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A Call for the Study of Iowa Rivers

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Abstract. The year around study of Iowa's rivers would provide a priceless body of data. The physical and chemical data, the biological data are needed so that the state may evaluate the progress of quality control in the crucial years ahead. The state has hundreds of men capable of doing such studies in local areas (high school, Jr. college, and college instructors in science). A massive approach could yield state-wide data quickly and enable many scientists to be useful scientifically and socially. This could involve many students of all ages who are eager to work and learn.

Water pollution is one of the obvious dangers in an agricultural state like Iowa. State agencies are now allowed to be more active in pressing for clean water; yet there are two major frustrations in our quest for cleaner waters. The first of these is a catastrophic ignorance of the ecology of our streams. The second frustration is that of our citizenry; we wish we could do something, yet we know not what to do or how to do it. The thrust of this note is a proposal for the scientist-teachers of the state to alleviate both of these frustrations by initiating a study of our state's waters. If this is done all over the state, we would have a priceless body of data—a baseline to work from in our progress toward cleaner waters. At the same time, a large number of investigators and their many students would achieve that rare satisfaction of participation in science as well as in the war on pollution.

Many of you have anticipated this call for action. I know that Krohn of Spirit Lake has been active with his students; in this volume of the Proceedings he has presented a year's data on the physical and chemical limnology of the upper Little Sioux River (Krohn, 1970). Also in this volume is a preliminary report of the fauna of the same stretch of river (Bovbjerg, Pearsall and Brackin, 1970). At Lake Park, Gochenauer has worked with his students on the ecology of Silver Lake. Press reports indicate a similar study on Otter Creek at West Union in north-east Iowa by Loterbour and his students. There are probably more such studies. Why not dozens, scores, or hundreds of investigations for the entire state? I have some suggestions to make.

Teams of scientists from a high school, Jr. College, or college should confer immediately—chemists, biologists and agriculturalists. The local waters could be explored, consulting county road maps, other maps obtained from the State Geological Survey in Iowa City, and the maps from local soil conservation office, including air photographs. Stations for study should be selected for accessibil-

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ity and with an eye to ecological variants including potential pollution sites such as feed lots, industry and cities. Stations above and below are critical.

The physical data are easily obtained: 1. water depth at a consistent site, 2. an estimate of water flow, 3. temperature and ice cover, 4. the turbidity, or silt load. Precipitation data may be obtained from the local press. Recording in metric as well as English measure would be a useful educational venture. (For Iowa precipitation data, see Waite, 1969.)

Water chemistry is more involved but not many tests are really essential. Oxygen levels are critical. Hardness tests are useful and not difficult. Nitrate and ammonia levels are valuable indicators. Measurements of pesticides, herbicides, radiation levels, and biological oxygen demand (BOD), are beyond the capacity of most laboratories, but perhaps not beyond some enterprising groups. Three samples are always better than one. Careful records of exact site, date, and time of day are essential. It may matter, for instance, whether oxygen readings are taken in the morning or afternoon. The Hach Chemical Company of Ames, Iowa produces field kits for water chemistry, so do some of the other scientific supply houses. The definitive reference is the American Public Health Association "Standard Methods" (1965).

The biologists have a more difficult task. It is not an easy matter to obtain quantitative data on a biota; sampling procedure is tricky. But, even a good species list would be a prize set of data. Care should be exercised to collect all areas of the station. And sorting of the substratum is essential; wire screen seines, dip nets, and minnow seines each serve a function in collecting. Species determinations must be approached with humility; we are dealing with many immature forms and poorly known species. Two references come to mind; Pennak (1953) and Harlan and Speaker, (1956). Other references could be gathered, particularly from the papers of the Iowa Conservation Commission and from the group in fisheries at Iowa State University. Specimens should be carefully preserved and labelled, and detailed records must be kept for each station. Of most importance studies should be around the calendar, and hopefully for more than one year, since no one year's data are ever "typical".

What then, after a careful study has been made and records analyzed. I suggest that entire stream systems be organized for study. Different teams could agree on the sampling times and procedures. If several such groups along the length of a river cooperated, a paper in these proceedings could result. A review of the last 20 years of the proceedings of this academy failed to reveal any systematic surveys; there have been reports on specific groups such as fish. In Ohio, a recent publication has done exactly what

is being proposed here (Kent State University Symposium Proceedings: The Cuyahoga River Watershed, Cooke, 1969). In any event, the data could be forwarded to the State Hygienic Laboratory, Iowa City, for them to add to the records kept there.

If large numbers of studies were completed, a very significant review of these data on a state-wide basis could very well reveal some important trends. We would have massive and solid data to work from. At the same time, there are many theoretical opportunities in such large scale studies; significant ecological conclusions could be drawn.

But the scientific data are not the only aims of the proposal being made here. Too often the science educators, other than those at the largest universities, feel out of the flow of their science. This should not be so and science teachers could very usefully turn their training to this end.

Students at any level are impatient to be doing things of this sort. Here is a chance not only to educate in science, but a chance to involve students. This takes leadership by the scientist and the students would need to learn scientific discipline. Every school district could become the warden of our waters. Local communities might well listen to their own youngsters in a way far better than to state authorities.

If our waters become known on a scientific basis, we at least have a baseline on which to design programs to restore them to a better condition. Why should not Iowa lead the nation in this direction? Only 50 years ago, Bohumil Shimek said of the Iowa River at Iowa City that the river might become so silted and polluted that the time might come when one would not care to swim in it, if the farmers upstream continued clearing the bottomlands of forests. How prophetic and how soon it occurred. It is up to the state to restore our rivers but, it is up to us as the state's roster of scientists to assist in this.

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