

it either stays there or it goes out. If more is going out than is coming in, then eventually the lake will clear itself up. This may take a very long time in the case of lakes.

As an example of this, it was suggested that the detention time or the holdup time in portions of Lake Michigan, the southern portion of Lake Michigan, is actually measured in terms of decades or possibly centuries, where in small lakes the amount of time necessary to in effect replace the lake may be in terms of years.

To reduce nutrient levels you must have more nutrients coming out than going in.

Now one of the reasons why this is such a difficult problem is that the nutrients recycle—let me deal with one of the elements, and that is phosphorus. The organisms take the phosphorus out of the water and use the phosphorus to make living material. When the organisms die and decay, they then release the nutrients. The phosphorus is then available for the following year.

So in direct answer to your question, if you reduce the amount of nutrients going into a very low level such that the amount coming out is far greater, you can then begin cleaning the lake.

In the absence of that favorable situation, then in addition to controlling the nutrients going in you have to have some way of accelerating the removal of the nutrients that are there.

Now there are a number of ways of doing this that have been proposed, ranging from such things as trying to harvest the algae and remove them physically from the lake and taking with them the nutrients. It has been suggested that we might try and effect the entire biological system and perhaps have fish consume algae and then harvest the fish. The suggestion has been made that in some cases we may want to remove some of the deposited material.

Mr. CARPENTER. From the bottom?

Dr. WEINBERGER. From the bottom to take out some of the nutrients.

Mr. MOORE. Any one of which on any sizable body of water is a difficult process.

Mr. CARPENTER. Right.

Dr. WEINBERGER. And expensive.

Mr. CARPENTER. I think the important thing, though, here is that the mere stopping or retarding of the nutrients into the body of water will not necessarily cause the body of water to clean itself up. If the cycle has been established within the body of the water so that it is self-contained, then you do not change that cycle by reducing or eliminating the nutrients flowing into the body of water.

Dr. WEINBERGER. Yes. And I would say here that this ties in with some of your previous comments.

Mr. CARPENTER. Yes.

Dr. WEINBERGER. And that is the concept that when you put in a water pollution control project you necessarily get immediate results. In other words, what you are doing is contributing to the solution.

Mr. CARPENTER. Yes.

Dr. WEINBERGER. In this case one of the first things that we must do is stop nutrients from going in. This is a step in the right direction. The next step will be to accelerate the removal of the nutrients that are there.