The oil spill and the food web

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The ecological destruction of the oil disaster in the Gulf is perhaps most aptly embodied in the pictures of brown pelicans made lifeless by a thick coating of toxic sludge. However, the true toll may spread far beyond these dreadful images. Scientists warn that the gravest threat, including possible ecosystem collapse, is posed by the poisoning of organisms at the base of the food chain.

These organisms—primarily grasses in the coastal wetlands and plankton in the waters of the Gulf—form the basis for one of the most biologically rich areas in the country. Thousands of species inhabit the region, including small and large populations of sea birds, dozens of varieties of marine mammals and reptiles, and fish stocks plentiful enough to provide a quarter of the catch in the entire country. All these creatures, somewhere down the line, depend on primary producers to convert energy from sunlight into food.

John Caruso, an ecology professor at Tulane University, remarked in a recent interview published in *Christian Science Monitor*, "The greatest threat is to the whole food chain, and the base of the food chain. People see the big impressive animals like pelicans and the other sea birds. It's a devastating sight, it tears you up when you see those poor birds covered in oil, but the real damage to our coastal ecosystem here will come from destruction of the cordgrasses."

Cordgrasses are by far the most prevalent vegetation in the saltwater marshes of coastal Louisiana. In addition to generating food and nourishment for a host of organisms as they decay, the living cordgrasses are critical in holding together the coastal habitats. Their extensive root system protects the shoreline from erosion and can mitigate the impacts of severe storms inland.

While cordgrasses can tolerate some level of oil contamination, the duration and severity of the spill could ultimately overwhelm even the most hardy of plants. "If the oil lingers in heavy concentration for any length of time and gets into the soil, then damages that below-ground portion of the plant, there is a pretty good chance that the plant will die altogether," Mike Materne, a plant specialist with Louisiana State University AgCenter, said in an interview in early June.

The US Geological Survey estimates that in Louisiana alone, approximately 30 square miles of wetlands are lost annually. Almost 2,000 square miles of wetlands have disappeared since the 1930s. The combined effect of Hurricane Katrina in 2005 and the ongoing oil disaster threatens to accelerate the already tremendous rate of decline.

Parallel to the cordgrass, microscopic phytoplankton are the primary producers in the marine ecosystems. Near the Gulf Coast and in the saltwater marshes, various types of single-celled algae predominate, thriving in nutrient rich waters and consistent sunlight at shallow depths.

Dr. Sibel Bargu Ates, an assistant professor and specialist in plankton ecology at Louisiana State University, explained that the phytoplankton can take up chemicals from the oil and the dispersants directly on the surface of the organism or inside their cells. The immediate impact on the phytoplankton depends on a number of factors, including the particular species affected. Some species show a proclivity towards oil, while others are killed off by it. This in itself can have a significant impact by changing the entire dynamic of the ecosystem, Dr. Ates explained.

Another important impact occurs as larger organisms feed on the chemical-stained phytoplankton. “The zooplankton or whatever else consumes them,” Dr. Ates told the WSWS, “can be negatively impacted, all down the line.” In certain organisms, the toxic chemicals tend to accumulate, therefore those at the top of the food chain (sea birds, large fish and aquatic mammals) face a significant risk from their food stocks.

The zooplankton, scarcely visible creatures including larval stage fish and other sea life, though higher on the food chain, are important food sources in themselves. Scientists have observed zooplankton feeding on dispersed oil particles, according to Congressional testimony of Dr. Carys Mitchelmore, an associate professor at University of Maryland Center for Environmental Science.

Dr. Mitchelmore summed up the threat, “If [phytoplankton and zooplankton] are removed then higher trophic level organisms simply will not have food to eat and will ultimately suffer reduced growth, reproductive output and eventually death. Therefore, dispersants and dispersed oil do not have to directly affect an organism for them to have serious repercussions.”

The complexity of the marine food web interactions, combined with the unprecedented scale of the spill and novel use of chemical dispersants, makes it nearly impossible to pinpoint the exact impact that the oil spill will have, even months into the ongoing disaster. However, the longer the spill goes on, the higher the risk that despite the knowledge gaps, the ecological devastation will be revealed for all to see through the disappearance of entire ecosystems.