



NATIONAL GEOGRAPHIC EXPLORER **ANDRIAN GAJIGAN**

INVESTIGATING HARMFUL ALGAL BLOOMS

Red tides occur world-wide, but Dr. Andrian Gajigan is concentrating on those in the Asia-Pacific region.

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In the first half of 2021, the Philippines Bureau of Fisheries and Aquatic Resources issued more than 20 shellfish alerts, recommending people avoid eating shellfish due to red tide toxins. If ingested, these toxins can be debilitating or even fatal for humans and ocean life. How can such red tide events be reduced or stopped? Biochemist Dr. Andrian Gajigan is trying to determine the answer.

Growing up in the Philippines, Gajigan witnessed firsthand the damage caused by harmful algal blooms (HABs), sometimes known as red tides. HABs form when rapid growth, or blooming, of single-celled organisms turns water red. In the Philippines, single-celled dinoflagellates and diatoms are responsible for HABs. Of the 2000 species of known dinoflagellates, roughly one-half are photosynthetic but only about 20 produce toxins.

Algal blooms can be beneficial as the photosynthesizing organisms fuel the ocean food web. When toxic species bloom, however, the toxins move through the food chain causing fish to die and shellfish to become dangerous to eat. The amount of photosynthesis occurring during blooms of toxic and nontoxic algal species does increase oxygen in the water. However, when large quantities of photosynthetic organisms die and decompose, so much oxygen is depleted from the water that many fish and other animals either leave the area or die because not enough oxygen is available to carry out cellular respiration.

Gajigan is investigating the role of viruses in red tides, focusing on those that infect dinoflagellates and other marine algae. Often, viruses keep populations of dinoflagellates in check. But viruses can also form symbiotic relationships with cells and give them a survival advantage. By studying the viruses, Gajigan is trying to figure out what encourages blooming algal growth and how it might be slowed or stopped.

Gajigan sees his research as an intersection of his fascination with science and community activism in his home country. Outside the lab, Gajigan encourages equity and inclusion in STEM fields. He wants to establish a research program in the Philippines to train the next generation of explorers and lead projects across the Asia-Pacific region as a way of staying connected to his roots. ■

THINKING CRITICALLY

Explain Why are marine algae important in the ocean food web? Why would scientific research focused on finding a way to slow or stop harmful algal blooms be important to society as well as to the environment?