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DR. JUTAMAS KAEWSUK, MAHIDOL UNIVERSITY

MICROPLASTIC CONTAMINATION IN FRESHWATER ENVIRONMENT, THAILAND



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MARINE DEBRIS

MARINE PLASTICS

- ▶ Over 300 million tons of plastic are produced every year
- ▶ At least 8 million tons end up in the ocean every year
- ▶ Cause severe injuries and death of marine species
- ▶ Threaten to human health and contributes to climate change
- ▶ International agreement is necessary
- ▶ R&D for new product to replace single-use plastic is necessary

PLASTIC OCEAN





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Webinar on Building partnership against plastic pollution

MICROPLASTIC



<https://www.newscientist.com/article/2213622-tiny-magnets-could-help-rid-the-ocean-of-harmful-microplastics/>



<https://www.kobis.hr/microplastics-analysis-ftir-raman/>



<https://journals.openedition.org/factsreports/5290?lang=fr>

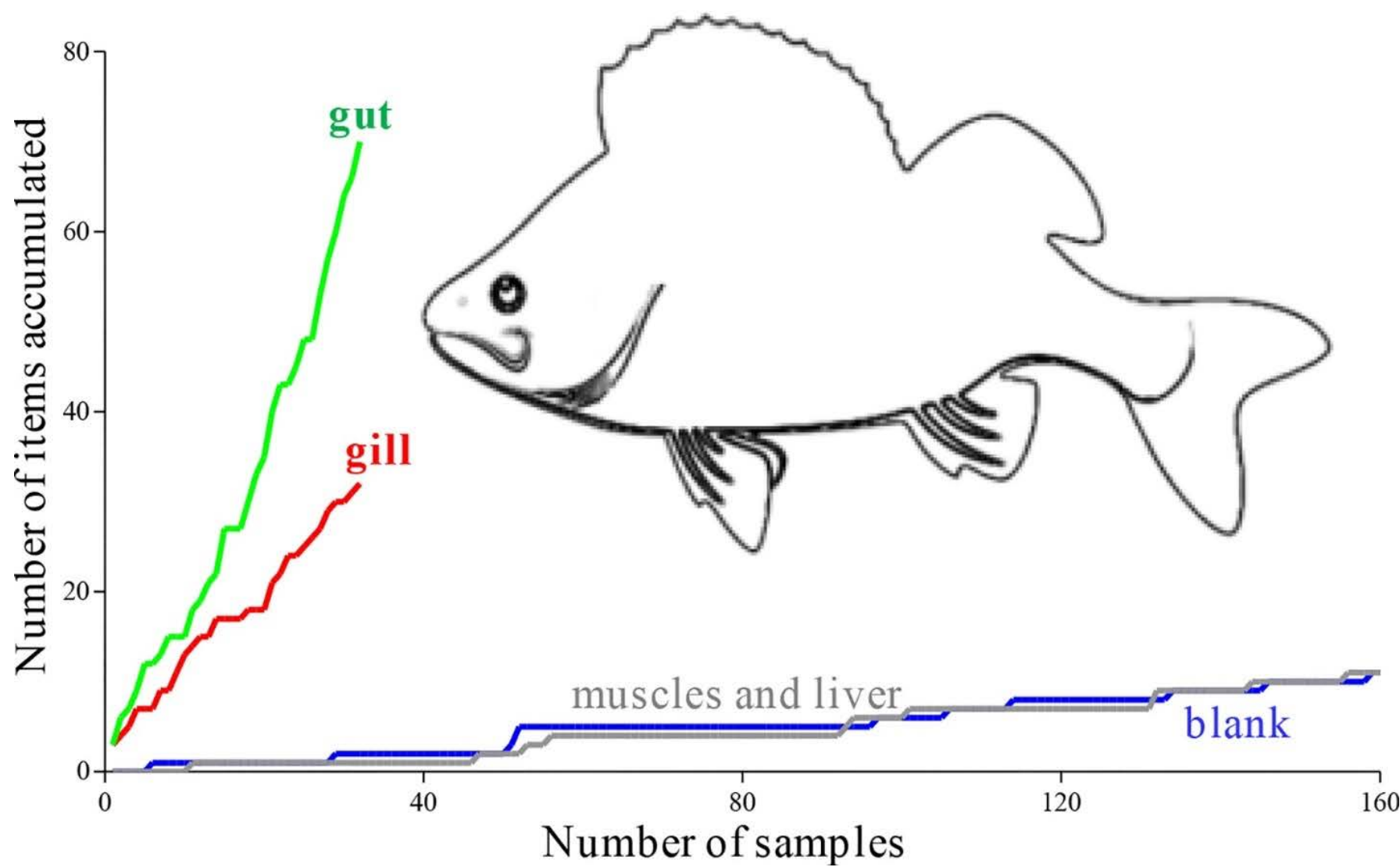
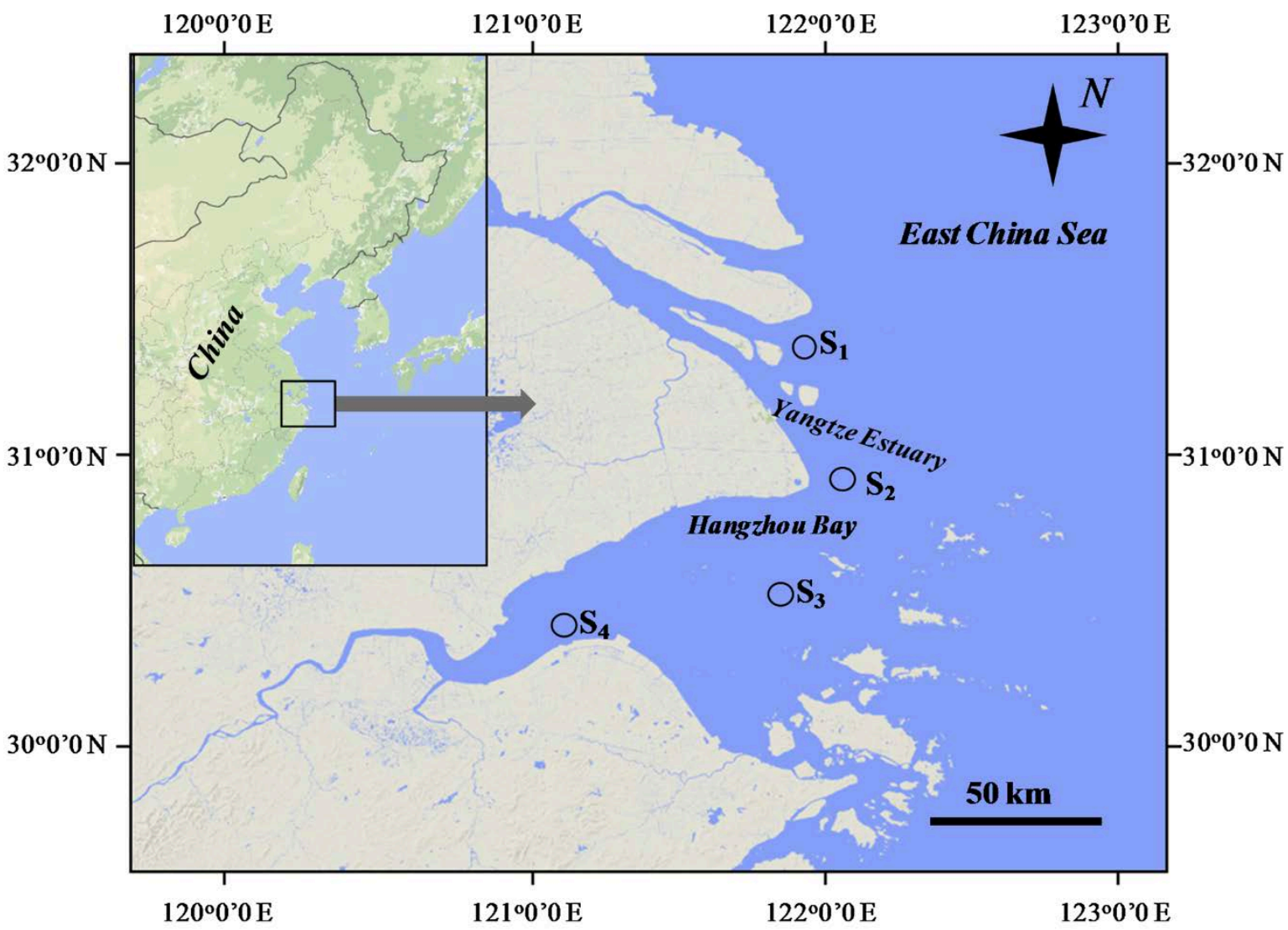
MICROPLASTIC IN MARINE ANIMALS



The occurrence of microplastic in specific organs in commercially caught fishes from coast and estuary area of east China



Lei Su^{a,b}, Hua Deng^a, Bowen Li^a, Qiqing Chen^a, Vincent Pettigrove^c, Chenxi Wu^d, Huahong Shi^{a,*}



MICROPLASTIC IN MARINE ANIMALS



Contents lists available at [ScienceDirect](#)

Science of the Total Environment

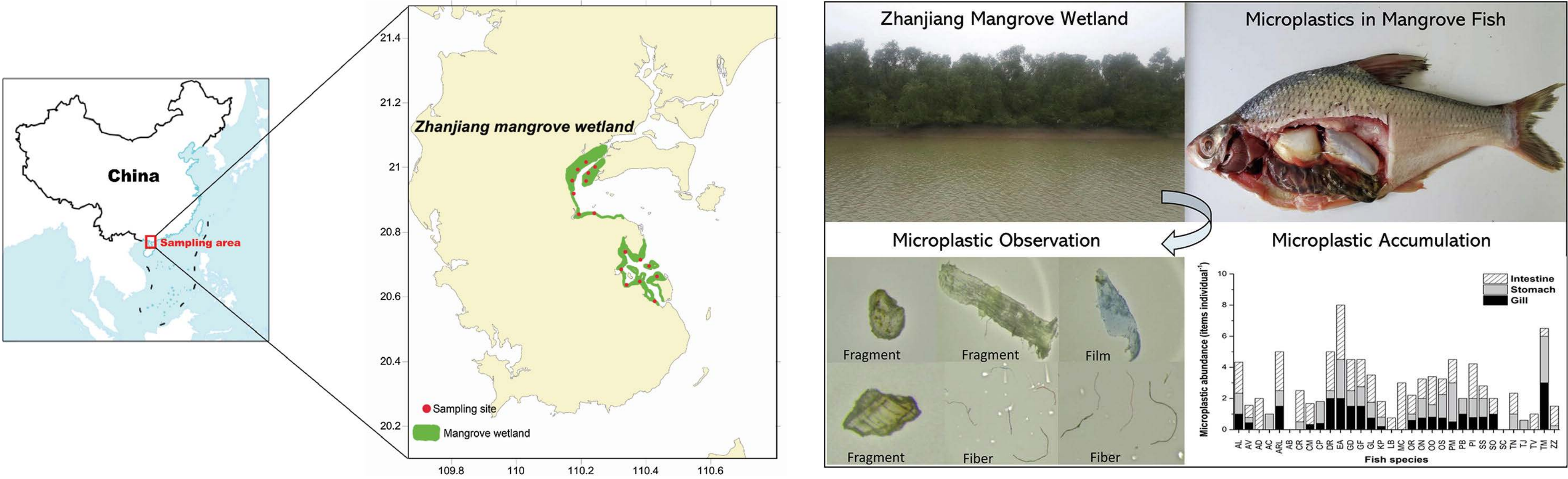
journal homepage: www.elsevier.com/locate/scitotenv



Microplastic accumulation in fish from Zhanjiang mangrove wetland, South China



Jian-Sheng Huang^{a,1}, J. Bimali Koongolla^{b,c,1}, Heng-Xiang Li^b, Lang Lin^{b,c}, Yun-Feng Pan^{b,c}, Shan Liu^b, Wei-Hong He^b, Dusmant Maharana^b, Xiang-Rong Xu^{b,*}



MICROPLASTIC IN SEA SALTS/ROCK SALTS/LAKES SALTS

Global Pattern of Microplastics (MPs) in Commercial Food-Grade Salts: Sea Salt as an Indicator of Seawater MP Pollution

Ji-Su Kim, Hee-Jee Lee, Seung-Kyu Kim*, and Hyun-Jung Kim

✓ Cite this: *Environ. Sci. Technol.* 2018, 52, 21, 12819–12828

Publication Date: October 4, 2018

<https://doi.org/10.1021/acs.est.8b04180>

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Altmetric

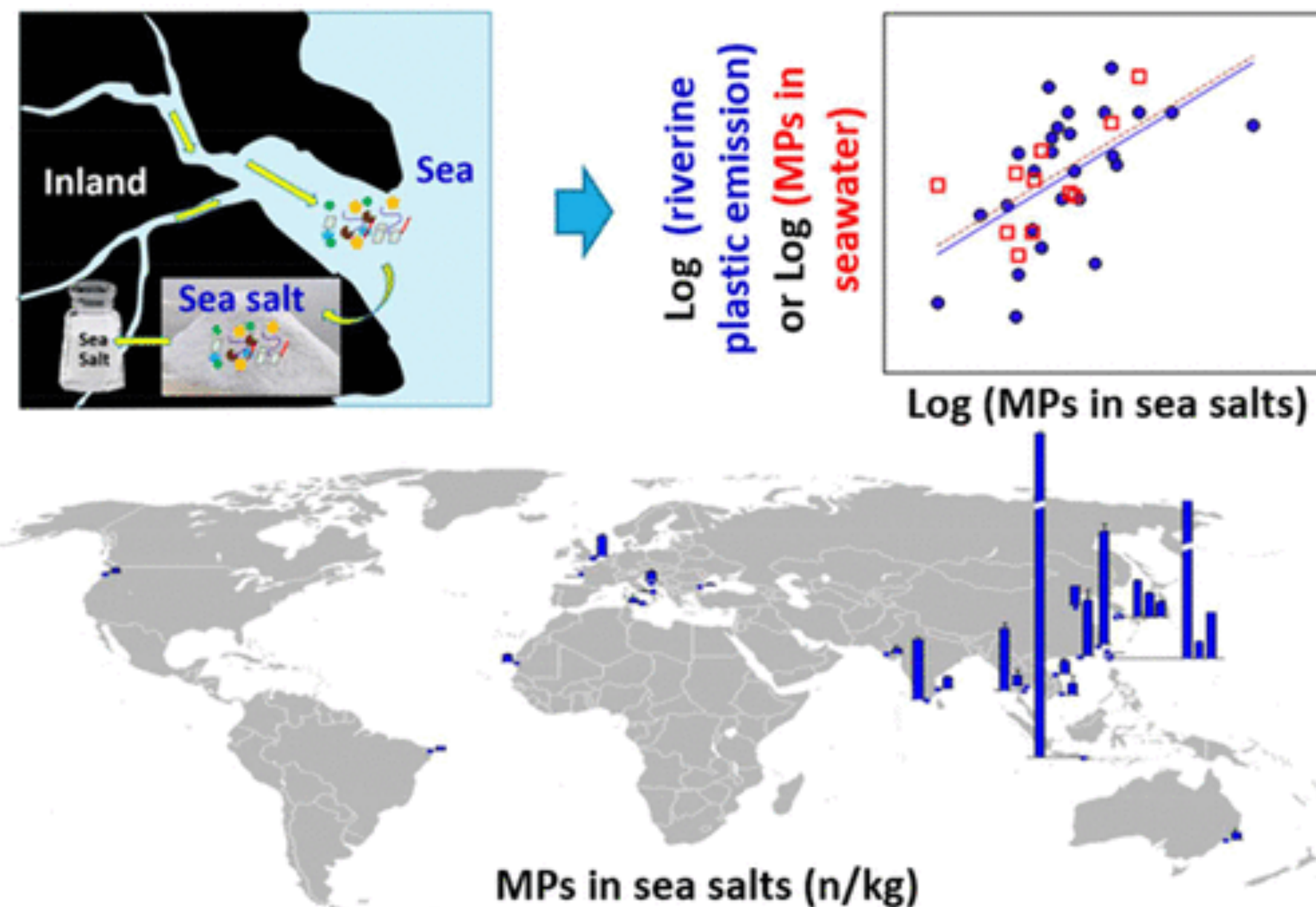
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Citations

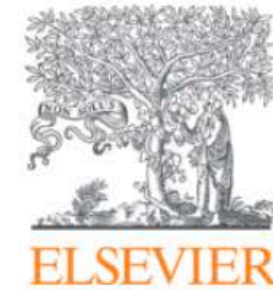
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MICROPLASTIC IN DRINKING WATER



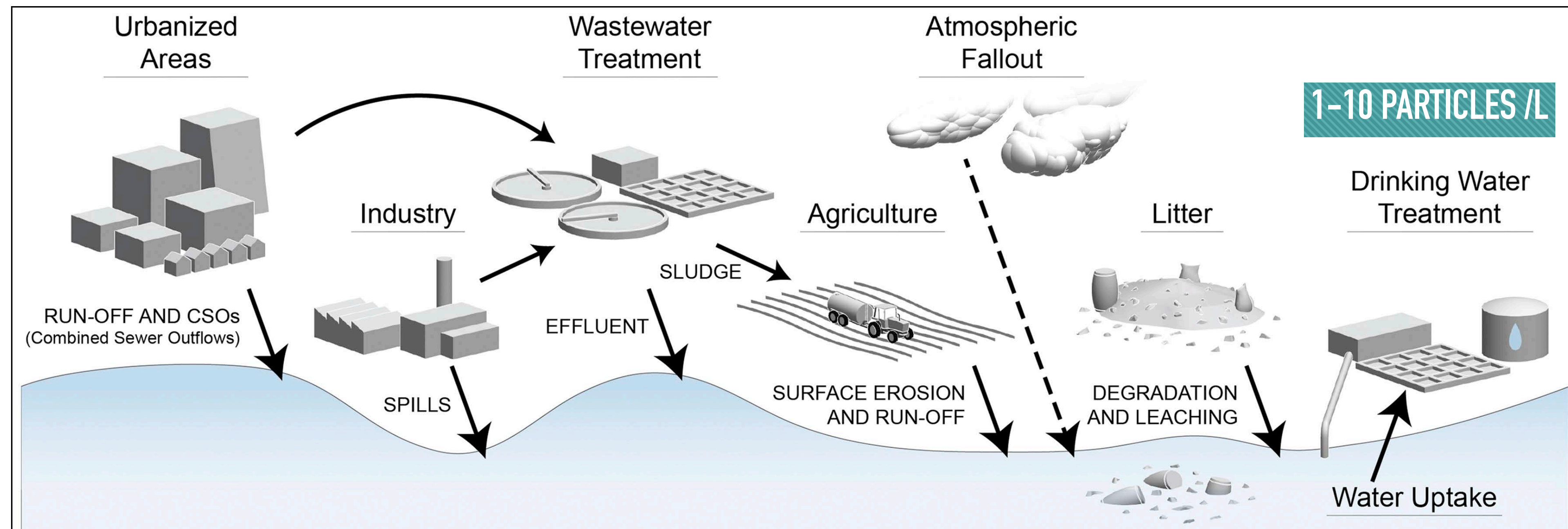
Current Opinion in Environmental Science & Health

Volume 7, February 2019, Pages 69-75



Microplastics in drinking water: A review and assessment

Dafne Eerkes-Medrano¹ , Heather A. Leslie², Brian Quinn³



MICROPLASTIC IN DRINKING WATER

Plastic fibers in the tap water

Prevalence of microscopic plastic fibers by sample source location



Worldwide
83%



USA
94%



Europe
72%



Beirut,
Lebanon



Quito,
Ecuador



New Delhi,
India



Jakarta,
Indonesia



Kampala,
Uganda

>150 TAP WATER
SAMPLES

FIVE CONTINENTS.

83 PERCENT HAD
PLASTIC.


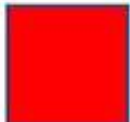

MICROPLASTIC IN DRINKING WATER



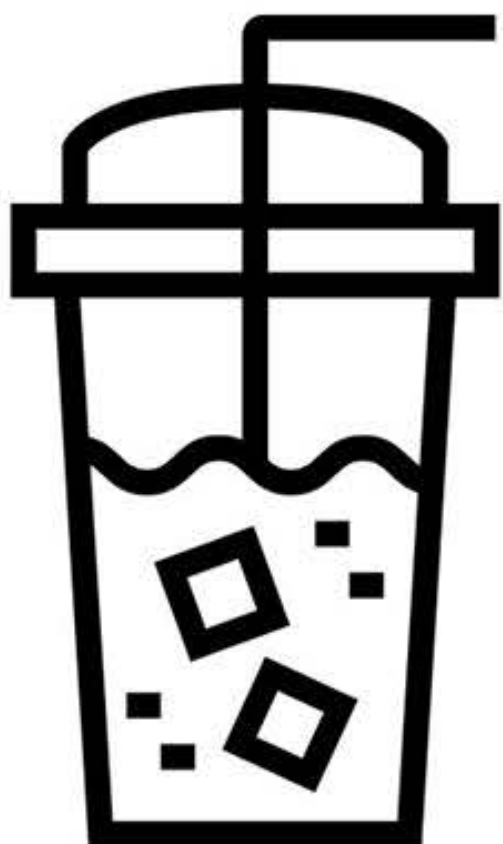
ENERGY DRINKS



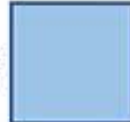


SOFT DRINKS

Positive : 20 out of 26
Content : ND – 7 particles/L
Shape : Fibers
Size : 0.1 – 3 mm
Color :   
Type: Polyamide, poly(ester-amide), acrylonitrile-butadiene-styrene
ND : Not detected

Microplastics








COLD TEA

Positive : 4 out of 4
Content : 1 – 6 particles/L
Shape : Fibers
Size : 0.1 – 2 mm
Color :   
Type: Polyamide, poly(ester-amide)

Microplastics



BEER

Positive : 24 out of 27
Content : ND – 28 particles/L
Shape : Fibers and fragments
Size : 0.1 – 3 mm
Color :     
Type: Polyamide, poly(ester-amide), poly(ethylene-terphthalate)
ND : Not detected

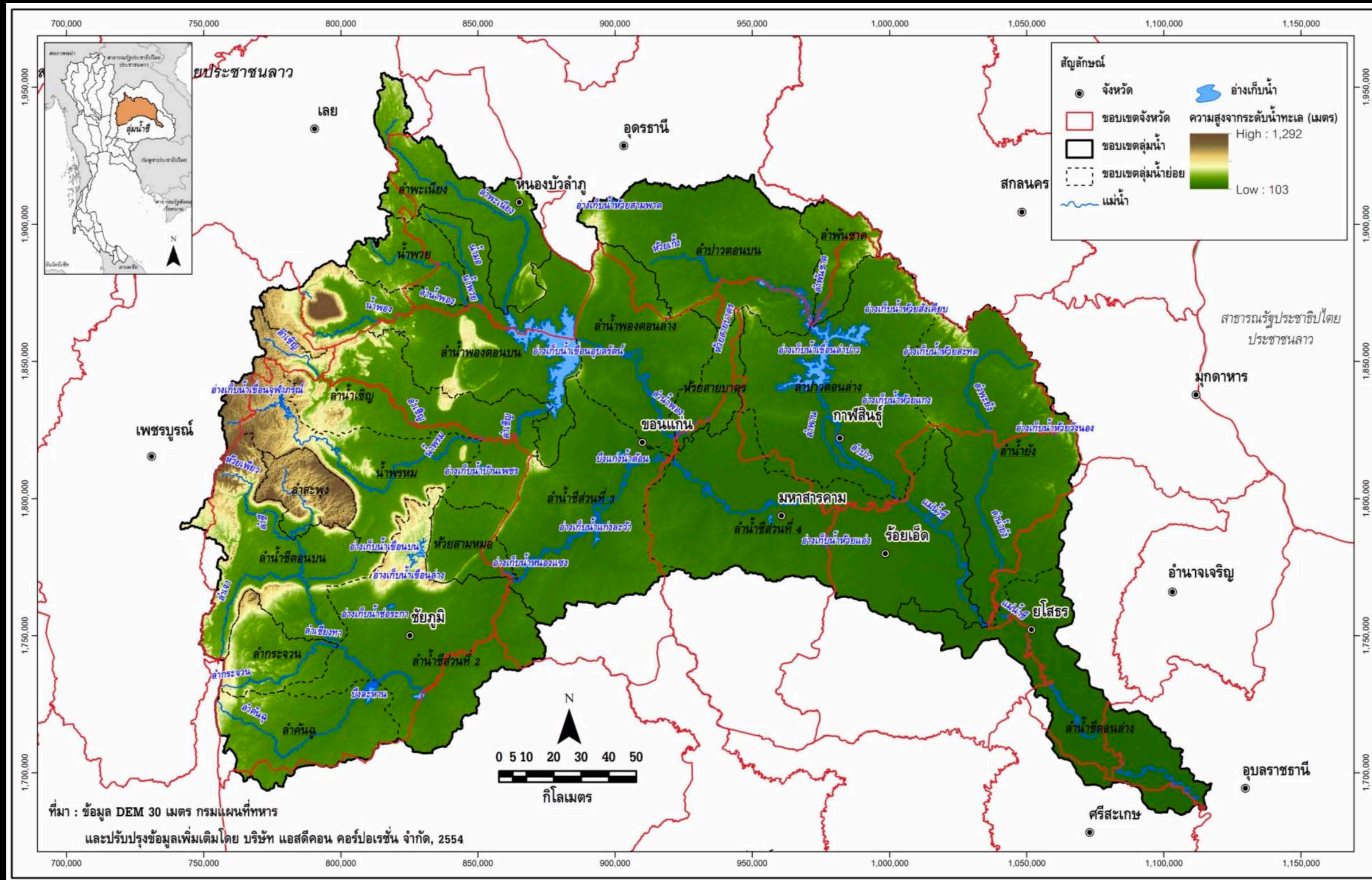
Microplastics

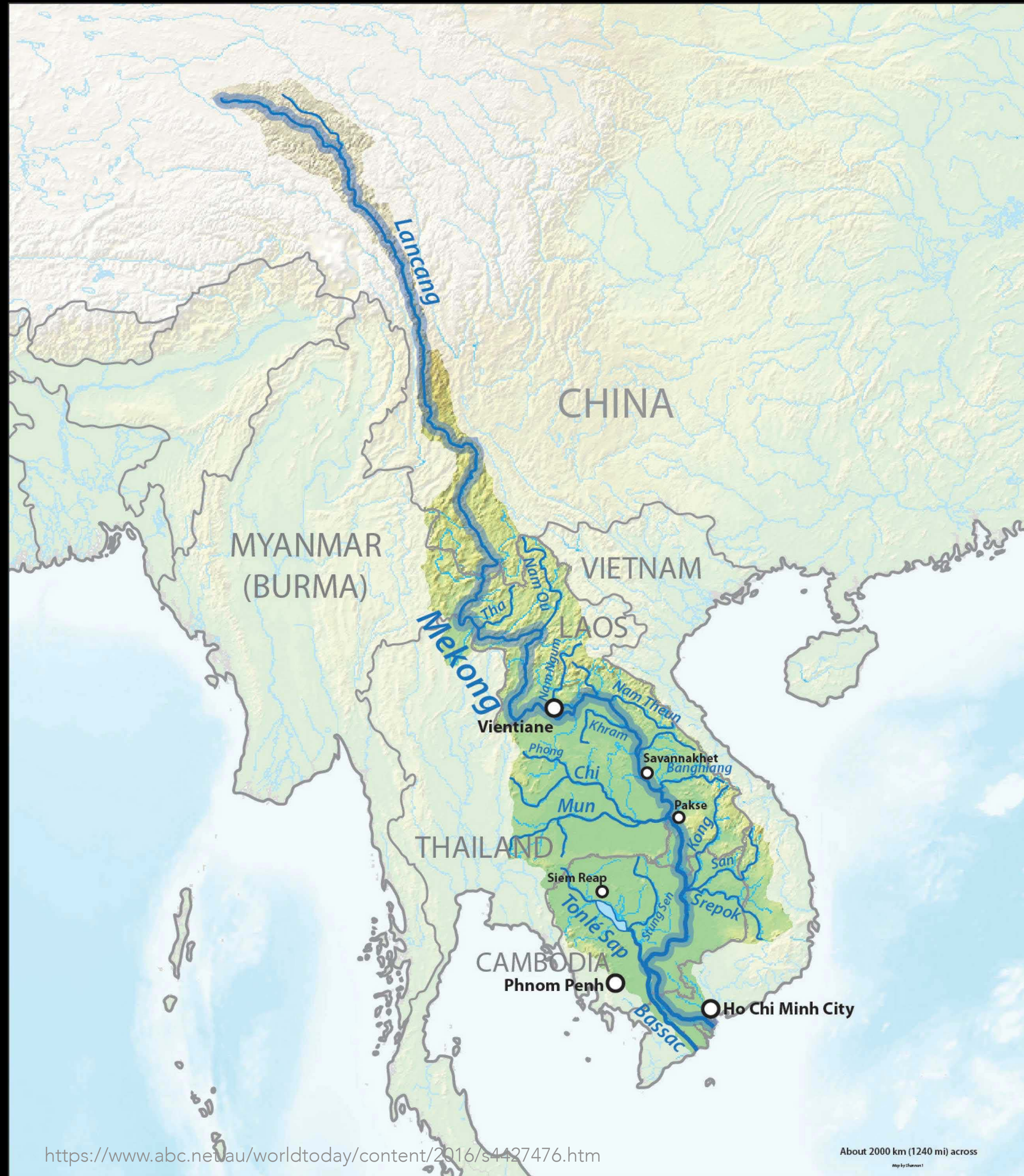


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INTRODUCTION TO CHI RIVER

CHI RIVER



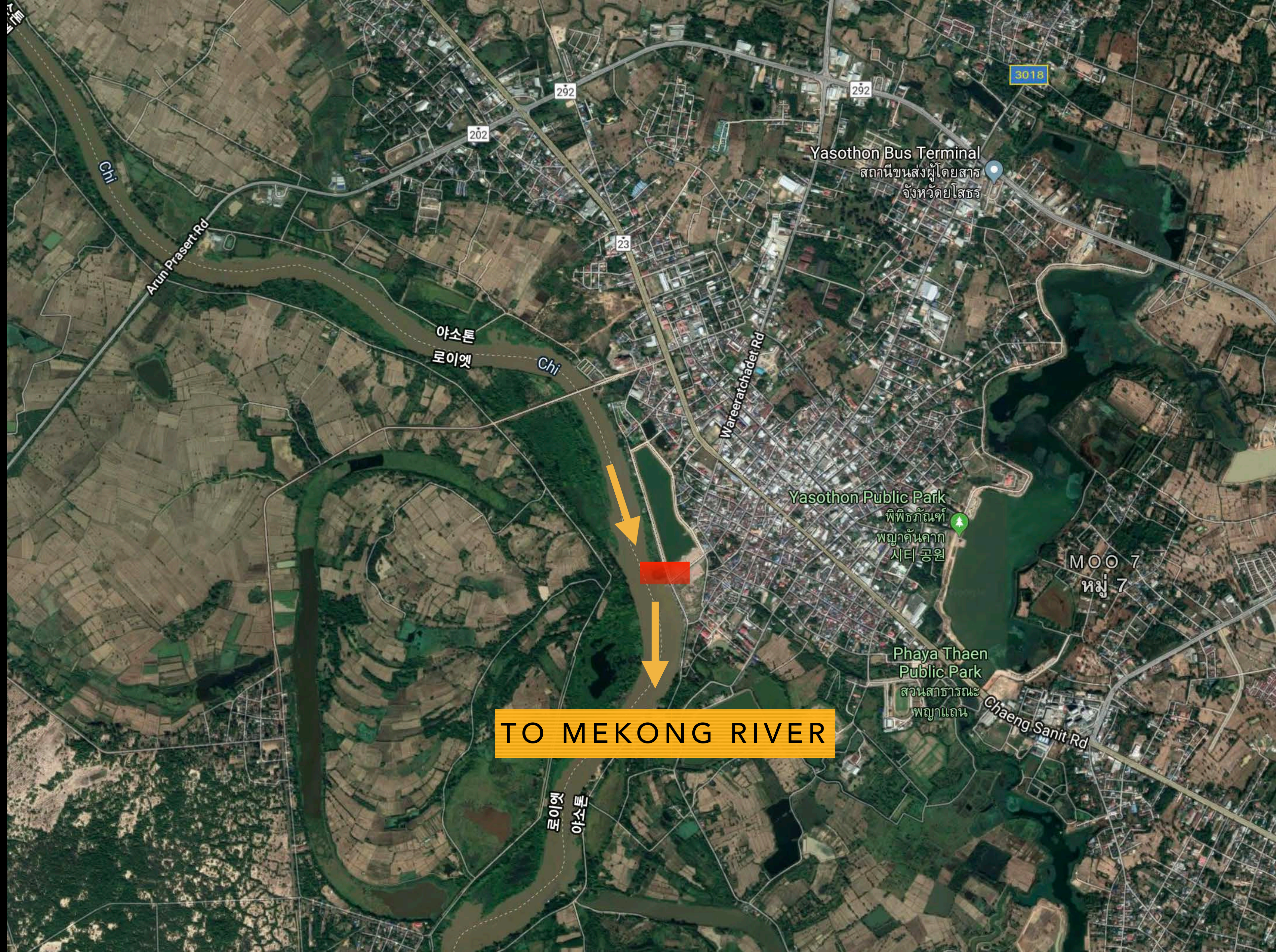


CHI RIVER

- 49,476 km²
- 830 km - longest river in Thailand
- 14 provinces
- 6,709,330 people
- 3 seasons (Rainy - 6 months, Winter - 3 months, Summer - 3 months)
- 17 Provincial Water supply Systems
- Water for agriculture (rice, cane, cassava, rubber)
- Protein source (Fish Farming)
- Municipal waste and wastewater
- Agriculture-monoculture - POPs and Fertiliser
- Industrial wastewater





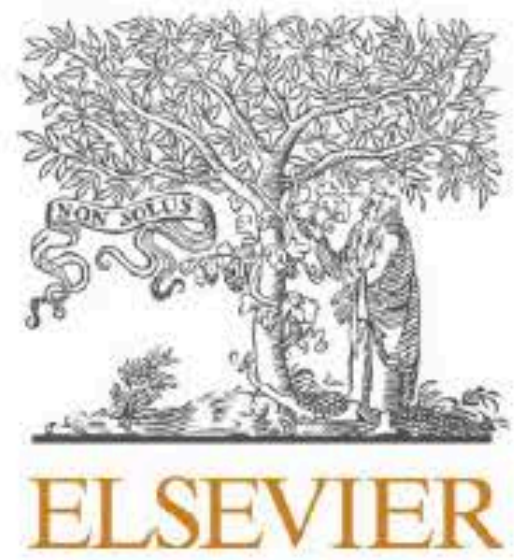


TO MEKONG RIVER



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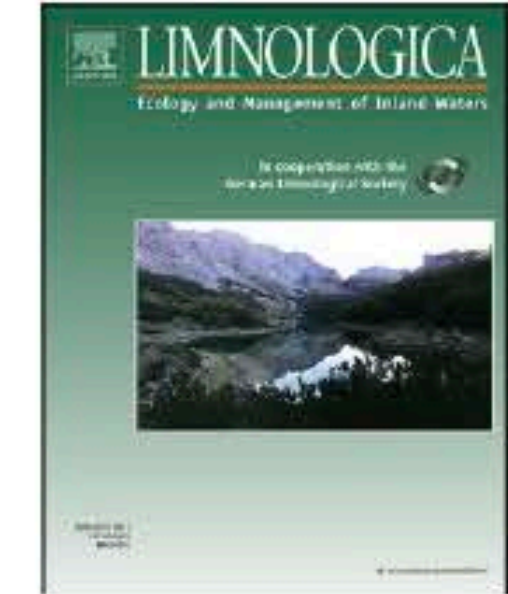
UPPER CHI RIVER



Contents lists available at [ScienceDirect](#)

Limnologia

journal homepage: www.elsevier.com/locate/limno



Evidence of microplastics in the Chi River Basin, Thailand: Anthropogenic influence and potential threats to edible arthropods

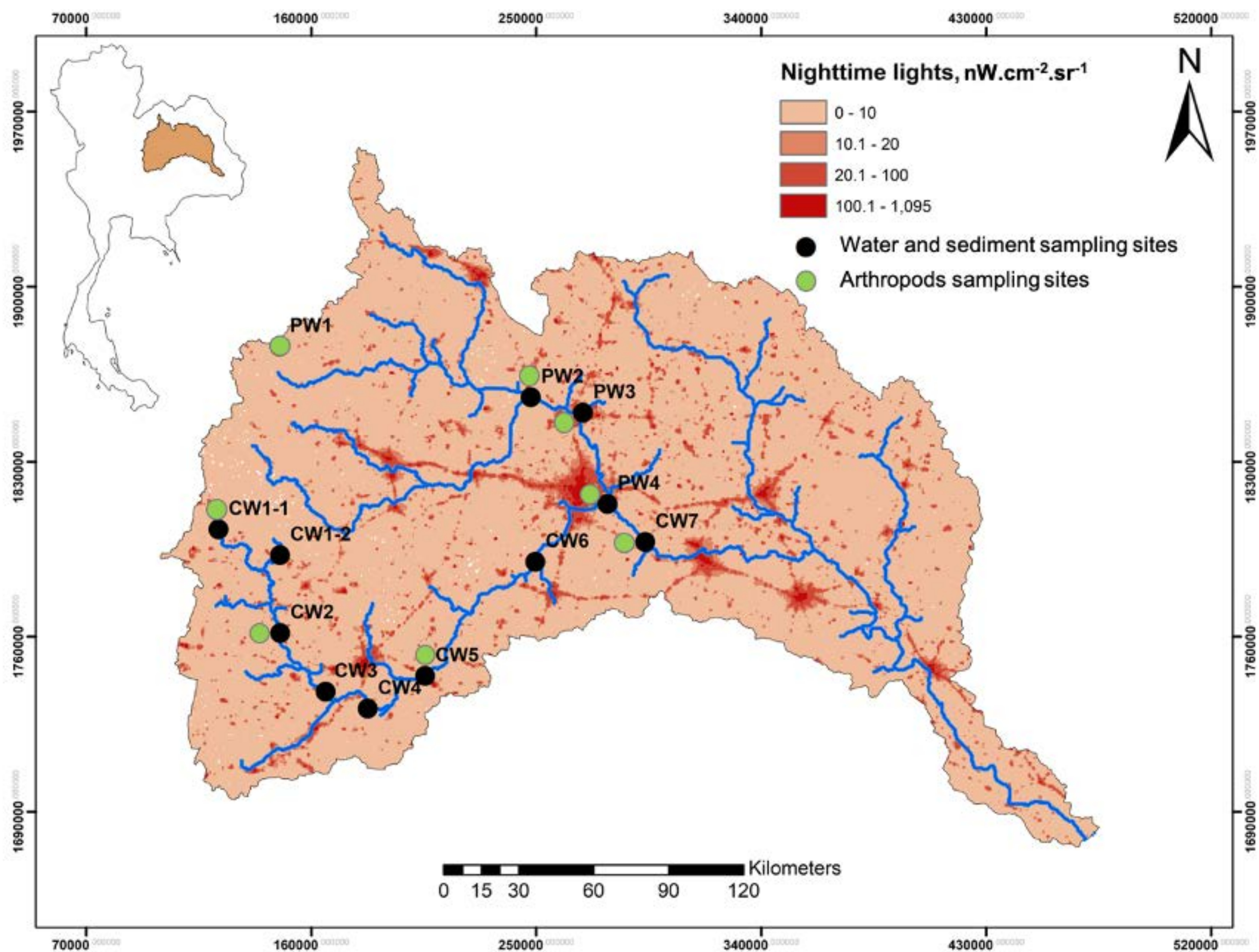
Penkhae Thamsenanupap^a, Tawatchai Tanee^{a,b}, Jutamas Kaewsuk^{c,*}

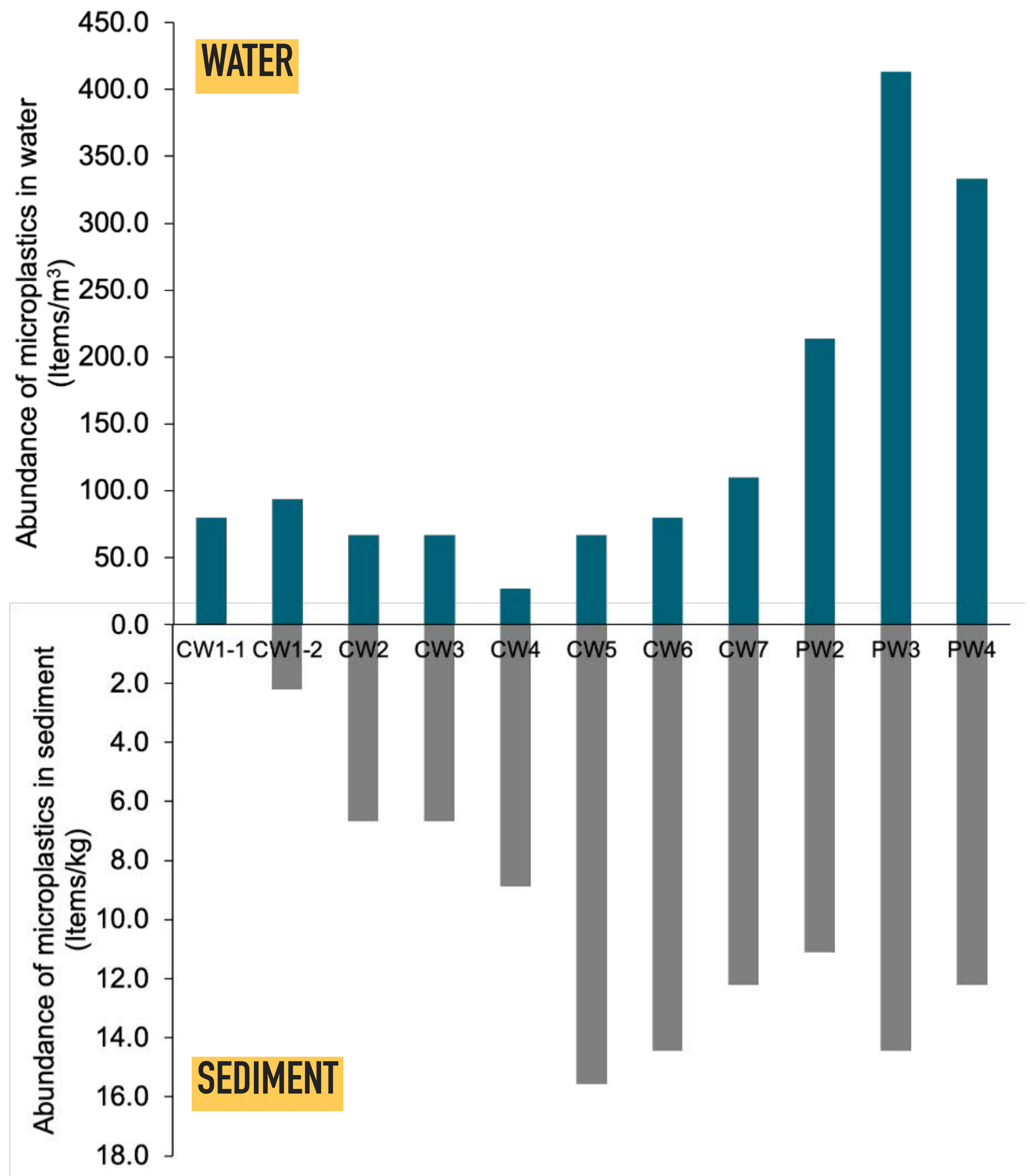
^a Mahasarakham University, Kham Riang, Kantarawichai, Maha Sarakham, Thailand 40150

^b Genetics and Environmental Toxicology Research Group, Khon Kaen University, Khon Kaen 40002, Thailand

^c Mahidol University Kanchanaburi Campus, Lumsum, Saiyok, Kanchanaburi, Thailand 71150







■ Caridina sp.

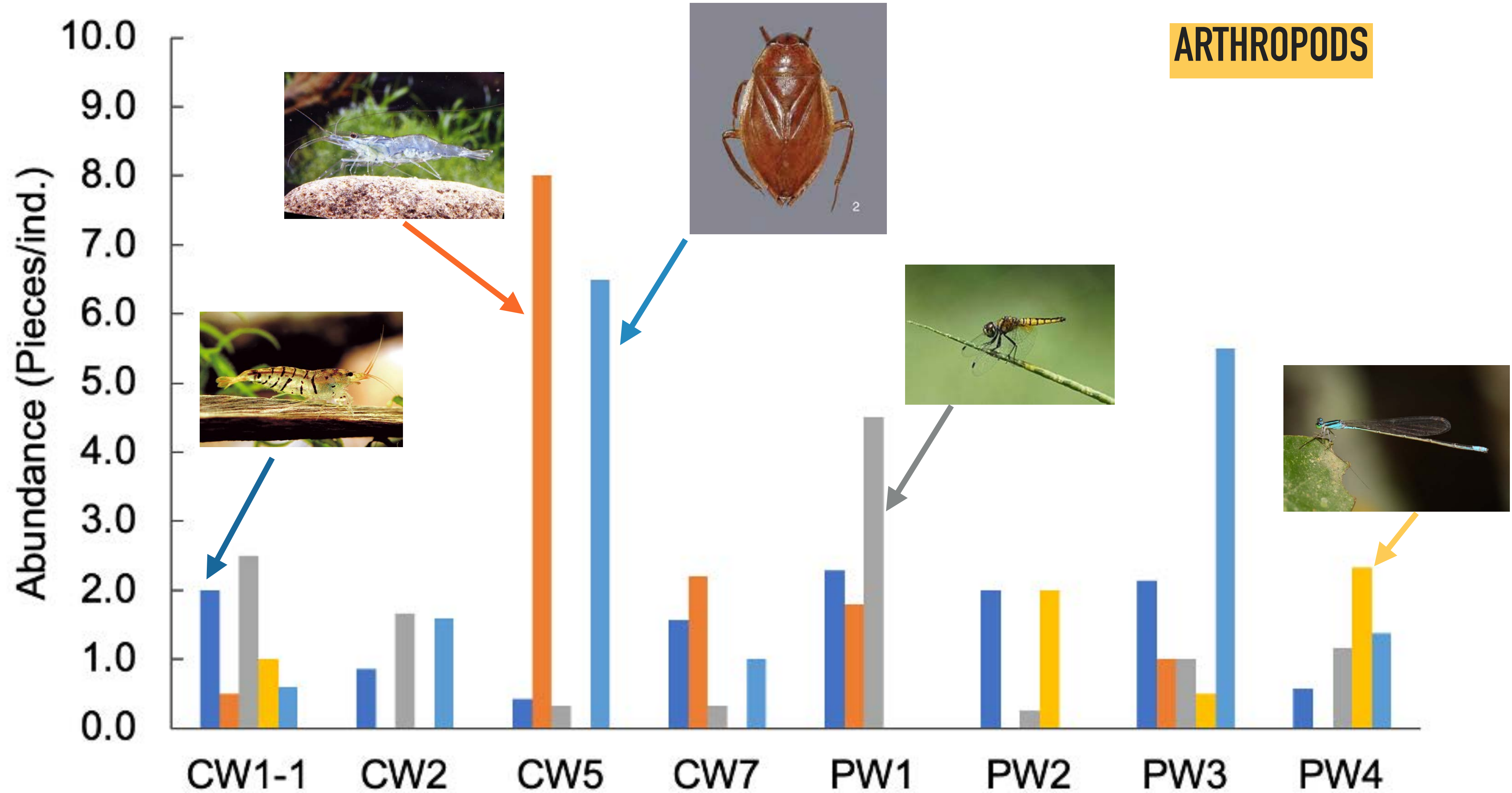
■ Macrobrachium sp.

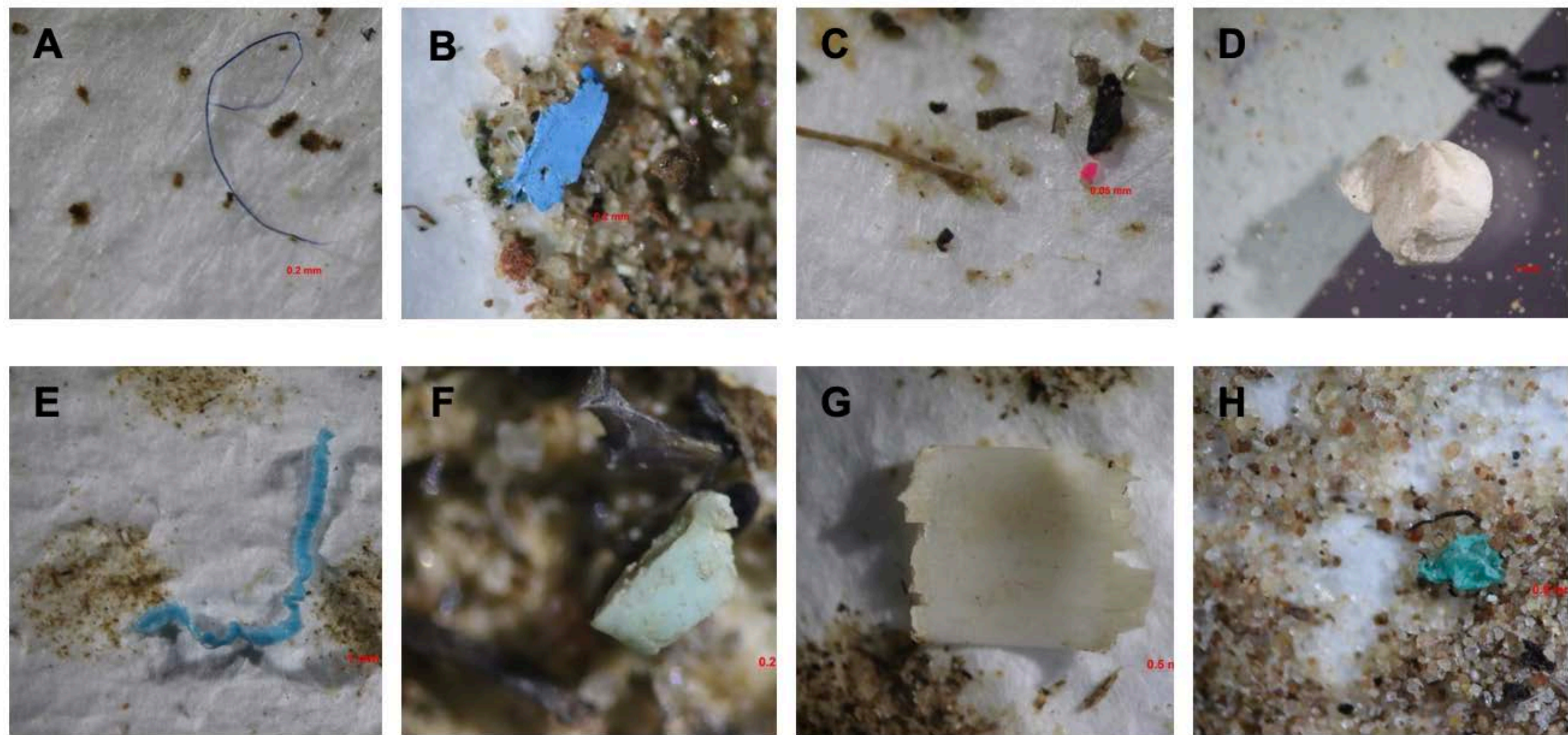
■ Aethriamanta sp.

■ Aciagrion sp.

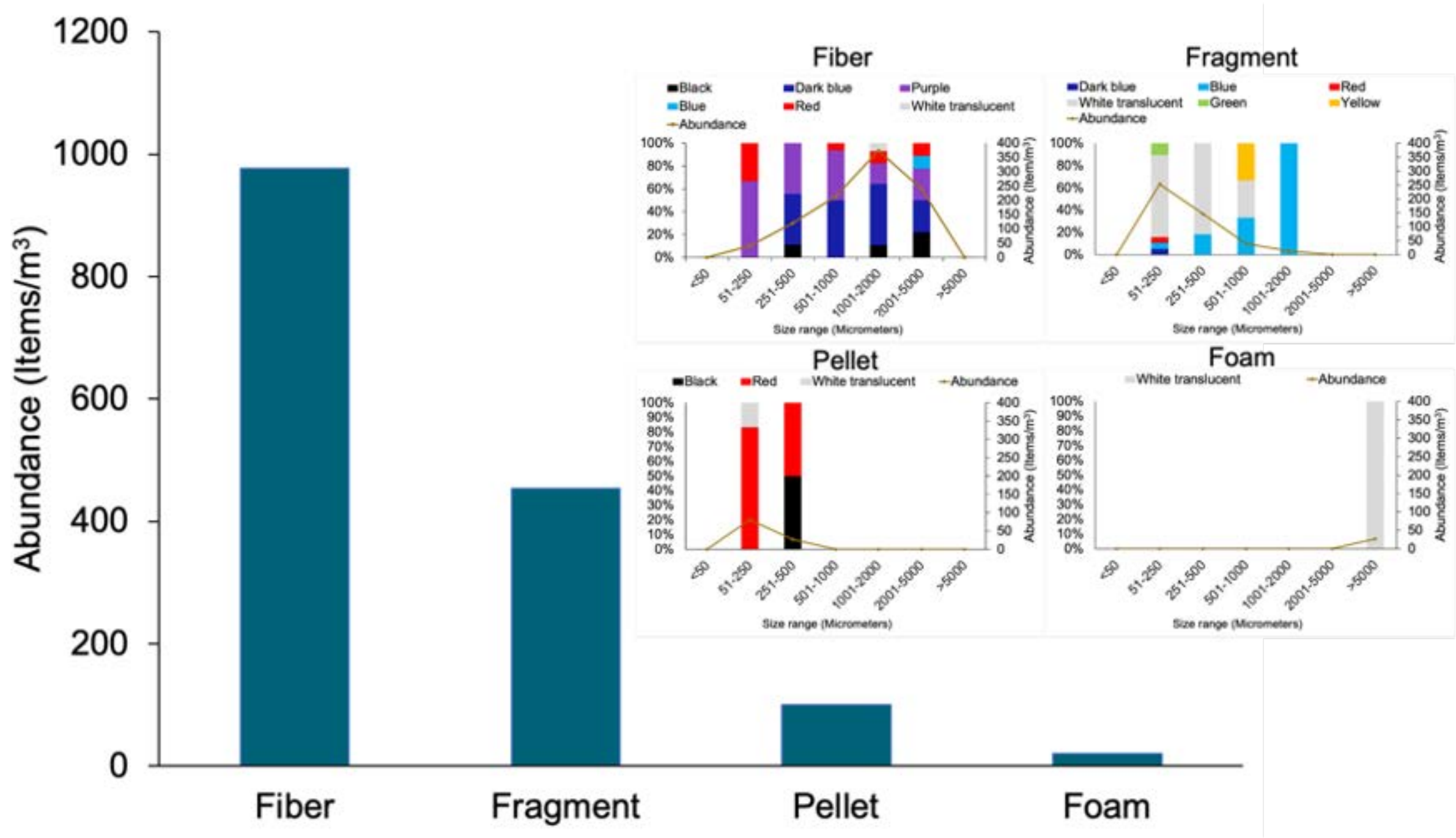
■ Sphaerodema molestum

ARTHROPODS

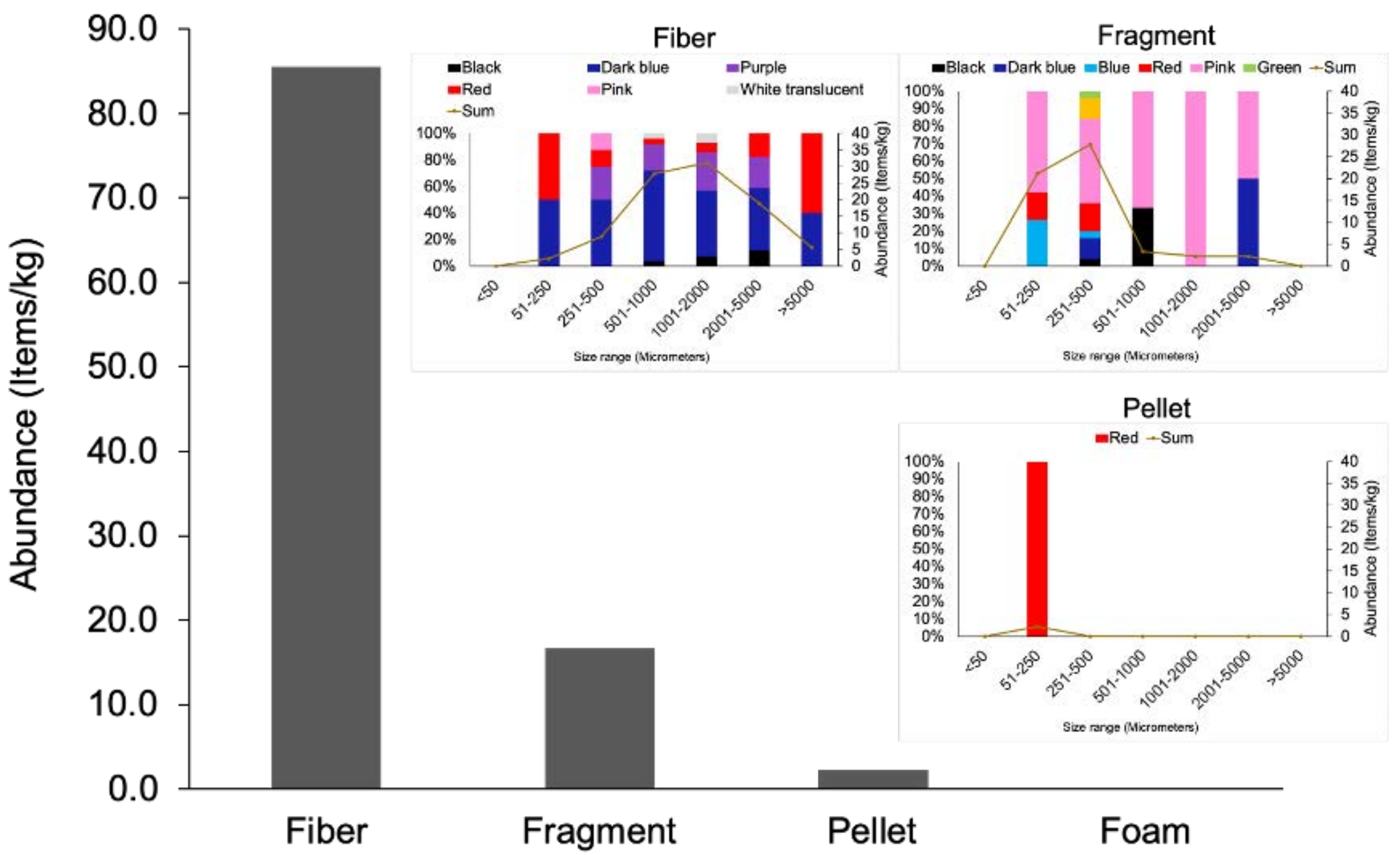




Examples of microplastics found in water; fiber (A), fragment (B), pellet (C), foam (D) and sediment; fiber (E), fragment (F, G), pellet (H)

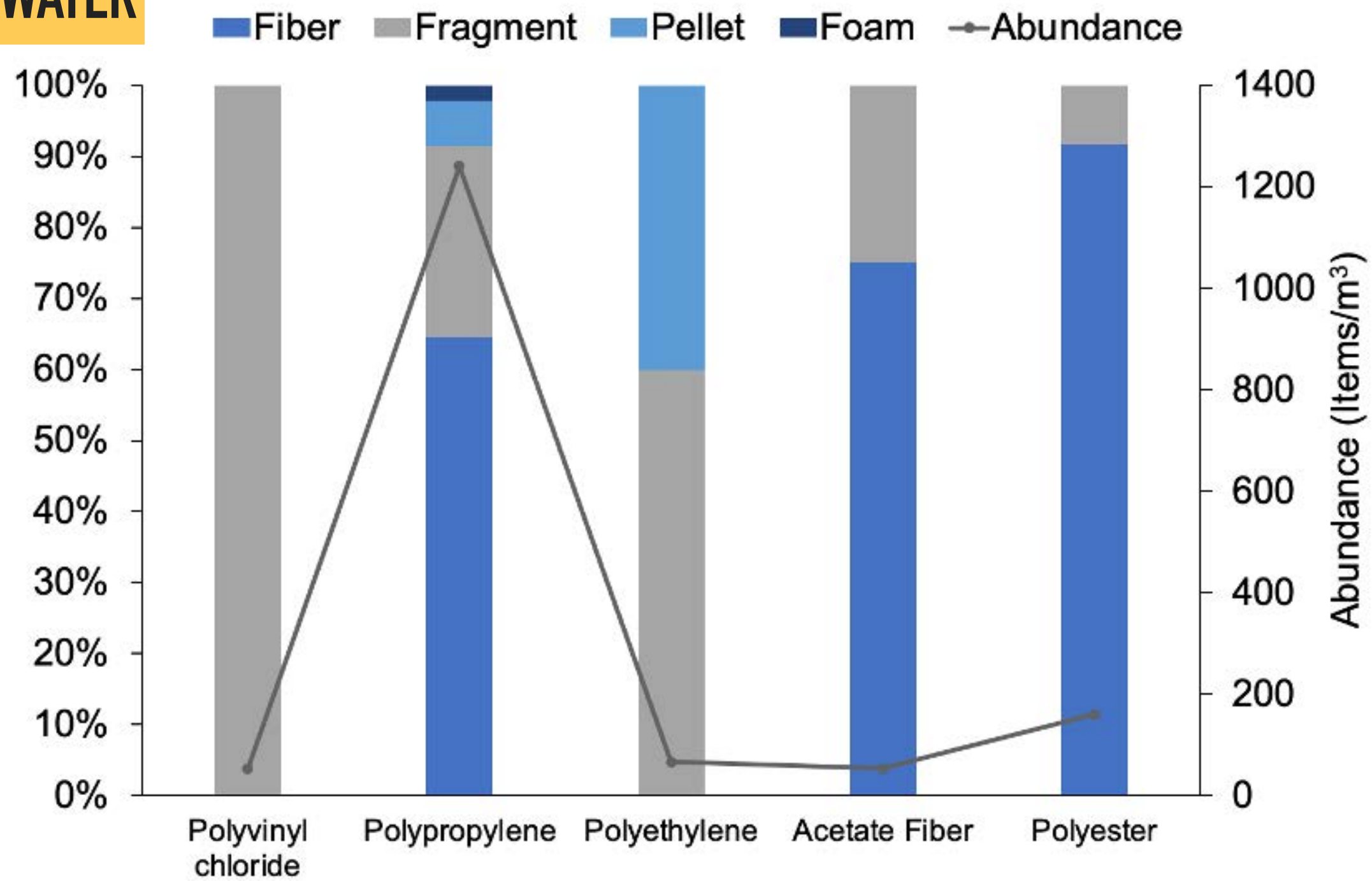


WATER

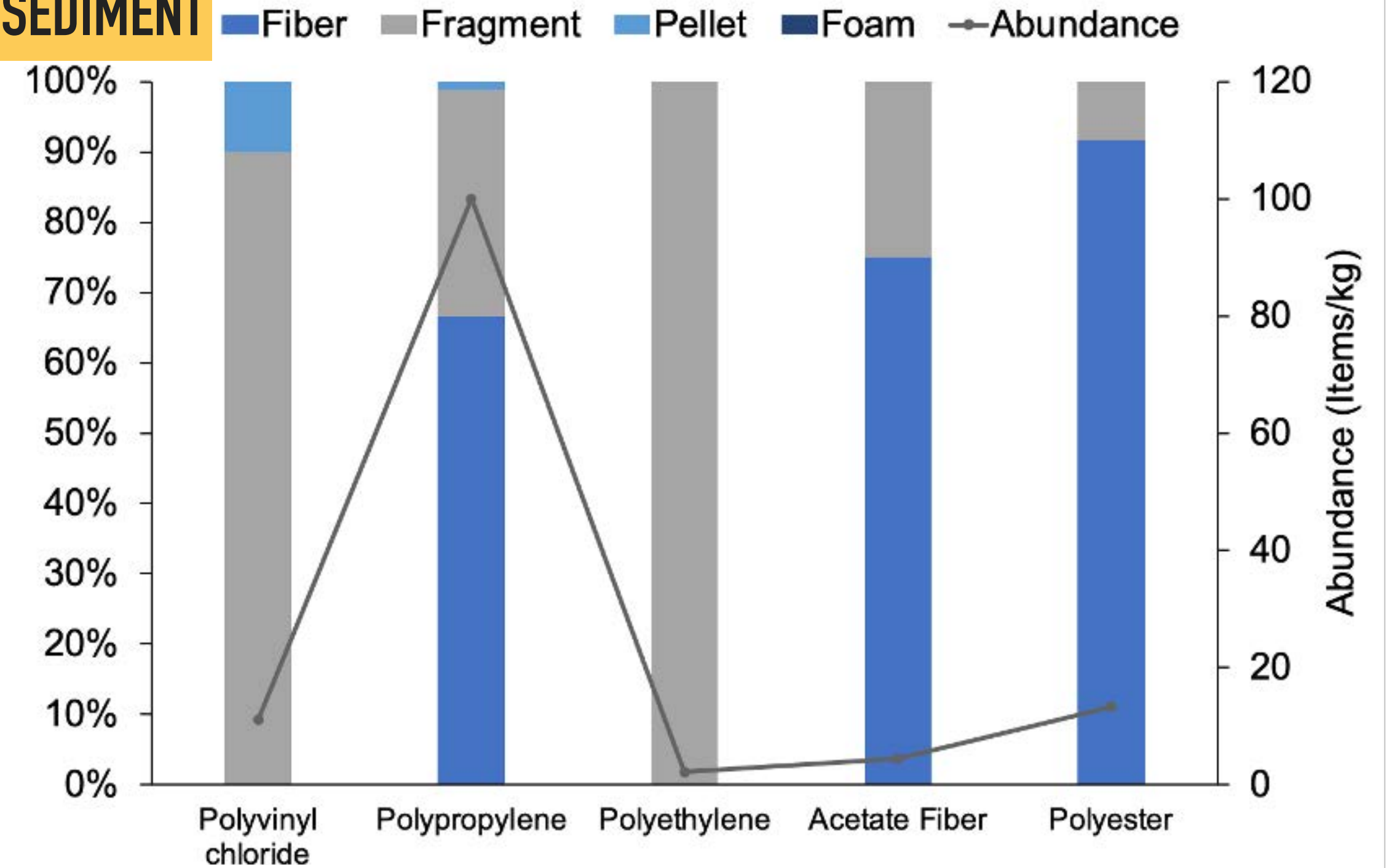


SEDIMENT

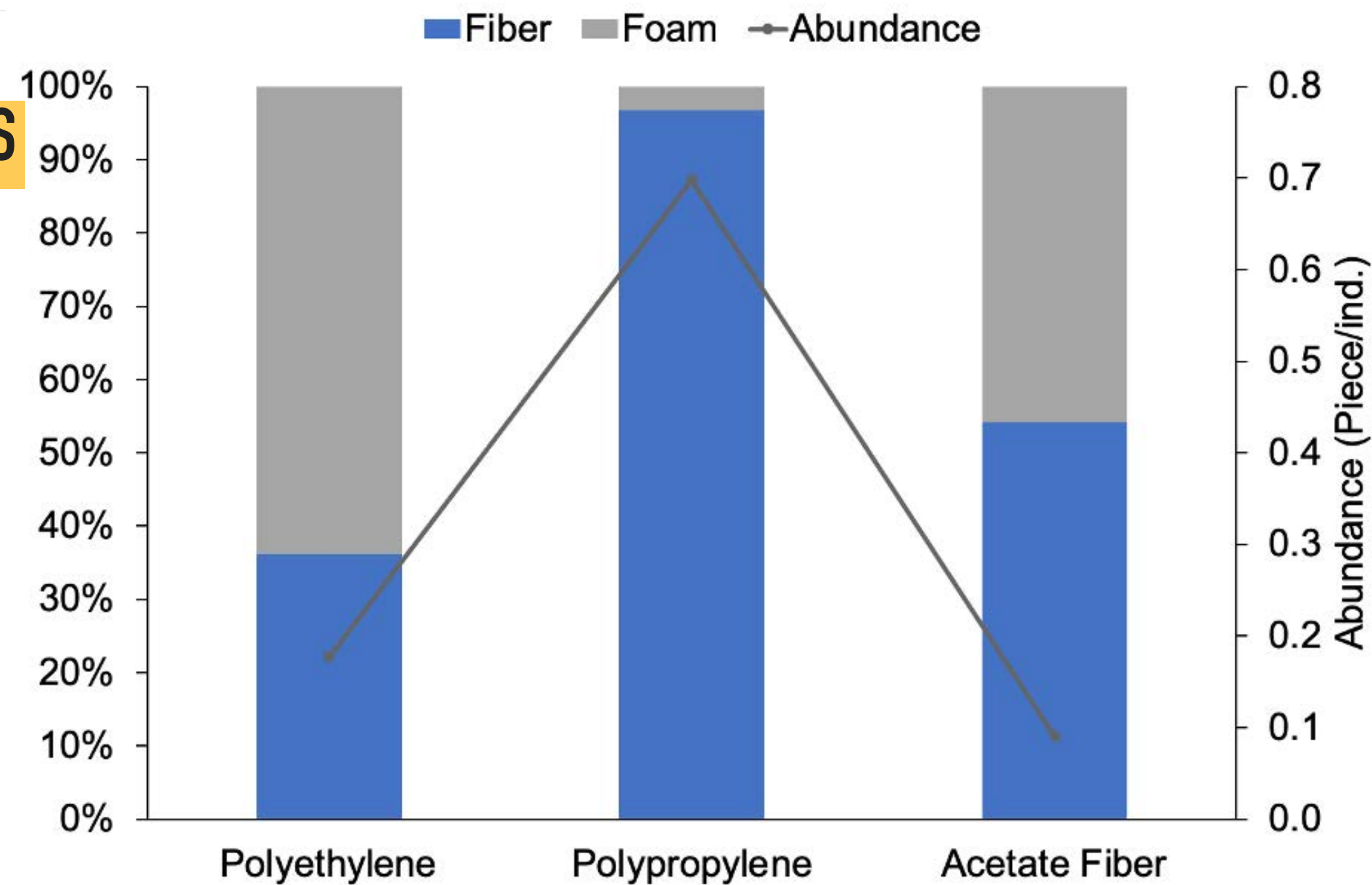
WATER



SEDIMENT



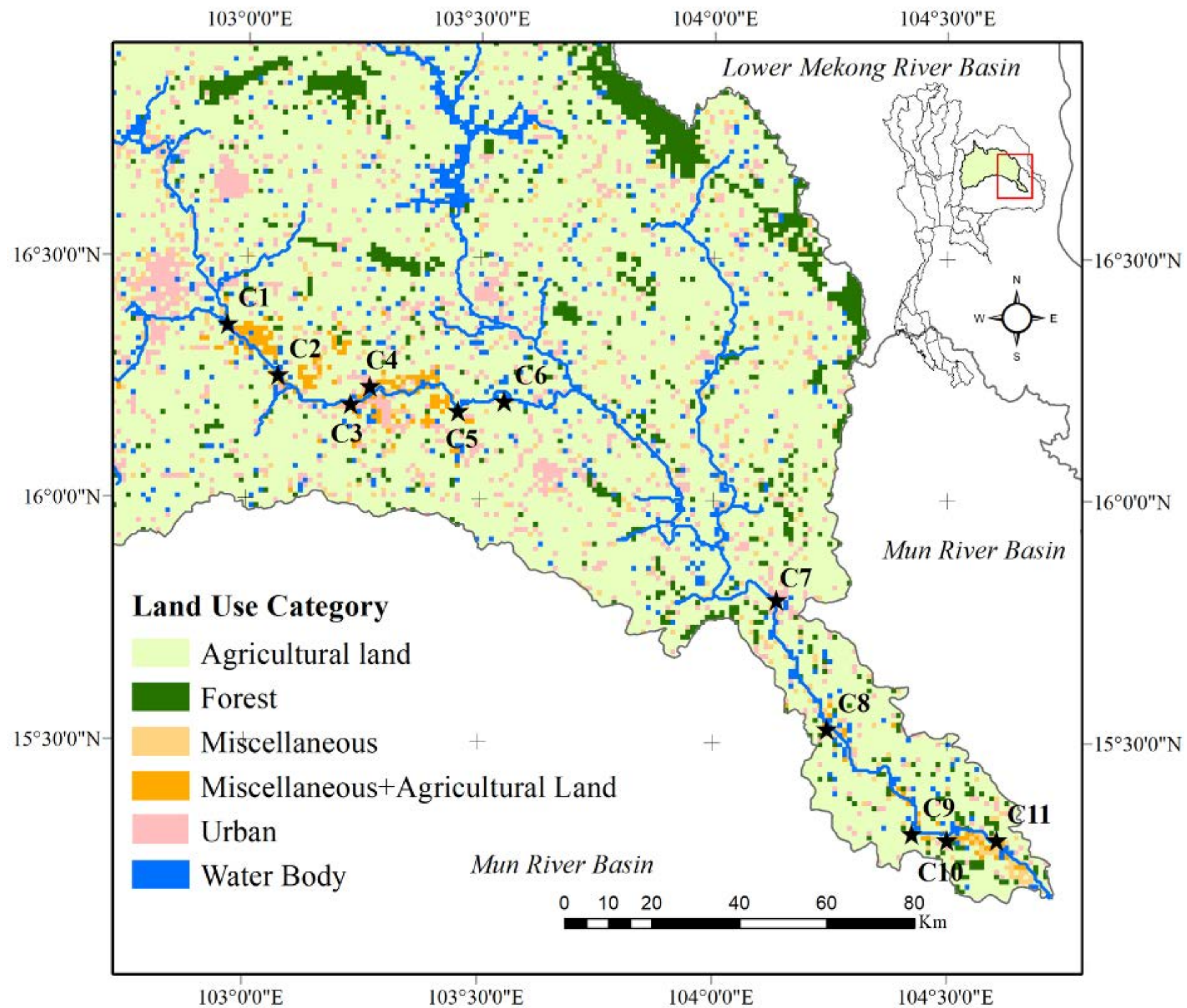
ARTHROPODS

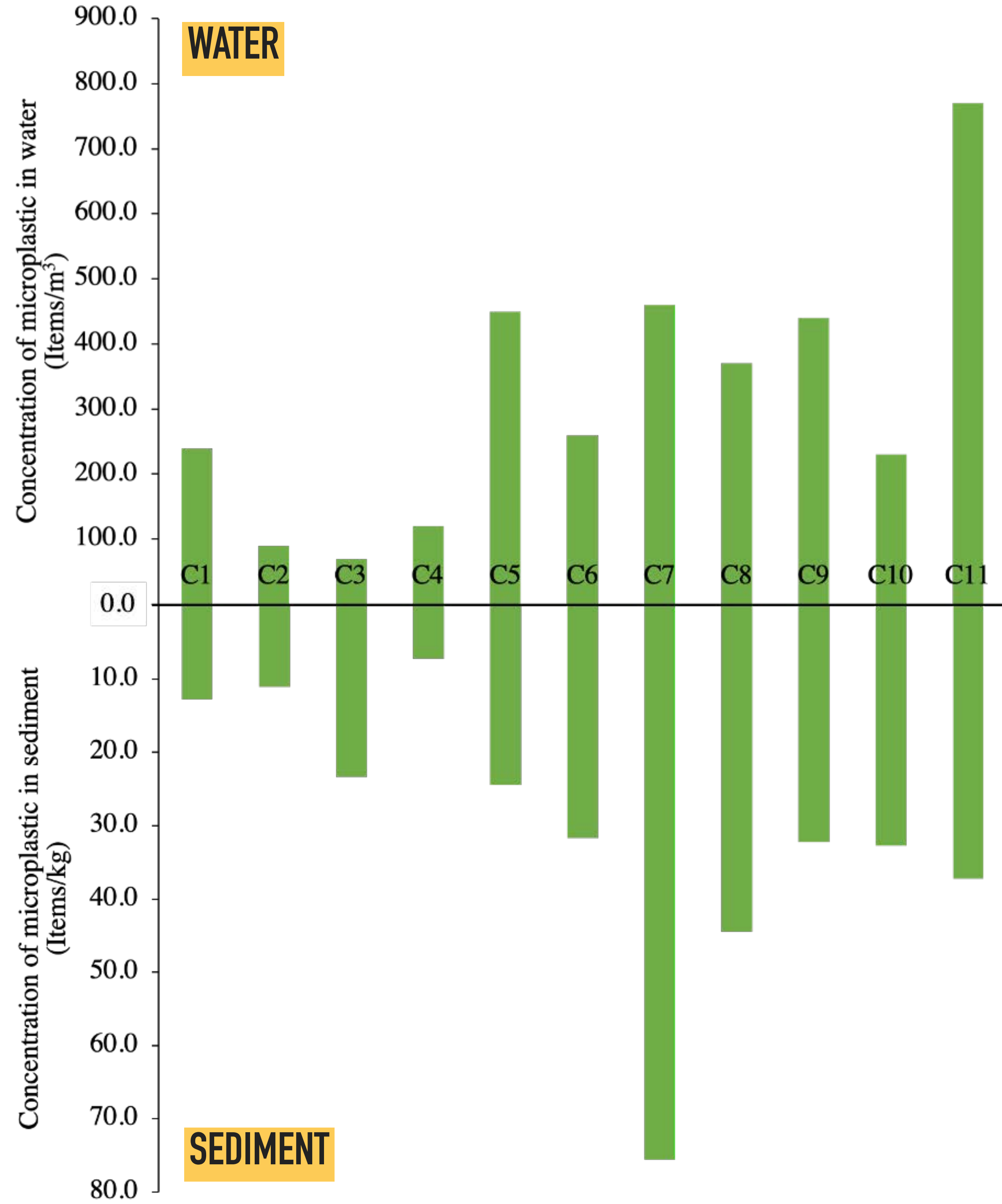


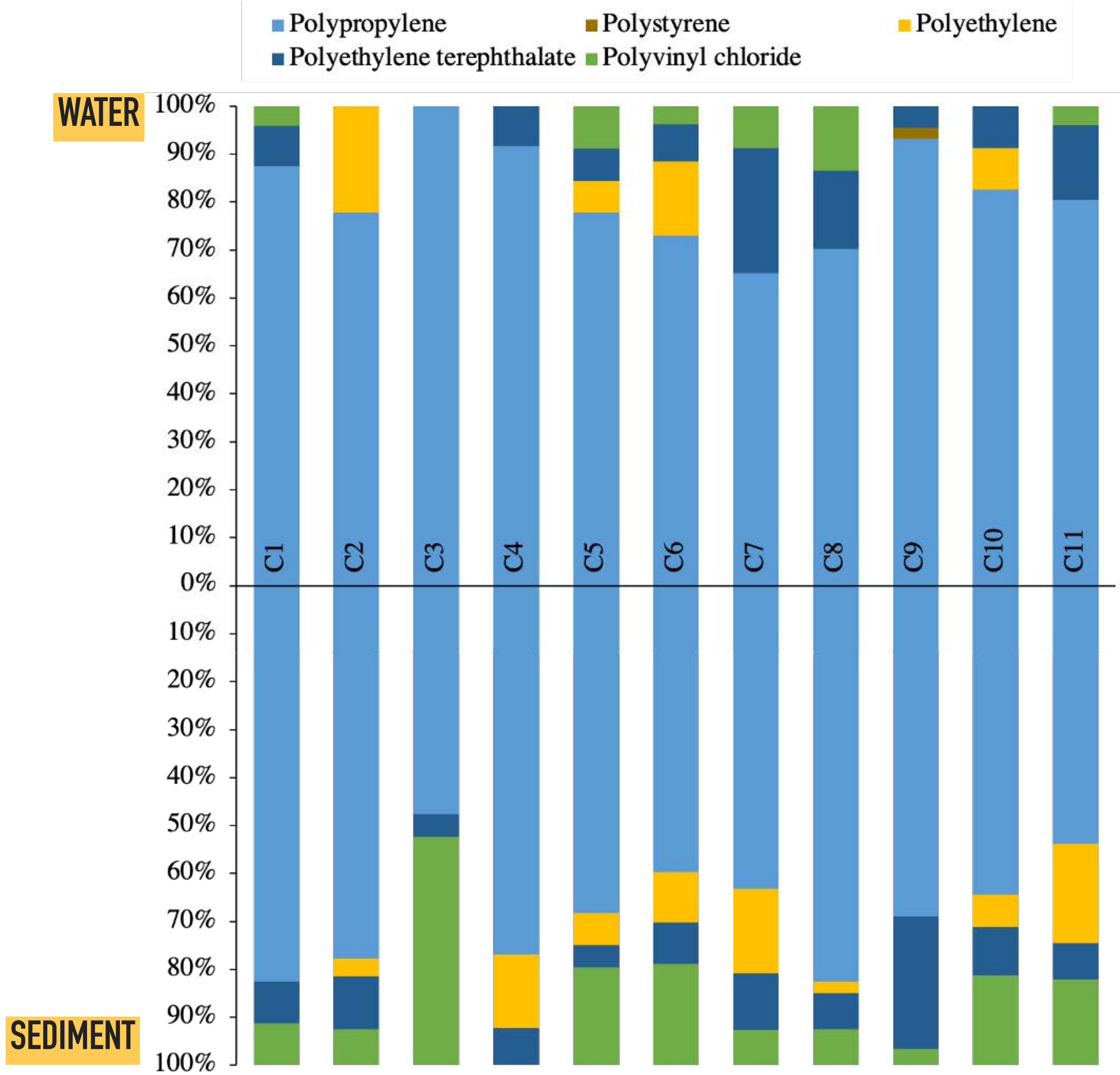


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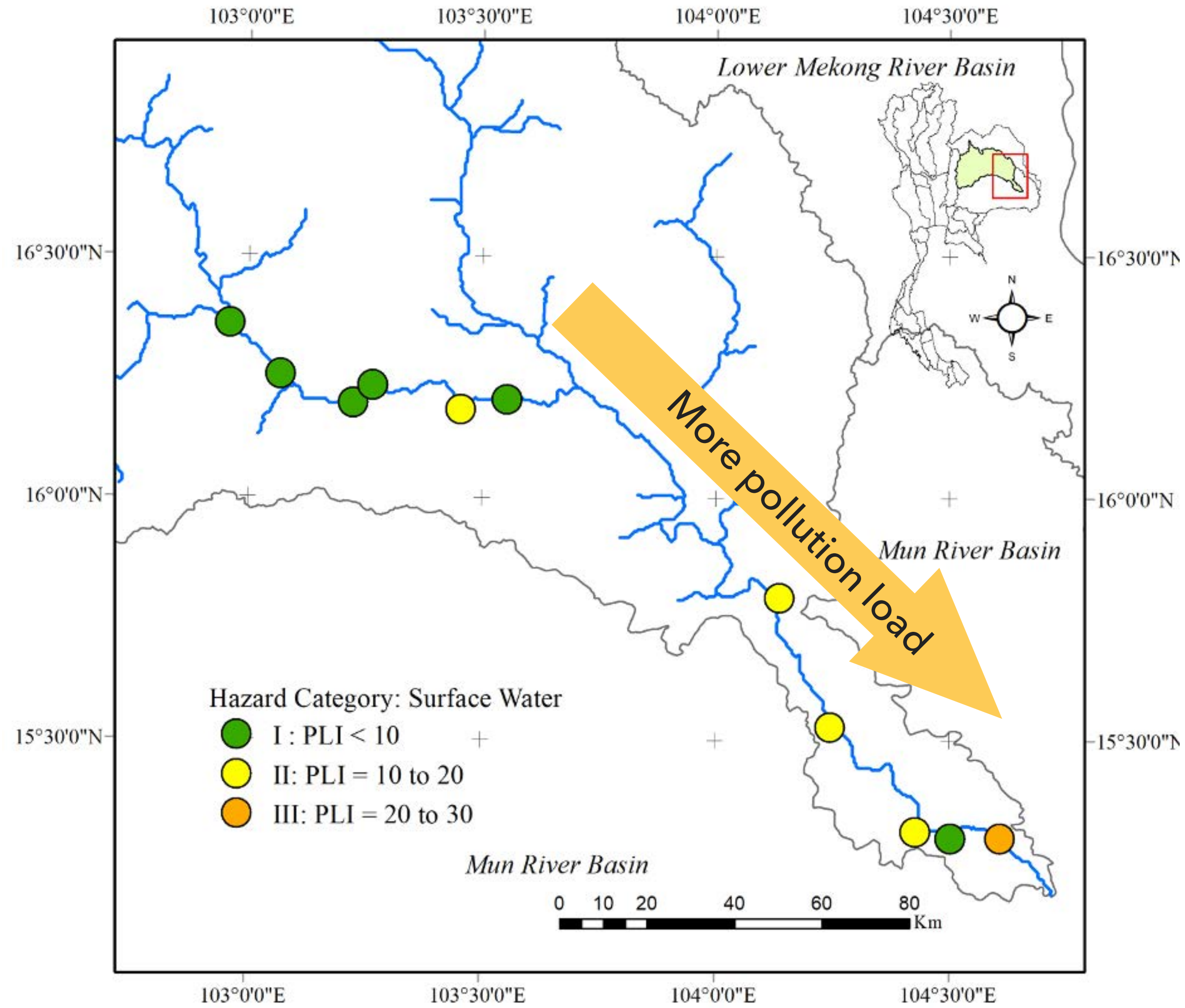
LOWER CHI RIVER



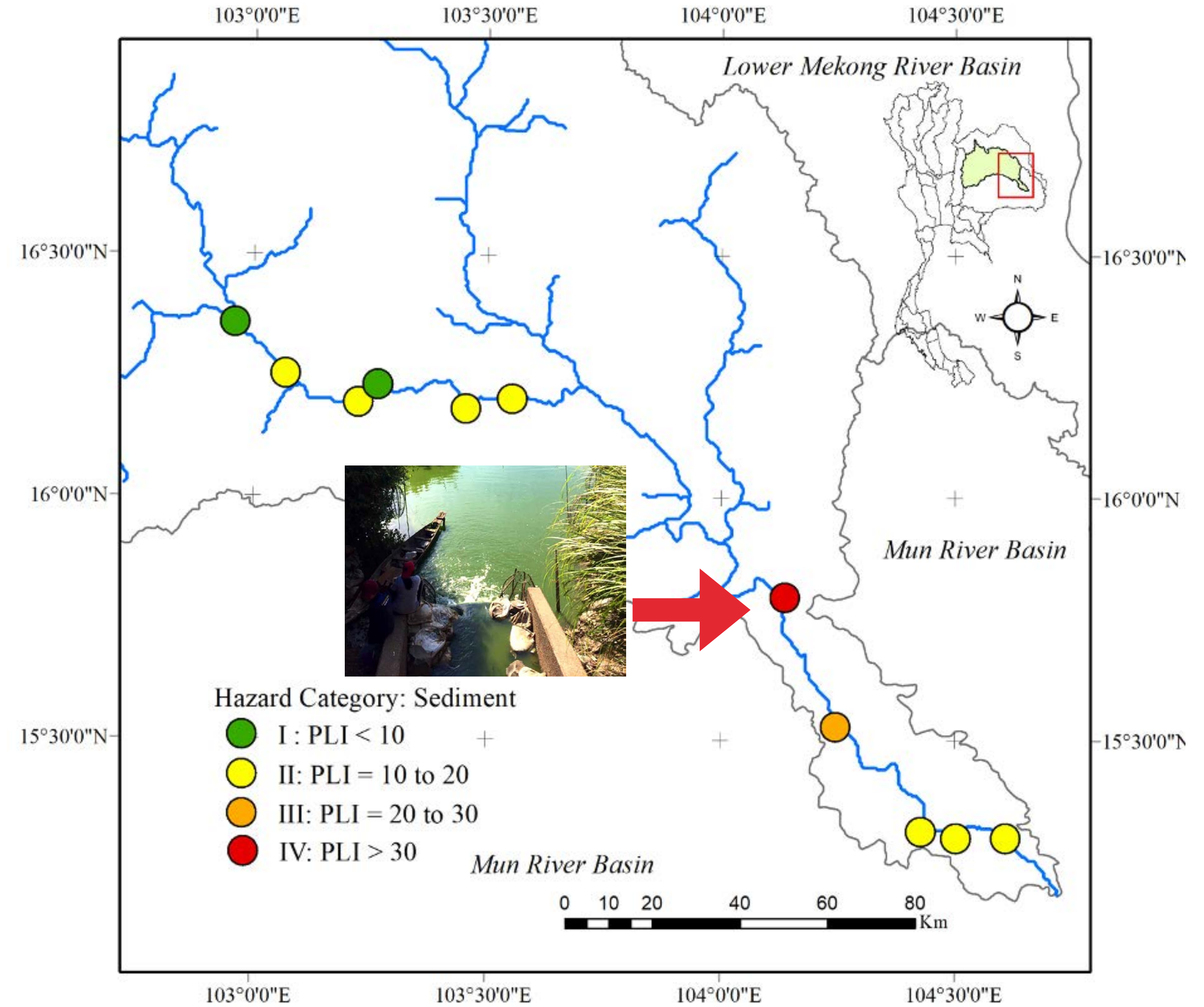




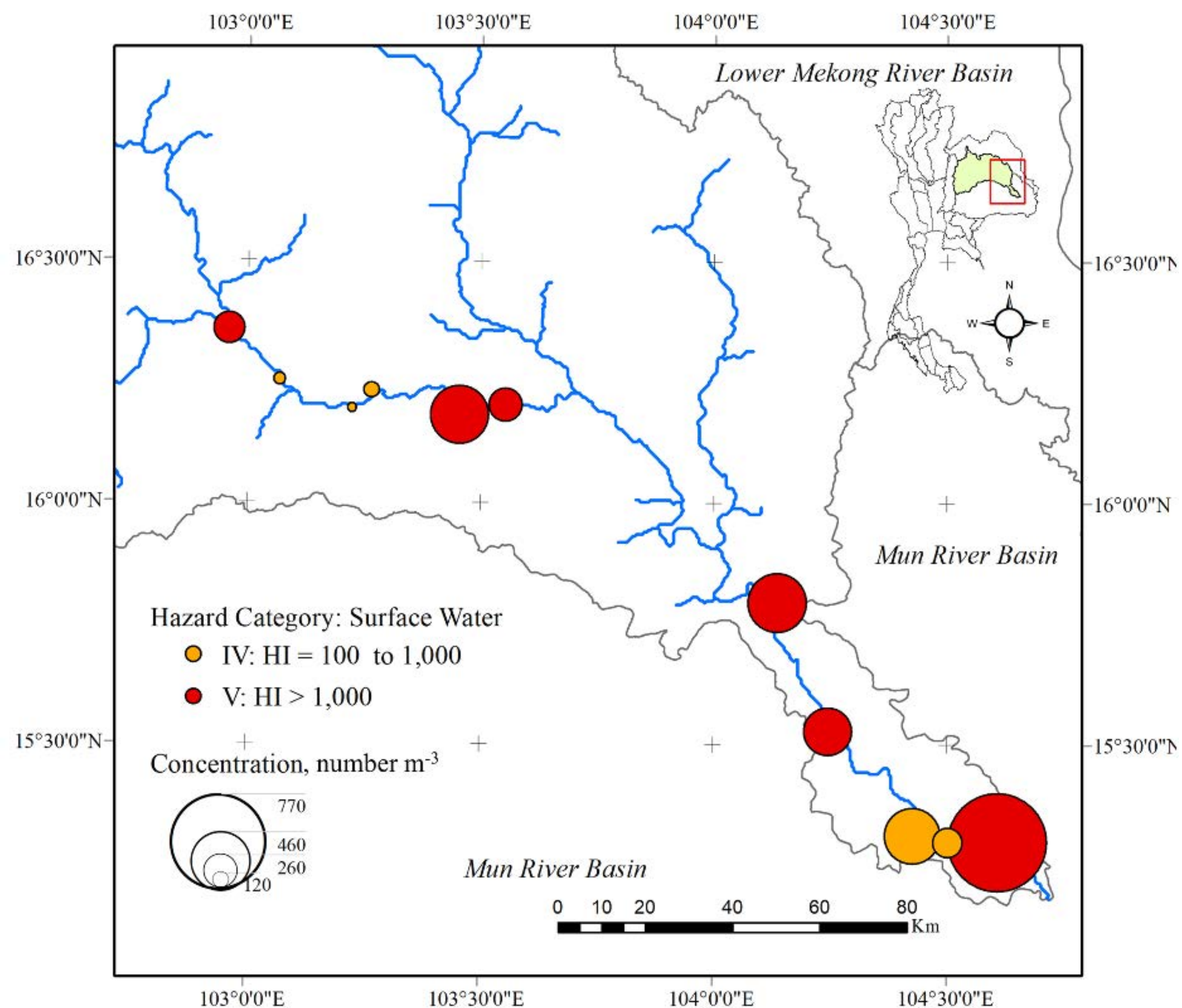
WATER



SEDIMENT

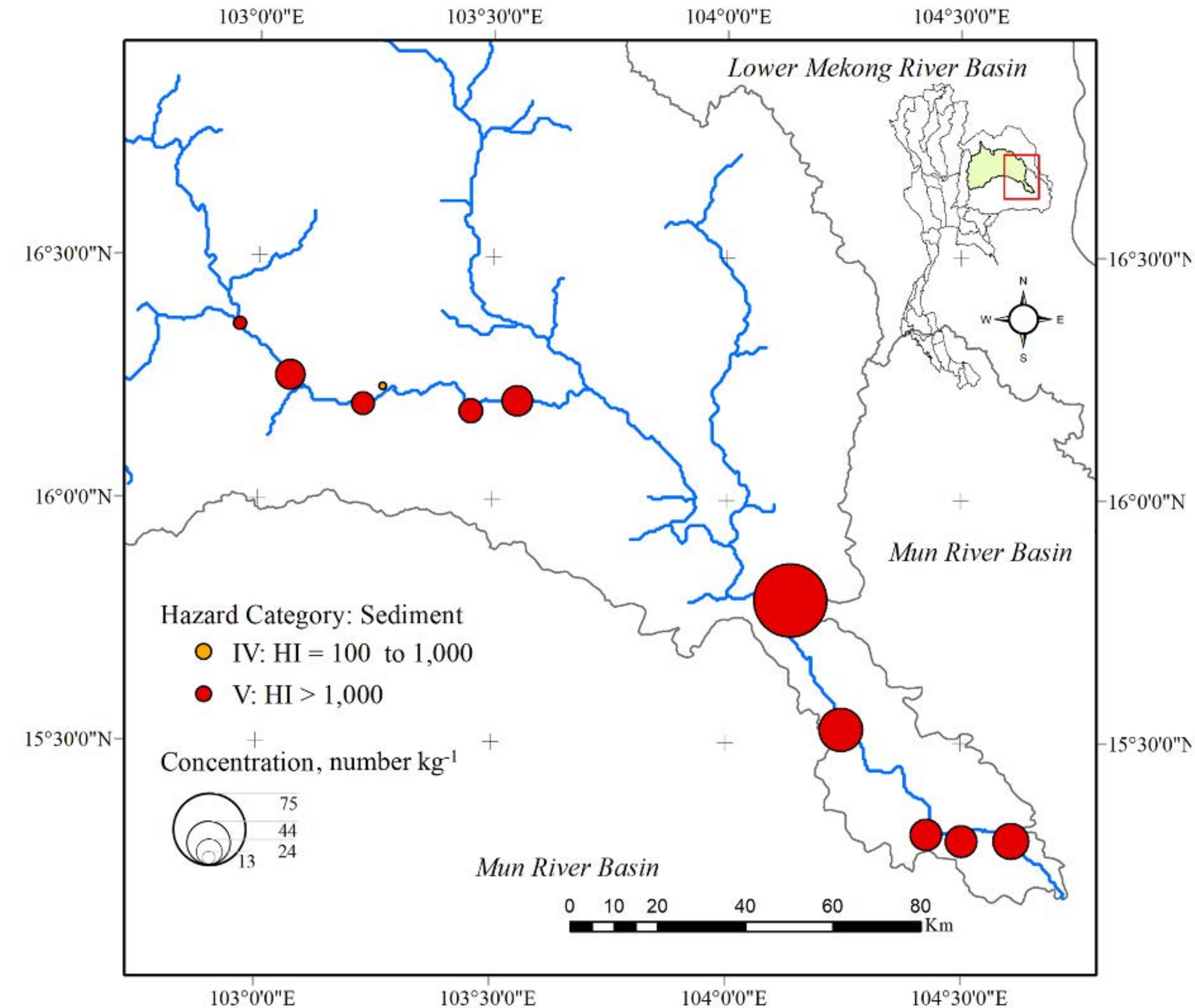


WATER



Large global production of monomer with hazard level V – phenol formaldehyde resins, unsaturated polyester, polycarbonate, polymethyl methacrylate and urea-formaldehyde resin. (Lithner et al., 2011)

SEDIMENT



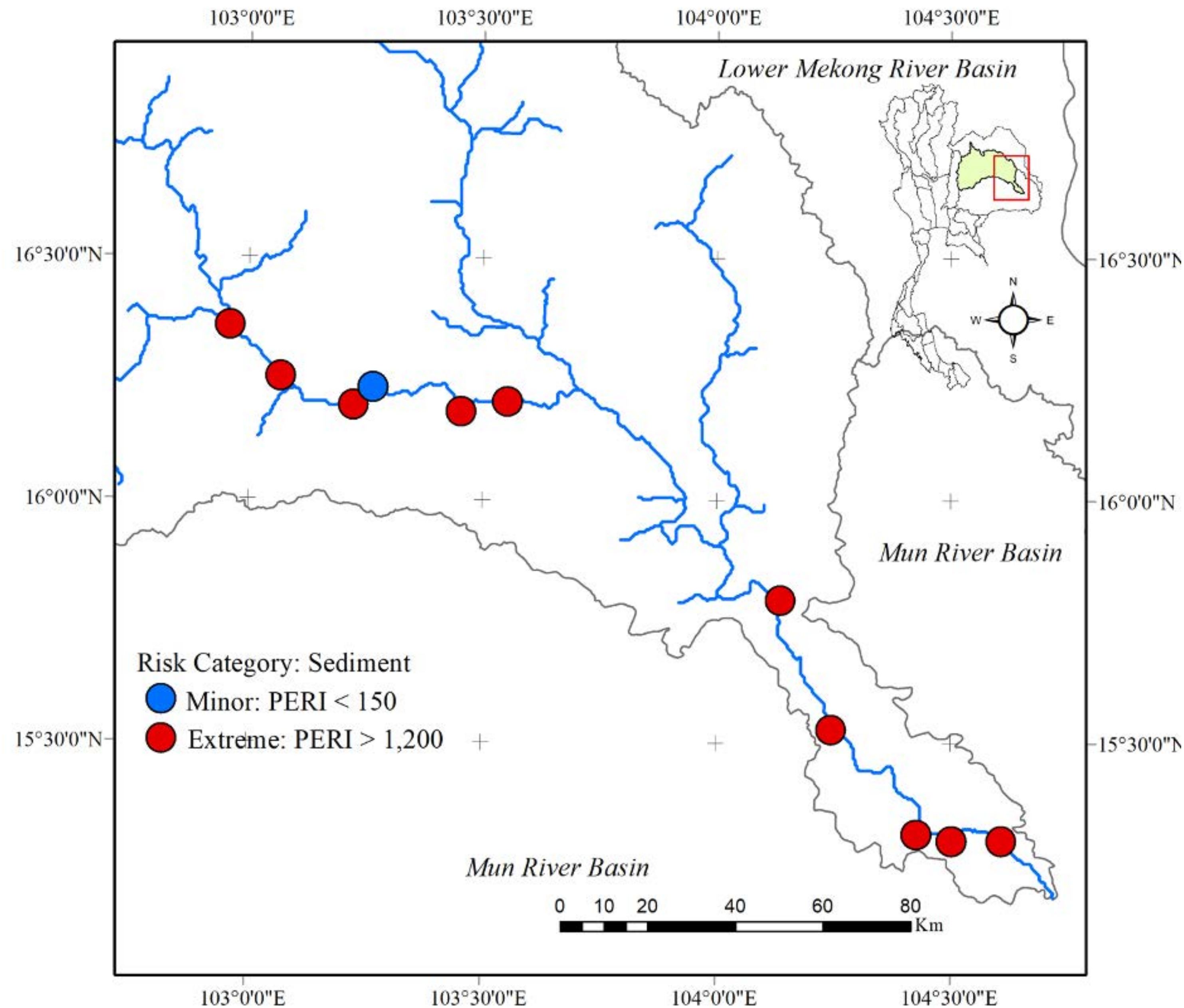
Hazard category V

Germ cell mutagenicity (cat. 2)
Acute toxicity (cat. 1A; 1V)
Respiratory/skin sensitization (cat. 1)
Specific target organ toxicity (cat. 10)
Hazardous to the aquatic environment (chronic cat. 1; 4)

Hazard category IV

Carcinogenicity (cat. 2)
Reproductive toxicity (cat. 2; lact)
Acute toxicity (cat 3.0 oral; dermal; inhalation)
Skin corrosion/irritation (cat 1A.; 1B; 1C)
Serious eye damage (cat. 1)
Hazardous to aquatic environment (acute cat. 1; chronic cat. 2)

SEDIMENT



Microplastic is a threat to aquatic ecosystem.

Policy makers should consider the ecological risk of MPs in sediments along Chi River and other surface water and strict regulations should be in place.

MICROPLASTIC ACCUMULATION IN LANDFILL

Hazard compound using non-targeted and targeted analysis

Fate in the environment





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Webinar on Building partnership against plastic pollution

THANK YOU

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