

POPs in the Sediments and Mud Shrimps at the Changhua Coastal Wetlands

Huaizhe Lu, Lindy Zeng

Presenting study:

Occurrence and distribution of anthropogenic persistent organic pollutants in coastal sediments and mud shrimps from the wetland of central Taiwan

Authors:

Shagnika Das, Andres Aria, Jing-O Cheng, Sami Souissi, Jiang-Shiou Hwang, Fung-Chi Ko

Objective:

- Investigate the spatial and temporal **distribution of several POPs in sediments and mud shrimps** at the Changhua coastal wetlands.
- Identify the possible **sources of POPs**.
- Assess the potential **ecological risks to benthic organisms**.

Method:

Collecting and analyzing samples of sediments and mud shrimps.

Sample collection

Location

Changhua coastal wetlands

Sample time

Sep. 2017 (wet) and Jan. 2018 (dry)

Sampling POPs

- PAHs
- PBDEs
- OCPs (DDT and HCB)
- PCBs

Sampled objects

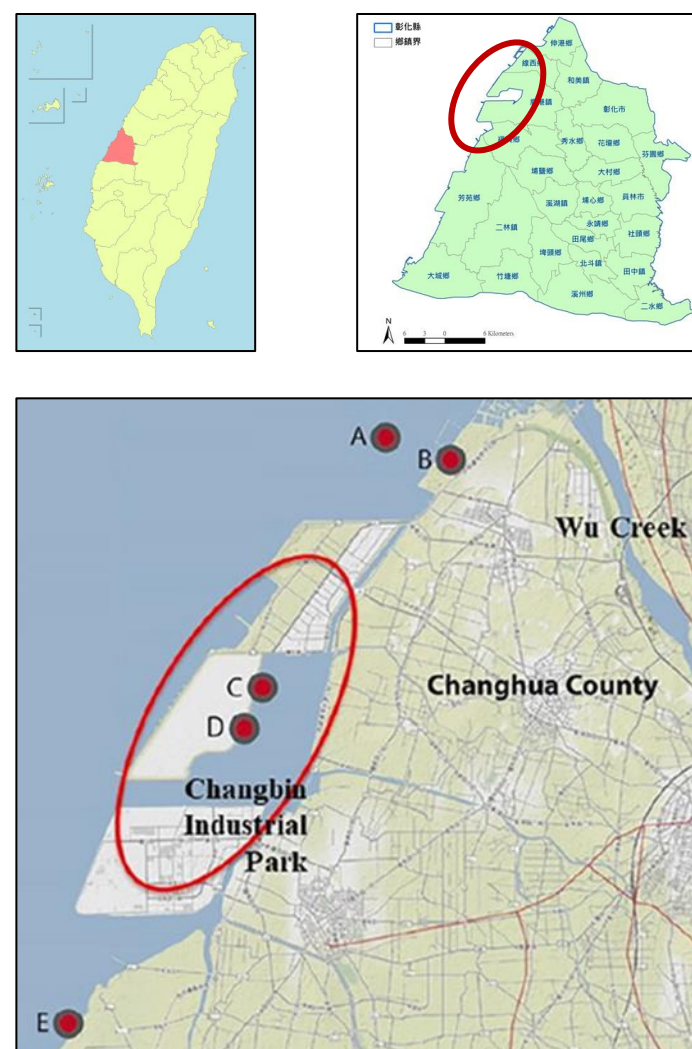
Sediment and mud shrimps

Sample stations

- A. Conservation area
- B. Conservation area
- C. Coastal industrial park
- D. Coastal industrial park
- E. Hanbao Wetland

Sample sediment depth

0, 25, 50 cm



Results

POPs concentration in sediment (table 1)

- Proximity to the industrial park** determines concentration size.
- Pollution level lower than Effect Range-Low → **rarely causes detrimental impact**.
- Mud shrimp absence at the most contaminated sites → **marginal impact of POPs?**

Bioaccumulation effect (table 2)

- Mud shrimps present only **at the least polluted stations** (A and E).
- POPs bioaccumulation at **A significantly lower than E** → effect of conservation effort?

POPs sources

- PAHs:
 - C and D: petrogenic
 - A and B: gasoline, coal combustion
 - B and E: coke + diesel combustion
- PCBs:
 - Aroclor 1016
 - Aroclor 1260
- DDT: DDT > DDE/DDD → recent input
- PBDEs:
 - BDE-209 → most abundant (85–90%)

Table 1. Comparison of POP concentrations in the sediments (ng/g dw) and the effect range—low

	A	B	C	D	E	ERL
PAHs	58.42	99.2	238.93	254.38	41.80	4022
PCBs	0.25	0.73	2.07	1.75	0.07	22.7
DDTs	0.06	0.16	0.67	0.79	0.06	1.58

Table 2. Concentrations and bioaccumulation factors of POPs in mud shrimps

	PAHs	PCBs	PBDEs	DDTs
Concentration (ng/g)				
A	61.9	0.5	1.2	0.4
E	94.1	3.9	2.2	1.1
Bioaccumulation factor (Concentration in organism / concentration in sediment)				
A	1.1	1.9	0.5	6.2
E	2.3	54.6	0.9	17.3

Supplementary information

Changhua coastal wetlands

- Mudflat ecosystem – rich biodiversity
- Visited by various endangered migratory birds
- Home to Formosan fiddler crabs and mud shrimps



Saunders's gull and Far Eastern curlew
Source: Changhua Coast Conservation Action



Mud shrimp
Source: Taiwan Ocean Conservation Administration

Mud shrimps

- Only live in tunnels in mudflats
- Feed through filtering water
- High economic importance
- Threat: over-capturing, habitat loss, pollution

POPs

POPs	Usage	Harm
PAHs	Plastics, dyes etc.	Cancer, tissue disease
PCBs	Insulators, electrical equipment etc.	Nervous, endocrine system, reproduction
OCPs	Fireworks (HCB), insecticides (DDT)	Nervous system, liver, epilepsy
PBDEs	Fire retardant, fire-proof material	Nervous system, kidney, liver

Changhua Coastal Industrial Park

- Industries involving POPs: textile, plastic, chemical, metal, metal hardware, solar energy, steel, machine, recycling etc.
- POPs are easily emitted through uncaredful management of industrial wastes.

Sources

Das, S., Aria, A., Cheng, J. O., Souissi, S., Hwang, J. S., & Ko, F. C. (2020). Occurrence and distribution of anthropogenic persistent organic pollutants in coastal sediments and mud shrimps from the wetland of central Taiwan. PLOS ONE, 15(1), e0227367.
Agency for Toxic Substances and Disease Registry
Changhua Coastal Park Service Center
Changhua Fishers Association
Taiwan's Ramsar Citizen