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Reflections from the Filthy Mud: Environmental Wisdom and Coastal Pollution in Industrial Corridors

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Abstract

This paper is a reflective synthesis of long-term environmental monitoring and personal experience from two of Malaysia's most polluted coastal ecosystems: Kuala Juru in Penang and Kg. Pasir Puteh in Southern Johore. Drawing upon empirical evidence collected in 2004 and 2005 on elevated levels of heavy metals in mussels (*Perna viridis*) and surface sediments, this narrative integrates ecological data with moral teachings expressed through proverbs from Hindu, Malay, Chinese, and English traditions. Despite being published in high-impact journals, such as *Marine Pollution Bulletin*, the findings were met with indifference from policy authorities. This paper explores the emotional toll of environmental science unheeded, and seeks to reframe pollution as not just an ecological crisis, but a spiritual and ethical failure. Each section reflects upon the polluted landscapes through the lens of ancient wisdom, as an urgent reminder that science, culture, and morality must converge in the face of environmental degradation.

Keywords: Coastal Pollution; Environmental Ethics; Cultural Proverbs; Ecological Grief

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Introduction: Between Science and Sorrow

Back in 2003, when I was first appointed as an academician in a Malaysian university, the air was filled with hope, passion, and an unshakable sense of mission. The corridors echoed with ideals, and one slogan in particular often caught my eye, namely *"Cintailah Sungai Kita!" (Love Our Rivers!)*. It wasn't just a motto; it felt like a calling.

It was during the early 2000s that I began my journey documenting the state of Malaysia's industrialized coastal waters. Armed with curiosity, scientific training, and the eager hands of my students, we ventured to places often ignored; Kuala Juru in Penang, near the heavily active Juru Industrial Area (Figure 1), and Kg. Pasir Puteh in Johore, tightly wrapped in the embrace of the Pasir Gudang industrial belt (Figure 2). These were not glamorous sites. They were muddy, polluted, neglected. But to us, they were sacred classrooms, places where nature whispered truth, and we were there to listen.

What we uncovered was unsettling. Our collection of molluscs and surface sediments revealed consistent patterns of heavy metal contamination. Mussels and bottom sediments bore the unmistakable fingerprint of industry: alarmingly high levels of Copper (Cu), Cadmium (Cd), Lead (Pb), Nickel (Ni), and Zinc (Zn), are toxic metals that silently accumulate and poison over time (Yap et al., 2002; 2003a; 2003b; 2004a; 2004b) [1-5]. These were not just data points or academic exercises. These were distress signals from the ecosystem, quietly screaming through tissue concentrations and sediment profiles.

Each result felt like a page from a prophecy. We weren't merely reporting contamination; we were witnessing a betrayal of the natural trust. Every mollusc, every core of sediment we analyzed, was a testimony to neglect. These were not "samples"; they were wounds. And as we wrote our findings into publications, I often paused, not out of doubt, but out of sorrow. These numbers should have moved policies, stirred authorities, protected communities. But too often, they were buried in reports, filed away from action.

My early academic years were supposed to be filled with joy, and they were. But they were also laced with grief. The rivers and estuaries I loved were bleeding, and I was documenting their slow death. And I still remember those field days clearly, not as scientific triumphs, but as ethical reckonings.

This reflective paper aims to document and re-express, through both scientific evidence

and cultural wisdom, the long-term environmental degradation observed in two heavily industrialized coastal regions of Malaysia, namely Kuala Juru in Penang and Kg. Pasir Puteh in Johore. By integrating personal field experience, published research findings, and philosophical proverbs from English, Malay, Chinese, and Hindu traditions, this piece seeks not only to recount the ecological and human consequences of persistent heavy metal pollution but also to evoke moral and emotional awareness among policymakers, researchers, and the public. Ultimately, it strives to inspire a deeper sense of environmental accountability and urgent action grounded in both science and ethical stewardship.

Kuala Juru: The Betrayed Trust of Nature

English Proverb: We do not inherit the earth from our ancestors; we borrow it from our children

In 2005, at Kuala Juru jetty, we witnessed plastics, oil residues, and chemical sludge embedded in the estuarine mud. Our results, published in Yap *et al*., [6], showed elevated levels of Cu (60.9-1019 μg/g), Pb (65.3-1267 μg/g), Cd (1.46-15.9 μg/g), Zn (330-484 μg/g), and Ni (47-121 μg/g) in sediments near active industrial zones.

In Kuala Juru, that trust has been profoundly violated. The landscape captured in Figure 1 does not merely document a polluted site, it chronicles a betrayal of generations. The Juru River, once a lifeline, now appears shackled by sludge and blackened effluent, choked by plastic refuse and contaminated silence. Figure 1A shows a steel bridge that perhaps once channelled life, whether water or gas or utility, but today looms over a river turned rust-brown, with death flowing beneath what should have been a symbol of connection. In Figure 1B, the water hyacinths growing wildly at a drainage outlet are not signs of resilience, but rather messengers of imbalance, the plants thriving on nutrient overload from untreated industrial discharge. Their lushness hides decay.

This systemic abuse, as highlighted by Yap *et al*., [7], mirrors the catastrophe of Sungai Kim Kim, where improper industrial waste disposal in March 2019 caused widespread illness, panic, and distrust. The passive stance of regulatory bodies is akin to a shepherd watching wolves descend without raising alarm. We echoed then, and repeat now, that science without governance is a silent accomplice to ecological crimes. The English proverb reminds us that we do not inherit the earth but borrow it from our children; when that stewardship is breached, it becomes a debt owed not only in policy but in the nation's conscience.

Malay Proverb: *Alam terkembang menjadi guru* ("Nature is the unfolding teacher")

What more did we need to see? Nature was not silent; it shouted. Figure 1C–F shows a shoreline strewn with garbage, oily patches, floating refuse, and toxic sludge. Each scene is a failed exam in our moral education. In Figure 1C, the juxtaposition of a man walking past heaps of waste beside a jetty is haunting. The lesson here is loud: economic survival is forced to coexist with ecological decay. Kuala Juru becomes a grim lecture hall where lessons are taught not with words, but with blackened water and rotting waste.

In Figure 1D, the water's surface carries a floating manuscript of ignorance; plastic wrappers, decomposing food containers, and chemical residue. Figure 1E shows a researcher lifting a chunk of black sediment, as if lifting a portion of a grave. This is not soil; it is the diary of sins deposited year after year by industries unchecked. The mud is no longer earth, but memory, that etched in hydrocarbons, heavy metals, and human indifference. Studies by Yap *et al*., [1-5] have shown the recurring presence of elevated concentrations of Cu, Pb, Zn, and Cd in sediments and mussels along the west coast of Peninsular Malaysia, especially in the Straits of Johore and areas like Juru.

Figure 1: Sampling sites at Juru River (A and B) and Kuala Juru Estuary (C–F), located near the Juru Industrial Area in Penang, Malaysia, photographed on 20th April 2005. These images reflect the alarming level of industrial and domestic pollution encroaching into ecologically sensitive estuarine and riverine zones.
(A): Juru River viewed from a steel utility bridge, likely supporting metal or water pipelines. The adjacent factory infrastructure and reddish-brown turbid water suggest industrial runoff affecting the river's health.
(B): Outfall drain discharging stagnant, murky water heavily clogged with water hyacinth (*Eichhornia crassipes*), signifying eutrophic conditions likely due to high nutrient load from untreated effluents.
(C): The Kuala Juru estuarine jetty area, covered with solid waste debris such as plastic sheets and domestic trash. A lone individual walks toward small fishing boats, highlighting the tension between livelihood and pollution.
(D): A close-up of the estuarine water surface, showing a thick accumulation of floating plastic bags, wrappers, and organic refuse—evidence of chronic solid waste mismanagement.
(E): A black, tar-like sediment sample being collected from the polluted shore, with oil-slicked debris and industrial waste evident in the background. The viscosity and color suggest hydrocarbon contamination.
(F): Shoreline at low tide showing a thick, oily layer covering the muddy substrate. Mixed with plastic refuse and decomposing matter, the site reveals severe ecological degradation and sediment toxicity.

Chinese Proverb: 勿以恶小而为之，勿以善小而不为 ("Do not think any evil is trivial, and therefore ignore it; do not think any good is minor, and therefore neglect it")

The Kuala Juru disaster did not happen in a day. It was the sum of a thousand ignored small wrongs. Each pipe that discharged without treatment. Each oversight waived in the name of growth. Each fisherman who suffered silently. Each plastic bag tossed and never retrieved. Every little sin, when accumulated, became sludge. Every little good that could have been done, but wasn't, allowed this suffering to grow.

Figure 1F, where polluted sludge clings to the foot of a pier, is the symbolic footprint of our negligence. The earth beneath us is soaked not only in oil but in collective guilt. The environment may not speak with a voice, but it records with precision.

But there is still time. Kuala Juru's tears are also prayers for renewal, if we listen, act, and redeem. Let our policies not be posthumous tributes to lost rivers, but living covenants with the ecosystems that sustain us. Environmental protection cannot be a footnote in industrial policy; it must be the foundation. Let the Figure 1 not just be illustrations in a paper, but windows into responsibility. And let the proverbs not just adorn this section, but guide our next decisions.

Kg. Pasir Puteh: A Crisis Foretold

Chinese Proverb: 竭澤而漁，焚林而猎 ("Drain the pond to catch fish; burn the forest to hunt")

By 2019, in the same vicinity, a chemical disaster occurred at Sungai Kim Kim, highlighting that the signals we had long documented had not translated into preventive policy. The 2019 incident was later evaluated against historical scientific data in our review [7], confirming that the long-standing warnings had indeed gone unheeded. That paper argued emphatically that *merely reporting scientific findings without action is equivalent to complicit silence*. Similarly, in Telok Jawa, we saw mussel aquaculture grounds nestled just meters from super oil tankers, a juxtaposition both ironic and tragic. These landscapes still haunt me.

Our earlier comparative work [8, 9] between Tanjung Piai Wetland and Kg. Pasir Puteh had already shown that while the former remained relatively pristine and qualified for sanctuary protection, the latter had significantly elevated heavy metals that exceeded Sediment Quality Criteria. Tanjung Piai remains a contrast to what Kg. Pasir Puteh has lost.

Adding to this, our recent findings [10] demonstrated that bioavailability of copper was significantly higher in edible mussels (*Perna viridis*), snails (*Telescopium telescopium*), and horseshoe crabs (*Carcinoscorpius rotundicauda, Tachypleus gigas*) collected from Kg. Pasir Puteh. The sediment data and tissue analyses confirmed nonresistant geochemical forms of heavy metals in the area, reinforcing Kg. Pasir Puteh's classification as a high-risk industrial effluent receiving site.

Kg. Pasir Puteh was never a mystery but it was a mirror. A mirror of decades of industrial excess, of marine exploitation, and of political apathy. Figure 2 is not merely a gallery of sites but it is a funeral portrait of foresight extinguished. Figure 2A and Figure 2B reveal a bustling estuary hemmed in by vessels and rigs, nestled in the Pasir Gudang industrial zone. These were not signs of prosperity but omens of peril. What seemed like economic lifeblood was in fact ecological hemorrhage.

As early as Yap *et al*., [5], and consistently echoed through later studies [7-10] , the data told us plainly: metal concentrations in mussels, snails, and horseshoe crabs in this area were alarmingly high, especially for Cu, Pb, Zn, and Cd. The muds and waters of Kg. Pasir Puteh were no longer nourishing. They were accumulating secrets, which are dark, metallic secrets. Yet, we drained the pond for every last fish. We burned the forest of resilience for short-term yield. And in return, we silenced generations of marine life.

Malay Proverb: *Seperti kerakap tumbuh di batu, hidup segan mati tak mahu* ("Like ferns growing on rocks; barely living, unwilling to die")

Figure 2C and Figure 2D of Figure 1 paint this reality vividly. The river snakes past factories, its banks marked with discharge outlets, silty sludge, and murky stillness. This is not a flowing river; this is a dying breath. The oily film and grey slicks seen in Figure 2D confirm what we had warned for years, that untreated or semi-treated effluents had been allowed to mingle with mangroves and fisheries, with no consequence except to nature. This was not environmental management; it was abandonment dressed in policy language. We scientists had published and pleaded, but our voices drowned in boardrooms and budget meetings.

Figure 2: Sampling sites at Kg. Pasir Puteh and surrounding areas along the eastern Straits of Johore, Malaysia, as photographed during fieldwork on 12th August 2004.
(A): Jetty at Kg. Pasir Puteh with local fishing boats docked near residential stilt houses. The visible degradation and proximity to industrial activity highlight the direct human-environment interface.
(B): Mussel aquaculture platforms and a large red offshore oil vessel stationed dangerously close to Kg. Pasir Puteh, indicating conflicting use of marine space between heavy industry and food production.
(C): The narrow, heavily channelized river at Pasir Gudang Industrial Area, lined with mangroves and oil refinery tanks. This site was sampled for both water and sediment, representing a direct effluent input zone.
(D): A stagnant and polluted river stream at Pasir Gudang with visible oily films and sediment discoloration. This photo captures the disturbing aesthetic and ecological damage caused by industrial discharge.
(E): Industrial skyline and offshore infrastructure at Senibong, with numerous cargo cranes and factory chimneys silhouetted against the haze. It marks the broader industrial belt influencing marine water quality downstream.
(F): Close-up of a massive red oil tanker docked at Kg. Masai, a critical site illustrating the scale of petrochemical shipping activity directly adjacent to traditional coastal fisheries and human settlements.

The mussels and horseshoe crabs, studied in Yap *et al*., [10], were not just bio-accumulators, they were messengers. They absorbed the heavy metals, the poisons, the neglect. Our tissue analyses showed bioavailability of copper and zinc far exceeding safety limits in many samples. The horseshoe crab I held in my hands, though armored, was fragile; its body a relic of a collapsing ecosystem, its survival a question mark. I cried quietly then, not just for a species, but for a broken promise. We were once stewards. We became spectators.

Figure 2E and Figure 2F show the distant industrial horizon, namely Senibong and Kg. Masai, were lined with barrels, ships, and economic activity. These seascapes appear serene from afar. But under that deceptive calm lies contamination, corrosion, and cumulative toxicity. According to Yap *et al*., [8], when comparing

sites near active industrial discharge to relatively unpolluted ones, the difference in heavy metal content in soft tissues of bivalves was stark. Kg. Pasir Puteh consistently bore the burden.

And so, we scientists chronicled a tragedy, like monks copying sacred texts while temples fell to fire. Our data were scrolls of warning, our figures prayers for change. But what use is a warning unheard?

English Proverb: "You can lead a horse to water, but you can't make it drink"

We led them, to whom it may concern, to the evidence. But they chose not to drink from the well of truth. And now the well is poisoned. Kg. Pasir Puteh stands as both a place and a prophecy, a place once teeming with marine life, and a prophecy fulfilled in sludge, sickness, and sorrow.

Let the photos in Figure 2 not be archived but remembered. Let the tears shed by scientists become ink for policy reform. Let the silence of the horseshoe crab become a roar of ecological reckoning.

Emotional Ecology: The Science of Disappointment

Malay Proverb: *Hujan emas di negeri orang, hujan batu di negeri sendiri, lebih baik di negeri sendiri*

Despite numerous publications, including Yap et al. (2002; 2003a; 2003b; 2004a; 2004b; 2006; 2007; 2010; 2019a; 2019b) [1-10], the local agencies remained inert. I remained committed to Malaysia, but the silence was louder than the outcry. Our paper advocated for the "Polluters Pay Principle", and yet, impunity reigned. The weight of each citation I wrote was like a memorial to the rivers lost. I feel both proud and powerless.

Conclusion: Wisdom as Environmental Justice

Chinese Proverb: 前人栽树，后人乘凉 (*One generation plants the trees, another gets the shade*)

Our 2019 review (Yap et al., 2019b) was both a scientific plea and a moral testimony. If we are to ever plant again, it must begin with justice, and the courage to act on evidence. I hope that even if I may never sit beneath the shade of restored waters, the seeds I sowed in these muddy coastlines will bloom for those yet to come. *Selamat Maju Jaya!* (Best of luck!).

References

1. Yap CK, Ismail A, Tan SG, Omar H. Concentrations of Cu and Pb in the offshore and intertidal sediments of the west coast of Peninsular Malaysia. Environ Int. 2002; 28: 467-497.
2. Yap CK, Ismail A, Tan SG. Cd and Zn in the straits of Malacca and intertidal sediments of the west coast of Peninsular Malaysia. Marine Pollut Bull. 2003a; 46: 1348-1353.
3. Yap CK, Ismail A, Tan SG. Background concentrations of Cd, Cu, Pb and Zn in the green-lipped mussel Perna viridis from Peninsular Malaysia. Marine Pollut Bull. 2003b; 46: 1043-1048.
4. Yap CK, Ismail A, Tan SG. Heavy metal (Cd, Cu, Pb and Zn) concentrations in the green-lipped mussel Perna viridis collected from some wild and aquacultural sites in the west coast of Peninsular Malaysia. Food Chem. 2004a; 84: 569-575.
5. Yap CK, Ismail A, Tan SG, Ismail AR. The impact of anthropogenic activities on heavy metal (Cd, Cu, Pb and Zn) pollution: Comparison of the metal levels in green-lipped mussel Perna viridis and in the sediment from a heavy industry site at Kg. Pasir Puteh and a relatively unpolluted site at Pasir Panjang. Pertanika J Trop Agricult Sci. 2004b; 27(1): 73-78.
6. Yap CK, Pang BH, Fairuz MS, Hoo YI, Tan SG. Heavy metal pollution in surface sediments collected from drainages receiving different anthropogenic sources from Peninsular Malaysia. Wetland Science. 2007; 5(2): 97-104.
7. Yap CK, Peng SHT, Leow CS. Contamination in Pasir Gudang Area, Peninsular Malaysia: What can we learn from Kim Kim River chemical waste contamination? J Human Educ Develop. 2019b; 1(2): 1-4.
8. Yap CK, Ismail A, Edward FB, Tan SG, Siraj SS. Use of different soft tissues of Perna viridis as biomonitors of bioavailability and contamination by heavy metals (Cd, Cu, Fe, Pb, Ni, and Zn) in a semi-enclosed intertidal water, the Johore Straits. Toxicol Environ Chem. 2006; 88: 683-695.
9. Yap CK, Edward FB, Tan, SG. Heavy metal concentrations (Cu, Pb, Ni and Zn) in the surface sediments from a semi-enclosed intertidal water, the Johore Straits. J Sustainabil Sci Manag. 2010; 5(2): 44-57.
10. Yap CK, Chew W, Cheng WH, Okamura H, Harino H, Peng SHT. Higher bioavailability and contamination by copper in the edible mussels, snails and horseshoe crabs at Kampung Pasir Puteh. Adv Biotechnol Microbiol. 2019a; 2(5): 1-8.