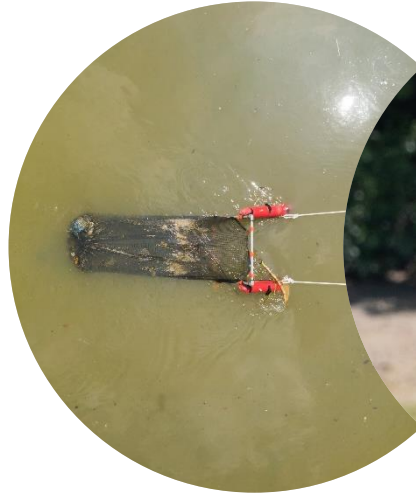
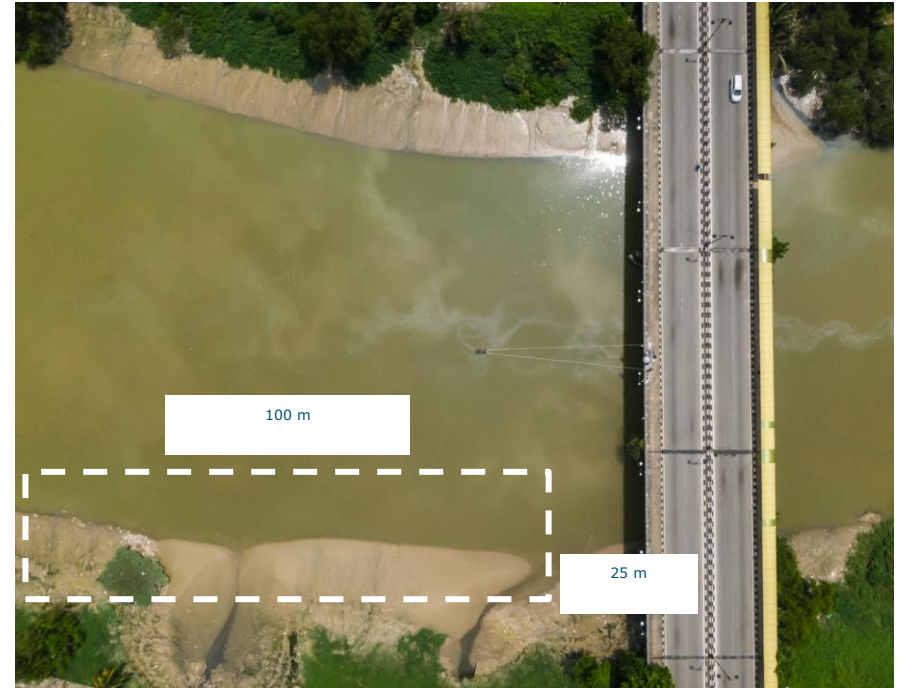


Riverbank sampling



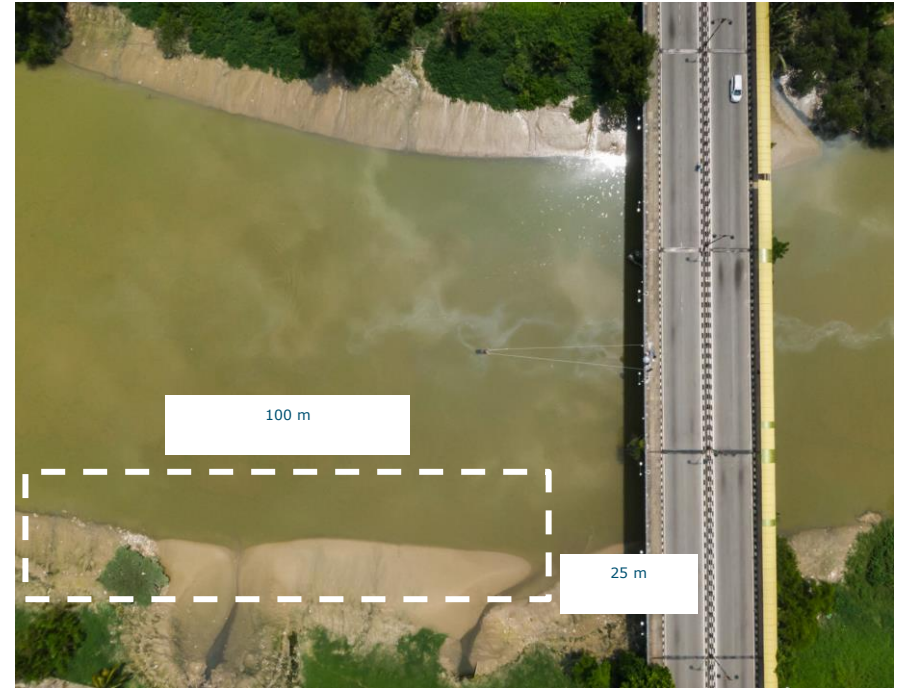
Riverbank sampling

- Good method for detailed assessment
- Flexible approach, can be tailored to specific questions
- Find trade-off between level of detail and required effort



Riverbank sampling: The concept

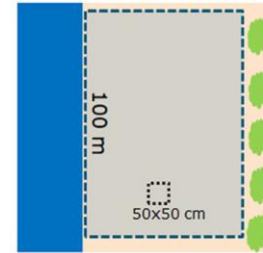
- Select sampling area
- Choose level of detail
- Collect the waste, or tally the items without collection
- Choose measurement frequency
- Determine number of locations



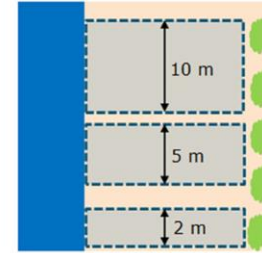
Riverbank sampling: The concept

Select sampling area

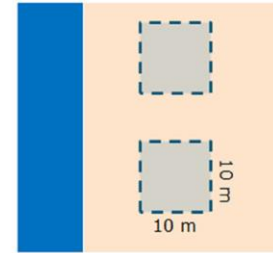
- Rectangular areas or circles
- Depends on the level of pollution
- Micro or macro?



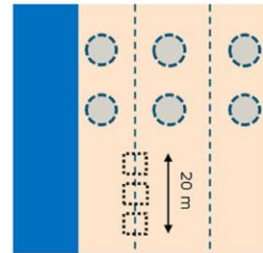
Schone Rivieren



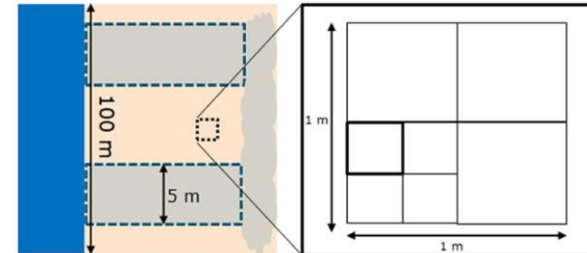
Crowdwaterr



Battulga



Plastic Pirates

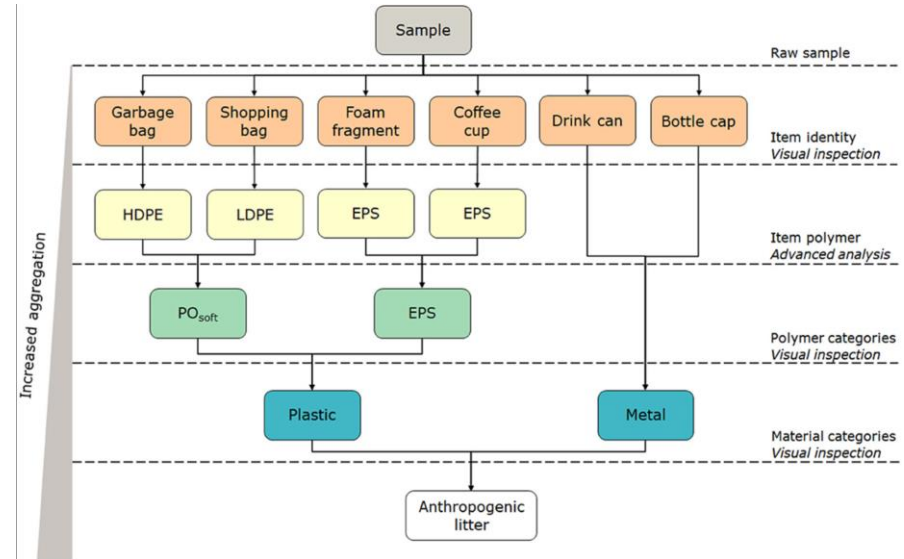


NOAA

Riverbank sampling: The concept

Choose level of detail

- More detail, more information
- More detail, more effort
- What is the question, and what information is needed?



Riverbank sampling: The concept

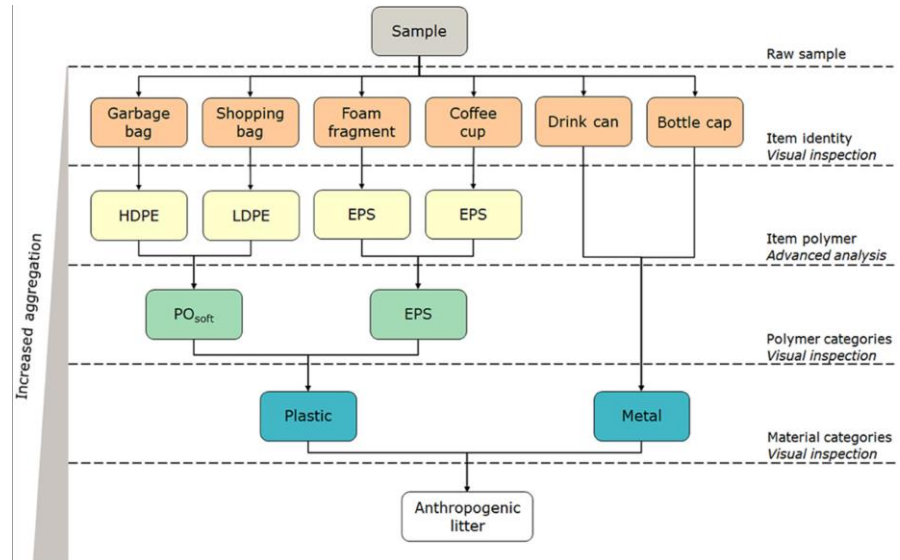
Choose level of detail

- More detail, more information
- More detail, more effort
- What is the question, and what information is needed?

Example:



Litter → Plastic → PO hard →
PE or PP → “Food” → 22. Cutlery



Riverbank sampling: The concept

Name river		Riverbank side	Left / Right
Province		Sampling executed?	Yes / No
Area ID		→ If not, why?	
Date riverbank sampling		Length sampled area (m)	
Name Researcher #1		Width sampled area (m)	
Name Researcher #2			
Name Researcher #3			

OSPAR ID	Plastic and foam	Count
----------	------------------	-------

15	Caps and lids	
4.2	Bottles (<0.5 litre)	
4.1	Bottles (>0.5 litre)	
40	Industrial packages	
3	Small bags	
117.1	Hard fragments (<2.5 cm)	
46.1	Hard fragments (2.5 – 50 cm)	
47.2	Hard fragments (>50 cm)	
117.2	Foams (<2.5 cm)	
46.2	Foams (2.5 – 50 cm)	
47.2	Foams (>50 cm)	
6.1	Foam food packages (e.g. hamburgers)	
212	Foam cups	
21	Drinking cups	
117.2	Soft fragments (i.e. foils) (<2.5 cm)	
46.2	Soft fragments (i.e. foils) (2.5 – 50 cm)	
47.1	Soft fragments (i.e. foils) (>50 cm)	
22.1	Plates & straws	
22.2	Mixing sticks (e.g. to stir your coffee)	
19	Food wrappers (multilayer) (e.g. chips)	
6	Food packages (e.g. snackbar fries box)	
4.3	Labels that were wrapped around bottles	
5	Packages from cleaning products	
1	Six-pack rings	
16	Lighters	
14	Parts from cars	
22	Cutlery	
48.1	Biofilm water filters	
36	Glow in the dark sticks	
38	Buckets	
38.1	Plant pots or trays	
43	Gun rounds	
25	Cleaning gloves (bit softer plastic)	
113	Professional gloves (bit harder plastic)	
42	Helmets	
10	Jerrycans	
11	Tubes of caulking (Dutch: kitspuiten)	
13	Crates	
39	Bands & tie wraps	
39.1	Tape (Dutch: plakband) & duct tape	
19.1	Lolly sticks	
8	Motor oil packages (<50 cm)	
9	Motor oil package (>50 cm)	
24	Net bags (e.g. nets for onions or fruit)	
2.1	Garbage bags	
17	Writing instruments (e.g. pens)	
20	Toys	
35	Fishing gear	
2	Big plastic bags	
31	Pieces of rope (diameter >1 cm)	
32	Pieces of rope (diameter <1 cm)	
35.1	Pieces of fishing line (nylon)	
43.1	Fire-works	
48	Other unidentifiable plastic items	
OSPAR ID	Rubber	Count
49	Balloons & ribbons	
52	Tires (e.g. from bikes or cars)	
53	Other unidentifiable rubber items	
OSPAR ID	Textile	Count
54	Clothes	
57/44	Shoes, boots & flipflops	
55	Pieces of carpet	
59	Other unidentifiable textile items	

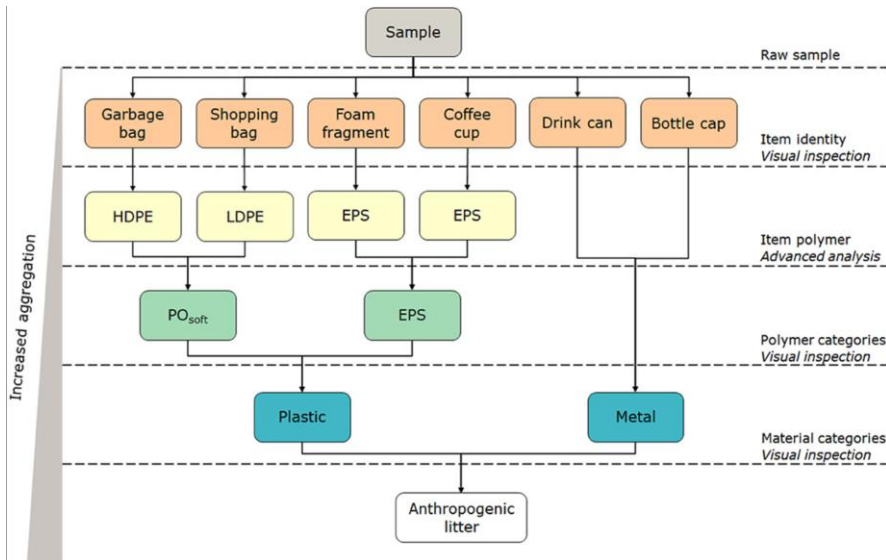
OSPAR ID	Paper	Count
----------	-------	-------

62.1	Carton drinking packages (e.g. milk)	
67.1	Other unidentifiable paper items	
64	Cigarette filters 'cigarette butts'	
63	Cigarette packages	
61	Carton	
65	Carton drinking cups	
66	Newspapers	
60	Bags	
67	Other unidentifiable paper items	
OSPAR ID	Wood	Count
72	Ice cream sticks	
68	Corks	
73	Paint brushes	
69	Pallets	
74	Other unidentifiable wood items (<50 cm)	
75	Other unidentifiable wood items (>50 cm)	
OSPAR ID	Metal	Count
81	Aluminium foils	
81.1	Capsules (e.g. coffee or coffee-milk)	
78	Soda cans	
79	Electrical wires	
83	Old metal (iron) (e.g. pipes)	
77	Caps (Dutch: kroonkurken) & beer caps	
84	Oil drums (Dutch: olie vaten)	
88	Barbed wires (Dutch: prikkeldraad)	
76	Spray cans	
86	Paint cans	
80	Fish lead	
82	Food cans	
120	Single use BBQ's/grills	
89	Other unidentifiable metal items (<50 cm)	
90	Other unidentifiable metal items (>50 cm)	
OSPAR ID	Glass	Count
91	Bottles (e.g. wine) & pots	
92	Light bulbs & fluorescent tube TL lamps	
93	Other unidentifiable glass items	
OSPAR ID	Sanitary	Count
7	Cosmetic packages (e.g. shampoo, deo)	
98	Plastic cotton swabs	
98.2	Wooden cotton swabs	
102.2	Wet tissues	
97	Condoms	
99	Sanitary towels & packages thereof	
18	Plastic hairbrush or hair comb	
100	Tampons & tampon applicators	
102.3	Pieces of toilet paper	
101	Toilet refreshers	
102	Other unidentifiable sanitary items	
OSPAR ID	Medical	Count
103	Packages (e.g. pills, contacts)	
104	Injection needles / syringes	
105	Other unidentifiable medical items	
OSPAR ID	Nurdies	Count
	Nurdies (per area of 50 by 50 cm)	

Notes

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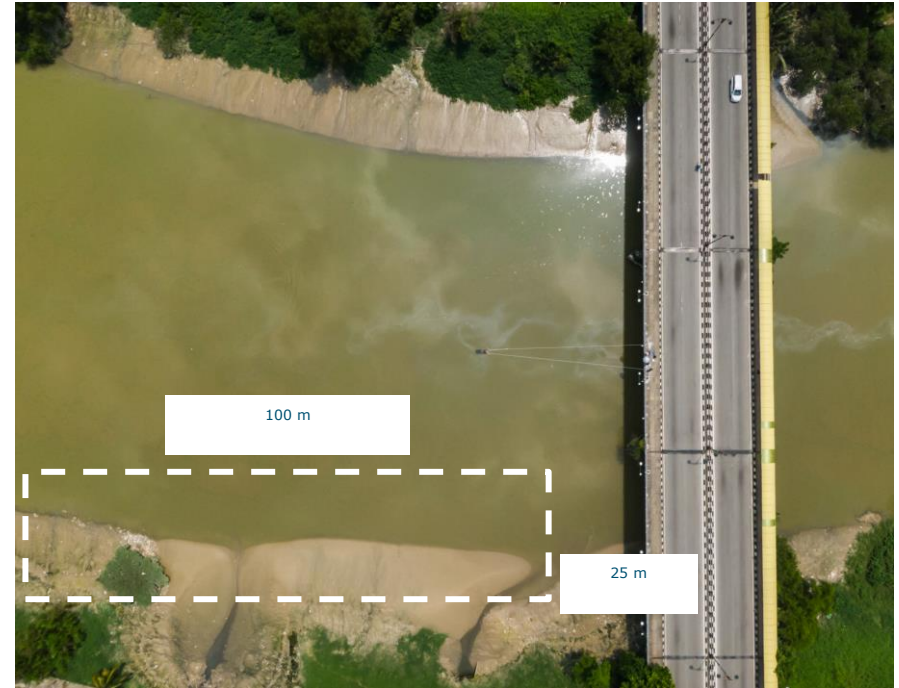
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Riverbank sampling: The concept

Collect the waste, or tally the items without collection

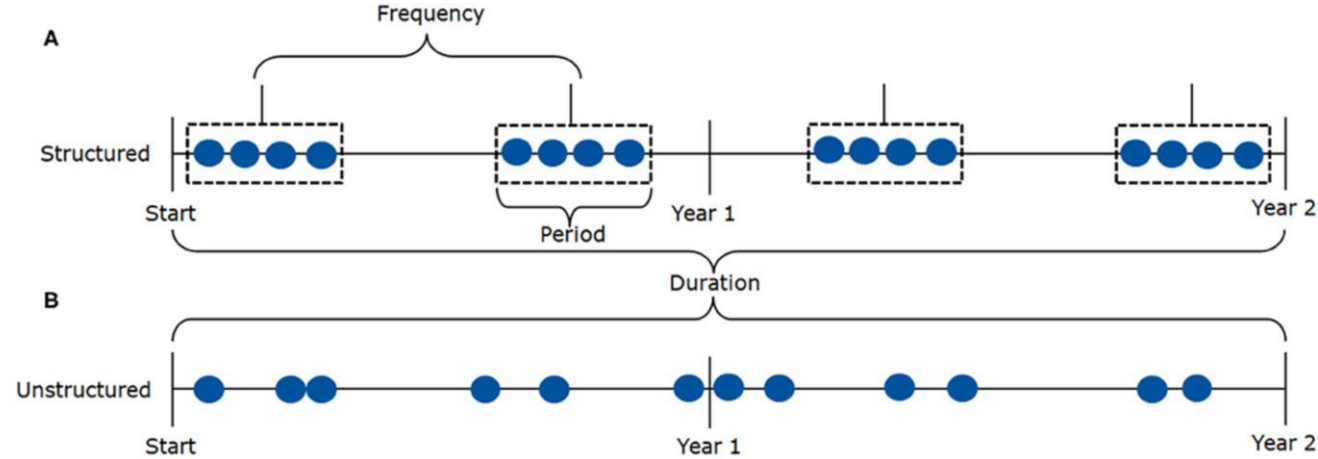
- Collection: Can also measure the mass and the size (and it's remove from the environment)
- Tallying: Less effort, and “no disturbance of system”



Riverbank sampling: The concept

Choose measurement frequency

- Yearly, monthly, daily?
- Structured or unstructured?

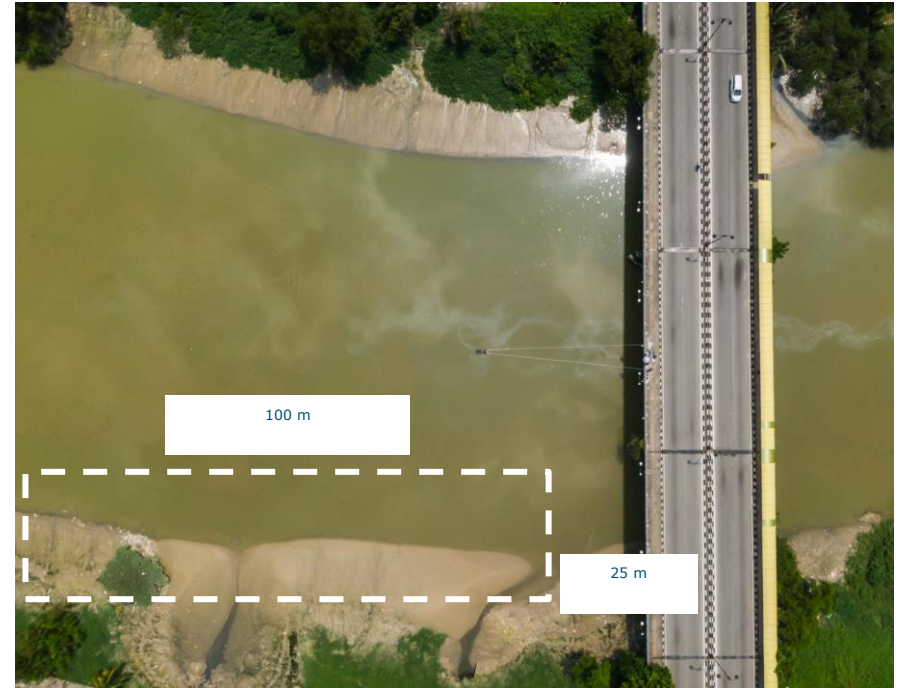


● = Sampling of one riverbank location

Riverbank sampling: The concept

Determine number of locations

- One location in detail, or many locations superficially?
- How to mobilize observers?

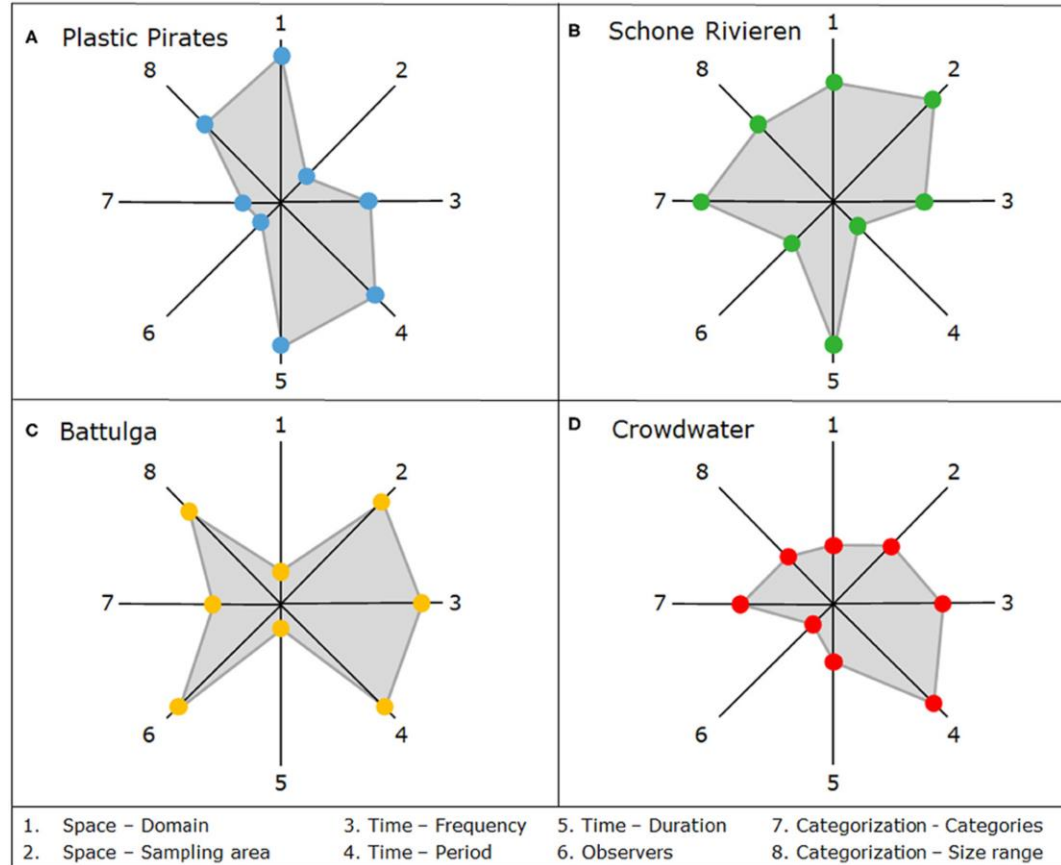


Riverbank sampling: The concept

Element	Sub-element	Range		
Space	Domain	Sub-basin		Multi-basin
	Sampling area	Subsampling		Sampling larger area
	Structure	Structured		Unstructured
Time	Period	4 Weeks		Single day
	Frequency	Yearly		Daily
	Structure	Structured		Unstructured
	Duration	Singular		Multi-year
Observers		Citizen Scientists		Trained Professionals
Categorization	Category	Material Based		Identity Based
	Size Range	Macro		Macro and Micro

Riverbank sampling: Examples

- Plastic Pirates
- Schone Rivieren
- Battulga et al.
- CrowdWater



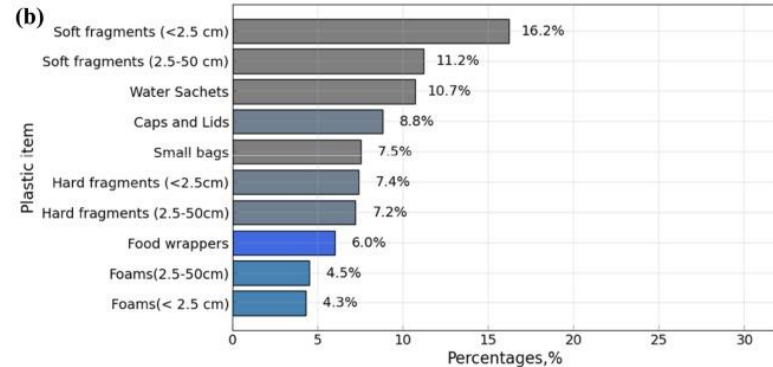
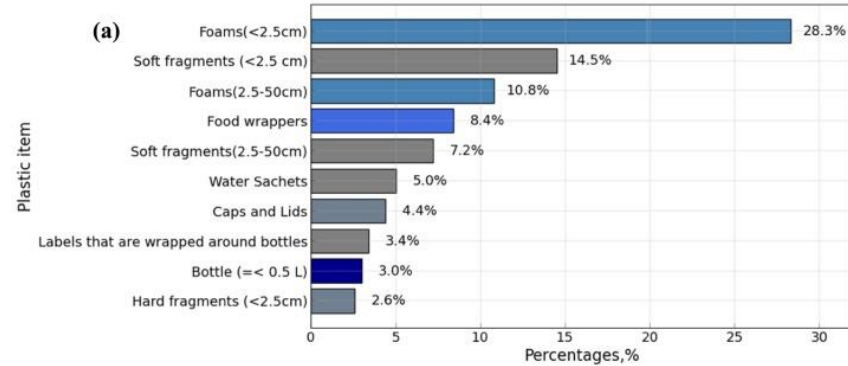
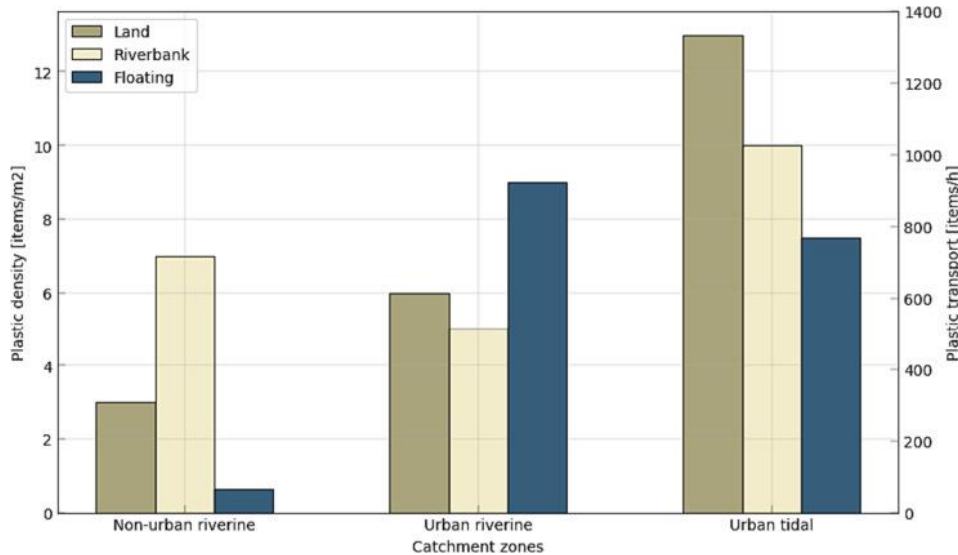
Example 1: Odaw river basin

Riverbank and land

- Ten locations along river
- Riverbank and land sampling areas
- Three times within a month
- Detailed analysis of composition



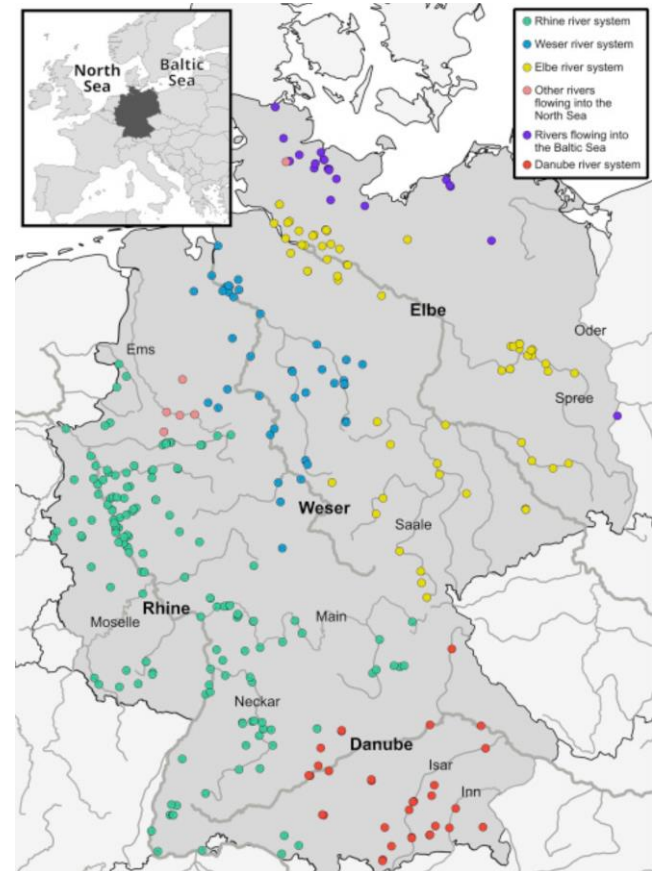
Example 1: Odaw river basin



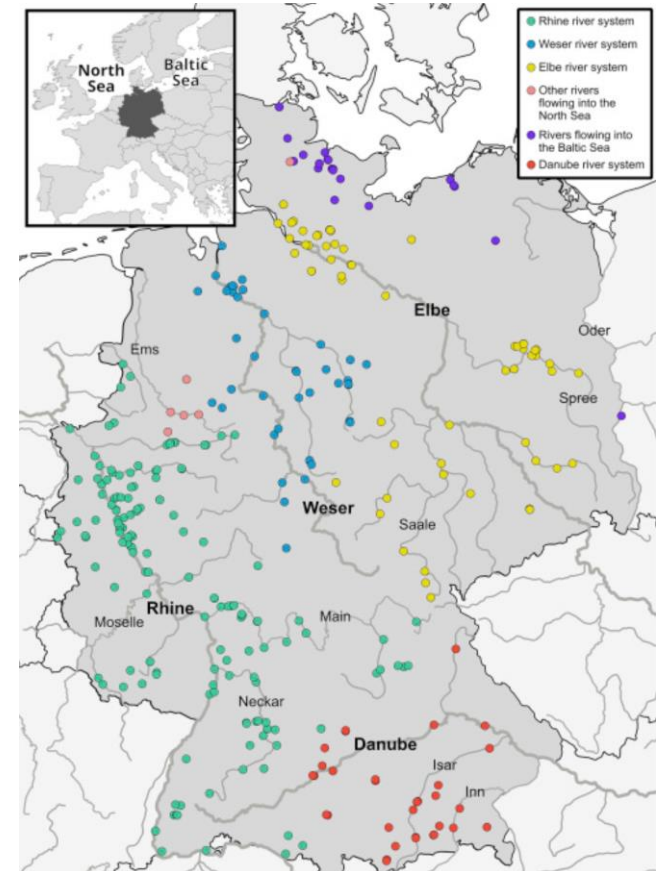
Example 2: German rivers

Rivers across the country

- 6 main rivers
- Schoolkids did the sampling
- Simple categorization



Example 2: German rivers



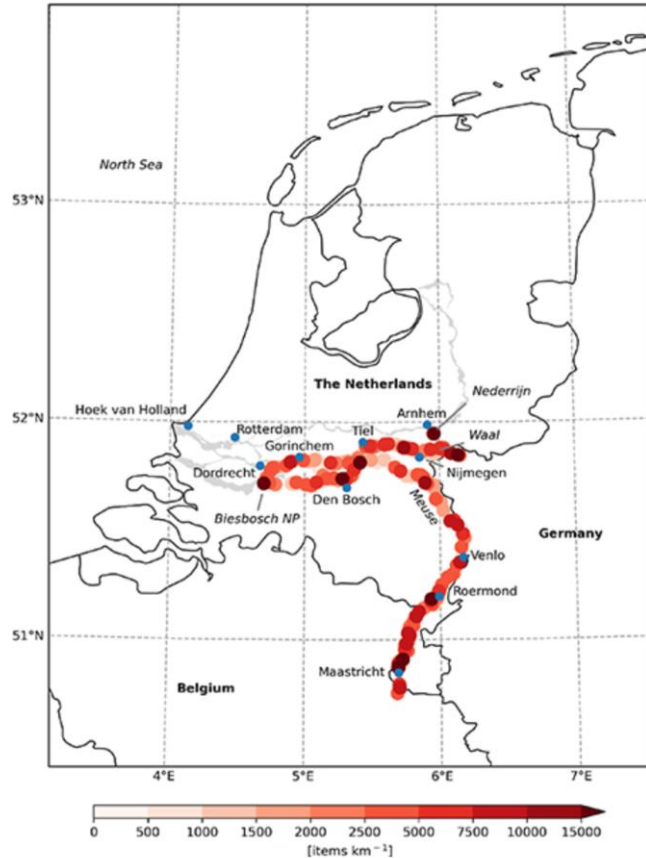
Example 3: Rhine and Meuse

Clean Rivers project

- Over 300 locations along Rhine and Meuse delta
- Over 1000 volunteers
- Bi-annual monitoring
- Detailed classification



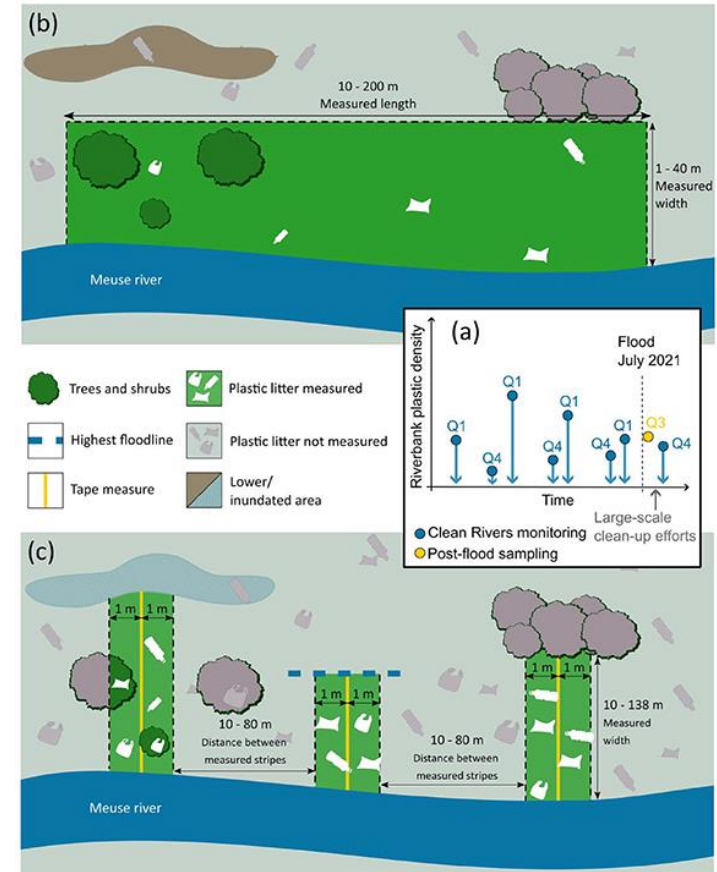
Example 3: Rhine and Meuse



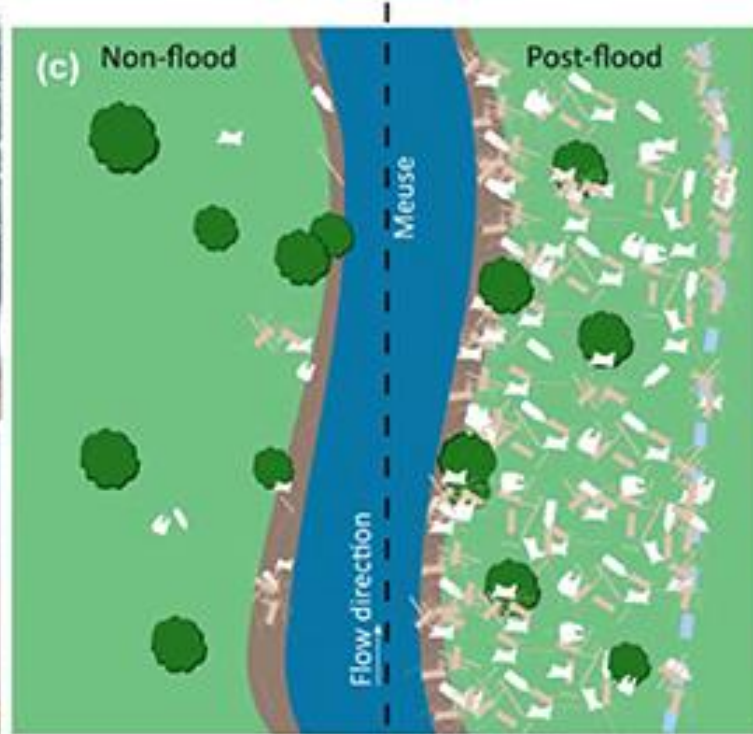
Example 4: Basin-scale post-flood sampling

Spatial variation

- 25 sampling points
- Cover entire Dutch Meuse
- Compare with non-flood conditions



Example 4: Basin-scale post-flood sampling



Riverbank sampling

- Good method for detailed assessment
- Flexible approach, can be tailored to specific questions
- Find trade-off between level of detail and required effort

