

LOGGING SAFETY IN FOREST MANAGEMENT EDUCATION

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Abstract: Forest management degree programs prepare students for careers in forestry by teaching a combination of biological sciences (e.g., silvics and genetics) and business management (e.g., forest policy and timber valuation). During a 4-year degree program, students learn the impact of interest rates, equipment costs, and environmental policies on forest management and silvicultural decisions. However, little consideration is given to worker safety and health and its impact on forest management. This paper illustrates the ethical and economic importance of logging safety to forest managers and advocates incorporating safety issues into existing forestry courses. An appendix provides examples of safety and health information that can be integrated into forest policy and forest economics courses.

INTRODUCTION

Four-year forest management programs are designed to prepare students for professional careers in management of natural resources, including the business aspects of finance and personnel management. Students are exposed to a diverse curricula, ranging from the biological sciences to accounting principles. This broad program emphasis is encouraged through the *Society of American Foresters (SAF) Accreditation Standard for Forestry Program Mission, Goals and Objectives* (Society of American Foresters 1994a), in which the interdisciplinary nature and service orientation of the forestry profession are emphasized. The SAF places importance on management training -- two of the four areas of study that must be adequately represented in the forestry curriculum are Management of Forest Resources (including forest engineering, harvesting and utilization) and Forest Resource Policy and Administration (including policy development, administration, and personnel management). Forestry curricula must "provide students with an understanding of the social, cultural, political, legal, economic, institutional, and historical influences on forestry" (Society of American Foresters 1994a).

Forestry programs traditionally meet this goal of providing students with an understanding of socioeconomic influences on forestry through policy and management courses. External influences on forestry typically addressed in these courses include organizations, cultural resources, environmental concerns, pollution control, military policy, taxation, and international trade policy (see tables 1 and 2). One important topic, occupational safety and health, is not typically addressed in these courses.

WHY TEACH SAFETY AND HEALTH IN FORESTRY PROGRAMS?

Worker safety concepts should be integrated into forestry education for several reasons. First, logging is the primary tool for accomplishing forest management objectives on the ground. Logging has long been considered a dangerous industry, and death certificate data indicate that the rate of work-related fatalities in the logging industry is extremely high (Myers and Fosbroke 1994), with regional rates ranging from a low of 87.0 deaths per 100,000 workers in the southeast to 394.3 deaths per 100,000 in the central hardwood region. For comparison, the fatality rate across all industries is 7.0 per 100,000 workers, and the rate in the manufacturing sector (of which logging is a part) is 4.4 per 100,000 (Jenkins et al. 1993). The logging industry has also been identified as having a high rate of nonfatal injuries with a lost workday case rate of 10.7 per 100 full-time workers in 1990 compared to a private industry average of

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Table 1. Examples of Forest Management Influencing Legislation Taught in Forest Policy Courses¹.

<u>Legislation</u>	<u>Date</u>	<u>Notes</u>
Magna Carta	1215	King's ownership of wildlife in trust for all people
King's Broad Arrow	1691	Reserved mast trees for the British navy
Lacey Act	1900	Prohibited interstate trade of wildlife illegally taken
Antiquities Act	1906	Preservation of cultural artifacts
Week's Law	1911	Watershed protection; Fire protection
Forest Cons. and Taxation 1949		Tax incentives for certain forest management practices
Land and Water Cons. Fund	1964	Public purchase of private land for recreational use
Wilderness Act	1964	Established the Wilderness Area system
Nat'l Historic Preservation Act	1966	Assessment of activity impact on historic sites
Clean Air Act and Amendment	1970, 1973	Designation of air quality classes, scenic visibility
Fed. Water Pollution Control Act	1972	Stop discharges, attain fishable/swimmable waters
Endangered Species Act	1973	Protection of endangered plants/animals, critical habitat
Eastern Wilderness Act	1974	Extended 1964 act to eastern U.S.; added 16 new areas

¹ Sources: Cubbage, O'Laughlin, and Bullock (1993); Dana and Fairfax (1980)

Table 2. Examples of Organizations and Events that Have Influenced Forest Policy¹.

American Assoc. for the Advancement of Science	Monongahela National Forest Controversy
American Forestry Association	National Academy of Sciences
Bitterroot National Forest Controversy	National Trail System
Civilian Conservation Corps	Native Alaskan Lands Settlement
Council on Environmental Quality	Office of Management and Budget
Environmental Protection Agency	Sand County Almanac publication
Farm Abandonment & Westward Expansion	Sierra Club
Hetch Hetchy	Soil Conservation Service
Friends of the Earth	Society to Protect New Hampshire Forests
Izzak Walton League	Tellico Dam

¹ Sources: Cubbage, O'Laughlin, and Bullock (1993); Dana and Fairfax (1980)

3.9 and a manufacturing industry rate of 5.3 per 100 full-time workers (U.S. Department of Labor 1992). Though there have been tremendous advances in harvesting technology over the past 30 years, the logging industry has seen little improvement in injury statistics (McCormack 1963, Myers and Fosbroke 1994).

The second reason for teaching forestry students about worker safety is that forest management decisions directly affect logging safety. There are many examples. The decision to leave den trees may raise logger's risk of being hit by a falling snag. The selection of a residual stand density influences the probability of a logger being injured in the hit-tree reaction type of incident described by Peters (1991). Decisions about the length of a cutting contract may influence the amount of time loggers have to complete the job safely. Even forestry graduates that do not make harvesting decisions may be employed by industry in supervisory positions where they are responsible for other employees. Under the provisions of the 1970 Occupational Safety and Health (OSH) Act (Public Law 91-596), employers are responsible for assuring safe and healthful working conditions for all employees (see Appendix).

Graduating forestry students need to be aware of their responsibility for understanding and following regulations that apply to their jobs.

Finally, teaching safety to forestry students is an ethical obligation of any forestry program. The "Code of Ethics" set forth by the Society of American Foresters (Society of American Foresters 1992), states in its preamble that compliance with the SAF canons "ensures just and honorable professional and human relationships, mutual confidence and respect, and competent service to society." Professional foresters are morally and ethically bound to ensure that their decisions and actions do not jeopardize the safety of others. Graduating forestry students need to be aware of how their future management decisions can affect the safety and health of other workers.

CURRENT STATUS OF SAFETY IN FORESTRY PROGRAMS

Programs that train students to become professional foresters often devote less program time to safety than do programs that train forestry technicians. This is partially exhibited by differences in SAF requirements for accreditation of professional programs and recognition of technical programs. Though current *Guidelines for Accreditation of Educational Programs in Professional Forestry* (Society of American Foresters 1994a) do require coverage of personnel management and do require that facilities provide an environment that is safe, healthful, and conducive to learning, the guidelines make no other mention of safety. In contrast, the *Standards and Procedures for Recognizing Educational Programs in Forest Technology* (Society of American Foresters 1994b) have a specific curriculum requirement for "Woods Safety," which is to include basic first aid, identification of hazards, hand and power tool safety, and pesticide safety.

In May of 1993, the authors sent a request to the 45 professional degree programs accredited by the Society of American Foresters. Each program was asked to provide a college catalog describing their program, course syllabi of management and policy related courses, and a copy of the most recent self-evaluation report. These materials were reviewed to determine how prominent a role safety topics played in the way courses and programs are described to prospective students. Thirty-one forestry programs provided materials (26 schools sent catalogs, 22 sent course syllabi, and 18 sent self-evaluation reports). Only seventeen programs referenced any safety concept within the reviewed material and these references were generally limited to the harvesting course. Based on this review, most professional forestry degree programs do not currently emphasize safety issues in their descriptions of course content.

Though the numbers above suggest that safety is not an emphasis area in forest management programs, most programs do have some safety components. Frequently, the strongest safety component of 4-year programs is in the summer forestry camps. Here, a few days are spent teaching the technical aspects of harvesting, road construction and chain saw use. Most 4-year programs also touch briefly on safety issues in a variety of courses. For example, logging hazards are discussed in harvesting classes, though the impact of these hazards in terms of lives lost and lost work time injuries is typically not. Pesticide labelling is covered in planting, silviculture, and entomology courses. Ecology and wildlife management courses also discuss pesticide safety, though usually from the environmental contamination standpoint. Each year, a few students gain practical experience in safe woods operations from forest managers while working for the school at the university woodlot or forest. Other attempts are made to instill a consciousness of safety among forestry students, including the requirement that all students wear hard hats and sturdy boots during field labs and industry tours.

What is Missing?

Professional foresters need to make rational decisions based on an understanding of safety principles and an awareness of safety issues that affect forest (and any other management) operations. Forestry programs should prepare students for challenges they will face by at least making them aware of: the safety record of the logging, sawmilling, and paper manufacturing industries; the existence of safety regulations, standards, and policies; the identification and control of hazards; the management of safety; the methods of preventing injuries; the impact of safety programs on insurance premiums; the concepts of insurance and shared risk; the impact of injuries on operating

costs and employee morale; the responsibility and liability of decision makers and managers; and the influence of management decisions on worker safety.

When the National Research Council (NRC) surveyed academic and nonacademic forestry groups to identify needs in forestry education (National Research Council 1990), respondents suggested a need to "move from technician-type courses to more analytical, decision-making, conflict resolution types of courses." Expansion beyond technical safety topics (e.g., first aid and tool safety) toward the legal, economic, and moral aspects of safety and health fits well with this NRC recommendation. This expanded coverage of safety and health issues will provide future foresters with the analytical tools they will need to evaluate management decisions.

INTEGRATING SAFETY CONCEPTS INTO EXISTING COURSES

Integration of safety and health concepts into forestry education **will not** require a new course, "Safety in Forest Operations." Forestry curricula already contain a full complement of course requirements; any new course would require elimination of an existing course. The ultimate goal should be to teach future foresters to consider the safety implication of all decisions. To do this, safety thinking needs to be incorporated into many courses, wherever a safety issue is relevant. This need not be difficult because most safety issues relate in some way to concepts that are taught in existing courses.

For example, forest policy courses traditionally include tax laws, environmental regulations, recreational development programs, and resource funding programs because of the influence of these regulations and programs on forest management decisions. The inclusion of safety and health regulations, the regulatory process, and safety research organizations fits into the concept of teaching policies and programs which influence forestry (see tables 3 and 4 for selected examples). Additional topics that could be incorporated into forest policy courses include the regulatory process (including the OSH Act's provision for public comment during standards development), owner liability, third party tort, and specific Occupational Safety and Health Administration (OSHA) and national consensus standards related to forestry operations.

In addition to the above forest policy examples, other topics can be integrated into the existing curricula. Introductory forestry courses should cover sources of injury and illness information, injury statistics specific to forest industries and occupations, and the importance of safety. Timber harvesting courses should describe specific hazards associated with logging and recommended ways of minimizing hazards, especially machine guarding, rollover protection, and the identification and safe felling of hazardous trees. Forest Management courses should emphasize the role of managers in ensuring safe and healthful working conditions. Other safety topics for forest management include safety language in logging contracts, hazard communication, recordkeeping, accident investigation, and safety management programs. Silviculture courses should explain the effect of cutting method, leave tree selection, and cutting cycle on logging safety.

Specific information on the Occupational Safety and Health Act, the history of workers' compensation, and the incorporation of workers' compensation costs in machine cost calculations are provided in the appendix. This material provides details of the type of information that could be integrated into forest policy and forest economics courses. Other examples of incorporating safety issues into an existing curriculum are described by Taylor et al. (1994).

Table 3. Examples of Safety Legislation, Standards, and Policy Impacting Forest Management¹.

Legislation	Date	Notes
Federal Workers' Compensation	1908	Federal law providing compensation for federal workers injured on the job
State Workers' Compensation	1911	Wisconsin and Maryland pass laws similar to federal workers' compensation law
Walsh-Healy Act	1938	Specified working conditions for employees working for private companies under contract to the U.S. government
Fair Labor Standards Act	1938	Prohibited children under 18 years old from working in hazardous occupations (including logging)
Occupational Safety and Health Act	1970	Created regulatory and research agencies and a process for development and enforcement of OSH standards
Safety Requirements for Pulpwood Log.	1971	ANSI national consensus standard
OSHA Pulpwood Log. Standard 1910.266	1971	OSHA adopted ANSI consensus standard
NIOSH criteria document on logging	1976	Recommendation for an occupational standard on logging from felling to first haul
Safety Requirements in Logging	1978	ANSI consensus standard extending prior pulpwood requirements to all logging
ANSI withdraws Safety Req. in Logging	1984	ANSI committee fails to renew standard
OSHA Logging Standard	1994	Proposed in 1989, OSHA promulgated a single standard for the logging industry on October 12, 1994.

¹Sources: DeReamer 1980; Hammer 1989; Kaviani and Wentz (1990); Public Law 91-596 (1970); Readers' Digest (1975); U.S. Department of Labor (1989, 1994)

Table 4. Organizations Influential in the Establishment of Safety Policy Affecting Forest Management¹.

Organization	Notes
American National Standards Institute	Develops national consensus standards
American Pulpwood Association	Produces logging safety materials; facilitates safety
American Society of Agricultural Engineers	Forest Operations Safety Committee provides a forum for harvesting safety research
American Society of Safety Engineers	Established an independent board to certify safety professionals
International Labor Organization	Established as part of League of Nations to improve working conditions around the world; major contributor to woods worker training and international recommendations
National Fire Protection Association	Develops national consensus fire protection standards
Nat'l Institute for Occupational Safety and Health	Conducts occupational safety and health research, trains safety and health professionals
National Safety Council	Private, non-profit organization working in traffic, home, recreational, and occupational safety
Occupational Safety and Health Administration	Administers the OSH Act, promulgates regulations, and provides state training grants

¹Sources: DeReamer 1980; Hammer 1989; Kaviani and Wentz (1990); Readers' Digest (1975)

SUMMARY

Logging is well known as a hazardous industry, both in terms of fatal and nonfatal outcomes. Recent statistics, when compared to statistics from 30 years ago, indicate that the industry's injury record is not improving (Myers and Fosbroke 1994). These facts led OSHA to promulgate a new standard for logging operations (U.S. Department of Labor 1994). The new mandatory standard has direct implications on the way logging is conducted. Since logging is the primary tool for accomplishing natural resource management objectives, this standard also impacts forest management decisions. Therefore, graduate foresters increasingly will need to be aware of occupational safety and health concepts. Professional forestry degree programs have traditionally provided students with a wide range of background; however, worker safety and health typically is not a major focus of class instruction. Integrating important occupational safety and health issues into existing curricula can be done, but will take a concerted effort on the part of faculty to expand existing courses into new subject areas. This paper demonstrates a few examples of how safety topics can be covered in forestry courses. The appendix contains additional examples. It is hoped that faculty will consider these examples, look at their existing courses, and ask, "Are there important safety issues that I should incorporate into my courses?"

LITERATURE CITED

- Cubbage, F.W., J. O'Laughlin, and C.S. Bullock, III. 1993. Forest resource policy. John Wiley & Sons, Inc., New York, NY.
- Dana, S.T. and S.K. Fairfax. 1980. Forest and range policy. McGraw-Hill, New York, NY.
- DeReamer, R. 1980. Modern safety and health technology. John Wiley & Sons, New York, NY.
- Hammer, W. 1989. Occupational safety management and engineering. Prentice Hall, Englewood Cliffs, NJ.
- Jenkins E.J., S.M. Kisner, D.E. Fosbroke, L.A. Layne, N.A. Stout, D.N. Castillo, P.M. Cutlip, and R. Cianfrocco. 1993. Fatal injuries to workers in the United States, 1980-1989: a decade of surveillance--national profile. Pub. No. 93-108. Morgantown, WV: National Institute for Occupational Safety and Health.
- Kavianian, H.R. and C.A. Wentz, Jr. 1990. Occupational and environmental safety engineering and management. Van Nostrand Reinhold, New York, NY.
- McCormack, C.R., 1963. Injuries and accident causes in logging operations. (Report No. 252). Washington, DC: Bureau of Labor Statistics.
- Myers J.R. and D.E. Fosbroke 1994. Logging fatalities in the United States by region, cause of death, and other factors--1980 through 1988. JSR 25(2):97-105.
- National Research Council. 1990. Forestry research: a mandate for change. National Academy Press, Washington, D.C.
- Peters, P.A. 1991. Chainsaw felling fatal accidents. Transactions of the ASAE 34(6):2600-2608.
- Public Law 91-596. 1970. Occupational safety and health act of 1970. Washington, D.C.: 91st Congress, s.2193.
- Readers' Digest. 1975. The readers' digest family encyclopedia of american history. The Readers' Digest Association, Pleasantville, NY.

- Society of American Foresters. 1994a. Accreditation handbook: standards, procedures, and guidelines for accrediting educational programs in professional forestry. Society of American Foresters, Department of Science and Education, Bethesda, MD.
- Society of American Foresters. 1994b. Standards and procedures for recognizing educational programs in forest technology. Society of American Foresters, Department of Science and Education, Bethesda, MD.
- Society of American Foresters. 1992. Code of ethics for members of the Society of American Foresters. Bethesda, MD.
- Taylor, S.E., C.E. Johnson, R.W. Brinker, and B.L. Lanford. 1994. Safety and health in agricultural and forest engineering curricula. *Appl Eng in Agric* 10(3):429-435.
- U.S. Department of Labor. 1994. Logging operations: final rule. *Fed Reg* 59(196):51672-51748.
- U.S. Department of Labor. 1992. Occupational injuries and illnesses in the United States by industry, 1990. Bult 2399. Washington, DC: Bureau of Labor Statistics.
- U.S. Department of Labor. 1989. Logging operations: notice of proposed rulemaking. *Fed Reg* 54(83):18798-18817.