

- Searle J. B. 1990. Evidence for multiple paternity in the common shrew (*Sorex araneus*). *J. Mammal.* 71: 139 – 144.
- Shillito J. F. 1963. Field observations on the growth, reproduction and activity of a woodland populations of the common shrew, *Sorex araneus*. *Proc. zool. Soc. Lond.* 140: 99 – 114.
- Stickel L. F. 1954. A comparison of certain methods of measuring ranges of small mammals. *J. Mammal.* 30: 399 – 411.
- Vogel P. 1972. Beitrag zur Fortpflanzungsbiologie der Gattungen *Sorex*, *Neomys* und *Crocidura* (*Soricidae*). *Verhandl. Naturf. Ges. Basel.* 82: 165 – 192.
- Yoshino H. and Abe H. 1984. Comparative study on the foraging habits on two species of soricine shrews. *Acta theriol.* 29: 35 – 43.

Received 15 April 1991, accepted 18 October 1991.

Acta Theriologica 36 (3 – 4): 237 – 238, 1991.

BOOK REVIEW

Ecological risks

Ecological risks. Perspectives from Poland and the United States. W. Grodziński, E. B. Cowling and A. I. Brey Meyer, eds. National Academy Press, Washington D. C. 1990. 415 pp. ISBN 0-309-04293-3 pk.

The science has changed during the last decade toward an acknowledge very high complexity of nature. We shall never be able to describe all the various components in our environment in detail. As the quantum mechanics set limitation for the accuracy of our observations in physics it does also in ecology. While the limitations in physics are caused by our influence on the object by the observation, the limitations in ecology is caused by the enormous complexity of nature (ecosystems).

These conclusions are very clear. The nature is complex, but we cannot observe all details; consequently we must attempt to get a more holistic view on our environment by including only the mainline and the bearing processes in this description. We must therefore put more emphasis on synthesizing our many analytical results. We cannot do science without analytical method, but we should not do entirely analysis; we need to stop from time to time in our analytical effort and make synthesizing conclusions. On of such synthesis is the reviewed book, based on the joint Polish – USA workshop on "Ecological Research and Environmental Protection" held in Mogilany near Kraków in 1987.

The various contributions to the book were developed to illustrate the current state of knowledge about ecological risks in Poland and the United States. It begins with an overview on natural systems for human beings and then define what is meant by ecosystems, ecological risk assessment, and ecological risk management. They point up some interesting contrasts and similarities between ecological goals and conditions in Poland and the United States.

The next section of the book consisting with 4 papers is focussed on ecological management concepts. It is impossible to summarize, in this review, all findings published in the book written by many authors. Nevertheless, I would like to turn readers attention to selected papers which, to my mind, are of special interest.

One of such is 'Russell's paper who proposes that all questions of ecological impact need to be answered in the context of human values – both economic and easthetic or existential. In this context, the environment (including all terrestrial and aquatic ecosystems) are sources of materials and aesthetic or recreational experiences which ecosystems are regarded as public or private property. It should be managed for the benefit of humans rather than protected or conserved for their own sake.

One should however remember, that ecological impacts, whether avoided or encouraged, have both economic and social costs. In a human-centered value system, the social dilemma centers around whether those costs are worth bearing.

S. J. Kabala in his paper analysis the economic factor involved in Poland's contemporary environmental problems. A. W. Maki and M. W. Slimak discuss the role of ecological risk assessment in environmental decision making. The formal assessment process used by many industries and by the Environmental Protection Agency in the United States consists of two parallel lines of investigation designed to relate observed effects to expected exposures.

The next section of the book relates to human effect on the terrestrial environment. This section of the book begins with two chapters on concepts in stress ecology. It includes four chapters on air pollution impacts and ends with two chapters on environmental monitoring. It is one of very interesting part of the book. M. A. Harwell *et al.* discuss concepts in stress ecology. They show how understanding stress ecology is essential to effective assessment and management of ecological risk. They argue that a complete assessment process should also identify those specific components of ecosystems (e.g., particular species, rates of particular processes, concentrations of particular chemicals) that need to be measured and monitored in order to detect socially significant ecological changes caused by stress.

Such indicators of ecological effects, properly measured and compared with non-stressed situations, can provide the basis for evaluating impacts from human activities and, through application of ecological understanding, can allow projections of future impacts. In this way, ecological risk assessment and management can be prospective and not just in reaction to unacceptable environmental damage already done.

The other group of paper deal with air pollution impacts. The known effects of air pollution and the possible effects of acid deposition on forests have evoked major public concern and a many fold increase in research in North America in recent years. Earlier research on the effects of sulfur dioxide and fluoride near major point sources of these pollutants has given way to greatly increased research on the effects of regionally dispersed secondary pollutants such as ozone and acid deposition. In distinct contrast to the situation in the United States, air pollution effects on forests in Poland are better understood that effects on agricultural crops.

The Polish authors present data showing how grave situation is in Poland. The impacts of air pollution on a broad regional scale is currently not known in Poland because a country-wide survey has not been made. While investigations near sources of pollutants have shown significant decreases in crop yields, these impacted areas also have high soil concentrations of heavy metals which correlates with current air pollution.

The other section of the book is devoted to agricultural and forestry impacts on environmental quality. Special attention is given to the twin problems of soil erosion and its impacts on both land quality and surface waters, and chemical contamination with fertilizers and pesticides and their impacts on both surface waters and groundwaters.

A major advance in understanding losses of topsoil due to erosion was development of the universal soil loss equation (USLE) which expresses soil losses in tons of topsoil per acre of land per year. Average losses in the United States are about 4.8 tons per acre per year. Leaching of water soluble pesticide and fertilizer nutrient chemicals from agricultural lands is another serious problem in many parts of the United States. W. E. Johnston describes the development and use of a series of practices designed to decrease erosion and leaching of agricultural chemicals from farmland. These include conservation tillage, strip cropping, terracing, land leveling, and planting of trees on highly erodable land. Practices aimed at decreasing chemical contamination of surface waters include decreased dependence on pesticides through increased use of crop rotations and genetically resistant varieties of crops and adoption of integrated pest management practices.

The book ends with recommendation for a science-base program of ecological risk assessment and environmental protection.

To my mind, the book is of interest mostly for researches.