

and production of whole populations including soil bacteria. In a section on population dynamics of predatory arthropods of the soil surface, a formula is presented which purports to calculate the total number of individuals that entered any particular stage in the case where the egg-laying period extends over a period longer than the duration of the stage. The formula is

$$N = \frac{T}{t} \cdot \bar{n} \text{ where}$$

N = total number of individuals reaching a given stage,

$\bar{n}$ = mean catch per sample date,

T = duration (days) of the period during which individuals of the stage in question have been captured,

t = duration of stage under natural conditions.

Assuming that what is meant by T is the length of the trapping period, then if T is longer than t , the formula seems to me to be reasonable. For example, if the trapping period is 28 days and the duration of the stage is 7 days, then $n \times 4$ should give a reasonable estimate of the total number of individuals which entered the stage. But I fail to see the general applicability of the formula in other cases.

Part 3 is an assessment of environmental conditions in the areas studied including climatic conditions and the chemistry and micromorphology of soils.

Part 4 is listed as concerning the general applicability of the results but consists of only two short reports which are inconclusive.

The chapter headings, generally, are slightly overambitious and, reading them, one gets the impression that there must be more empirical facts presented than there actually are. But the methods presented are interesting and although many of them are not new, the great value of the book is that these methods are brought together in a single volume. Anyone engaged in a quantitative study of natural populations of plants or animals should have this book in his library.

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Air Pollution

By C. W. Lavaroni, and P. A. O'Donnell.

Water Pollution

By C. W. Lavaroni, P. A. O'Donnell, and L. A. Lindberg.

Noise Pollution

By P. A. O'Donnell, and C. W. Lavaroni.
Addison-Wesley Pub. Co., Menlo Park, Calif. and
Don Mills, Ontario, Canada. 1971. 94 p. \$1.85.

The young people of today are more aware of their environment than any previous generation. The mere mention of the word, "pollution" sparks an instant reaction — anger, disgust and an eagerness to 'clean-up'. They will be able to specify local examples — garbage piled behind neighbouring stores, industries that are pumping out clouds of black smoke and machines that are offending their ears. Teachers, however, were faced with a problem. *They* were enthusiastic, the students were eager and had cleared the schoolyard of any debris, clipped all the articles on the subject, collected newspapers for recycling, etc. but how did the teacher undertake the task of explaining the more complicated chemical and technical aspects of environmental damage by pollution? A trio of new books offers a valuable solution to the problem.

Patrick A. O'Donnell, *et al.* have presented teachers and students with an activity series of three books entitled respectively, 'Water Pollution', 'Air Pollution', and 'Noise Pollution'. Individual Teachers' Manuals and Student Texts are available in each title. Although the books are on different topics, they each follow the same format.

With these particular books, a teacher need not hesitate to spend an entire month or two covering pollution for fear of neglecting all the other subjects. O'Donnell, *et al.* have made the three completely cross-disciplinary and interdisciplinary. For example, in Chapter Two of 'Water Pollution' — 'Water, a Vital Resource', in only two pages, they offer the following suggestions:

Health — 'Have a physician visit your class to discuss how the human body absorbs, stores and eliminates water . . .'

Geography — 'Locate major industrial complexes on a map . . . Why do industries require an abundance of water?'

English — 'The topic, 'The Year We Began to Run Out of Water', would provide an excellent creative writing experience.'

Math — 'How much water would they need to have sufficient for essential uses? (daily use in the home)'

The suggestions are both practical and stimulating, avoiding the idealistic tendency of some Teachers' Manuals. In the majority of cases, equipment is readily available.

From the student's point of view, these books are enjoyable, pleasant and easy to use. Each book begins by presenting the 'Problem'. Actual photos of the results of pollution and startling accounts of the damage, arrest the student's attention immediately and enable him to parallel his own experiences with those illustrated. (Were *you* aware that in 1930 in the Meuse Valley in Belgium, 63 people died of air pollution or that due to the water pollution, the Cuyahoga River in Cleveland, Ohio burst into flames in 1969?). This chapter enables the child to look around his own environment and assess its condition. He may be interested in oil pollution on the ocean coast or in the Arctic, but the explanation of why he is unable to swim at the local beach, is much more meaningful. The defining of the problem for themselves makes them aware of the smaller, less obvious warning signs and evidences of pollution. Thought-provoking questions at the end of the chapter test the students' abilities to observe, assess and draw logical conclusions.

Once the pupils have clarified the problem(s) in their own mind and mastered the simple observation and recording skills, the authors encourage the liberal use of the books by the student in any particular order that appeals to him. Of course, the entire class may approach it as a unit, and many concrete suggestions are offered for the teacher taking that approach.

Imaginative, and in many cases, humorous illustrations reinforce the information, facts, history, statistics, etc. of Chapters 2. These chapters help the student clarify the role of the resource being destroyed and the physical properties of each. Ideas like that of noise being relative are introduced. Perhaps some of these students will be more understanding of their parent's complaints.

The most exciting aspects of the book — the activities and experiments, are explained in Chapter Three. Here they have the opportunity to explore pollution for themselves. (There are still many suggestions for the teacher to make the most effective use of all the experiments). Twenty to twenty-five progressive experiments and activities enable the student to build on his accumulation of pollutant facts. The activities are directed enough that the student has guidance to work alone and discover a particular aspect, and yet provide room

enough to let imagination play an important role. Here, he gathers statistics, records data, mixes chemicals and tests sound equipment for quality. The materials required for these can be found not only around the classroom but also in the home, which allows the child to progress and pursue his interests even over the weekends and evenings. Thus, the more complicated chemical aspects of pollution are broken down into easily comprehended experiments that give students the basic understanding that will be necessary as they move on to high school.

The final chapter in each of the books, 'Extending Your Ideas' very tidily sums up what I feel Mr. O'Donnell and associates had intended their books to be — doorways to more detailed and extensive research into each of these areas. The authors have provided them with the basic understanding in the previous chapters, now they offer them leads into new fields. Each section of questions begins with one or two that have the answer contained within the book, the others build upon the answers to these and require that the student calculate the answer for himself. The questions cover such a range and scope that there should be no difficulty in locating questions for those interested in art, geography, chemistry, etc.

The books are particularly suited to the Junior levels of the elementary system, but challenging enough to make worthwhile activities for the intermediate grades, and in places, simple enough for the teacher to introduce the topic to the primary grades. An added incentive to those students who believe that adults should practise what they preach, is that all the books are printed on recycled paper.

Although teachers should all welcome the advent of Mr. O'Donnell's books on the educational scene, perhaps the most necessary one is 'Noise Pollution'. We can all hear noise pollution, and know that it is irritating and damaging, but how can you explain what it does and how to differentiate? The authors have done an excellent job of accomplishing this.

Teachers will appreciate the fact that not only are the disciplines covered in these exciting texts, but value judgments, distinguishing between observations and assumptions, drawing conclusions, recording data, and other abstract ideas are stressed.

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Rawes, Jacqueline. 1972. "Air Pollution, by C. W. Lavaroni and P. A. O'Donnell; Water Pollution, by C. W. Lavaroni, P. A. O'Donnell and L. A. Lindberg; and Noise Pollution, by P. A. O'Donnell and C. W. Lavaroni [Reivew]." *The Canadian field-naturalist* 86(3), 318–319. <https://doi.org/10.5962/p.343632>.

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