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CONTINUING EDUCATION NEEDS OF NATURAL RESOURCE PROFESSIONALS

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New products, technology and changing social attitudes have created continuing education needs in many natural resource-related professions. Environmental educators rapidly become obsolete without continued study, and many professional organizations are addressing this problem. Causes of professional obsolescence are briefly reviewed with emphasis on natural resource managers. Foresters' needs and continuing education efforts are discussed to illustrate continuing education concepts in an environmental and natural resource-related profession.

1. INTRODUCTION

For many managers in environmental and natural resource areas, formal education ends when the necessary or required college degree is obtained. Professional education, however, is a continuing process. Continuing education for environmental and natural resource-related professionals has been considered important for many years, at least partially due to earlier work in continuing education programs for engineers.

Engineering obsolescence was defined by Seifert (1964) as "The measurement at some point in time of the difference between the knowledge and skills possessed by a new graduate of a modern engineering curriculum and the knowledge and skills actually possessed by the practicing engineer who may have completed his formal education a number of years ago." Obsolescence was also discussed by Lukasiewicz (1971), who defined *potential obsolescence* of engineers as "the number of new courses (not offered at the time of his graduation) relative to all courses offered at a given point in time." The adjective *potential* was used since the definition does not consider additional information and experience acquired after graduation. Although defined for engineering in general, the terms apply equally well to obsolescence in other fields, including natural resources and environmental studies.

Rates of professional obsolescence are often judged by *professional half-life*: "the time after completion of professional training when, because of new developments, practicing professionals have become roughly half as competent to meet the changing demands of their profession" (George and Dubin 1971). Many widely different professions have used the half-life concept. As early as 1970, for example, the Vice President of the American College of Physicians estimated the half-life of medical knowledge to be only 5 years (George and Dubin 1971). Engineering half-life was also estimated at 5 years (Lukasiewicz 1971). In natural resource areas, professional half-life was recently reported as 8 years (Straka and Richards 1984).

We discuss the causes of professional obsolescence, emphasizing natural resources and environmental studies. We also discuss continuing education to address such problems and present forestry needs and efforts as an example of continuing education in a dynamic field of environmental management.

2. CAUSES OF PROFESSIONAL OBSOLESCENCE

Professional educations become obsolete over time, as important new knowledge is generated but not directly communicated to practicing scientists and managers. Managerial and field experience provides much useful information to practitioners, yet experience alone often cannot keep pace with the educational deficiencies created by new technologies, methods or socio-political changes. Obsolescence in most professions is therefore related to two broad areas of potential change: new products and technical developments, and socio-political trends and policy changes.

2.1 New Products and Technical Developments

The discovery and application of new knowledge is an important part of dynamic societies. Research and development is a direct input to creating such knowledge, and is heavily supported by public and private funds in many countries where environmental concerns and natural resource management receive great attention. As knowledge grows, the rate of professional obsolescence increases, since new knowledge is based on previous results. Figure 1 (adapted from Beardsley 1972) illustrates the general exponential growth of technical knowledge over time, and the resulting increase in the potential rate of technical obsolescence. Figure 1 shows technical obsolescence in two parts, a retention gap from forgotten material and a new knowledge gap from technology growth. Both deficiencies can be addressed through well-designed programs of continuing professional education.

2.2 Socio-Political Trends and Policy

In many developed countries, socio-political changes in the last twenty years have created new educational needs for environmental and natural resource managers. In the United States, for example, environmental concerns have become increasingly important since the late 1960's. Increased awareness of the environment and the general quality of life occurs as nations develop and provide higher levels of income and access to material goods to larger

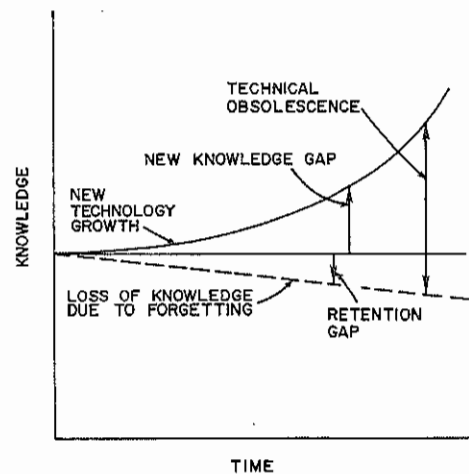


FIGURE 1. Potential for increasing technical obsolescence over time.

portions of the population (Schnitzer 1978). New regulations and policy changes reflect social concerns and require natural resource managers to recognize and accept new ideas and methods. Also, as societies develop and influence environmental and natural resource policy, managers and scientists increasingly find themselves in positions that are very important to the public. Communication skills are often important continuing education needs for such professionals.

3. CONTINUING EDUCATION AND PROFESSIONAL DEVELOPMENT

Changing products and technology, new social attitudes and regulations, and increased needs for communication skills have resulted in educational deficiencies in many diverse professions. Engineering and medicine, of course, are examples of professions with strong programs and requirements for updating practitioners and meeting educational needs. Natural resource and environmental professions are also addressing such needs, however, with professional societies often playing a major role.

Registration, licensing, and other methods of certification are increasingly being used to promote higher standards of competence in natural resource-related professions. Continuing education needs are great for those who manage fish and wildlife resources, range, outdoor recreation and forest resources. We discuss forestry as an example of an environmental and natural resource-related profession where specific continuing education needs have been identified and are being addressed through a national continuing education program.

3.1 Continuing Education Needs in Forestry

The Society of American Foresters (SAF) is a national organization devoted to advancing the science, technology, practice and teaching of professional forestry. Continuing education is recognized as an important need for foresters and in 1981 the Mississippi SAF Forest Science Committee surveyed 800 Mississippi foresters to determine specific continuing education needs. One hundred ninety-six usable responses were obtained.

Foresters rated each of 62 subjects by continuing education need. Straka and Richards (1984) published complete results on each of the 62 subjects. Here, we discuss results for each of seven SAF subject *areas*: (1) forest mensuration/biometrics (e.g. statistical concepts and regression, computer procedures, growth and yield equations and simulation models), (2) forest resources protection (e.g., from fire, insects, and disease), (3) forest biology and ecology (e.g., soils, wildlife ecology, and physiology), (4) silviculture (e.g., tree genetics, fertilization, site preparation and regeneration methods), (5) managerial and decision sciences (e.g., forest economics, taxation, land use mapping, and systems analysis), (6) social and related arts and sciences (e.g., public relations and communication skills), and (7) forest products utilization (e.g., cost analysis for harvesting operations, road construction, marketing and forest products, and wood procurement for manufacturing facilities).

Respondents placed continuing education into one of four categories of need: Don't Need (not mandatory for professional progress), Already Have (already fully competent in the subject area), Would Help (would help professional progress), and Must Have (necessary for professional progress). Respondent's age, years of experience and type of employer were also recorded. Thirteen public and private *employers* of Mississippi foresters were also surveyed. Respondents ranged from a forest products company

TABLE I
Continuing Education Needs of Mississippi Foresters Ranked by Subject Area, as Perceived by Foresters and Their Employers (Need is Defined as Total Percentage Responses in the "Would Help" and "Must Have" Categories)

Subject Area	Foresters		Employers	
	Percent	Rank	Percent	Rank
Managerial and Decision Sciences	70.9	1	72.3	2
Forest Products Utilization	66.7	2	65.0	5
Silviculture	59.9	3	60.7	7
Social and Related Arts and Sciences	57.5	4	66.9	4
Forest Biology and Ecology	52.2	5	67.0	3
Forest Mensuration/Biometrics	50.9	6	61.0	6
Forest Resource Protection	48.1	7	74.4	1

regional manager responsible for over 100 foresters, to a forestry consultant with only 3 employees. The 13 employers were responsible for the performance and professional development of 448 foresters.

As shown in Table I, forestry employers generally perceive a greater need for continuing education than foresters themselves, especially in protection and areas which include computer and communication skills. Over 70 percent of foresters and their employers perceive a need for continuing education in managerial and decision sciences.

Figure 2 illustrates perceived continuing education needs for the 7 subject areas by age of respondent. Foresters' ages do not greatly affect their relative rankings of subject areas. Overall need for continuing education, however, does vary somewhat with age. An expected trend away from technical forestry subjects to "people management" skills as age of respondent increased is not apparent. Managerial and decision sciences, however, do show a relatively strong increase in need as age increases.

Perceived needs for continuing education decline but stabilize as years of experience increase (Figure 3). Relative rankings of subject areas are about the same for each level of experience, however. In forest resources protection, decreasing continuing education needs may reflect increasing competence and abilities as fire protection experience increases, or the trend may simply reflect that more experienced foresters are increasingly devoted to duties other than forest resources protection.

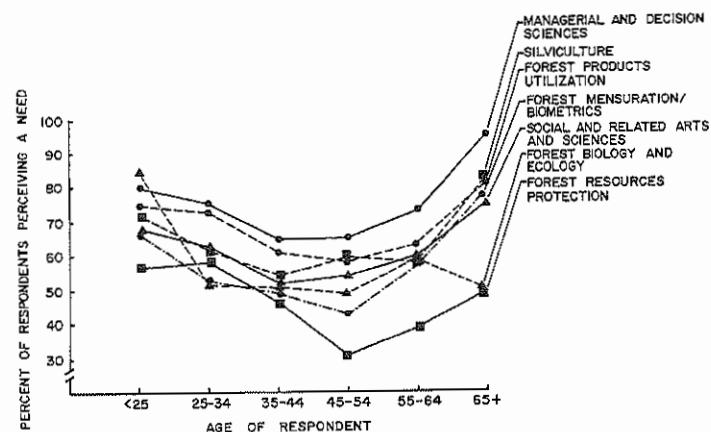


FIGURE 2. Perceived needs for continuing forestry education at different ages.

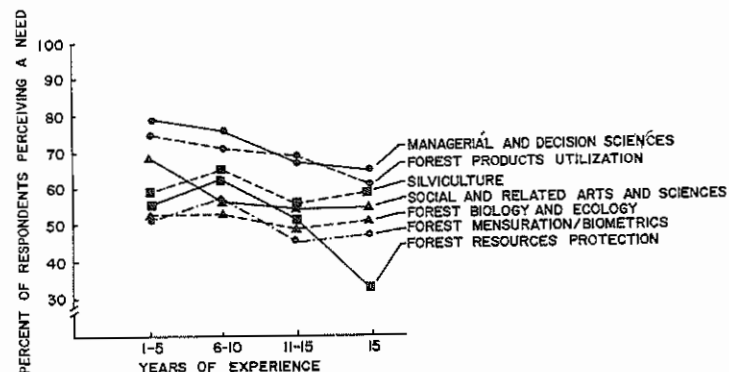


FIGURE 3. Perceived needs for continuing forestry education for increasing levels of experience.

Subject area rankings do not change when the type of employer is considered, but forester's perceived levels of need vary significantly. Government employees, for example, have the least overall perceived need for continuing forestry education. Forest industry employees perceive a moderate need for continued study. Consultants and self-employed foresters have the highest overall level of perceived continuing education needs.

3.2 Continuing Forestry Education Program

At the national level, the SAF has initiated a voluntary program of Continuing Forestry Education (referred to as the CFE program). Objectives of the program are to:

“Encourage foresters and allied professionals in a formal program of continuing education and professional development.

Stimulate individual self-assessment by providing standards for achievement.

Advance the knowledge and skills of those engaged in forestry.

Give recognition, through issuance of a certificate, to those completing the program and thereby demonstrating continued learning and development.”¹

The program requires foresters to obtain at least 150 contact hours within a maximum period of 3 years. Six potential categories of continuing education and professional development are recognized in the program: (1) organized courses or activities in forestry or forestry-related subject matter (60 hours minimum), (2) organized courses or activities not specifically related to forestry (60 hours maximum), (3) developing, preparing and presenting courses or activities (60 hours maximum), (4) preparing, writing and publishing forestry or forestry-related materials (60 hours maximum), (5) self-improvement through participation in or attendance at certain types of professional meetings (30 hours maximum), and (6) holding elected or appointed office in the SAF or allied professional organizations (30 hours maximum).

CFE requirements are stated as minimum and maximum numbers of hours

to encourage a balanced program in reaching the 150 total hours of continuing education and professional development in forestry. The program has been very successful. In the first 3 years, 300 certificates were awarded nationwide.

Regional and state organizations are also encouraging foresters to participate in continuing education and other professional activities. In Mississippi, for example, foresters who pass an examination by the State Board of Registration for Foresters become Registered Foresters. Beginning in 1986, foresters must meet certain minimum requirements for continuing education and professional development *each year* to retain Registered Forester status. Mississippi is the first state to establish such a requirement, but other State Boards of Registration are considering similar programs.

4. SUMMARY

Many professions recognize potential obsolescence as a problem which must be addressed. Obsolescence in environmental and natural resource-related professions has increased in recent years, as important new regulations, products and methods create new needs for education among resource managers. Foresters' needs reflect the continuing education requirements common to many resource-related professions. Foresters perceive great needs for continued study in managerial and decision sciences, applied aspects of silviculture and management, and social and communication skills. Educational deficiencies for foresters have also resulted from new developments and methods in harvesting timber and processing the raw material into paper, lumber and other wood products.

The Society of American Foresters has begun a successful program of encouraging continuing education and professional development. Universities, State Cooperative Extension Services and many other agencies are providing continuing education services to help meet the needs of foresters. Surveys such as the one conducted by the Mississippi SAF Forest Science Committee assist planners to direct programs to areas where perceived needs are greatest. In forestry, as in other environmental and resource-related professions, the traditional concept of a terminating education is giving way to what George and Dubin (1971) term “a concept of life-long continuing education as a regular concomitant of professional work.”

NOTE

1. From the SAF continuing forestry education and professional development program's 1983 "Application for CFE Certificate."

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