


Chapter in Book

SAMUDERAMAPS: Water Quality Maps for Improving Rural Communities' Quality of Life and Preserving Marine Ecosystems

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Abstract: *There are not a lot of water quality maps available right now, especially in the northern regions of Malaysia. The goals of SAMUDERAMAPS are to achieve the conservation of marine ecosystems and to improve economic profits for rural communities. SAMUDERAMAPS was developed by combining data on the most recent state of the water data with Geographic Information System (GIS) technologies. SAMUDERAMAPS is a ready-made product that consists of water quality maps of physicochemical water parameters, including water nutrient parameters, covering the area of Sungai Kilim, Pantai Kok, Pulau Dayang Bunting, Pulau Tuba, and Sungai Merbok in Kedah. At a reasonable cost, SAMUDERAMAPS offers a variety of maps in both paper and digital versions. These maps are designed to meet the needs of a diverse audience of customers, including social and economic players, and local communities. In terms of the contribution that it can make, SAMUDERAMAPS can help environmentalists monitor the levels of water quality in locations that are difficult to access or that have a high degree of biodiversity. In addition, SAMUDERAMAPS helps conduct site-selection analyses to promote the long-term sustainable development of mariculture regions, coastal tourism destinations, and fishing hotspots. SAMUDERAMAPS is congruent with the Sustainable Development Goals established by the United Nations, particularly SDG 14: "Life below water," SDG 2: "Zero hunger," SDG 3: "Good health and well-being," and SDG 13: "Climate action."*

Keywords: *Conservation, Marine, Livelihood, Sustainable, Water Quality.*



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1. INTRODUCTION

When unsustainable substances enter water bodies, there is a risk that disease will spread, the water will become poisoned, and invading species will move in. The bulk of sources of marine pollution are land-based, including excessive nutrient inflow from rivers, wind-borne debris, industrial and domestic pollutant output, and potential spill overs from ocean-borne freight (Kamaruddin et al., 2022). Many components mix in a very oxygen-depleted manner when poisons build up in the ocean food chain, causing estuaries to become anoxic and leading to severe ecological issues (Kamaruddin et al., 2020).

Due to several factors, including pollution and the destruction and deterioration of marine habitats, coastal waters are currently under significant environmental stress (Kamaruddin et al., 2021). Unsustainable elements have the potential to introduce invasive species, modify water quality to potentially toxic levels, and transfer diseases when they enter water bodies. Most of the marine pollution comes from land-based sources, such as excessive nutrient input from rivers, wind-borne litter, potential spill overs from ocean-borne freight, and industrial and domestic pollutant emission (Mohd Rizal et al., 2022a). When poisons build up in the ocean food chain, several components combine in an oxygen-depleted manner that makes estuaries anoxic and leads to a variety of biological issues. Figure 1 shows an accumulation of plastics waste along a river in Malaysia.



Figure 1. Accumulation of marine waste along a river in Malaysia

Traditionally, water quality maps were created without taking spatial or temporal perspectives into account (Kamaruddin et al., 2018). Several researchers are presently assessing the feasibility of integrating water quality data with geospatial technology (Kamaruddin et al., 2022b). Currently, few water quality maps are available in the northern regions of Malaysia (Kamaruddin et al., 2019). The goals of SAMUDERAMAPS are preserving marine ecosystems and enhancing rural communities' financial well-being.

2. METHOD & MATERIAL

Current water quality data and Geographic Information System (GIS) technologies were combined to create SAMUDERAMAPS. SAMUDERAMAPS is a prefabricated product comprised of water quality maps of physicochemical water parameters, including water nutrient parameters, for Sungai Kilim, Pantai Kok, Pulau Dayang Bunting, Pulau Tuba, and Sungai Merbok, Kedah. Figure 2 shows the production of SAMUDERAMAPS.

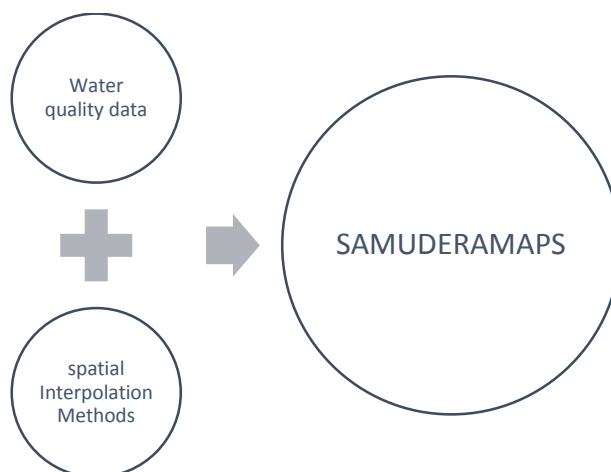


Figure 2. Production of SAMUDERAMAPS

3. FINDINGS

SAMUDERAMAPS has the potential to aid environmentalists in monitoring water quality in hard-to-reach or highly biodiverse regions. SAMUDERAMAPS is also helpful for site-selection analyses to promote the long-term, sustainable development of mariculture regions, coastal tourism destinations, and fishing hotspots.

The combination of water quality data with Geographic Information System (GIS) technologies is the fundamental development of the SAMUDERAMAPS. SAMUDERAMAPS is a ready-made product that consists of water quality maps of physicochemical water parameters, including water nutrient parameters, for the Sungai Kilim, Pantai Kok, Pulau Dayang Bunting, Pulau Tuba, and Sungai Merbok regions of Kedah. SAMUDERAMAPS provides a variety of paper and digital maps at an affordable price.

4. DISCUSSION

The ability of water to sustain diverse uses or activities is referred to as "water quality." 98% of the water consumed comes from rivers, while 70% of the water resources are used by agriculture (Lee Goi, 2020). Due to urbanisation and modernisation, river water pollution is a significant issue in Malaysia and has a detrimental effect on the sustainability of water resources. The Water Quality Index showed an improvement in river water quality in 2019. The proportion of clean rivers has dramatically increased from 56% in 2018 to 61% in 2019. From 8% in 2018 to 9% in 2019, there are significantly more rivers that are poisoned.

In terms of river pollution in 2019, the Department of Environment figures show that the Biochemical Oxygen Demand (BOD), Ammoniacal Nitrogen, and Suspended Solids (SS) all remained

high. Inadequate sewage or effluent treatment in manufacturing and agro-based industries may be the cause of high BOD levels. The main causes of SS might be improper building work and land clearing operations, whereas the main sources of NH₃-N could be related to animal farming and home waste. Increased levels of heavy metals, mercury, coliforms, and nutritional burdens are caused by these environmental variables (Lee Goi, 2020).

5. CONCLUSION

SAMUDERAMAPS aligns with the Sustainable Development Goals established by the United Nations, specifically SDG 14: "Life below water," SDG 2: "Zero hunger," SDG 3: Good health and well-being; SDG 13: Climate action.

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