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BOOK REVIEW

KESSELL, S. R.: GRADIENT MODELING: RESOURCE AND FIRE MANAGEMENT. — Series on Environmental Management, Vol. 1. — Springer Verlag, New York—Heidelberg—Berlin 1979. 432 pp. 175 figs. DM 79.50; US \$ 43.80.

The book reviewed is the first volume of the new Springer series on environmental management, dedicated to the solution of practical, serious environmental problems.

Gradient modeling is a new approach to scientific resource management, developed by the author. As he writes "it is nothing more than the linkage of multidimensional gradient analysis with a site-specific stand inventory and appropriate computer software". This method aims to construct a resource management computer information system for managerial use. Such a system was constructed in the Glacier National Park. It is possible in several minutes to describe the environmental, vegetational (*e.g.* species composition, diversity) and fuel conditions of arbitrary standpoint in the area under consideration and/or to predict fire behavior (*e.g.* rate of spread, flame length) and/or to predict the postfire successional development of the stand. The "conversation" with the computer is held in very simple language using common English words; knowledge of FORTRAN (in which the computer program is written) is not necessary; the system is acknowledged to be foolproof.

The development of this information system is described including basic data collection, data analysis, construction of gradient models of distribution of particular species and construction of succession model, of fire behavior models and the linkage of components. Related problems are discussed from both managerial and theoretical points of view. The methods used in field sampling, show some common features with the Braun-Blanquet methodology. Stands were selected to obtain representative samples from all possible combinations of environmental conditions (consequently non-randomly) and their area was stated according to the homogeneity of environment and of vegetation; on the other hand quadrates for understory species composition sampling were located at random within the stand; herbs and shrubs were recorded by absolute cover for each quadrate on an eight-point scale, not much different from the Braun-Blanquet scale. Special attention is given to fuel properties. Furthermore, the data from shrub dimension analysis, fuel moisture and microclimate study, false color infrared aerial photography and fire behavior monitoring are employed. Properties of vegetation are related to the following gradients: elevation gradient, time since burn gradient (over 95% of Glacier forests below 1500 m have burned within the past 400 years), topographic-moisture gradient, drainage area gradient, primary succession gradient (Glacier vegetation was all developed during the past 10 000 years, since the last ice retreat) and Alpine wind-snow exposure gradient, and to categories of disturbance. It is surprising that the influence of the ground is ignored at all.

Special attention is paid to the role of fire and to the fire management. The total fire suppression policy is thoroughly criticised. Fire is the most important and natural determinant of the structure, species composition and other community characteristics of the Glacier forests. Their total suppression hinders the maintenance of many tree species and community types (and consequently leads to the fall of ecological diversity).

In the last part of the book several subsequent applications of gradient modeling are described.

The book contains a great deal of useful information for both researchers and managers. It is written in a easily understandable manner and can serve as a textbook. It shows how to use some of the methods which have been used mostly in basic research so far — the ones in resource management.

B. SLAVÍK (Přaha)