Guideline Book

CITIZEN SCIENCE:
INTRODUCING MISTICSCAN AS SIMPLE TOOL FOR IDENTIFYING MICROPLASTIC IN THE RIVER

2022

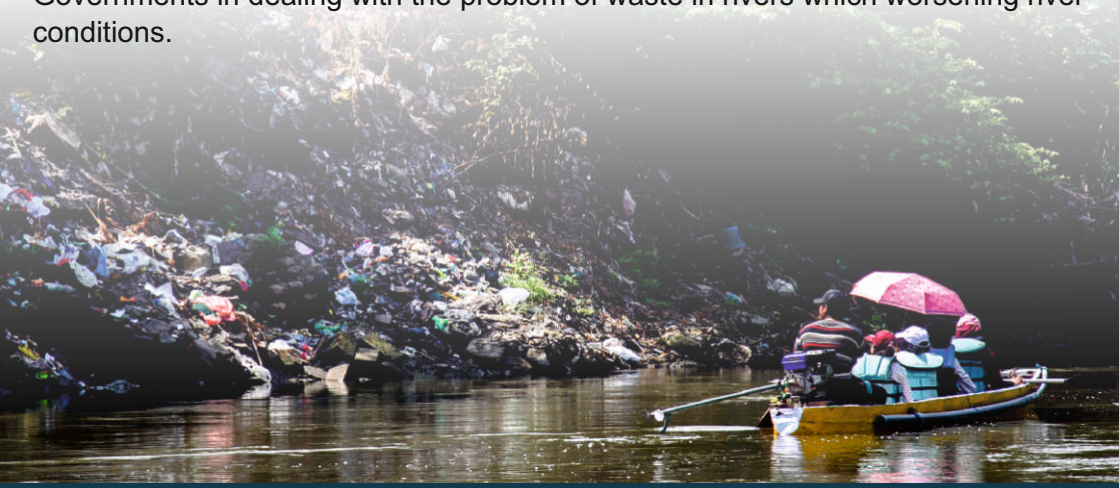
A guideline book as river maintenance step that can be used by the community to increase basic knowledge for responding about environment changes in their surrounding.

ecotonID ecoton.id ECOTON FOUNDATION

Indonesia's River Contaminated by Microplastic

In Expedition 3 Rivers 2021, ECOTON found that rivers in Indonesia have been contaminated with Microplastic Particles (MP). The main rivers in Java, such as the Brantas River, Bengawan Solo, Ciliwung, Citarum, and Ciujung have been contaminated with 62-198 MP/100L. Moreover, fish in these rivers are one of the living things that are very often exposed to microplastics, in the Brantas River it has been identified that there are 42 MP/fish, Bengawan Solo River 20 MP/fish and Citarum River 68 MP/fish. In fact, ECOTON's findings reporting that Tilapia's gut in Bengawan Solo River is quite high of microplastic and it is be worrying if consumed. The Nusantara River Volunteer Community formed by ECOTON also found microplastic contamination in rivers outside Java, such as in Lampung it was found 97 MP/100L, Ternate 82 MP/100L, East Nusa Tenggara (NTT) 122 MP/100L and Pontianak 124 MP/ 100L.

Microplastic contamination in fish gut and in river water comes from weakness waste management and high volume of plastic waste dumped in the rivers. Trihadiningrum (2020) proves that 80% of plastic waste in the oceans comes from rivers. Based on ECOTON's research and all findings (can be seen at *https://ecotonjournal.id/*) national strategic rivers in Indonesia are in a state of concern. The habits and culture of Indonesian people who regard rivers as trash bins are accompanied by inconsistencies from Central Government and Regional Governments in dealing with the problem of waste in rivers which worsening river conditions.



A Dangerous Little Thing Called "Microplastics"

Microplastics are crumbs, fragmentation, degradation of plastic that are less than 5 millimeters in size. Beside that, microplastics can be produced from industrial waste, household cleaning and personal care products, disposable mask waste, domestic waste to disposable diapers that are thrown into rivers.

Microplastic Sources

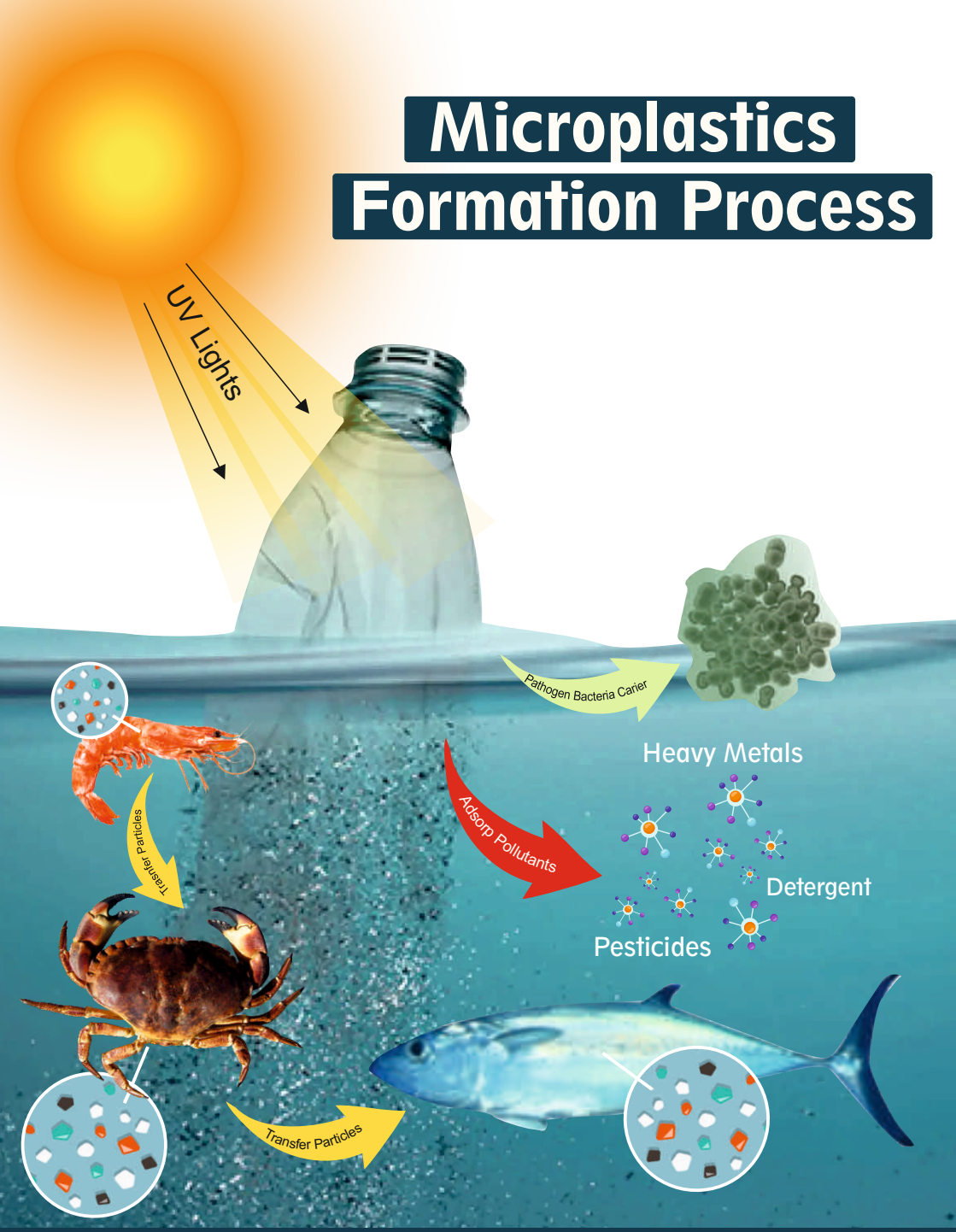
Industrial Waste

Personal Care Products

Domestic Waste

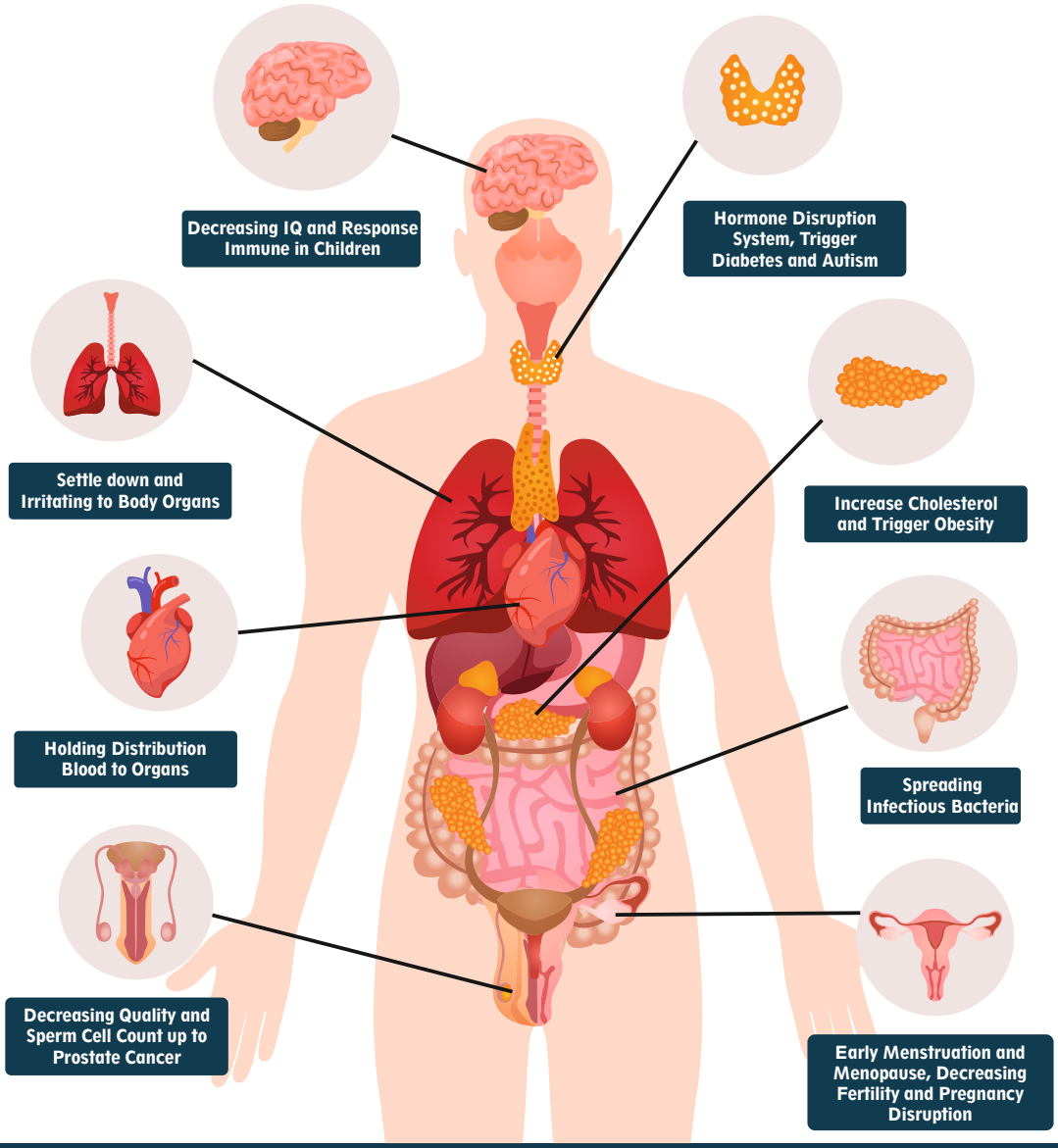
Disposable Diaper

Microplastics Formation Process



Microplastic Impacts On Human Health

Source : Health and Environment Alliance, 2020



MisticScan
Microplastic's Simple Tool

MisticScan comes from the acronym of "Microplastic Screening Can" which in Indonesian means Canned Microplastic Filter. MisticScan was created by ECOTON as a filter microplastics in the river water. This tool has been implemented in Brantas watershed to make it easier for community to conduct community-based research or Citizen Science because of efficient and simple to use. Along the popularity, it is currently also being used to pick up microplastics in rivers throughout Indonesia.

Procedure for taking water samples using Mistic Scan:

1. Determine the location of the river that is target of sampling, avoid steep river parts, fast-flowing and rocky parts because it can endanger the safetyness.
2. Water sampling starts from a predetermined point and does not move from a predetermined point.
3. Assemble the MisticScan by tying the screen to the mouth of the can using a rubber tire and tightening it.
4. Use Stainless Steel media (Dipper, Bucket, Mug) 2L capacity to take 10L of water samples.
5. After taking 10L of water, hold the screen using the hand palm, then slowly open the rubber tire. Once the screen is removed, transfer it to a clean container.
6. Rinse the screen that is accommodated into the petri disc and then observe using microscope.
7. Identify the type of microplastic and count their abundance.

How To Take Microplastics Using MisticScan

Used Cans

Tire Rubber Straps

Filter Screen Size 300 mesh

1 Prepare the MisticScan Tool in Earlier Steps

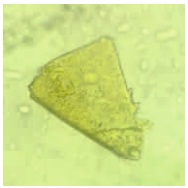
2 Install Filter Screen in MisticScan Using Tire Rubber Straps

3 Pour 10L of River Water Or Equivalent with 5x Repetition

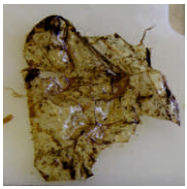
4 Rinse and Placed the Sample Into the Petri Disc Then Identify It

The Types of Microplastic

Fiber



Fragment



Filament

Foam

Granule

Table 1. Example of Identifying Microplastic Calculation

No.	Sample's Name	The Types of Microplastic					Total
		Filament	Fiber	Fragment	Granule	Foam	
1	Titik 1	2	4	1	1	3	11
2	Titik 2	3	1	8	7	1	20
Total		5	5	9	8	4	31

How to Reduce Microplastics in the Environment

No Burn Plastic waste

Avoid burning plastic waste which not to trigger the formation of microplastics and plastic toxins in the air

Sorting Domestic Waste Start from Home

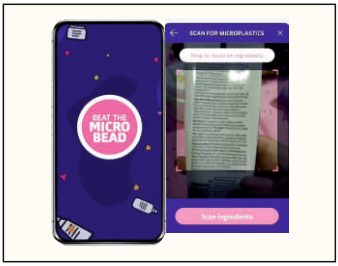
Implement Waste Segregation from Home
So that Useful Waste is Not Wasted into the River
(Organic Waste, Recycled, & Residue)

Reusable Container For Reducing Plastic

Use Non-Plastic Reusable Containers
to Reduce the Existence of
Single-use Plastic Waste

Choose Products Microplastic-Free

Use ***Beat The Microbead*** application
to find out microplastics ingredient
in the products that we choose



Indonesia is one of country that has many rivers such as National Strategic River whose function has many benefits for the community. Besides that, it is not comparable to the maintenance of the river. A lot of pollution has been reported along with the increase in population settlements, household activities, industry activities, agricultural activities and plastic waste pollution which has affected the water quality because the waste produced is discharged directly into the river, thus triggering the formation of microplastics.

Weak law enforcement by the government, not maximal preventive measures and not involving the community in maintaining rivers make this pollution continues to occur every year.

Through this guidebook, we want to invite the community to be directly involved in river maintenance using simple materials. In addition, the use of this book can also be used as a guide in advocacy if at any time there is a change in the surrounding environment.

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