Natural Resources and Environmental Issues

Volume 12 *University Education in Natural Resources* Article 27

1-1-2004

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Recommended Citation

Lockhart, Brian Roy and Nyland, Ralph D. (2004) "Teaching professional codes of ethics to forestry and wildlife students: A case study using diameter-limit harvesting in a bottomland hardwood stand," *Natural Resources and Environmental Issues*: Vol. 12, Article 27.
Available at: http://digitalcommons.usu.edu/nrei/vol12/iss1/27

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Teaching Professional Codes of Ethics to Forestry and Wildlife Students: A Case Study Using Diameter-Limit Harvesting in a Bottomland Hardwood Stand

Brian Roy Lockhart[1] and Ralph D. Nyland[2]

ABSTRACT: Professional ethics involve statements by a professional organization to guide the behavior of its members, and to help them determine acceptable and unacceptable behavior in a given situation. Most, if not all, natural resource organizations have Code of Ethics. How to incorporate them across the curriculum and in individual courses of a natural resources program is a current challenge to faculty and administrators alike. We propose to capitalize on the role that professional ethics play in the daily activities of forestry and wildlife professionals engaged in hardwood resources management. Many hardwood stands today are subject to "selective harvesting" whereby trees of choice species and of the best quality are removed with little or no thought towards the future development of the stand or the benefits that landowners will derive from it (after Helms 1998). They are simply mined of the standing timber to the detriment of hardwood resource sustainability. A case study example relevant to the appropriateness of diameter-limit harvesting in a southern bottomland hardwood stand is presented as one way to integrate discussion of technical issues in forestry and wildlife management and professional ethics related to this practice. We propose its use in college and continuing education courses. Questions presented after the case study will help participants integrate knowledge of the ecology, silviculture, and management of bottomland hardwoods with the Code of Ethics of several professional organizations, including the Society of American Foresters and The Wildlife Society. Discussion of the issue will also help them to better appreciate the options for sustainable management of the bottomland hardwood resource.

INTRODUCTION

Professional codes of ethics are increasingly important in the everyday activities of natural resource managers, especially foresters and wildlife managers who have dual roles of dealing with forests and people. The days of working independently in the woods and relying principally on technical skills are over and will not return for most natural resource professionals. Today's foresters and wildlife managers now spend much of their time resolving complex management issues that involve people (e.g., certification, timber supply, land ownership disputes, mill demands, BMP

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compliance, hunting and fishing disputes, policy development) in addition to plying their skills related to day-to-day management of stands and forests. Professional codes of ethics play a key role in guiding these activities and in influencing their decisions. In fact, several state forester registration programs now require continuing education credits in ethics as a part of a forester's responsibility in maintaining their registration, e.g., Georgia (Field 1996) and Mississippi (http://www.cfr.msstate.edu/borf/cfe.asp).

We have observed that undergraduate programs in natural resources education have not historically kept pace with the need for teaching professional codes of ethics beyond an obligatory review in the first-year freshmen natural resource introductory course and junior/senior policy courses. And while natural resource programs have begun teaching professional codes of ethics (Lewis et al. 1998), faculty members often have difficulties in deciding how to teach these codes to students. Should they have students memorize then regurgitate the codes, attend guest speaker seminars, or use case study examples? These are but a few of the teaching methods utilized. The objectives of this paper are to briefly review the importance of teaching professional codes of ethics to undergraduate students and to argue the advantages of using a case study approach for teaching professional ethics using bottomland hardwood forests as an example. Our focus is on undergraduate forestry and wildlife students. However, the case study, associated questions, and teaching approaches can also be used in graduate courses and continuing education.

WHAT ARE PROFESSIONAL CODES OF ETHICS

Cunningham and Saigo (1990) described ethics as a branch of philosophy concerned with morals – the distinction between right and wrong, and values – the ultimate worth of actions or things. Coufal (1998) stated that values are the basis of ethics while Greenburg (2004) stated the essence of ethics is to go beyond what is required. Lammi (1968) distinguished between religion, morality, and ethics. He stated that the tenets of religion relate broadly to human life rather than specifically to professional conduct. Morals and morality are concerned with the rules and practices of conduct of an individual within a society – defined as laws. Ethics relate to individual conduct and group activity with respect to the goals of a particular profession to human society (Lammi 1968). Essentially, they represent the "do's" and "don't's" of a profession in broad, general terms (Coufal 2000).

A professional code of ethics serves to guide an individual's or group's behavior (Smyth 1995). Field (1996) stated that adherence to a code of ethics is one of the common characteristics of a profession. Another is that members must be formally educated. Codes of ethics generally are not designed to provide individuals with the right answers so much as to help them to ask the right questions (Banzhaf 1994). Codes of ethics in the natural resource professions can be thought of as the force that integrates a person's science background with the social and philosophical implications of a given natural resource issue. Professional ethics also encourage a humility among natural resource professionals. Codes of ethics help to prevent inappropriate conduct (Irland 1994b).

Lammi (1968) classified unethical conduct into three categories. Category 1 issues involve the deliberate choice to make an unethical decision. Lammi (1968) described this conduct as the "most abhorrent violations of ethics" and "morally despicable". The penalties can include expulsion from the professional ranks. Category 1 behavior can oftentimes be thought of as the "bad apple" example. Category 2 unethical conduct involves the lack of knowledge, i.e., a good faith effort to make a decision without full knowledge of the situation. Penalties often involve corrective actions, including payment of damages and requirement for remedial education. A strong professional curriculum in any natural resources field and continued learning beyond the time of graduation will usually alleviate potential Category 2 misconduct. Category 3 behaviors involve the lack of means (e.g., practices in limited resource countries) where policies and politics prevent or discourage proper conduct. Lammi (1968) stated that changes in policies, politics, and education help to alleviate the potential for Category 3 conduct.

A purview of the literature indicates that ethics has been discussed for many decades with reference to natural resources issues (Olmsted 1922, Chapman 1947, Chapman et al. 1948), but only recently have they been the focus of widespread discussion across natural resource disciplines (Irland 1994a, List 2000). The Society of American Foresters (SAF) and the Wildlife Society each have Professional Codes of Ethics, as do other natural resource professions. All evolved through years of debate and change. In fact, Kipnis and South (2000) stated that within a profession, its code of ethics is a collective undertaking by which practical wisdom is developed and employed – it is a living document that should be regularly reviewed and updated as needed. Yet Field (1996) stated that seldom is any thought given to improvements in ethical codes or to training in their application once they are established. On the contrary, the SAF has gone through several revisions in its professional Code of Ethics, the most recent being in 2000. The latest changes involved sections of the Code that were deemed ambiguous, redundant, too specific, or unnecessary (Radcliffe 2000).

Overall, professional codes of ethics encourage appropriate behavior within the natural resources professions. They also provide guidance for effective communication and collaboration among colleagues within the profession, and improve relationships with employers, clients, forest resource users, and the public in general (Lammi 1968). The latter two groups are particularly important as they can influence forest policy through contact with legislators, but may have little knowledge on the technical aspects of forestry and wildlife management (Lammi 1968). Coufal (1998) stated that without active involvement in ethical discussions, natural resource professionals are likely to march to the beat of drums played by others.

WHY TEACH PROFESSIONAL CODES OF ETHICS TO UNDERGRADUATE STUDENTS

The above arguments lead us to conclude that undergraduate students should be exposed early and often to the codes of ethics for their chosen profession and for other natural resource professions as well. Most students who enter college have already been exposed to concepts of ethics through life-learning experiences such as parental guidance, scouting, hunting and fishing sportsmanship, and high school athletics sportsmanship. Oftentimes though, they have not been formally introduced to professional ethics. This is important to:

1. introduce students to some of the philosophical aspects of their chosen profession (Lammi 1968),
2. expose students to real life situations in a safe setting,
3. teach students how to use guidelines to resolve ethical dilemmas,
4. help students learn how to ask the right questions in natural resource issues,
5. give students the opportunity to be interactive in classroom exercises,
6. engage students in controversial issues,
7. teach students that there may be more than one way to resolve ethical dilemmas,
8. teach students to display a decent respect for the conflicting views and values of others (Ireland 1994d), and
9. encourage students to continually ask: "What is the right thing to do?" (Coufal 1996).

McNeil (1998) argued that teaching professional ethics would help students: (1) gain confidence in dealing with ethical questions, (2) recognize and explore those questions, (3) appreciate moral dimensions of common issues and analyze positions of others, and (4) increase their "mental fluency" and ability to participate in public discussions over moral aspects of work. Furthermore, Coufal (1996) indicated that including the study of professional ethics in a curriculum helps students to more fully understand what it is they believe and to better justify their own values and ethics with those involved in natural resources management and use.

Field (1996) indicated that academia has failed to convey the importance of professional conduct to students and that this deficiency must be addressed. One approach is to teach ethical reflection (Irland 1994c). This involves reflective thought and discussions about upcoming issues. In the context of ethics, it enables students to identify potential problems early and helps them develop the ability to recognize available options for resolving a problem in a satisfactory manner (Irland 1994c). Irland (1994c) considered the development of ethical reflection a core professional skill that should be an integral part of all natural resources curricula. Adherence to ethical reflection may help a student to avoid ethical relativism or the blurring of right from wrong (Johnson 1989 from Irland 1994a). Ethical relativism involves the erosion of a person's sense of right and wrong in favor of a "no-fault" society. It is a threat to sound ethical judgement (Johnson 1989 from Irland 1994a).

Ladd (1979 from Irland 1994a) questioned whether a code of ethics is really needed. Those to whom a professional code of ethics is addressed and who need it most will not likely adhere to it anyway (such individuals are probably not even a member of the profession's organization). Others in the profession already know what they should do. Further, many respectable members of a profession regard its code of ethics as a joke and something not to be taken seriously. Yet teaching about codes of ethics to undergraduate students is a part of their professional maturation. Field (1996) pointed out that learning professional ethics is part of the life-long experience; that regular, systematic attention to ethics enhances the awareness of forestry and wildlife students to their professional obligations and to the ethical implications of their actions. To that end, we believe that students should have opportunities to learn about professional ethics throughout their entire undergraduate program.

A CASE STUDY

Background

Our experiences in forestry underscore the importance of professional ethics in modern hardwood management. The eastern United States supports a tremendous hardwood resource – from the northern and central hardwoods to the Appalachian hardwoods, and southward to the upland and bottomland southern hardwoods. Research and practice has provided much information about the sustainable management of these hardwood resources, as exemplified by several comprehensive hardwood management publications. These include Putnam's (1951) "Management of Bottomland Hardwoods", Putnam et al.'s (1960) "Management and Inventory of Southern Hardwoods", Walker and Watterston's (1972) "Silviculture of Southern Bottomland Hardwoods", Kellison et al.'s (1981) "A Guide for Regenerating and Managing Natural Stands of Southern Hardwoods", Hick's (1998) "Ecology and Management of Central Hardwood Forests", and the U.S. Forest Service's Northern Hardwood Notes (Hutchinson 1985) and Central Hardwood Notes (Clark and Hutchinson no date). Unfortunately, far too many forests are exploited by diameter-limit cutting harvesting under the guise of "selective management". This has had considerable short- and long-term negative impacts on the hardwood resource and the potential for landowners to sustain the critical values that hardwood forests can provide for future generations (Nyland et al. 1993, Fajvan et al. 1998, Nyland 2001).

What is Diameter-Limit Harvesting?

Diameter-limit harvesting usually involves removing trees larger than a specified diameter (d.b.h.), with little or no thought to the composition and structure of the residual stand, or any deliberate effort to regenerate a new age class (Nyland 2002). Past thinking (and unfortunately much present thinking), especially with respect to bottomland hardwood ecosystems, suggests that the smaller trees, regardless of quality, vigor, or even species, will grow to replace the harvested trees. Stand development studies clearly show

many bottomland hardwoods growing on moist sites resulted from natural reforestation in either old fields or after major disturbances that resulted in stratified even-aged stands (Oliver 1978, Clatterbuck and Hodges 1988, Ashton and Peters 1999). Diameter distributions in mature mixed-species hardwood stands will typically show a reverse-J shaped curve, a situation often considered representative of uneven-aged stands. But these diameter distributions should be broken down to the species level (Ashton and Peters 1999). That would show that within many bottomland hardwood stands the diameter distribution for each species may plot out as a bell-shaped curve, with each one covering a different spread of diameters. Among stratified mixed-species stands, these tend to overlap to form a reverse-J distribution for the stand as a whole (Oliver and Larson 1996). Thus in bottomland hardwood stands, the oaks (Quercus spp.) and green ash (Fraxinus pennsylvanica Marsh.) will typically have the largest diameters, sweetgum (Liquidambar styraciflua L.) and red maple (Acer rubrum L.) the intermediate sizes, and shade-tolerant species such as American hornbeam (Carpinus caroliniana L.), eastern hophornbeam [Ostrya virginiana (Mill.) K. Koch], and flowering dogwood (Cornus florida L.) comprise the smaller diameter classes. Removing the largest trees (oaks and green ash) will release poorer-quality (and assumed genetically inferior) oaks and green ash, along with the more shade-tolerant species having less desirable characteristics (Clatterbuck and Meadows 1993). These may interfere with the regeneration of new oaks and green ash, especially if repeated diameter-limit cutting removes the seed source.

In some cases, one diameter-limit harvest may not be totally detrimental to the future development of the stand. If large diameter trees co-exist with smaller acceptable growing stock of a desired species, then removal of the larger trees releases the smaller ones and they may develop into acceptable trees at some future time. Such conditions often followed a past disturbance that partially opened the overstory, leading to regeneration of a second age class beneath the older upper stratum. Diameter-limit harvesting has also been used when the shade-tolerant species that develop in the lower stratum of an even-aged stand are good quality trees with sufficient vigor to respond to the release [e.g., released overtopped sugar maple (A. saccharum Marsh.] from beneath an overstory of shade-intolerant species of high commercial value (Reed et al. 1986, Erickson et al. 1990). Yet this release has the greatest benefit when linked to supplemental tending (thinning) of the smaller diameter classes (Bodine 2000). Unfortunately, no shade-tolerant species in southern bottomland hardwood forests are considered to be both high-quality timber trees and useful components of wildlife habitat, so releasing it by diameter-limit harvesting provides little economic benefit to a landowner. Diameter-limit harvesting has also been considered acceptable when the management objective calls for the promotion of specific shade-tolerant species, such as sugarberry (Celtis laevigata L.), boxelder (A. negundo L.), or red maple. While not common as a management objective, promoting these species may serve a specific purpose in wildlife habitat management.

Despite these possible exceptions, diameter-limit harvesting (often called selective management or selective harvesting) usually represents the antithesis of good hardwood management. Repeated diameter-limit harvesting degrades the hardwood forests, does not optimize the long-term production potential of stands, and is often simply outright

high-grading. This "management style", or exploitation, represents the greed associated with a philosophy of maximizing short-term profit with a minimum investment (Nyland 1992). Coufal (2000) stated that "This situation is made complex because the public probably prefers the appearance of a high-graded stand to a clearcut, and the high grading often meets the immediate needs of the landowner." Yet repeated diameter-limit harvesting in hardwood stands is poor land stewardship.

The Case Study – "Diameter-Limit Cutting – Short-Term Gain at a Long-Term Loss"

The case study "Diameter-Limit Harvesting – Short-Term Gain at a Long-Term Loss" is adapted from the SAF's ethics guide titled "Ethics Guide for Foresters and Other Natural Resource Professionals" (SAF 1996). We modified it for conditions in southern bottomland hardwood forests. Students should read the introductory statement that outlines the situation in a general sense, as follows. Then they will consider a specific case like the one illustrated below. Through discussions they explore the issue, and consider how they might respond with respect to the Code of Ethics developed by the SAF and The Wildlife Society.

The Situation

Throughout the latter half of the 1900s vast acreages of second-growth hardwoods developed into sawtimber size across much of the southern United States. These stands became established following heavy liquidation harvests in the early 1900s, as well as from natural reforestation of abandoned agricultural fields.

While the market for poor-quality and small-diameter trees has been limited, the export market for logs and lumber of a variety of choice species has grown. This presented an opportunity to sawmills to profitably ship lumber from prime hardwoods [oaks, yellow-poplar (Liriodendron tulipifera L.), cottonwood (Populus deltoides Bartr. ex Marsh.), green ash, and sweet pecan (Carya illinoensis (Wangenh.) K. Kock)] abroad. To get sufficient raw material to capitalize on the new markets, they raised stumpage prices for choice species.

Many landowners responded to the new opportunities by increasing sawtimber sales from their forests. In many cases, their interest in silvicultural practices aimed at producing quality hardwoods shifted toward simply taking out the biggest and best trees (the valuable ones), and leaving behind depleted and poorly-stocked stands with insufficient growing stock to sustain high levels of future production. At best, the harvesting was a bit less severe than out-and-out high-grading.

The Case

You are a forestry consultant in the southern United States, in an area where the conditions described above prevail. Although you have known that diameter-limit harvests are not part of "accepted silvicultural practices," you have used the method in private forests when landowners insisted on minimal costs and maximum returns. You did this because the practice has been common in the area; because if you did not do it, a competitor would; and because you believed that you could, at least, soften the impact of the practice by laying out proper skid trails and haul roads, and minimizing site disruption. Further, your belief was that the diameter-limit harvests, while not the best practice, were not significantly damaging the forest over the long term.

In reading your professional journals and other sources of information, you find arguments that discredit this latter belief. Research is now indicating that diameter-limit harvests being applied under recent and current market conditions portend a long-term conversion in the composition of stands, resulting in lower market values and decreasing other landowner benefits for the future. Also, diameter-limit harvesting leaves poorly stocked stands having an irregular distribution of residual trees, and it makes no effort to tend the residual size classes to upgrade their quality or enhance their growth. Over the long term, diameter-limit harvests tend to result in residual stands of poor-quality stems, with less desirable species and genetically inferior individuals, having variable stocking and crown cover, and lacking desirable seed sources.

A landowner, who owns 200 acres of bottomland hardwoods, has asked you to provide consulting services. He learned about you through a friend, for whom you worked several years earlier when you laid out and supervised a diameter-limit harvest. Your potential new client has 124 acres of high-quality mixed hardwoods he wants harvested. Wanting to take full advantage of the current market, he asks you to lay out and supervise a diameter-limit harvesting on a commission basis. With your new knowledge of the long-term implications of such harvesting practices in bottomland hardwood forests, what do you do?

Following Through With Discussion and Questions

We believe the case mentioned above represents a common ethical challenge to foresters and wildlife managers who work throughout the eastern and southern hardwood forests. The following questions are to generate thoughts and discussion about the ethical implications of the proceeding with a diameter-limit harvest in this case, and more broadly about the implications of diameter-limit harvesting in bottomland hardwood forests.

1. Over the past several years, forestry professionals have talked about forest stewardship and developed catchy "bumper-sticker" slogans, such as "Trees Are America's Renewable Resource," "For a Forester, Every Day is Earth Day," and

"A Healthy Forest Is No Accident". Foresters have also developed land ethics statements and principles of sustainable forestry, and promoted them within the profession and to a variety of publics. Few, however, have spoken out against diameter-limit and species-removal harvesting; in fact, many have encouraged such sales without question.

A: What are the likely long-term effects on the forestry profession when actions do not match the rhetoric?

A: What are the likely long-term effects on the wildlife profession?

A: Under which of Lammi's (1968) unethical categories does this case example fall?

2. What guidance do the individual Principles and Pledges in the SAF's Code of Ethics, and statements in the Preamble in particular, give to you when faced with a decision about responding to this landowner? What Principles and Pledges in particular seem applicable, and how? [The SAF Code of Ethics can be found at http://www.safnet.org/who/ethics.htm]

3. What guidance do the individual canons in The Wildlife Society's Code of Ethics give to you in this case? [The Wildlife Society Code of Ethics can be found at http://www.wildlife.org/about/index.cfm?tname=bylaws]

4. How do best management practices (BMPs) for your state address diameter-limit or selective harvesting? You may find that most, if not all, state BMP guidelines do not explicitly address diameter-limit harvesting. In that case, should state BMP guidelines be amended to address the issue? Or is that the responsibility of each practitioner?

5. Presume that you advised this landowner about the likely long-term, negative effects of the proposed diameter-limit harvest, but he decides to proceed anyway. Should you do more in trying to dissuade the landowner? What more can you say to him about better alternatives? Do you decline the consulting job if he insists on doing it anyway? Why or why not?

   Note: In discussions with students about whether to proceed or decline the job, remind them of their pending graduation and that they will need to support themselves and a family. Ask the student how would they respond if this landowner has an immediate need for money to pay emergency medical expenses.

6. Presume that you decline the job, and later you learn that a competitor has taken it on and does a diameter-limit harvest for the landowner. What do you do, and why? Which SAF Principles and Pledges in particular apply to this question and question 5? Which Wildlife Society Canons apply?

7. You have discussed the implications of diameter-limit harvesting with a Society of American Forester member who is a certified forester and the owner of a local sawmill. He has the opportunity to bid for the logs coming off the property. What would you say to him? What should he do and why?

8. Assume that the landowner and the mill are Forest Stewardship Council and Sustainable Forestry Initiative certified. How does the proposed diameter-limit harvesting affect certification? What should you do about it?

9. Given that this case involves bottomland hardwoods, what is the likely consequence of repeated diameter-limit harvesting practices on species composition, stand structure, and the long-term production potential?

10. One commonly accepted concept in natural resources management says: "Any type of forest harvesting is both good and detrimental to wildlife habitat, depending on the wildlife species". Then how can diameter-limit harvesting enhance wildlife habitat? How can it be detrimental to wildlife habitat?

11. How would you advise a potential client, who is considering diameter-limit harvesting in a bottomland hardwood stand? What factors would you include in outlining the negative effects, and any possible benefits to the landowner?

Other Questions to Consider

Besides providing an opportunity to discuss ethical issues related to professional practice, this case also encourages students to review the technical aspects of silviculture, forestry economics, forest management principles, wildlife management, and related matters. Other questions that will broaden the discussion even more include:

1. Are there state or local laws or regulations (best management practices, clean water laws, right-to-harvest laws, etc.) that are pertinent to the type of harvesting practices used in bottomland hardwoods? How do they relate to your personal and professional ethical responsibilities, particularly with reference to the Society of American Foresters' Code of Ethics?

2. How does this case illustrate the differences between laws and ethics?

3. Should professionals be held to their ethical codes of conduct in legal proceedings? If not, how are professionals held accountable for their actions in cases related to the harvesting practices that they recommend and use in their business?

APPLICATION OF THE CASE STUDY

The key to using the diameter-limit harvesting case study in teaching ethics, or really any subject, is to make the learning experience natural and fun for undergraduate students by promoting curiosity, exploration, and knowledge-sharing (Moen 2002). Several approaches can be used. Preferably the case study is offered to students at the junior and senior levels, who can use prior knowledge of concepts about the ecology of bottomland hardwoods as found in Hodges (1997) and Lockhart et al. (In press) and from their studies in silviculture and wildlife management. That will insure a meaningful linkage between their appreciation of those technical fields, and an awareness of the importance of ethical behavior to natural resources professionals.

In teaching this case study, the instructor might divide students into teams of four people during one laboratory period. The goal of this group format, in addition to having the students address the questions posed above, would be to develop a cooperative learning environment. Knuth (1996) stated that use of student teams helps them to incorporate important concepts into their knowledge base. A field trip to visit several stands recently harvested by diameter limit and more appropriate methods would help to enliven the conversations by providing a common experience that the class could discuss in comparing and contrasting the different approaches. Unfortunately, it is usually not difficult to find recent examples of exploitative practices. Ideally, the field trip would include recently harvested stands showing appropriate and inappropriate practices, and others at least 10 years since the harvest to demonstrate the longer-term effects of diameter-limit harvesting. After the field visits, teams would meet to discuss the questions presented above, and to consider other thoughts raised during their discussions. Each team would summarize their conclusions into a 10-minute PowerPoint® presentation to share with the rest of the class. In this way, each team would be reviewing perspectives not posed by other teams. During the presentations, each team would be questioned by the other students for about 5-10 minutes. The instructor would interact as needed, but would primarily observe each team's presentation and interaction with the other students.

This approach could take two laboratory periods. But student discussion and enthusiasm could be heightened if done in a single laboratory period while the students still have a vivid recall about what they saw during the field trip. Either way, the case study approach requires students to integrate information from other courses (e.g., dendrology, silvics, forest ecology, and measurements of trees and wildlife habitat). Furthermore, it engages students in a group activity of the kind that seems to benefit young people in today's technologically advanced society (Moen 2002).

A second approach to presenting this case study, and one that we have not used, is to split students into two teams for a debate. One team would present the "positive" sides of diameter-limit harvesting in hardwoods while the other would present the "negative" sides. As observed in the forest policy course in the School of Forest Resources, University of Arkansas – Monticello, the university's debate team could coach the students on how to frame their arguments to insure an effective debate. The laboratory

trip would still be beneficial so students can gather information, including pictures, for use in presenting their case. Peers and other faculty and staff could be invited to hear the debate and raise questions to the teams, thus extending the learning experience to other members of the campus community. A subset of the university's debate team, those not involved in coaching the students, could serve as the judges. Besides giving students the opportunity to practice oral communication in a public forum, this approach requires students, especially those arguing the pros of diameter-limit harvesting, to examine both sides of the issue while exploring the ethical dilemmas posed in the questions related to the situation. We believe the learning atmosphere presented by a debate would likely be more effective as a learning experience than if a faculty member simply lectures about the negative effects of inappropriate harvesting practices in bottomland hardwoods.

The use of a case study, such as the diameter-limit harvesting example, promotes a high level of interaction between students and the instructor (Webber and Crews 1998). Little time is spent on lecturing, testing, and grading. More time is spent on leading, mentoring, offering constructive criticism, and evaluation (Webber and Crews 1998). Whether incorporating a team presentation or a debate, this case study requires students to consider professional ethics in a philosophical framework for decision making as well as in a context representing the environment for real decisions in professional work (Lewis et al. 1998).

The case study can be taken one step further in a future exercise where students are required to prescribe a rehabilitation treatment for a high-graded stand. This next logical step would require students to use their studies in silviculture, particularly the artistic side of silviculture, to alleviate one of the most complex technical challenges of hardwood management. This additional exercise also would help students prepare for the time when landowners, who have high-graded hardwood stands, seek their professional assistance in finding a remedy for the dilemma.

The use of case studies does have potential pitfalls. Rashad (1994) pointed out that case studies are not effective when students have difficulty conceptualizing the problem to be solved, especially if they had little or no training in problem-solving. This shortfall can be resolved by ensuring that upper-level undergraduate students review pertinent materials prior to engaging in the case study. The laboratory trip is especially important in helping them to appreciate the implications of diameter-limit harvesting and the short- and long-term effects it has on the hardwood resource in bottomland forests.

SUMMARY

Major newspapers and television news programs include daily examples of ethical misconduct. It is imperative upon university administrators and faculty to press their students to consider professional ethics early and often in each student's academic life. Exploration of professional ethics should be formally incorporated into every course of a professional nature in natural resources curricula (Coufal 1996). Further, attention to professional ethics should go far beyond the basic statements regarding professional

behavior, cheating, plagiarism and the customary professional conduct policy that faculty members routinely write into course syllabi. Irland (1994c) suggested that faculty members treat ethics as a key professional skill that students must continually deal with, and not isolate it as a formal component of only selected courses. A periodic review of applicable codes of ethics should involve case studies and discussion of recent situations, even if they are only somewhat related to natural resources. Irland (1994c) further suggested that faculty and students alike continue to ask the question, "Is this ethical?" as a way to reinforce professional ethics. The diameter-limit harvesting case study and teaching approaches that we suggest represent but one small component of an across-the-curriculum approach to incorporating a study of ethics into natural resources education.

We used the diameter-limit harvesting to illustrate the case study approach based on our experiences in teaching hardwood silviculture and working with landowners who have needed to make important choices about the way to manage their forests. Diameter-limit harvesting, or outright high-grading, is still far too common in hardwood forests of North America. We hope to encourage two things – to promote increased teaching of professional ethics in forestry and wildlife management education, and to encourage the cessation of high-grading in hardwood stands. A hardwood forester who wished to remain anonymous recently said it well:

"Do not exploit the hardwood resource – it is what got us here and it is what will provide for us in the future."

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