

## **Environmental Impacts of Dolomite Sand on the Marine Environment of Manila Bay (Understanding the Ecology and Hydrology of Manila Bay)**

### **Background**

Manila Bay is a natural heritage of immense value to culture, science, and the Filipino people. As the idea of the Filipino nation started on its shores, the City of Manila and the view of its shores were last seen by Filipinos, heroes of their own land, as they went on to continue the struggle for freedom and in some cases exile. The Filipino people and their government are obliged to protect and rehabilitate this environment. A recent action made for the rehabilitation was the beautification of Manila Bay through artificial shore enhancement or beach nourishment. Based on the information given by the DENR website<sup>1</sup>, the Manila Bay Rehabilitation Program has three phases: (1) Cleanup/Water Quality Improvement, (2) Rehabilitation and Resettlement, and (3) Education and Sustainment. DENR is one of the Supreme Court mandamus agencies that was ordered to implement the Operational Plan for the Manila Bay Coastal Strategy (OPMBCS) 2017-2022. The OPMBCS pushes for the clean-up, rehabilitation, and preservation of Manila Bay to restore and maintain its waters as a Class SB (i.e. recreational and fishery waters). Looking closer at the details of the rehabilitation program, each activity seems to have been carefully considered and appears appropriate for the implementation of OPMBCS. However, it was also evident that beautification or beach nourishment was not the priority. To understand further the issue of Manila Bay, we need to see it from a scientific perspective.

### **Biodiversity of Manila Bay**

We would like to emphasize that the bay is not dead. Even in its human impacted state, recent scientific research in the last 18 years by marine environmental scientists from the University of the Philippines has revealed a high level of marine biodiversity. Very recently, a new species of sardines, *Sardinella pacifica*<sup>2</sup> was discovered from Manila's South Harbor where the sites of reclamation have been proposed. This high level of biodiversity supports the scientific theory that the bay is part of the center of global marine biodiversity which extends to the Batangas and Mindoro area. From records in museums around the world and in the National Museum of Natural History in Manila, there are an estimated 400 species of mollusks and 146 species of fish in the bay. These support substantial fisheries in communities around the bay. Fishers along the bay depend on mariculture which may contribute up to 60,000 PhP (per family of 5)<sup>3</sup> to their annual income, thus lifting them up from extreme poverty as defined by the United Nations. Historically, marine mammals have been sighted regularly in the bay and to this day are still occasionally seen. The City of Manila is named after a mangrove shrub the "Nilad" which grew along the shorelines. Very ironically, this plant can no longer be found in Manila but in cities like Singapore where it still thrives and acts as a natural shoreline protector.

### **Hydrology, Meteorology, and Hydrodynamics of Manila Bay**

There are several environmental factors that affect Manila Bay which involve hydrological, meteorological, and hydrodynamic processes. The Asian Disaster Reduction Center stated that

our country is located along the typhoon belt of the Pacific; hence, we experience an average of 20 typhoons in a year with 5 being destructive<sup>4</sup>. We receive plenty of rainfall all year round which sometimes causes severe flooding. Based on history, Metro Manila is prone to heavy floods during “habagat” rainfall events. Other factors that exacerbate the floods are the impervious surfaces of the city with poor urban planning and improper solid waste management. The resulting flood water, carrying with it tons of solid wastes and many types of micro-pollutants eventually reach our river systems, which includes smaller streams and tributaries. Manila Bay regularly receives water discharges from 17 principal rivers, which extends beyond Metro Manila namely Bulacan, Laguna, Nueva Ecija, and Pampanga. That signifies an extraordinarily complex water drainage system. Taking also into account storm surges, waves, and tides at sea, we can conclude that Manila Bay has a very dynamic marine environment. All these will erode the dolomite sand that was recently laid out on its beach, washing it off to the seabed of Manila Bay.

### **Impacts of Beach Nourishment using Dolomite Sand**

Dolomite is a naturally occurring mineral and has a low carcinogenic level to humans. However, this can be amplified in the food chain through other marine species. Furthermore, long exposure to this mineral can lead to respiratory problems which have been reportedly observed in dolomite miners<sup>5</sup>. The washing off of dolomite sand from the beach is akin to dumping foreign sediments, the most common pollutants in any water environment. They can disturb the habitats of marine animals and plants by potentially burying them, lowering the oxygen in the seawater, and blocking their access to sunlight. These outcomes endanger the biodiversity of the area. The polluted waters discharging to Manila Bay are already causing the degradation of its marine environment. The addition of sediments only hastens its deterioration.

For many Filipinos and tourists visiting Manila, the sunset is the cultural symbol of the bay. This can only be completely enjoyed if the natural integrity of the bay is enhanced not by reclamation and artificial shore enhancement through beach nourishment, but by assisting nature to rebuild natural shorelines and environmental quality. The bay historically has had natural swimming beaches which supported habitats for shellfish, birds and mangroves which contributed to tourism, fisheries, and coastal zone protection.

Many studies regarding beach nourishment reported that this practice is only beneficial for beaches experiencing severe coastal erosion, and that intensive case studies, research, and simulations are needed prior to its implementation<sup>6,7</sup>. Otherwise, it is not cost effective and in the long run, environmentally damaging<sup>8</sup>. Coastal erosion at the reclaimed shorelines of Manila Bay, including the site where the dolomite sand was laid, has already been addressed by the installation of seawall and breakers<sup>9</sup>, making it unnecessary to implement beach nourishment. In such instances, scientists recommend assisting natural processes in beach and shore enhancement as the sustainable option.

## Manila Bay Rehabilitation

The budget for the beach nourishment could have been spent on improving the Manila Bay Rehabilitation master plan since this will be a long and arduous battle. We support efforts to restore the natural environmental integrity of the bay by well-considered and science informed efforts in sewage treatment, waste management, providing informal settlers with housing and sewerage toilets, mangrove rehabilitation and tourism management. These efforts should benefit most citizens of the shores of Manila Bay and not just a few. Conducting beach nourishment amid a pandemic is downright insensitive to the plights of our front liners and our fellow Filipinos heavily affected by the current situation of our country. We cannot turn a blind eye on this issue.

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