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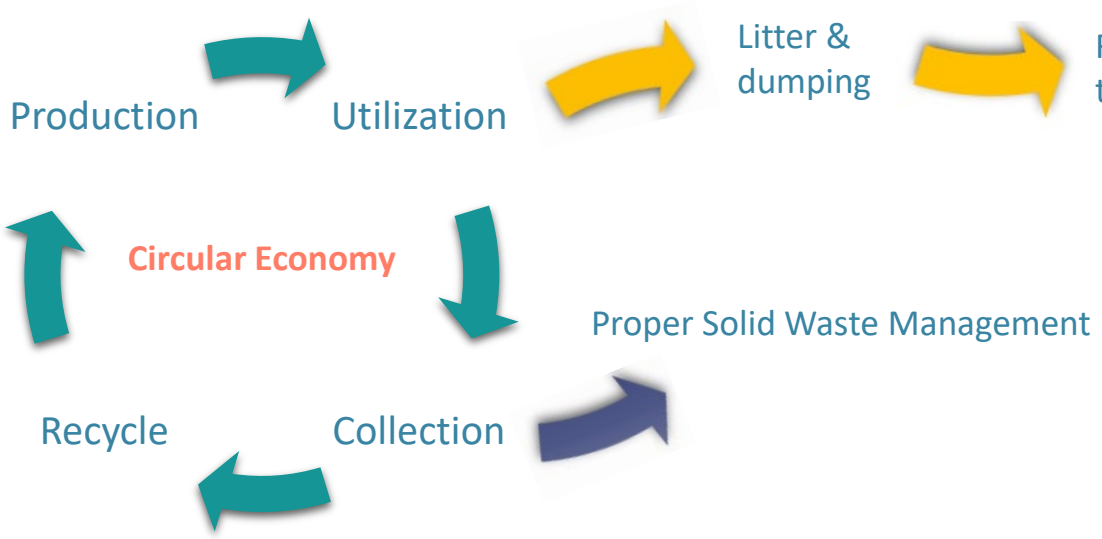
Riverine Litter Monitoring Technology for Green City and Blue Ocean

January 2025



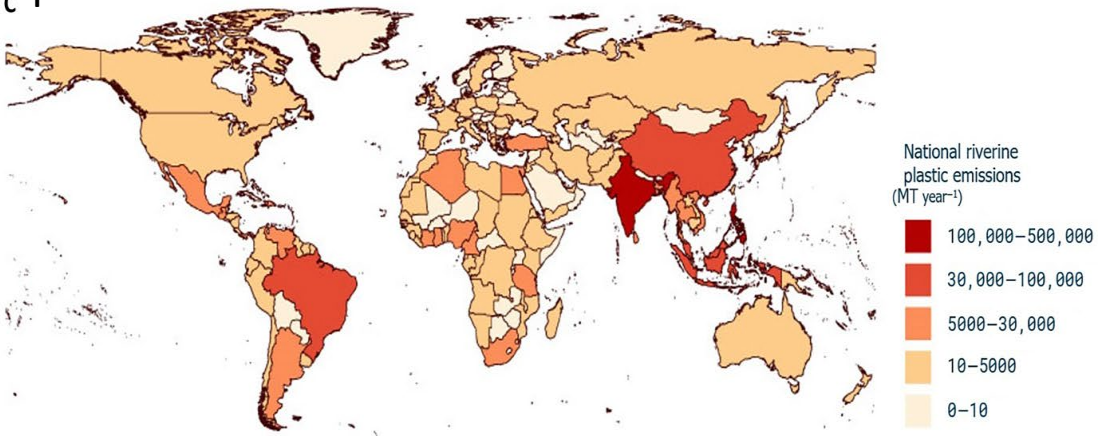
Coastal and Riverine Conditions in the Philippines

Marine Plastic Litter in the Philippines

- **The Philippines ranks third** in terms of the amount of plastic litter generated from land-based sources into the ocean (2010 estimate), estimated by country based on population density, economic status, and other factors.

(Source) Jambeck et al: Plastic waste inputs from land into the ocean, Science (2015)

- A study by Meijer et al. (2021) estimated that the **Philippines was the world's largest emitter of marine plastic litter in 2019, at about 360,000 tons per year.** They also estimated that the world's 1,000 most polluted rivers account for 80% of the world's marine plastic emissions.



Estimated Marine Plastic Litter Emissions by Country

Exhibit: Meijer et al. (2021)

Global Marine Plastic Waste Emissions Estimates (2010)

country name	Plastic waste generated (10,000 tons/year)
1st China	132-353
2nd Indonesia	48-129
3rd Philippines	**28-75**
4th Vietnam	28-73
5th Sri Lanka	24-64
6th Thailand	15-41
7th Egypt	15-39
8th Malaysia	14-37
9th Nigeria	13-34
10th Bangladesh	12-31

Exhibit: Jambeck et al: Plastic waste inputs from land into the ocean, Science (2015)

National Policy/Program on Riverine and Marine Litter in the Philippines

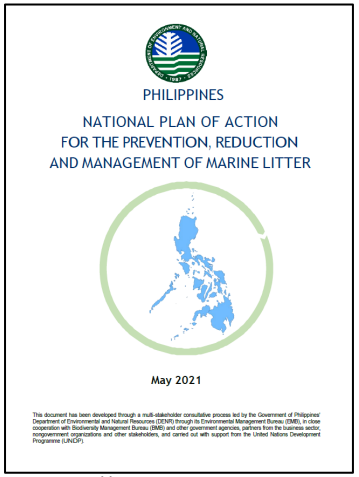
National Action Plan for the Prevention, Reduction and Management of Marine Litter (2021)

Objective - To enhance the country's current efforts in resource and waste management to reduce the problem of marine debris and additional waste discharges to water bodies

Overarching Goal - "**Zero riverine and marine litter in the Philippines by 2040**"

Action Plan:.

- **Strategy 1: Establish science-based baseline information on marine debris**
- Strategy 2: Mainstreaming circular economy and sustainable consumption and production initiatives
- Strategy 3: Expand the scope and market for collection and recycling
- Strategy 4: Prevent leakage from recovered and disposed waste
- Strategy 5: Reduce sources of marine debris
- Strategy 6: Manage trash already present in the river and marine environment.
- Strategy 7: Strengthen policy support and enforcement for marine debris management



http://seaknowledgebank.net/sites/default/files/Jan%2022%20Final%20Philippines%20NPOA-ML%20(1).pdf

Coastal and Marine Ecosystem Management Program (CMEMP)

This is a national program by the Ministry of Environment and Natural Resources (DENR), launched from 2017 to 2028.

Objective - To achieve effective management of coastal and marine ecosystems and enhance the capacity to provide ecosystem goods and services that improve the quality of life of coastal populations.

SDGs - The Program will directly contribute to SDG 14.2, which aims for the sustainable management and protection of marine and coastal ecosystems, with the goal of conserving at least 10% of coastal and marine areas based on the best available scientific information, in accordance with national and international law.

Healthy Oceans and Clean Cities Initiative

It is a UN-Habitat project funded by the Japanese government and implemented in partnership with international organizations, the Philippine central government, and local governments.

Objective - To assist in the implementation of the National Action Plan for the Prevention, Reduction and Control of Marine Litter described above and to enable local governments and communities in the Philippines to reduce marine plastic pollution. The project aims to solve the fundamental problem of plastic litter discharge into the marine environment in the six target cities (Manila, Davao, Calapan, Legazpi, Ormoc, and Cagayan de Oro).

UN-HABITAT FOR A BETTER URBAN FUTURE

RIAD : *River Image Analysis for Debris transport*

Imaging & Analyzing natural and anthropogenic debris transport from river

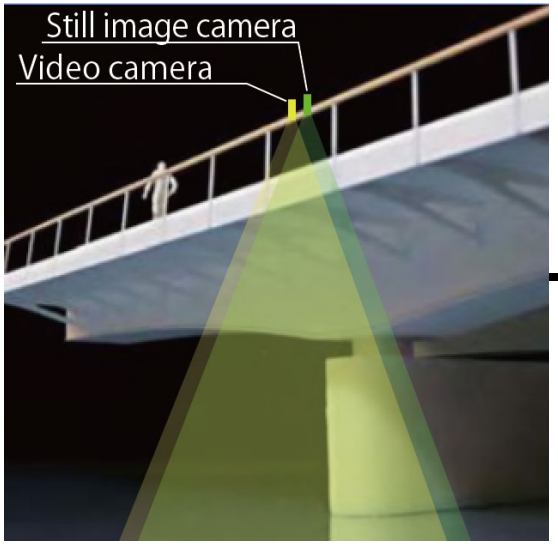
Riverine Debris Characters

- Much transported during overflow
- Float on water surface
- Includes natural (driftwood, leaf, etc.) and anthropogenic (plastics, lubbers, etc.) debris

Required Technology

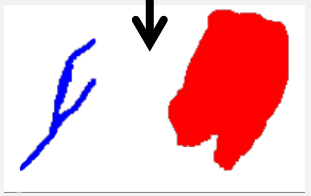
- Simple, Secured, Automated
- Effective imaging
- Distinguish natural and anthropogenic debris on water surface

※Refer to materials made by Prof. Nihei, Civil Engineering Dep., Engineering Science Fac., TUS



Acquisition of image

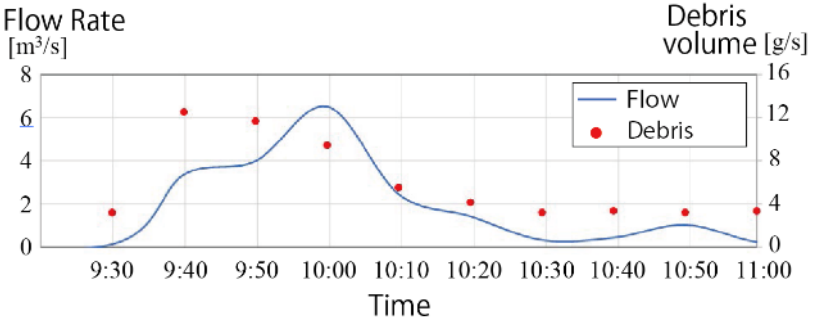
Original image



Auto-selection of anthropogenic debris

Processing of image

Automatic estimation of debris volume



Analyzing of numerical data

Proposal of RIAD for River Clean Activities in Your District

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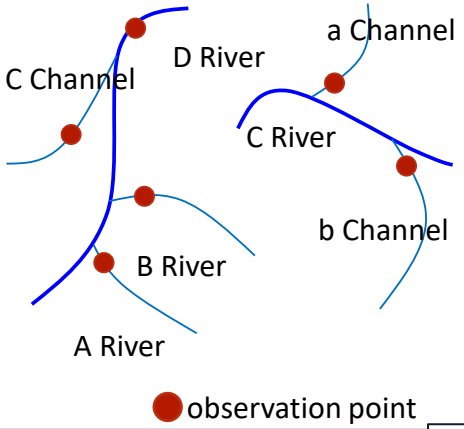
【RIAD】

Results at observation “point”

⇒**Information at a point**

Establishment of monitoring network



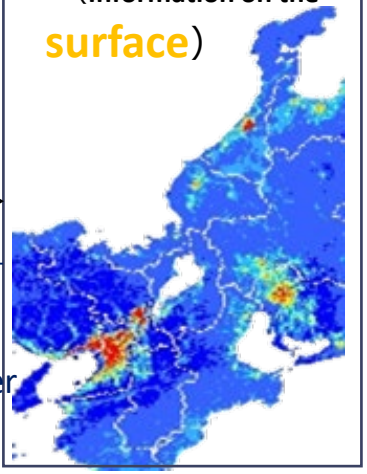
【Physical Properties】

- Land Use
- Population density
- Cross-section of a river
- Riparian vegetation

・・・etc.

Visualization of results

（Information on the surface）



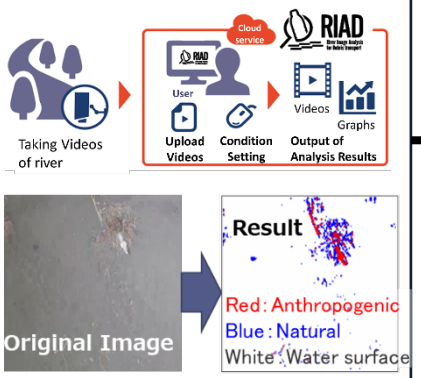
Countermeasures (Example)

- ✓Public awareness on riverine litter
- ✓Supporting volunteer group
- ✓River improvement
- ✓Collected in river （Oil fence, etc.）
- ✓Countermeasures in lands （Litter box, board, etc.）

・・・etc.

【RIAD】

Confirmation of effectiveness (scientific basis)



Goal

Reduce the amount of plastic discharged into the ocean to zero as much as possible.

About Yachiyo Engineering Co., Ltd. (YEC)

Business Domain	: **Infrastructure Engineering Consultants**
Establishment	: 29 January, 1963
Annual Sales	: USD 191 million (FY 2023-2024)
No. of Staffs	: 1,314 (as of Jul. 2024)
Headquarters	: 5-20-8, Asakusabashi, Taito-ku, Tokyo, Japan intl@yachiyo-eng.co.jp
Philippine Office	: 15th Floor of PRYCE TOWER Building, Pryce Business Park, J. P. Laurel Avenue, Bajada, Davao City, 8000, Philippines
URL	: http://www.yachiyo-eng.co.jp/e/

Private Sector

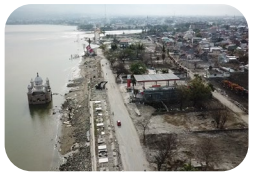
Urban Development

Transportation

Solid Waste Management

Sewerage & Sanitation

Water Resources Management



Disaster Risk Management

Electricity

ICT

Architecture

On-going projects in the Philippines

- Waste-to-Energy Plant Construction Project in Davao
- Septage Management Project of Metro Cebu Water District
- Project for Improvement of Water Supply in Cotabato City
- Pilot Project of GIS Drainage Database with Realtime Flood Monitoring System in Davao