Better management practices and the Bay

COLLEGE PARK, Md. — "Moderation in all things" is a bit of advice that wasn't lost on Mother Nature. Too much of a good thing seems to be the condemnation earned by modern society, and the Chesapeake Bay has fallen victim to that same verdict.

The Bay, according to scientists, suffers from "nutrient overenrichment" — a mouthful that simply means too much nitrogen and phosphorus, chemical elements usually associated with healthy growth of all living things, is getting into the Bay.

Given the right amount, plant and animal life thrive on the two elements, commonly found in commercial fertilizers. Too much, and a chain reaction begins that ultimately chokes off aquatic life in the Bay.

How is too much getting into the Bay, and where is it coming from?

Most of the nitrogen, say scientists who studied the problem for five years, comes from diffused sources — what the scientists call "non-point sources" of pollution. Unlike the discharge from a waste treatment plant that comes out of a single pipe, non-point source pollution generally is carried by heavy rainfall from many different sources.

Of all the nitrogen and phosphorus that flows into the Bay during a year of average rainfall, approximately two-thirds of the nitrogen and more than one-third of the phosphorus comes from non-point sources, according to EPA study.

Most of those non-point sources are farmlands, where expensive fertilizer washes off cultivated and poorly managed fields, and into the more than 150 tributaries feeding the Chesapeake Bay.

The pressure to produce more food, use more fertilizer to do so, and risk losing nutrients to rivers and streams is an irony not lost on farmers like Wally Miller, manager of the Walnut Point Farm in Kent County, Md.

"We're not only interested in good farming, here, we're interested in the water that surrounds us," says Miller, as he surveys a farm that butts against the Chesapeake Bay.

"We use the water same as our neighbors do. Everyone has a right to clear, clean water, and there's no reason at all why we farmers should be polluting."

A seemingly "simple" solution is to stop letting fertilizers run off into rivers and streams. But the task is not so simple, says William Magette, an agricultural engineer at the University of Maryland.

American agriculture requires heavy doses of fertilizer to keep productivity at a level where each farmer in this country feeds 78 other people.

When too much fertilizers like nitrogen and phosphorus get into bodies of water like the Bay, they set off a population explosion of small floating plants called blue-green algae, according to Magette.

Their growth out of control, the algae cut off precious sunlight to submerged plants and animals, consume huge amounts of life-sustaining oxygen and literally asphyxiate less mobile creatures like oysters.

Magette says the key to stopping the flow of nutrients from non-point sources into the Bay is to control them at their source. For nitrogen, especially, that means on the farm.

"We have to show farmers how to control the amount, the type, the time and methods of application for fertilizers," says Magette.

He also believes that those controls actually complement most farmers' objective of getting the optimum economic yield from their crops.

If the task sounds simple, adds Magette, it isn't What appears at first glance to be a simple matter of matching fertilizer rates of application to crop needs is a complicated process, he says.

The process for nitrogen is influenced by factors beyond the farmers' control, factors such as:

— Most crops can use only inorganic forms of nitrogen.

— Inorganic nitrogen can be changed into organic forms by bacteria, and back again by other bacteria.

— In extremely wet soils, inorganic nitrogen can change to a gas and escape into the atmosphere.

— When useful forms of nitrogen go below the root zone of a crop, water moving through the soil will leach the nitrogen into groundwater.

Similarly, phosphorus exists in soils in different forms. It, too, can change from one form to another and attaches itself to soil particles. Erosion carries both sediment and phosphorus into streams and other bodies of water, according to Richard Weismiller, an associate professor of agronomy at the University of Maryland.

"There are two ways to manage nutrients like nitrogen and phosphorus," says Weismiller. "One way is to limit how much nitrogen and phosphorus you put on, or find ways to put it on so crops use it more efficiently.

"Another approach is to find ways to keep the nitrogen and phosphorus on fields once they are applied correctly," he says.

Together, the two management concepts — application guidelines and retention guidelines — form what agricultural scientists call "best management practices," or BMPs.

The basis for application BMP's, according to Weismiller, is the soil test. It can help farmers determine nutrient needs, set realistic yield goals, and take into consideration the "case history" of a given field: What was grown on it in the past, how was it fertilized, and with what?

Some application BMP's, he says are:

— Proper timing — Split applications of nitrogen during the growing season are better than one massive dose. And avoid applying nitrogen in the fall to fields that will be planted in the spring.

— Proper application — Depending on the crop and the tillage system, some methods of application and sources of these elements are better than others.

When it comes to retention BMP's, there are even more choices, says Weismiller. To minimize surface runoff, erosion and fertilizer losses, farmers can:

— Choose the right tillage system for their soil type, climate and type of farming system.

— Employ crop rotations, cover crops, contour farming and strip cropping in their farming systems.

— Seed areas that are highly susceptible to erosion.

— Preserve or establish grass filter strips to trap sediment from field runoff.

— Incorporate terraces, diversions and grassed waterways to control the flow of runoff, especially during periods of heavy rainfall.