

Fish Kill in the Philippines—Déjà Vu

Gil S. Jacinto

Marine Science Institute, University of the Philippines, Diliman, Quezon City

Almost ten years ago today, the country woke up to screaming headlines— “Massive Fish Kill in Pangasinan” or something akin to that. The fish kill phenomenon, familiar to fishers in freshwater and coastal bodies of water where fish farming was being pursued, was suddenly manifested at a scale that had heretofore not been experienced.

In order to provide a context, a definition of terms is useful. A fish kill is “a significant and sudden death of fish or other aquatic animals such as crabs or prawns. These events are characterized by large numbers of aquatic animals dying over a short time, usually in a clearly defined area” (Queensland - Dept of Environment & Heritage, 1998).

Estimates of the revenues lost in the February 2002 milkfish catastrophe were in the order of PhP 500M. Whatever the numbers were or the value of resources lost, what became clear was that the losses were huge and the incident affected not only the fish culture operators and the caretakers but also the coastal communities in the vicinity of the catastrophe. The impacts of the fish kill cascaded even to the fishing industry beyond the locality as prices of fish plummeted; and consumers stayed away from eating fish, in general, not just milkfish from Pangasinan.

Obviously, the phenomenon stirred to action the executive and legislative branches of government at the local and national levels. Academic institutions and research organizations hastened efforts to understand the problem. The House of Representatives and the Senate conducted their investigations “in aid of legislation.”

Workshops were held at the municipal and provincial level, and a national fish kill workshop was conducted at the Marine Science Institute, University of the

Philippines Diliman, in February 2002. More than 100 individuals representing virtually all sectors that had a stake or interest in the finfish aquaculture industry participated in the national fish kill workshop. The assessment from the workshops then was that the immediate cause of the fish kill was the bloom of the dinoflagellate *Prorocentrum minimum*, coupled with hypoxia (<2.8 mg/L dissolved oxygen) in the water column, resulting in asphyxiation of fish in the cages and pens. The plight of the fish may have been exacerbated by the release from the sediments of toxic hydrogen sulfide and ammonia, compounds produced following the decomposition of organic material in the water column and sediments (unused feed, fish waste products, and dead plankton from the bloom).

However, the intermediate or root cause of the fish kill could be traced to the proliferation and intensification of finfish farming in the coastal waters of Bolinao and Anda (Pangasinan), activities that went well beyond the carrying capacity of the nearshore environment. The assessment of carrying capacity of coastal waters for a particular type of activity, let alone a multitude of uses, is by no means fully understood. However, relying on acquired data and best information available then, researchers of the Marine Science Institute (UP Diliman) had proposed an optimum number of structures (pens and cages) that should be allowed in the contiguous waters of Bolinao and Anda and the sites where these structures should be located. The number of structures were not to exceed 500, and areas that were naturally constricted (e.g., Caquiputan Channel) were to be left open. Concurrence by the local executives of Bolinao was manifested by the adoption of these recommendations into the municipality’s coastal management plan and the passage of a municipal ordinance in 1999. Unfortunately, the ordinance was not adhered to. By the end of 2001, just months prior to the massive fish

kill, ~1170 pens and cages had been built, with most of these stocked well beyond the optimum stocking density (San Diego-McGlone et al. 2008). A greater number of cultured fish meant more feeds used and wasted, especially as cage and pen operators also employed cheaper (but low quality) feeds. The coastal waters of Bolinao turned eutrophic (nutrient rich and enhanced the bloom of phytoplankton), and the proliferation of structures reduced flushing rates of the coastal waters. What followed, as they say, is history.

In the intervening years, several projects and forums involving groups from Norway and Scotland, the Bureau of Fisheries and Aquatic Resources, and research institutions in the country were conducted. Among these were: Environmental Monitoring and Modeling of Aquaculture in Risk Areas of the Philippines (EMMA); Mitigating Impact from Aquaculture in the Philippines (PhilMINAQ); and SAGIP Lingayen Gulf, which developed and implemented prototypes of a Marine Emergency Response System (MERSYS). Capability building of BFAR and Local Government Units staff for environmental monitoring in aquaculture sites was implemented, better practices for aquaculture were discussed and documented, zoning plans were formulated and ordinances were enacted, technical forums were organized, a handbook for sustainable aquaculture for LGUs was completed and circulated, and a Joint Administrative Order (JAO) on sustainable aquaculture was signed by the heads of the Departments of Agriculture, Environment, and Interior and local governments.

Fast forward to 2011, the country was again besieged by a string of fish kill events that not only affected the “traditional” coastal finfish growing areas in the country (e.g., Pangasinan) but was also happening in freshwater lakes (i.e., Taal Lake) at a scale that worried people from all sectors. Because Taal Lake is relatively near Metro Manila, media coverage was extensive; so, too, was the attention given by the legislative branch of government. Once more a Senate inquiry was held. Local and national government agencies, academic institutions, people’s organizations, NGOs, and the private sector attended. A moratorium on the stocking of fish in Taal Lake was to be

implemented, illegal and inappropriately sited structures were to be dismantled, water quality monitoring was to be intensified, and a review of aquaculture policies and guidelines was called for.

A fish kill forum was held at UP Diliman in August 2011 and attended by various stakeholders, many of whom were present in February 2002. Speakers tackled the (same) basic question “What caused the fish kill” and reviewed information from past workshops on what should be done. Once more the speakers echoed the cause of the problem—the carrying capacity of the culture areas had been exceeded, even if the proximate cause may have been asphyxiation of the fish because of very low dissolved oxygen in the water column.

A distinction needs to be made on what may be the immediate cause of fish kills from the intermediate and root causes. By way of analogy, a person’s immediate cause of death may be respiratory failure. In turn, the underlying cause of death may be infection with the human immunodeficiency virus that may have occurred several years before the person’s demise, bringing about, for example, acquired immunodeficiency syndrome (AIDS) and followed by pneumonia a few days before the person’s death.

Not long after the Taal Lake fish kills this year, media reports cited “authorities” blaming the fish kills on a temperature change, which purportedly brought down dissolved oxygen levels in the lake and caused the fish kills. There was no evidence to support this suggestion. Moreover, even if a 3 degree Celsius water temperature change had taken place (which would have been unlikely), the solubility of oxygen in water would not have decreased significantly and would not have been critical for the fish (<4 mg/L). Others even invoked “climate change”, an assessment that showed how little appreciation some people have on the temporal scale associated with climate change processes.

Recommendations from the August 2011 fish kill forum echoed those made during the February 2002 meeting of stakeholders: 1) a national fish kill quick response is needed; 2) an effective monitoring and surveillance system has to be established; 3) accountability and compliance is key; 4) a two-stage licensing system

for mariculture activities in order to provide checks and balances is important; 5) LGUs need to review and further strengthen existing sanctions and monitoring mechanisms; 6) empowerment and education are essential; 7) fishers and stakeholders must be aware of and apply only the proper technologies and practices in mariculture; 8) a comprehensive national framework on sustainable aquaculture must be put in place; and 9) regular forums on mariculture must be conducted for the benefit of all stakeholders.

It is convenient to blame nature for disasters that ultimately are caused (or at the very least exacerbated) by human actions or inaction; and fish kills are no exception. We experience today the fish kill problem that we encountered a decade ago. We knew then what had to be done because we had already identified the causal factors and the steps required to address these. Some progress has been made but at a pace that is, seemingly, unable to keep up with the proliferation of the problem. Moreover, and as articulated many years ago, accountability of public officials and aquaculture practitioners is key along with their compliance with laws and good practices.

The Food and Agriculture Organization defined sustainable aquaculture as “the management and conservation of the natural resource base and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations.” (BFAR- PhilMINAQ, 2008). Thus, aquaculture is not to “cause irreversible damage; harm human health or the safety of human beings; jeopardize the future productive base for short-term economic benefit; adversely affect biodiversity or sensitive habitats; and, adversely affect essential ecological processes.” Stakeholders in the aquaculture industry echo this perspective, although if one were candid, it seems that we only provide lip service to this principle. A decade ago I remarked at the national forum on fish kills that “mariculture will have to be addressed now because of the likelihood of unbridled expansion of the industry and associated dire consequences.” As in *déjà vu*, we have a sense that we have already witnessed or experienced a current situation. But unlike a *déjà vu* experience, we do know

the exact circumstances of the previous encounter, and these circumstances were not imagined. Today, that observation and perspective remains. My fear, however, is that for some aquaculture areas in the country, we may already have reached the “tipping point” with the negative consequences, and impacts may possibly be irreversible. Action and responses to address unsustainable aquaculture were needed from government and other stakeholders in the aquaculture industry many years ago; if we wait another decade, it will undoubtedly be too late!

REFERENCES

- BFAR-PHILMINAQ. 2007. Managing aquaculture and its impacts: a guidebook for local governments. Bureau of Fisheries and Aquatic Resources (BFAR)-PHILMINAQ Project, Diliman, Quezon City, 80
- Queensland. Dept. of Environment and Heritage (1998) Fish kill reporting and investigation manual: for use in investigation of possible breaches of the Environmental Protection Act 1994 and Fisheries Act 1994. Dept. of Environment & Heritage.
- San Diego-McGlone, M.L., Azanza, R.V., Villanoy, C.L., Jacinto, G.S. (2008) Eutrophic waters, algal bloom and fish kill in fish farming areas in Bolinao, Pangasinan, Philippines. *Mar Pollut Bull* 57: 295–301.