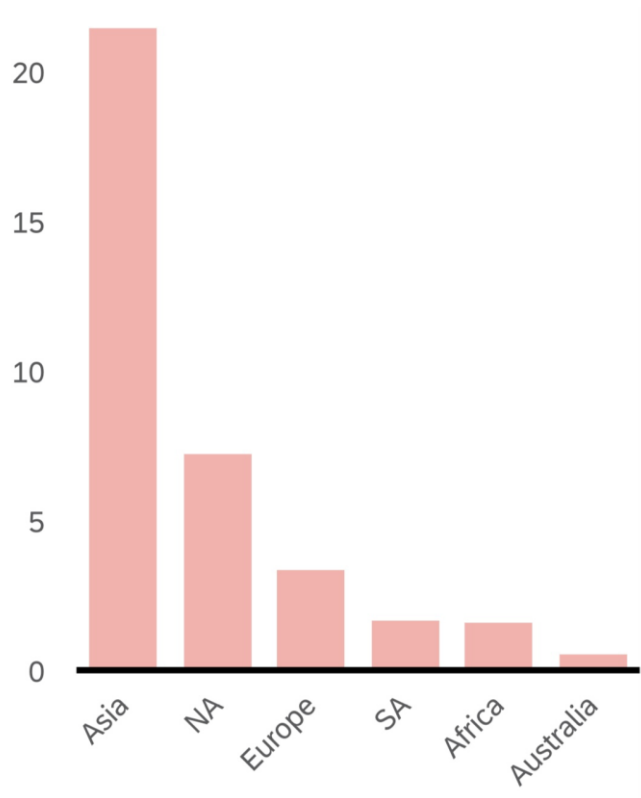


Water Usages

Approximately **1/4** of the water we use daily is **groundwater**

Groundwater withdrawal's effect on sinking cities

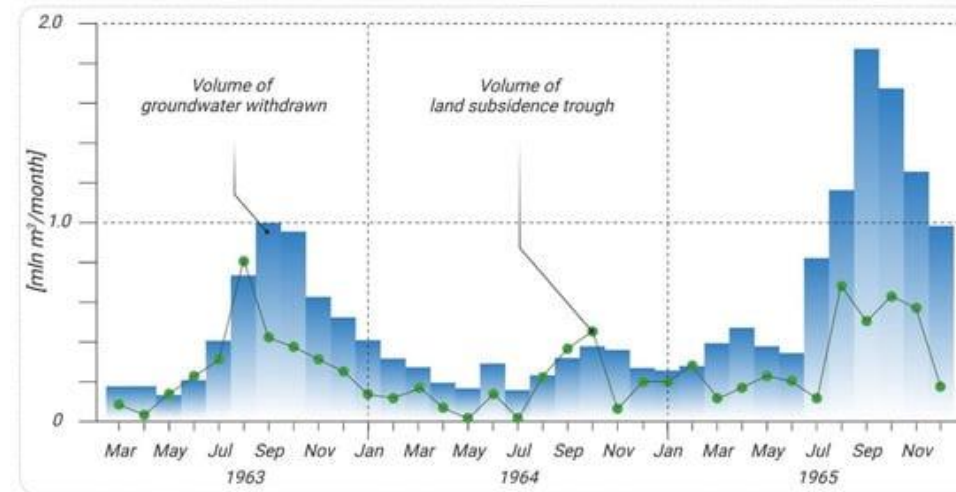
Groundwater withdrawals per unit area in continents



Source: UNWWDR 2022, worldometers

What does groundwater withdrawal affect

A recent research claims that withdrawing large amounts of groundwater considerably results in coastal cities sinking faster



Cities in ASEAN countries that are considered **fastest sinking cities** are:

- Jakarta, Indonesia
- Ho Ci Minh, Vietnam
- Bangkok, Thailand

How reusing wastewater can help lessen sinking cities



Jakarta is Sinking

- Jakarta is currently the fastest sinking city in the world
- It is predicted that over 95% of North Jakarta will be submerged underwater in year 2050

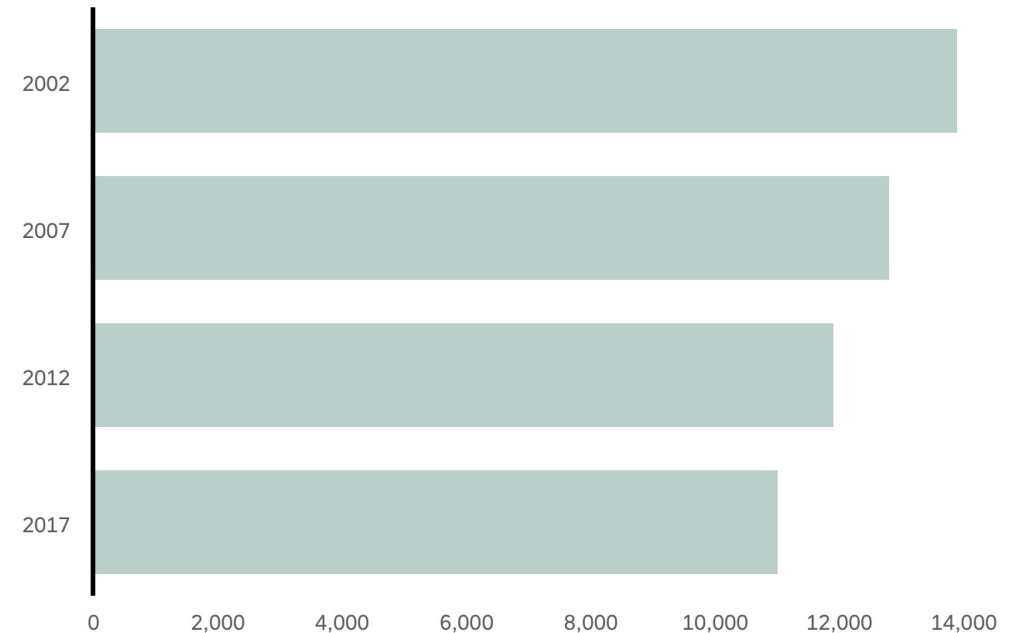


flooding



Land subsidize

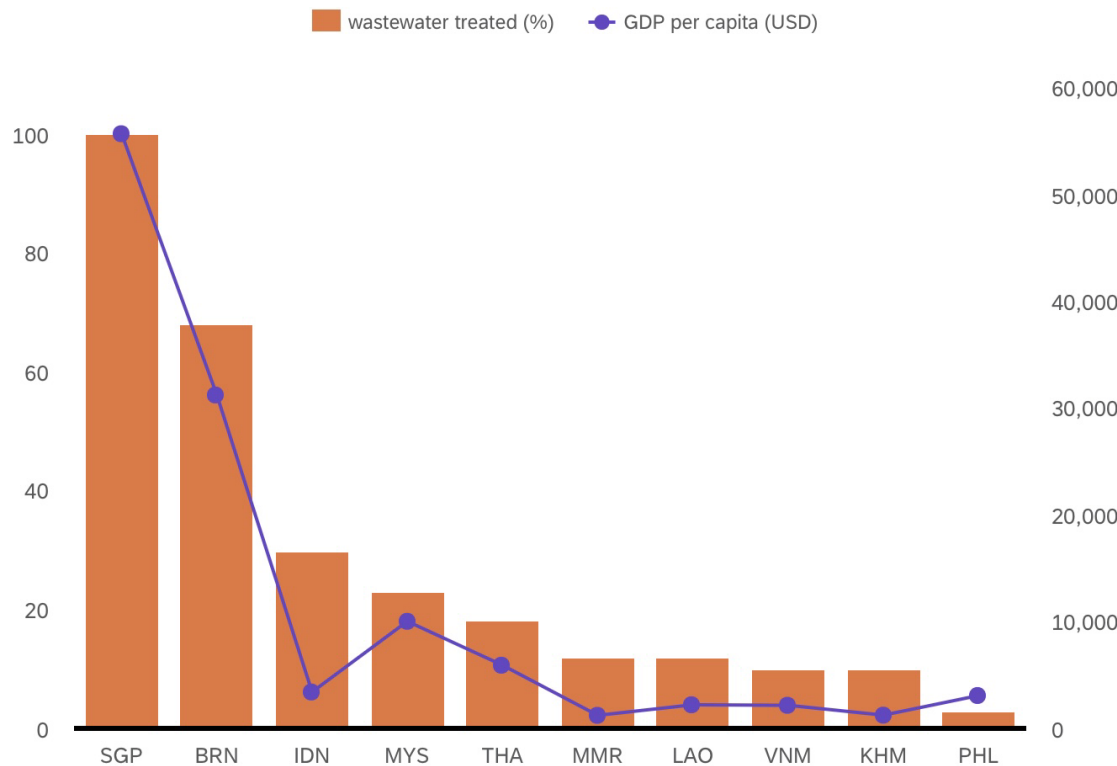
Renewable water per capita in ASEAN trends **decreases**



Reusable water will be an important source of **sustainable water cycle** in the future

Recommendations will be considered from ASEAN's financial condition and agricultural water's renewable system

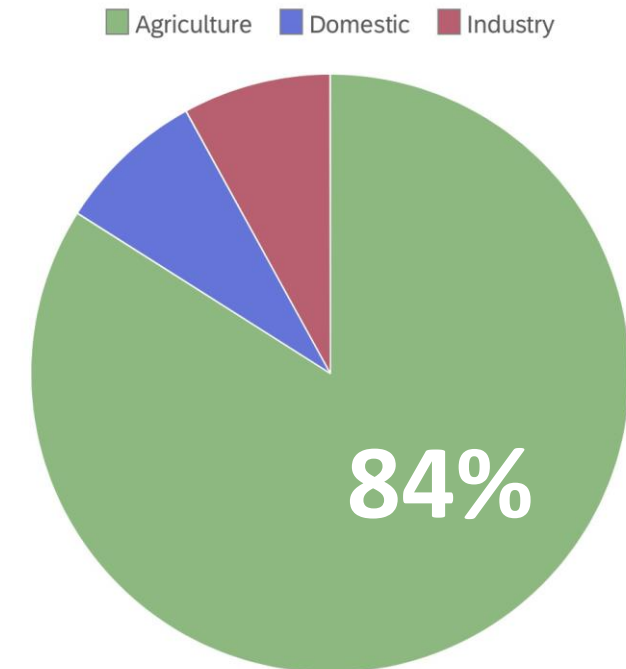
Correlation between **GDP per capita** and **wastewater treated**



It is terribly hard to develop water treatment because of the **lack of investment**

Source: ESSD, World Bank data, WEPA

In ASEAN, water is mostly used in **agriculture**



Agriculture can use the **lower water grade** which could be reused here

Recommendation 1: Agricultural wastewater management



Budget

To treat **agricultural wastewater**, more money is needed. Which includes **adding treatment plants** in locations with a lot of water usage.



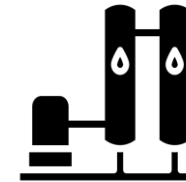
Design system

Professionals should plan **pipeline systems** carefully to create the best routes, keeping **wastewater** away from water bodies until it gets treated properly.



Education

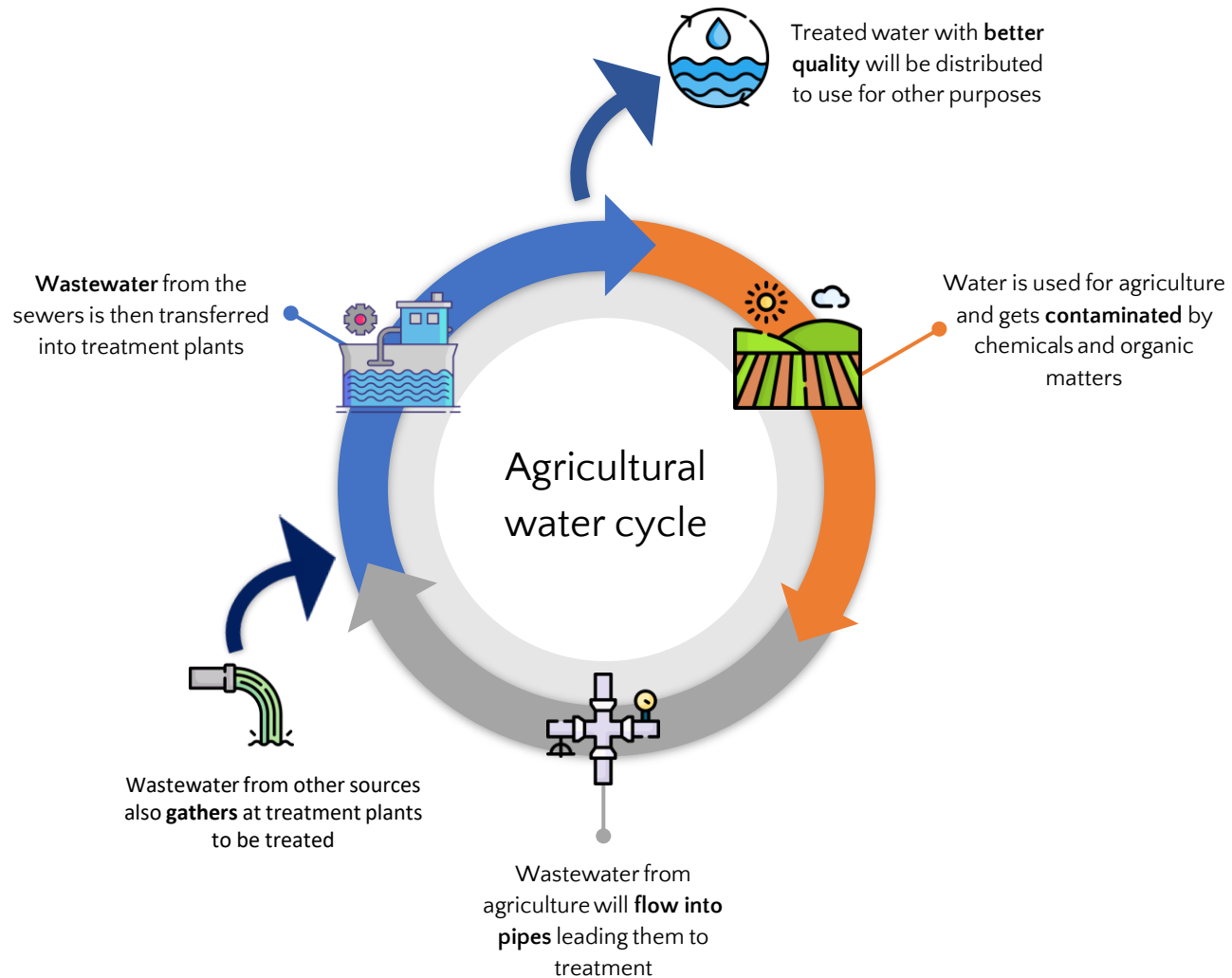
For the farmers to know how to manage the system themselves they need to know how the **wastewater treatment** system works.



Reuse wastewater

Agriculture in ASEAN uses water up to more than **80%** of **water source per year**. So, treating wastewater turning it into different grades of water will **lessen the usage of water** from other sources.

Recommendation 1: Route of Agricultural wastewater



Benefits of treating agricultural wastewater

- Water used for agriculture would be **less to non-contaminated** making safe products
- Water usage from natural sources will be **secured** by reusing wastewater
- An agricultural water cycle would be made creating **sustainable systems** which would prevent water scarcity in the future



Recommendation 2: Industrial wastewater management

Industrial wastewater route



Factories and mines release **wastewater**



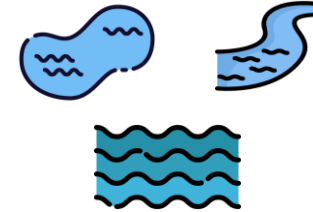
Sewage system



All industrial wastewater will be **gathered** in treatment plants



Sewage system



Treated wastewater is released into bodies of water which can also be **reused** in agriculture

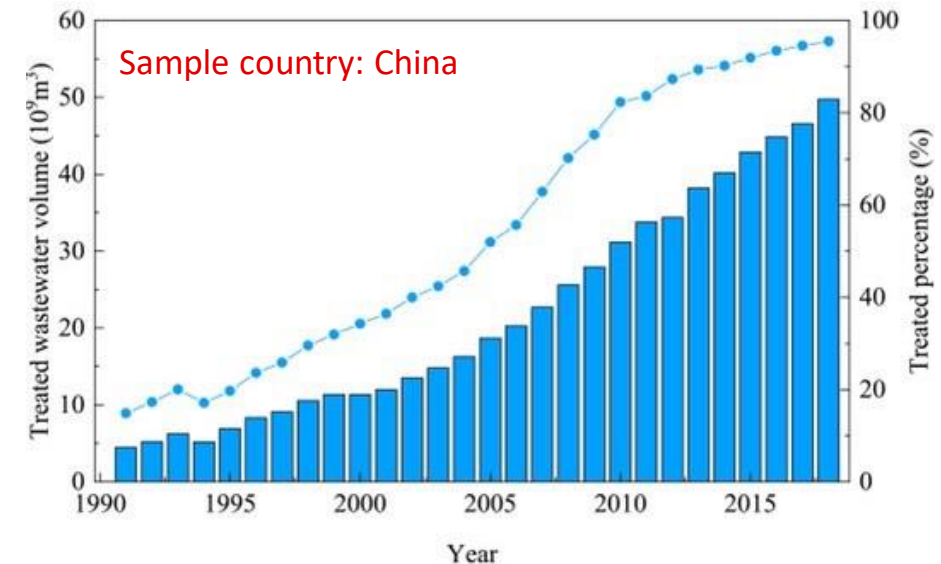


The most **dangerous** and **contaminated** type of wastewater.

Law for industries:

- The amount of wastewater and its **contaminant levels** should be at a **standard level**
- **Restricted chemicals** shouldn't be released with wastewater

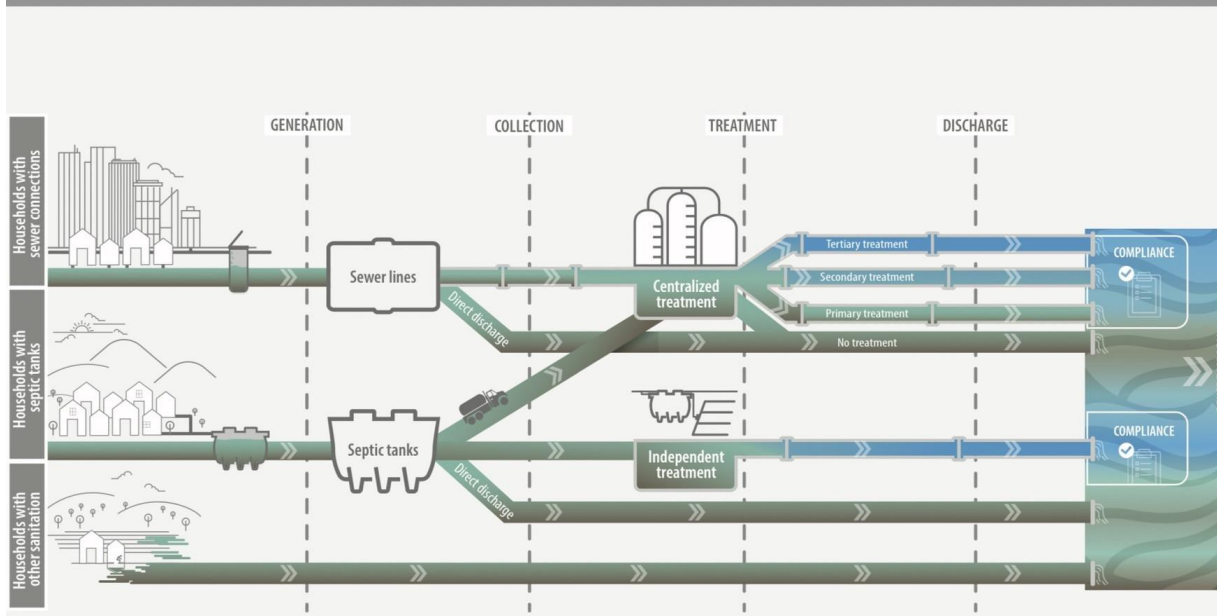
****This should be followed strictly**



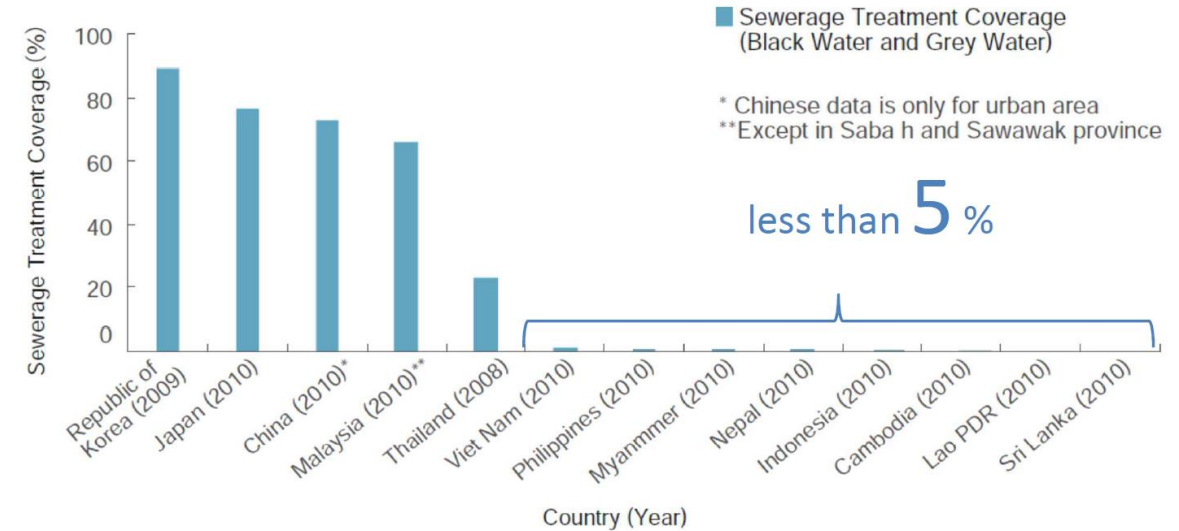
A **significant increase** in total wastewater treated indicates the trend in sustainable water management **getting better**

Recommendation 3: Routes for domestic wastewater

Figure 3. Household wastewater management chain



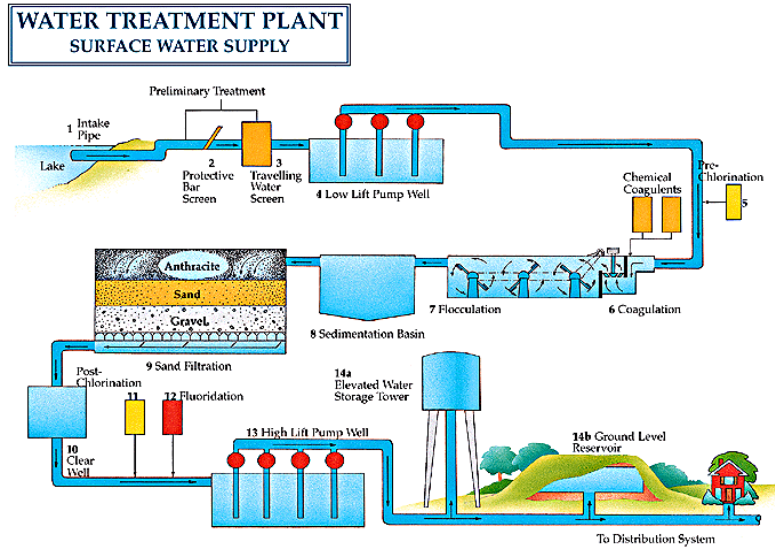
Two ways to dispose domestic wastewater are **sewers** and **septic tanks**. However, in Asia **80%** of household uses **septic tanks** since it's cheaper.



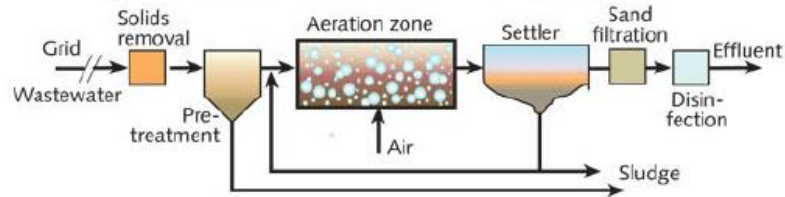
Either ways, **disposing domestic wastewater** works better than just releasing it into nature as many ASEAN countries are still practicing.

Recommendation 4: Treatment plant method

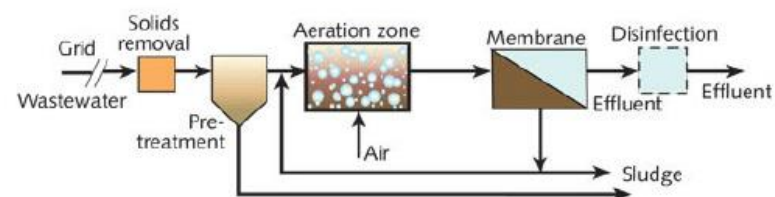
Non aeration treatment plant



(a) Activated Sludge Treatment (AST) Process

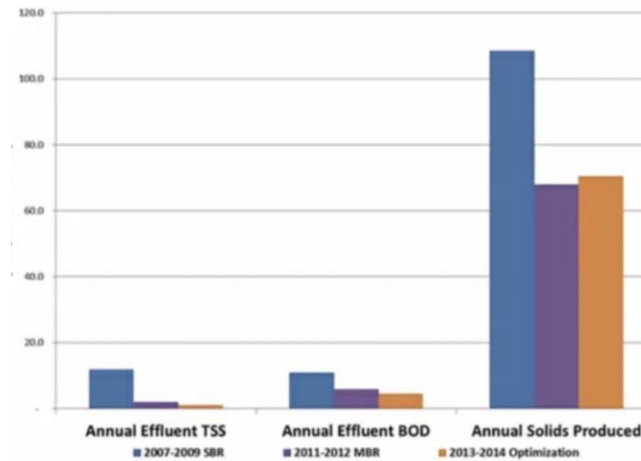


(b) Membrane Bioreactor (MBR) process



AST VS MBR methods

Treated water *qualities* for each method



Budget used for each method in years 2007-2014



Source: The MBR site

Suggested method

From the data in the graphs above and the past statistics we recommend ASEAN countries to use the **MBR treatment** because of it have **lower price**, **lesser procedures**, and **better efficiency** compared to the other methods of wastewater treatment.

Timeline

2024

Approval

Address the problems and solutions recommended to our country's government asking for approval and budget then suggesting it to ASEAN



2024
-2025

Plan

Draft laws regarding the issue of industrial wastewater. Draw out plans for pipeline systems and treatment plants.



2025-
2029

Construct

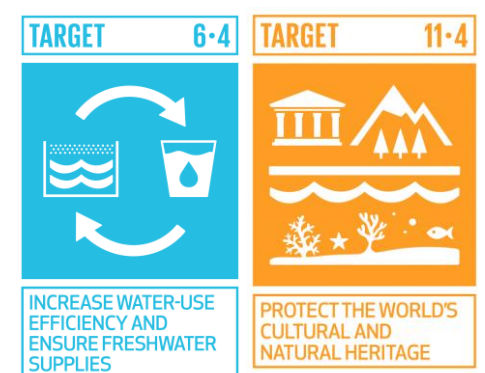
Follow the plans for constructing new water systems and treatment plants, then set the laws.



2030-
so on

Manage & Upgrade

Manage the new treatment systems with caution and upgrade the systems to a better version if more budget is allowed.



Goals that will be achieved...



C.1. Conservation and Sustainable Management of Biodiversity and Natural Resources

v. Enhance policy and capacity development and best practices to conserve, develop and sustainably manage marine, wetlands, peatlands, biodiversity, and land and water resources.

C.2. Environmentally Sustainable Cities

iii. Promote coordination among relevant sectors to provide access to clean land, green public space, clean air, clean and safe water, and sanitation.



C.4. Energy

v. Renewable Energy (RE): Increase the component of RE to a mutually agreed percentage number in the ASEAN Energy Mix (Total Primary Energy Supply) by 2020.

vi. Regional Policy and Planning: Better profile the ASEAN energy sector internationally through an annual publication on ASEAN Energy Cooperation.

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