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RSummary-Analysis of the Control of Water Pollution*

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THE ROCHESTER COMMITTEE FOR SCIENTIFIC INFORMATION
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Water Pollution

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Summary-Analysis of the Control of Water Pollution
by
Herman S. Forest

TOPIC

This report is based on the International Great Lakes Conference (April, 1968), the National Conference on Thermal Pollution (August, 1968), the American Institute of Biological Sciences Meeting (September, 1968), State Health Department Seminar (1968) and private correspondence and conversation. Only a few selected highlights can be included here, since events are moving too fast for a detailed report.

A subject index follows:

A. Nutrient Pollution

1. Lake Michigan regulations
2. New York: positive step on Lake Erie - the drafting of state regulations
3. What does "removal" mean? It is one thing to decide to remove phosphate and quite another to write and enforce a regulation.
4. The strategy of phosphate removal - why municipalities are the first target - why all due speed is justified.
5. Monroe County: encouraging steps for the northwest sector
6. Removal of Nutrients as Fish - a harvest of alewife? - a taste of Coho Salmon.

B. Thermal Pollution

1. Engineers vs. Biologists - how much protection is "over" protection?
2. State vs. Federal Government - much is said of states "rights" and little done about their responsibilities.
3. Exploitation vs. Regulation in New York - there is every evidence of a thrust to build before regulations can be applied.
- New York probably has the best staff work on regulations of any state, but such regulations never may be enforced effectively.
4. Alteration vs. Destruction - semantics as a weapon in public relations.

C. A Summary

1. Gambling with man's environment
2. Who regulates the system?

NUTRIENT POLLUTION (over-fertilization of waters)

1. The mid-western states bounding Lake Michigan appeared to be taking the lead in enforcing removal of phosphate during the next five years or so. Late information indicates that the goal is to be stated in terms of "practical removal", which may or may not encourage a maximum effort.

2. New York devoted conscientious staff effort to determining whether to attempt phosphate removal and the implementation of removal. After an examination of complex information and conflicting advice, New York (represented by Assistant Commissioner of Health Dwight Metzler) took a firm step and recommended to the Lake Erie Enforcement Conference that phosphorus in effluents should be reduced to 0.5 parts per million (equivalent to about 1.5 ppm as phosphate).

In regard to its internal regulation, it was apparent that blanket standards cannot be applied, and the more laborious route should be taken of classifying waters (analogously to the coliform classes) or even establishing separate standards for individual bodies of water. The intent of those doing staff work is clear, "The point removal of pollution at source." An immediate step is being taken in the case of municipal waste (see 4. below), and after January 1, 1969, industrial units must report waste analysis.

3. What does "removal" mean? The advisory group considered three different ways of achieving less fertile waters:
- a) Removal of a stated portion of phosphorus from waste water (80% or 95% of municipal sewage)
 - b) Establishing stream standards, which means that enough phosphorus would have to be removed to meet them (e.g., the phosphorus content of stream could not be increased over 1 ppm)
 - c) Regulating the phosphorus content of waste water, with the specification that the content be achieved by removal not dilution with fresh water.

There are situations in which each or all of these approaches seem most practical. At this time, however, the advice favors the control of effluent content.

4. The Strategy of Phosphate Removal. The first effort is being directed to removal of the largest contributors: metropolitan areas. This simple accomplishes the most in the shortest time. A 10-year program for Erie, Ontario and George Basins would include 15% of the state's total population but 46.5% of its sewered population. Effective removal in smaller units is a well-established practice in Switzerland where their largest plant serves fewer than 25,000 people.

The informed scientists, engineers, and administrators are well aware that present plans and regulations may NOT bring dramatic improvement. (A comforting parallel offered from the audience after my talk was that "Cancer hasn't been cured yet either"). What the public really is buying now are concrete tanks! All kinds of processing can be accomplished in them with only minor modifications. Better technology can (and should) be applied as it becomes known, but a base must exist for it. Phosphate removal may not be the only answer, but it is worth trying.

5. Monroe County - The R.C.S.I. water pollution committee members were most favorably impressed by the presentation of O'Brien and Gere, the engineering firm engaged to plan the "Northwest" sewage treatment plant in Greece. Not only was their information thorough, but their attitude in regard to what must be done demonstrated a strong public concern. The estimated level of phosphorus in the effluent would be 1 ppm. This is not good enough for a goal, but it is a well-justified start. It is to the credit of the firm that they have planned as well as possible, and promise less than is possible. Already it has been

demonstrated that the performance of a very ineffective plant (Latta Road) can be improved by accepting competent advice: installation of new mixers and increased aeration, which results in destruction of more organic matter. Cost for one of the best available processes, the Dorr-Oliver PEP, is \$30.00/million gallons. Removal of 95-8% of phosphorus is expected from it.

6. Removal of nutrients as fish. One of the ironies of nutrient pollution is that, having increased biological productivity of lakes, we are unable to derive any benefit from it. In Lake Michigan, alewife (or gizzard shad) have developed in large quantity, apparently in rather direct relation to the fertility and plant crop. Alewife have been considered worthless to man, but commercial fishing, subsidized by the Federal Government, has been undertaken with the intent of producing fertilizer or animal food as a useable product.

The latest development in Lake Michigan is fishing for alewife purely for removal of organic and mineral (fertilizer) material. Here is an attempt to reduce the volume of the food pyramid by blocking return to the green-plant base.

The introduction of Coho Salmon, which feed on alewife, also aims at removal and utilization. Certainly growth rates of the Coho have been phenomenal, and establishment (natural re-stocking) has already been judged successful not only in Lake Michigan but in Lake Ontario as well. However, Coho are NOT panacea. Even after delicate handling by the Belgian wife of my host at Milwaukee, Coho still tasted about like Carp. (Some like it, I was reminded.)

THERMAL POLLUTION

1. Engineers vs. Biologists

Several biologists attended the "Engineering Aspects" National Thermal Pollution Conference. Most (including this one) did not behave as a passive audience. Periodically a biologist would leap to his feet and virtually scream at the engineers. "You people are supposed to keep the heat out of water, not quibble about how to get the most in and get away with it." "The only thing you seem to be interested in is avoiding your own hot water."

When Miles Churchill, head of the Tennessee Valley Authority's Water Quality Division, expressed the hope that waters would not be "over-protected", every biologist in the audience twitched.

Engineers who have official responsibility to the public stand apart. Mr. Robert Burd of the FWPCA most perceptively stated that he found himself "talking like a biologist".

The foremost thought in the minds of engineers: the only answer to the power demand in the next generation is nuclear plants.

The foremost thought of the biologists: one-third of all the water in the United States would be required to dispose of their waste heat, unless it goes into the air or is channeled into industrial and domestic needs.

2. States vs. Federal Government

On the premise that Federal regulation should be avoided, the states are supposed to devise their own regulations, to be reviewed by the FWPCA (Federal Water Pollution Control Administration), which may accept, reject, or negotiate changes.

4.

A highly indignant oration was delivered by the representative of Tennessee (speaking for the Governor, apparently). He accused the Federal government of both rejecting the state's standards and refusing to state what it would approve. Was the indignation justified?

Further exploration produced a totally different perspective. Since some R.C.S.I. members have felt that New York was lagging, an effort was made to obtain other state's standards for comparison with those being drafted for New York. The astonishing discovery was that New York had drafted the most thought-out and detailed standards in the country. Few states attempted to muster the technical skill to devise rational standards! The FWPCA is not guilty of playing guessing games with the states, but rather expected them to hire competent specialists to do a technical job - a notion which seems strange in some State capitals.

3. Exploitation vs. Regulation in New York

New York is a prime area for nuclear power plants because it is relatively earthquake-free, has considerable cold water, provides an enormous market for power, and is particularly eager to grow industrially because it is slipping as a population and industrial center.

Although state agencies seem to be sluggish to those who try to get them to act, certainly a number of extremely capable people are at work there in the public interest. Thermal standards are complex in New York because there are different kinds of waters (the ocean, Lake Ontario, Finger Lakes, trout streams, etc.). Thus, an admirable job is done by members of the Health Department staff in consultation with the Conservation Department. After a conference in Washington, the standards they prepared are good - perhaps the best in the country. This set of proposed standards may be used in three ways:

- a) It may become Health Department policy, which results in weak enforcement, quickly.
- b) It may become Water Resources Commission policy and have more force. However, the commissioners of Commerce and Transportation are members of the Commission, and road blocks will probably be thrown by a hundred commercially interested parties. This process involves delays and dilutions both within the Commission and at public hearings.
- c) If the legislature passes a law on thermal pollution, the enforcement of such a law will be quite strong, but the chances of delay and disembowelment before passage are excellent.

Meanwhile, power plant construction may get ahead of the deadline of regulation (whenever it will be). Quite clearly, the drafted standards would not permit the "proposed" Bell Plant on Cayuga, but the New York State Gas & Electric Company is actually going ahead on schedule with plant construction while fending off the protests, chiefly from Cornell scientists. Interestingly enough, the power company engaged a consultant limnologist (specialist in lake biology) who thus far has concentrated on making a case for the power and against the Cornell group. Subsequently, Cornell Aeronautical Laboratories was also engaged. Other power companies are also investing in ecological studies in New York State, and (whatever the motive) this amounts to an acceptance of responsibility to study conservation. It remains to be seen whether responsible action will follow.

The events on Cayuga have recently been subject of two articles in periodicals. Seventeen Cornell Scientists (Arnold, et.al.) wrote Thermal Pollution of Cayuga Lake, The Conservationist, 22.2-5 & 36-37 (August-September 1968). A cautiously neutral reporter, Luther J. Carter, authored Thermal Pollution: A Threat to Cayuga?, Science, 162.649-650 (November 8, 1968).

In spite of the same history of early construction and use of consultants, the Easton Plant on the upper Hudson was abandoned. A splendid analysis by Martin Goldstein, consultant engineer for the Hudson River Commission, showed the entire River going through the plant at times, and its temperature being raised 15-20°F. The announced reason for abandonment was that the New York State Power Authority had decided to build a plant on Lake Ontario (Nine Mile Point, near Oswego). Officially, then, the plant was abandoned for reasons which had nothing to do with heat pollution. Thus, it raises the interesting question of who could have stopped this plant from being built? There simply is no presently visible regulation of heat pollution, and no agency can protect a lake like Cayuga from having its whole ecology changed by industrially generated heat.

4. Alteration vs. Destruction

Churchill marshalled the English language into the Battle of Britain, and the promoters of uncontrolled development are mustering the language of science to support their views. Filling a swamp and building a motel are termed "improvement". An industry representative, whose company dumped poison into the Buffalo River, spoke of "gradually shifting ecological balances" to a Congressional Committee. The promoters of the Bell Plant on Cayuga have written, reassuringly, "The growing season will be extended somewhat in the vicinity of the plant", "(the lake may be) suitable for Coho Salmon". The biologist will immediately notice the implied destruction of lake trout and other present organisms, but the layman will not. The biologist will also know that only conclusions have been published in this case, but not the data; Cornell scientists have asserted that data accumulated for two generations have simply been ignored.

In the battle of words, odds are against the ecological conservation group. The promoters work full time, the ecologists must oppose them on their own time, as an amateur activity. Biologists have produced few crystal clear "proofs", since there was no financial support for basic studies which would undergird firm conclusions. We have at this time no broadly applicable biological standards of pollution. The most extensive effort (using diatom algae) has produced only an intricate index of dubious value. There are only bits and pieces of good scientific work, and they tend to alarm, not reassure. For example, two short publications from Poland report that moderate thermal pollution reduces the capacity of bacteria to decompose organic matter (to reduce BOD), a vital cleansing activity of the natural community.

A SUMMARY

1. Given the existing amount of uncertainty, those who know the most about man's environment simply do not wish to take risks with it. Those who know least are quite willing to take chances.
2. Regulation of human activity is obviously needed to avoid destruction of biological systems such as streams and lakes. In the case of nutrient pollution, regulatory measures are only being applied after much harm has already been done. In the case of thermal pollution, we are threatened with a repetition of

the same blunder if construction races ahead of regulation. This report showed that the Government of New York State still has the opportunity for prompt and timely action, and that the Department of Health has done its share by drafting standards. The responsibility for effective action - and the blame for failure to act in time - lies with the Water Resources Commission because of their stronger regulatory power.