

INQUIRY INTO  
**Environmental  
Pollution**

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# A Note to Teachers

This book is intended to be useful in stimulating and supporting student activities related to the study of environmental pollution. The activities may vary widely, from laboratory work to field studies, from library research to class debates and discussion. The book is not, in itself, intended to be a major source of information; the supply of factual material on ecology and pollution is already immense and there seems to be little point in adding to it. Thus, our goal is to provide a *teaching* book, one that asks productive questions and suggests helpful exercises. Naturally, you will want to supplement it with samples from the rich supply of pamphlets, booklets, periodicals, and films related to the subject.

It is a common adage amongst teachers that there is no one single “best way” to teach something. Teachers tend to find styles and methods that work well for them. *Inquiry into Environmental Pollution* was meant to allow the individual teacher to use his own preferred styles. Many sections of the text will be suited to advance reading assignments followed by class discussion and seat-work. This can be done in as directive a style as is desired. Or it can be done in the inquiry mode if the class and teacher are moving in that direction. The text does not particularly demand one style or the other, although the author does confess to a personal bias in this respect.

There is strong emphasis placed throughout the book upon

the gathering and analysis of evidence. There are many experiments suggested, and the bulk of them are simple. It seems best suited to the temper of our time not to give the experiments as specific recipes and not to "give the show away" by telling what the official observations are. So many teachers today are planning the laboratory exercises with their students in thorough pre-lab discussions that it appears most helpful to only outline the laboratory activity here and to leave the specifics to the teacher to suit the particular situation in which he finds himself. In the same way, the laboratory activities are usually followed by questions, and each investigation is intended to speak for itself. Here again the teacher's personal guidance of the post-lab discussion, with appropriate scientific rigour applied to controls, assumptions, and interpretations, cannot be replaced by material in a textbook.

It is probably self-evident that it will be a barren course in environmental pollution that does not range beyond the boundaries of the classroom. There is a continual thrust in the text to urge students to look at their own and neighbouring communities. Field trips and industrial visits for whole classes or small groups will greatly enhance the use of the text. It may be productive to have an outside person spend some time with your classes. Again, you will find that the content and approach of this book is highly compatible with the use of community resource personnel. Finally, there is provision in Chapter Five for the involvement of teachers of subjects other than science. I have tried to make this involvement seem easy and natural without pushing it so hard as to appear artificial.

The text takes the view that it is more desirable to open doors than to close them. Thus there are frequent suggestions that students should speculate, or add to a list, or find other alternatives than those mentioned, or even to seek flaws in the text itself. Many of the questions asked do not have simple, direct, cut-and-dried answers that everyone will accept. But then, neither have our pollution problems. It seems appropriate to the subject to provide more questions than answers and to insist that sound reasoning, based on evidence, be the criterion for good answers.

Reference has been made to the feature of not demanding any one particular teaching style. An implication of this feature is the variability in the sequence and emphasis of topics. Many

teachers prefer to use the sequence given, omitting occasional sections if time presses. But it is quite possible to use other sequences, and I have tried to make it easy for the teacher who so wishes, to move about through the text. In order to help present an overview of the text and to see some of the possible sequences, an outline follows, together with a flow chart of some possible paths.

## **Outline of the contents**

Chapter One describes the mechanisms of an ecosystem and plunges directly into some pollution implications. Three ecosystems are described and optional laboratory work is suggested. The concepts of abiotic environment, producer, consumer, decomposer, matter cycles, and energy flow are introduced. This chapter will probably be the commonest place to start.

Chapter Two deals with water in the ecosystem. It is difficult to know how much of the chemistry of water is mandatory as background for the ecological explorations to follow. Certainly a course in environmental pollution is an excellent vehicle for some chemistry, and it seemed reasonable to assume that some teachers would have classes ready and able to pursue some chemical details. It also seemed probable that in other cases, the chemical details might be found peripheral to the main subject, and too time-consuming. This problem seemed especially acute in laboratory work requiring much technique. The matter was resolved by writing a reasonably general treatment of water as a solvent both of acids-bases and of gases. There is a strong laboratory emphasis and a continual theme of reference to pollution problems. Much of the laboratory work is useful for the experiments in Chapter Three.

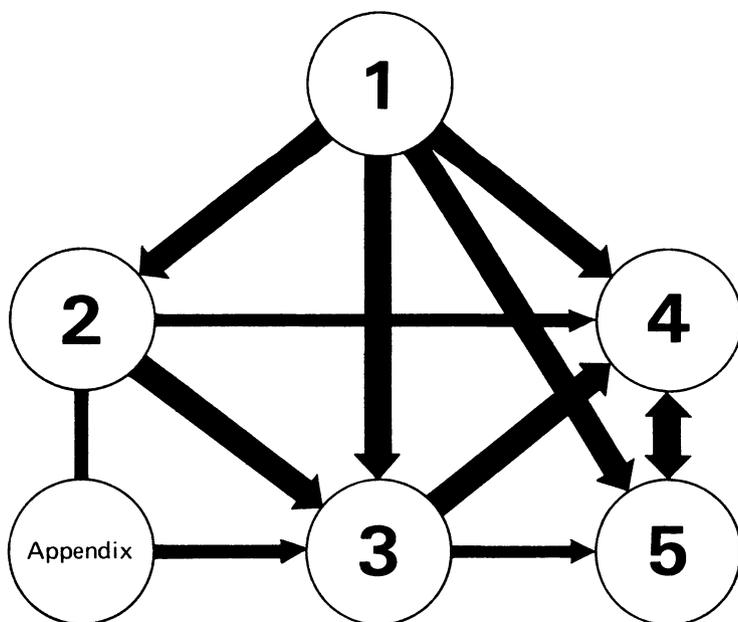
The more detailed, technical laboratory work for Chapter Two is placed in the Appendix. Thus, those who have the time and inclination can pursue that line, but it is *not* essential for the understanding of the rest of the text.

Chapter Three deepens the conceptual development of ecosystem relations by examining only producers and decomposers. There is laboratory work on photosynthetic production and on respiration, emphasizing the gas relations. Decomposers are sampled in the environment and their gas relations are explored.

Some factors affecting the growth of both are tested in the laboratory. If the lab work is to be done, appropriate parts of Chapter Two should be taken first.

Chapter Four completes and complements the previous chapter by describing the consumer as a modifier of the ecosystem. That does not mean that the chapter could not be taken on its own, out of order, if desired. Fish, beavers, and men are the examples studied. The emphasis is placed on men as consumers, and on the possibilities both for destruction and for improvement of the environment.

Chapter Five deals entirely with the human pollution situation, trying to use and apply general ecological concepts, but venturing also into social and political realms. Each level of society is examined through a series of case studies, which teachers



Flow chart. Some possible sequences for studying the chapters in *Inquiry into Environmental Pollution*. Other sequences are possible, especially if chapter sections are rearranged and taken in new combinations. (Many sections are written in a way that will permit rearrangement, if desired.)

may treat as lightly or as deeply as seems best. Successful learning with any case study in this chapter is not dependent on the completion of any other one.

# Acknowledgements

No matter how short a book is, it always seems to take more time than is available. The preparation of this one was greatly assisted by members of my family, especially Lyn Horwood. Very helpful detailed criticism was received from teachers in the field, from education students at Queen's University, and particularly from Dr. J. E. Guthrie of Whiteshell Nuclear Research Establishment, Manitoba. I am greatly indebted to them all.

R.H.H.

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