

# REDUCE OCEAN DEAD ZONES BY SWITCHING YOUR FERTILIZER

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# What is an ocean dead zone?

1. Ocean dead zones are areas of our ocean where most multicellular life has been destroyed due to extremely fast overturn of oxygen by decomposers
2. Essentially nutrients (most commonly nitrogen and phosphorus) enter the ocean and causing algal blooms. Then when the algae dies it is decomposed and the decomposers use up most if not all available oxygen in the process causing a massive amount of death for multicellular life
3. One of the most prolific dead zones in the world lies directly at the mouth of the Mississippi heading into the Gulf of Mexico



(Carrington, D.)

# Do Rivers Really Affect the Vastness of the ocean?

1. Your first instinct might be the ocean is so huge, but rivers are so small how much are we really causing these dead zones?
2. Well in reality quite a bit. Research shows that from the 70s to the 90s nutrient loading in the gulf has tripled (Cunha, L. C. D., Buitenhuis, E. T., Quéré, C. L., Giraud, X., & Ludwig, W.)
3. How does this happen?
4. While rivers are quite small by comparison their destructive capability is huge. With this they break down local sediments and can transport them thousands of miles suspended in the river
5. This can be especially detrimental to rivers located around agricultural hot spots, like around the Mississippi, because they pick up nutrients from fertilizers added to the soil then push them directly out into the ocean

# Other Affected Aspects of Oceans

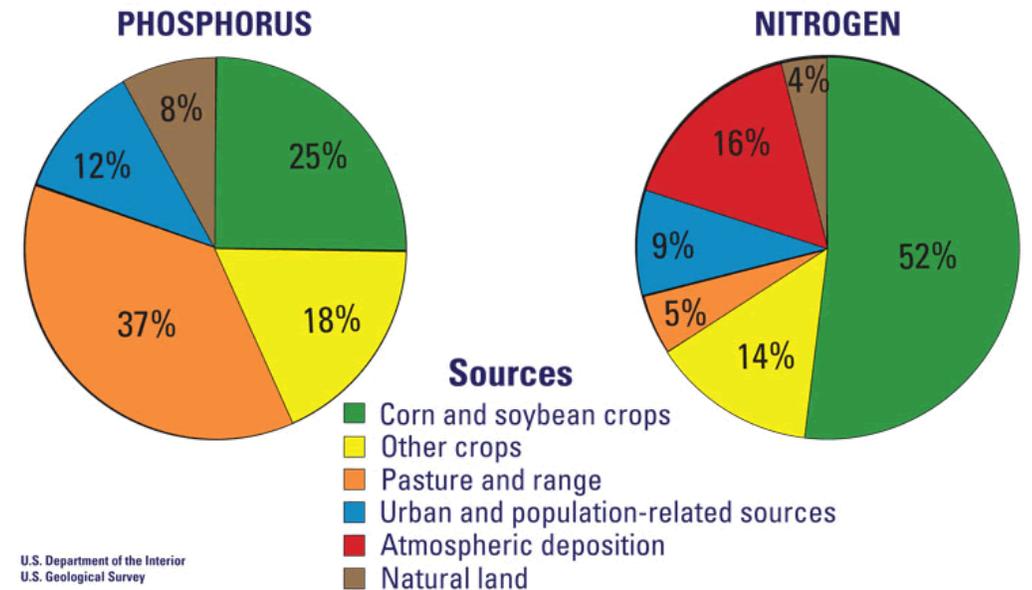
1. With increased fertilization we have increased the amount of Alkalines that are entering the oceanic habitat.
2. Why does this matter?
3. When oceanic Alkalinity is increased it is also directly related to increased dissolution of greenhouse gasses into the ocean (Cao, L., Zheng, M., & Caldeira, K.)
4. But removing greenhouse gasses, that's a good thing isn't it?
5. For life on land yes, but the increase of greenhouse gasses within oceanic waters also directly lowers pH of the ocean or in layman's term makes the ocean more acidic
6. So by robbing Peter to pay Paul, yes, we are observing higher removal of greenhouse gasses but are in turn also getting higher levels of ocean acidity which causes a plethora of negatives for oceanic life from coral bleaching to again massive fish deaths.

# How Much can you do?

1. I don't expect anybody to petition the government to restrict agriculture however, we can directly affect urban population related sources
2. How?
3. Well while a good portion of this comes from sewage sources another large source for urban nutrient run off is related to using fertilizers on lawns and gardens
4. How can I reduce this?
5. By instead of using spray fertilizer use environmentally friendly fertilizers that have organic nutrients compacted so they are less affected by physical weathering and release nutrients more consistently over a longer period
6. This is important because even reducing nutrient input into the ocean by 2-3% would be saving millions of oceanic critters from certain death as dead zones spread



## Sources of nutrients delivered to the Gulf of Mexico



([www.usgs.gov](http://www.usgs.gov))

# What type of fertilizers should I use?

1. The first thing to look for when buying a fertilizer is if it is organic or not. Organic nutrient sources will across the board be better because they are easier for microbial life and plant life to absorb before they can be weathered away
2. Inorganic fertilizers will often simply state what ratio of nutrients they possess while organic fertilizers will list what plant or animal product, they are using to input nutrients (Lamp, J., Lamp, J., Butler, J., Butler, J., Lamp, J., Jones, R., ... )
3. Furthermore, organic sources do not seep as much into the ground because the nutrients have been made denser
4. Figure out what nutrients your garden or yard need; Put research into what your area lacks as far as nutrients and buy a fertilizer that fortifies this absence
5. It is important to fertilize with what the ground/plant needs because adding large amounts of organic fertilizers to a system that does not need them will also result in run off

# I live in Colorado, Why should I care?

1. While we are far from the ocean our aquifer (massive underground lakes that span hundreds of thousands of miles) can transport nutrients from here directly into riverine systems far away and then into the ocean
2. There already exists research that indicates higher than normal nutrient deposits in our lakes and rivers as well as some wells having become toxic to humans due to nutrient loading (Kaushal, S. S., Jr., W. M. L., & Jr., J. H. M.)
3. So we not only have a local but also far reaching impact
4. These can be reduced by your use of environmentally friendly fertilizers