agreed, however, that nitrogen and phosphorus are perhaps the most significant.

A number of the microscopic plants have the ability to utilize or fix atmospheric nitrogen, making it available to promote algal growth.

Phosphorus, on the other hand, must be added to the water through the natural processes of decomposition of rocks and organic materials or be introduced as a waste pollutant. For this reason, phosphorus is recognized as a key factor in stimulating or limiting biological growth.

In addition to natural sources, phosphorus reaches our water supplies through return flows from agricultural lands and through sewage discharges.

Although phosphorus is an important ingredient in fertilizing materials applied to agricultural lands, return flows do not show significant amounts of phosphorus being returned to our waterways. This probably results from the utilization for crop development as well as from the chemical interaction with the soils which tends to retain the phosphorus.

Municipal wastes, on the other hand, appear to be our most significant source of phosphorus. The major portion of this phosphorus is from the builders used in detergents and other similar cleaning products.

Processes are available for reducing the amount of phosphorus in our waste discharges. These processes currently are being used at Lake Tahoe where nitrogen and phosphorus have been found to pose a threat to the clarity of that unique lake. The phosphorus-removal process is very costly—about $100 per acre foot—for general application. The urgent need to protect the pristine quality of the waters of Lake Tahoe also requires a treatment method to remove nitrates from wastes which might be discharged to these nitrate-sensitive waters. While this is an immediate need, its applicability should extend far beyond this particular instance.

Prolific algal growths have caused problems at Clear Lake and at the Salton Sea. These growths, resulting from excessive nutrients, have contributed to extensive fish kills and to odor problems in the areas where blooms have occurred.

Recognizing that one of the major areas of concern regarding the San Joaquin master drain relates to the possible effects of nutrients on the receiving waters, we are constructing a prepilot treatment plant to study various means to remove or strip nutrients from the drainage waters by inducing the growth of algae and then removing the algae from the water, thereby removing the nutrients that were utilized in the growth. We have submitted an application for a demonstration project grant from the Federal Water Pollution Control Administration to support a portion of our proposed studies.

Another area needing additional study is the development of a method for determining algal growth potential under various conditions. At the present time, we are limited in our capacity to predict with any degree of reliability the extent of algal growth that will occur when waters of differing characters are intermixed, for example, in a combination of sewage effluent and receiving water. We desperately need a tool for determining the possible effects of various stimulants or depressants on the growth of algae which can be related reliably to field conditions.