

Sustainability and Forest Certification as a Framework for a Capstone Forest Resource Management Plans Course

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Forest sustainability is the foundation of forestry and modern forest management. Originally the central concept was sustained-yield and maximum timber production and then multiple-use and other non-timber values gained importance. After the Rio Conference and development of the Montréal Process in the early 1990's, forest sustainability rapidly gained importance and various forest certification schemes developed to certify forest products that were grown using sustainable forest management. Forest sustainability and forest certification have become critical topics in forestry curricula. The American Tree Farm System is one of the important North American forest certification organizations. Modern forestry curricula often include a capstone course where forest management plans are developed. We describe a capstone course at Clemson University under development that uses the management standards and management plan template of the American Tree Farm System as a framework for students to develop actual forest management plans for local forest owners. The material is integrated into a series of four courses leading up to the capstone course. The course offered a hands-on approach for students to create management plans using actual certification standards and the system's management plan template. In addition, students received specialized training to qualify as auditors for the certification system. This is an example of forest sustainability being integrated into the forestry curriculum.

Keywords: Forest Certification; Forest Sustainability; American Tree Farm System (ATFS); Forestry Education

Introduction

Sustainability is a fundamental component and integral foundation of forestry (Floyd, 2002). Sustained yield is an elemental forestry system that produces a sustained annual flow of timber. Over time the product that flowed from the sustained yield forest was expanded to include more than timber, including wildlife, recreation, water quality, and aesthetics. The expanded outputs were based on a concept called "multiple use" that was intended to simultaneously consider the ecological, social, and economic framework of the forest (Straka, 2009).

Recently, public expectation and market forces have caused forest resource management to further develop a more explicit recognition of forest sustainability concepts (McConnell, 1966; Maser, 1994; Sample & Sedjo, 1996). Forest sustainability has developed into a global issue that relates equally to the vast commercial temperate forest production areas and deforestation in the tropical forests (Schelhas & Greenberg, 1996; Maser & Smith, 2001; Williams, 2006).

The development of forest sustainability as an important global issue is well-documented (Maser, 1994; Williams, 2006; Straka & Layton, 2010). The core problem is increasing human populations and urbanization that cause expanding demands on forests to produce more food, fuel, and timber. The need for additional food sources often create demands for new croplands and pastures, resulting in forest depletion.

Forest depletion has occurred throughout human history when forests were not replanted after harvesting. Deforestation impacted Mediterranean Europe in ancient Greece and the Ro-

man Empire; in the mid- to late-Middle Ages much of the rest of Europe was deforested; during the early centuries of the Common Era it impacted Central Asia and China; and the United States was clearcut region by region in the mid- to late nineteenth century. The advance of civilization seems to encourage deforestation and it is still a global problem today, especially in the tropical rain forest region and even in some boreal forest regions (World Commission on Forests and Sustainable Development, 1999; Williams, 2006).

Both ecological and economic problems result from deforestation. Forests are the economic foundation of some societies, provide habitats necessary to support biological diversity, and contribute towards regulation of global climate change (United Nations Forum on Forests, 2012). The effects of deforestation are devastating: soil erosion, changes in the hydrologic cycle (ground water), vegetation changes, increased watershed evaporation, lower rivers due to siltation, and species extinctions. Forests are storehouses for carbon and their loss can result in increased greenhouse gas emissions. Nations with strong forest economies have experienced lower standards of living after deforestation (World Commission on Forests and Sustainable Development, 1999).

The sustained yield concept developed in eighteenth century Europe as the linchpin of forestry as a method to ensure a constant supply of wood, fuel, game species, and other products from the forest (Davis & Fairfax, 1980; Steen, 1984; Davis et al., 2001). The owner of a castle often required his forest to generate annual income to support the estate, or a village might require a local forest to supply a steady source of fuelwood.

This concept was based on a forest regulation system that controlled growth, mortality, and harvest. Sustained yield ensured this steady supply of wood without much regard to the other forest resources; its main goal was to prevent a timber famine that could drastically impact the local population or economy.

Sustained yield is integral to the financial and economic character of forestry; it guaranteed a maximum even flow of timber products (and resulting cash flow) to the industrial and investor owners of the forest (Clutter et al., 1983; Leuschner, 1984; Bettinger, 2009). Over the past quarter century the related concepts of forest sustainability and ecosystem management have evolved to consider the forest's non-economic interests, its nature as a functioning ecosystem, and its components and natural processes as necessary for ecosystem productivity maintenance (von Gadow, 2002; Lindenmayer & Franklin, 2003). It now has a panoptic multifaceted context that embraces more than functioning on an ecosystem; economic, ecological, and social values are integrated to form the underpinning of forest sustainability (Washburn et al., 1999; Davis et al., 2001; Innes et al., 2005; Sample & Anderson, 2008).

Forest sustainability in the management of forest resources is supported by forest certification programs that attest that specific standards are met (Perera & Vlosky, 2006). Forest certification can be performance-based or systems-based and is primarily concerned with current forest management practices and their immediate impact on the environment (Fischer et al., 2005). Many certification systems track the forest products through the commercial chain, from the harvesting site to the final users (chain of custody) (Abusow, 2004; Holvoet & Muys, 2004; Hanson et al., 2006). Forest certification systems and forest sustainability concepts have contributed to improved natural resource management and enhanced environmental protection (Vianna, 1996; Floyd, 2001; Rametsteiner & Simula, 2003). They are still evolving and their importance is increasing; their impact is contributing to new definitions of forest resource management.

The concepts of sustainability and forest certification are now important components of forest resource management courses. We describe how a forest certification program is being utilized as the framework for a forestry curriculum. Our objective is to illustrate how these concepts can be integrated in to a capstone forestry course.

Forest Sustainability

Recognition of forest sustainability as a global challenge began to develop a few decades ago. The first global agreement on sustainable forest management, a Statement of Forest Principles, was produced at the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992 (often referred to as the Rio Conference or the Earth Summit) (Lindenmayer & Franklin, 2003). Eight years later, the United Nations Forum on Forests was established to promote "the management, conservation, and sustainable development of all types of forests" (United Nations Forum on Forests, 2012). In 2007 the "Forest Instrument," a global agreement on the framework for national action and international cooperation to advance sustainable forest management, was adopted by the United Nations General Assembly. Just a year after the Rio Conference, an International Seminar of Experts on Sustainable Development of Boreal and Temperate Forests was held in Montréal. This conference led to the development of the "Mon-

tréal Process" that identifies criteria and indicators for sustainable forest management (Montréal Process Working Group, 2012).

The Montréal Process produced seven key criteria and seven related thematic areas that are now considered fundamental to sustainable forestry on a regional or national level. They form a structure for systems that certify forest sustainability and are now generally considered an implicit definition of sustainable forest management (Montréal Process Working Group, 2012). These seven thematic areas are extent of forest resources, biological diversity, forest health and vitality, productive functions of forest resources, protective functions of forest resources, social and economic functions, and legal, policy, and institutional framework (Montréal Process Working Group, 2012).

The ecosystem approach is a second framework for sustainable development of forest resources that was developed by the Convention on Biological Diversity (Lindenmayer & Franklin, 2003). The Convention defined it as "a strategy for the integrated management of land, water, and living resources that promotes conservation and sustainable use in an equitable way." The approach has three objectives: conservation, sustainable use, and equitable sharing of benefits. The idea is that maintenance of fully-functioning ecosystems leads to sustainable development by managing the range of demands placed on the forest. Adaptive management, a system to enhance decision making, is a requirement, as ecosystems are complex organisms which are not fully understood. Another requirement is that the forest ecosystem's intrinsic values and tangible benefits should be shared in a fair and equitable manner. This approach promotes practices that are environmentally, socially, and economically consistent.

Forest Sustainability Certification Systems

The last two decades of the twentieth century saw the development of forest sustainability as a recognized global problem. The public's focus was on massive deforestation of tropical rainforests and the rapid loss of biodiversity. The International Tropical Timber Organization was pressured by several environmental groups in 1988 to develop a labeling program to identify tropical wood products produced under sustainable forest management principles. Eco-labeling is a claim (tag) attached to a product that indicated its environmental characteristics and consumer demand for eco-labeling increased (Perera & Vlosky, 2006). This allows consumers to identify environmentally-friendly products and direct their purchasing power to firms producing those products.

The United States, Canada, and Europe have significant environmental regulations that encompass both private and public forest lands. Some consumers, especially those associated with environmental groups, were not confident that these government regulations were effective enough. An opportunity developed for environmental groups and forest industry trade associations, among others, to develop certification programs to ensure forest products met specified sustainable forest management requirements. Essentially, forest certification assures consumers that the timber purchased was managed with ecological and sustainable forest management principles.

Some forest certification pressure is indirect. The US Green Building Council has introduced Leadership in Energy and Environmental Design (LEED) to improve the environmental performance and economic return in buildings (US Green Build-

ing Council, 2012). Even logging organizations have set up certification programs to ensure that harvesting systems support sustainability objectives (Vianna et al., 1996). Forest certification systems must involve all the stakeholders to be effective, including consumers, retailers, producers, mills, environmental organizations, trade groups, professional societies, and certification groups (Vianna et al., 1996). Since it includes standards that the basis of an assessment, a regulated “label”, and an organization to manage the system, certification systems are usually best handled by a third party or independent organization. Forestry can invoke many emotional issues and vested interests; identifying organizations to perform truly independent third party audits can sometimes be challenging.

After the Rio Conference several environmental groups met to develop an independent global organization that would certify forest products there were grown using sustainable forest management. These schemes took two forms: process-based and performance-based. Process-based systems focus on a systematic approach to management and performance-based systems specify performance standards that must be obtained. A system can contain both elements. Performance-based systems tend to be preferred by environmental groups as they include specific environmental protection standards (Innes et al., 2005).

The Forest Stewardship Council (FSC) was formed in 1993 as a performance-based forest certification scheme (Forest Stewardship Council, 2012). FSC does not certify forest themselves, but accredits other organizations to do the actual on-the-ground certifications (called certification bodies). FSC certification covers nearly 150 million ha of forest land in about 80 countries (Forest Stewardship Council, 2011). FSC certification standards are based on ten primary principles and it has strong chain of custody procedures. It is controlled by a three chamber governing body representing economic or commercial groups, socially beneficial forest management interests, and environmentally friendly forest stewardship interests. Thus, they operate via multiple stakeholder negotiations (Cashore et al., 2004; Fischer et al., 2005).

In 1994 the American Forest and Paper Association, an industry trade organization, established the Sustainable Forestry Initiative (SFI) to provide sustainable forest management standards for forest industry lands (Sustainable Forestry Initiative, 2012). Since then, SFI has become an independent organization and nearly 75 million ha of North American forest land are now certified to their standards (Sustainable Forestry Initiative, 2011). Participants are mainly forest industry firms and timber investment management organizations. SFI uses a hybrid of process-based and performance-based standards and is certified by independent third parties (Fischer et al., 2005).

In 1999 the Programme for the Endorsement of Forest Certification schemes (PEFC) was established as an independent non-governmental third-party organization that recognizes local forest certification schemes. PEFC is an umbrella organization that endorses national certification systems developed through multi-stakeholder processes and is tailored to local priorities and conditions. Initially it had a European focus, but now is global and covers almost 250 million ha of forest land (Programme for the Endorsement of Forest Certification, 2012).

In the United States, the American Tree Farm System (ATFS) date back to 1941 and originally had a wood supply orientation, but has always promoted sustainable forestry. The ATFS is one of the oldest certifiers and its definition of sustainability has changed over the last seventy years to more closely reflect cur-

rent definitions. It is performance-based and certification is based on a set of standards and guidelines, and it offers a group certification for tracts under the same management (American Tree Farm System, 2012a). Most of the certified forest is owned by family forest owners, and nearly 11 million ha are covered by this program (American Tree Farm System, 2012b). Both SFI and ATFS are recognized by PEFC (Programme for the Endorsement of Forest Certification, 2012).

The objectives, standards, and criteria used by the various forest certification groups tend to be similar. However, structural differences in the programs result in significant differences in terms of what is permitted on the ground. Rules may vary due to differences in regional or national laws or standards (Cashore et al., 2004). Differences tend to result from the focus of the founding groups; environmental groups established standards somewhat different than those established by forest industry groups (Innes et al., 2005). Below the ATFS standards are used to illustrate standards. The ATFS specifically designed these standards for small woodland owners, with requirements for scale of operations practiced on family forests in the United States (American Tree Farm System, 2012a). Another system, FSC, for example, founded by environmental groups, stresses basic goals minimizing forest conversion, respect of international workers' rights, respect for human rights with particular respond to indigenous peoples, limited use of hazardous chemicals, no corruption, and special protection for cultural areas (Innes et al., 2005).

ATFS's eight standards illustrate the types of rules and policies that form forest certification systems: 1) Commitment to practicing sustainable forestry, demonstrated by forest vitality and developing and implementing a sustainable forest management plan; 2) Compliance with laws at federal, state, and local levels; 3) Reforestation and afforestation, with restocking of desired species of trees on harvested and non-stocked areas, consistent with the forest owner's management objectives; 4) Air, water, and soil protection; 5) Fish, wildlife, and biodiversity must be conserved; 6) forest aesthetics must be recognized; 7) Unique historical, archeological, cultural, geological, biological, or ecological special sites must be protected; and 8) Forest product harvests and other activities must be conducted in accordance with the management plan and must consider other values (American Tree Farm System, 2010).

Sustainable forest management and forest certification have gained wide acceptance over the last two decades and around ten percent of the world's forest is now under some form of forest certification (Durst et al., 2006). Areas managed under certified sustainable forestry have grown steadily and the concept has found strong support from environmental groups, non-governmental organizations, and even forest industry and timber investment groups (Floyd, 2002). All certification systems have costs. Forest management activities must be changed, special inventories might be required, and tracking systems will be needed. Production costs can sometimes increase by up to 25 percent. Especially in developing counties these costs can be prohibitive (Vianna et al., 1996). To date, most of the certified forests have been industrial and investment ownerships. A significant portion of the world's forests are in small private holdings. These ownerships will need to be addressed as certification grows (Washburn, 1999). Measures to assist these owners may be necessary. The one forest certification system that is designed specifically for these small ownerships or family forests is the ATFS (American Tree Farm System, 2010).

Forestry Capstone Courses

Forestry capstone courses are typically last-semester senior-level forest resource management plans courses that integrate all prior knowledge gained in the forestry curriculum. They often involve the development of an actual forest resource management plan. In the past, these plans were expected to stress timber management. Since the main thrust was developing timber growth and yield information and silvicultural management prescriptions, these courses were often taught on the university forest or some other contrived forest tract. Today, multiple use and nontimber resources are usually emphasized, and the course is now commonly taught on tracts owned by actual forest owners. This means the students obtain actual management objectives from the forest owner and must develop a management plan that satisfies that forest owner. Once the student has the management objectives, he or she must describe the forest resource (do the field work to obtain timber and resource data), outline the planned management activities necessary to achieve the objectives, and summarize the results expected from the management plan (Straka, 1993).

Forestry capstone courses tend to be integrative, learning-centered, problem-based, and landscape level focused (Vaux, 1975; Arthur & Thompson, 1999; Thompson et al., 2003; Prokopy, 2009). They are integrative by nature. The student must synthesize prior course work from fields such as biometrics, silviculture, economics, forest management, valuation, soils, forest harvesting-operations, forest fire control, and forest pest management. This means that all prior course work is combined into one terminal cohesive forest resource management plan (Straka, 1993). At the same time the focus tends to be towards problems students are likely to encounter on the job, problem-solving or learning, and on the broad ecosystems or landscape (Vaux, 1975; Straka, 1993; Arthur & Thompson, 1999; Thompson et al., 2003; Prokopy, 2009). The capstone course and the students are forced to adapt to the changing demands of the profession (Sample et al., 1999; Straka & Childers, 2006; Munsell, 2009).

Forest resource management plans are written for various types of owners; for example, family forests, industrial forests, and public lands. The most traditional forest management plan is written for the small family forest owner property by a state forestry commission forester or consulting forester (Straka, 1993). In the United States, private forest owners collectively control 56 percent of the forest land and 62 percent of this private forest land is controlled by family forest owners (or family forest owners control 35 percent of all forest land in the United States (Smith et al., 2009). Ninety-two percent of all private forest owners are family forest owners in the United States (Butler, 2008). These family forests tend to be small (Straka, 2011) and 53 percent of family forests are less than 40 ha (Butler, 2008). This small tract size for family forests has significant impacts on the practice of sustainable forest management (Kilgore et al., 2007; Butler, 2008; Daniels et al., 2010; Straka, 2011). Only one in five ha of family forest land is owned by someone with a management plan and only two in five ha is owned by someone who has received forest management advice (Butler, 2008). Of the common forest certification systems in the United States, the ATFS is the only one with a major focus on these family forest owners and, thus, with a major focus on a critical forest management problem. Family forest owners have

specific needs and desires in a management plan and the ATFS offers a management plan template adapted just to these forest owners (Melfi et al., 1997; Thrift et al., 1997).

Forestry schools around the United States that utilize a forest resource management plans format capstone course tend to stress family forest owners. This is likely to be the first type of management plan the new forester is asked to develop (Straka, 1993). Some emphasis may also be the older more traditional timber management plan, as these types of plans are still popular on forest properties managed with a profit-motive (the type of tracts managed by consulting foresters for a fee). Timber management and timber harvesting are certainly part of the teaching approach we describe. However, the foundation and emphasis is forest sustainability.

The ATFS Management Plan Template and Forest Sustainability

During 2011 the American Forest Foundation's ATFS cooperated with the United States Department of Agriculture (USDA) Forest Service and the USDA Natural Resources Conservation Service (NRCS) to develop a forest resource management plan template designed especially for family forest owners (American Tree Farm System, 2012c). The advantage of this single template is that it satisfies the requirements of the ATFS forest certification system, the USDA Forest Service Forest Stewardship Program, and the NRCS forestry cost-share incentive programs. Detailed instruction guides were developed to assist in completing and understanding the template, one for foresters and other natural resource professionals (American Tree Farm System, 2012d) and one for family forest landowners (American Tree Farm System, 2012e).

The Forest Stewardship Program was established in 1991 by the USDA Forest Service as a vehicle to encourage development of multi-resource family forest management plans. Many federal cost-share programs require such a management plan. The Forest Stewardship management plan is commonly accepted as the established multi-resource forest management plan and has proven popular with family forest owners (Melfi et al., 1997; Thrift et al., 1997; USDA Forest Service, 2012). This management plan also meets NRCS requirements to qualify for federal financial cost-share assistance programs, usually administered at the state-level, for family forest owners to implement forestry and agroforestry related practices (USDA Natural Resources Conservation Service, 2012). Typical cost-share programs are the Environmental Quality Incentives Program, the Wildlife Habitat Incentive Program, and the Conservation Stewardship Program (USDA Natural Resources Conservation Service, 2012).

The ATFS Forest Management Template is a fairly standard format for a management plan (American Tree Farm System, 2012c). Like most modern forest resource management plans, it includes the basic timber management information necessary to manage a forest stand, but also includes additional resource information related to forest sustainability issues (Straka, 1993). A traditional timber-based management plan is still common forest owners with strong timber and financial objectives (the kind of forest owner who hires a consulting forester). The timber management plan focuses on defining the forest's land area and type, a timber description, and stand-by stand recommendations for current and future management. **Table 1** illustrates

Table 1.
Basic components of a traditional timber-oriented forest resource management plan.

I. Foundation	1. Purpose of the plan	a. Location and boundaries
	2. Description of the forest area	b. Topography
		c. Soils
		d. Prior management history
3. Economic situation	a. Local communities and population	
	b. Transportation	
	c. Forest industry	
4. Forest description	a. Forest subdivisions	
	b. Management subdivisions	
	c. Area by type and age class	
	d. Volume by species and age class	
	e. Accessibility	
II. The management plan	1. Management objectives	
	2. Silviculture	
	3. Regulation	a. Rotation age and cutting cycle
		b. Allowable cut and cutting budget
	4. Markets	a. Timber sale policy
		b. Logging and transportation
	5. Forest regeneration	
6. Protection from insects, disease, and fire		
7. Administration of the plan		

the components of a traditional timber-oriented management plan and these components are still foundations of modern management plans (Straka, 1993).

Today's stewardship-type management plan, the established family forest management plan that the USDA Forest Service requires as a multiple-resource, sustainability-oriented management plan for federal cost-share funding eligibility, includes the same elements as an ATFS management plan. This makes sense as that plan type was part of the model for the ATFS plan. Thus, the ATFS management plan qualifies as a stewardship plan for federal cost-sharing. **Table 2** illustrates the additional components that an ATFS plan includes (note that it would still include the basic timber-oriented components from **Table 1**).

The classic timber-oriented planning exercise stressed fundamental field skills: stand delineation, timber cruising, inventory, stand and stock tables, volume projections, and stand prescription using silvicultural (applied forest ecology) foundations. These are critical skills and they are still stressed as they have both economic and social value. The ATFS approach allows for enhanced "real-world" interaction with forest owners, broader multiple-use forest resource management, integration of forest sustainability and certification principles into the course framework, and practical auditing of forest sustainability standards. Forestry students will enter the workforce in an environment that includes many of the timeliest of forest conservation issues, and the capstone course still develops practical

field skills.

Going back to the ATFS standards discussed above, the difference in table information shows the forest sustainability principles that this management template emphasizes. These are the same standards accepted by the international community as evidence of sustainable forest management (Shindler & Cramer, 1999; Vogt et al., 2000; Oliver, 2003; McDonald & Lane, 2004; Klooster, 2005). The ATFS does not start with the forest management plans capstone course. The intention is that forest sustainability and forest certification are introduced over the standard junior/senior forestry courses in forest policy, economics, and management. These would lead to the capstone course. This is really just a new integrated model to incorporate both into the curriculum. Current forestry curricula are certainly expected to cover these topics somewhere (Temu, 1994; Sample et al., 1999; Luckai, 2002; Gordon, 2006; Temu & Kiwia, 2008) Forest sustainability has the same respect for the environment and the same concerns as any other sustainability issue.

The forestry students are introduced to forest sustainability as a means to promote the vitality of renewable forest resources. This does not mean nonuse of the forest or that timber harvests cannot take place. It does mean environmental, economic, and social benefits must be protected, and that increased public understanding of the benefits of sustainable forest management must be a goal. Adaptive management must be part of the process as it is required by PEFC. Forestry students will leave

Table 2.

Basic additional components of an ATFS forest resource management plan.

1. A management objective that addresses multiple forest resources, not just timber.	a. Protect special sites and social considerations (special sites, adjacent stand or ownership concerns, recreation, and access).
2. Forest natural resources enhancement and protection.	b. Air, water, and soil protection (soil protection, roads, streams, wetlands, ponds, lakeshore, effects of natural disasters, and carbon sequestration (optional)). c. Fish, wildlife and biodiversity (fish and wildlife, threatened or endangered species). d. Constraints to management of forest resources.
3. Management of related resources.	a. Relationship of pastures and hayfields to wild life habitat. b. Maintenance recommendations. c. Food plots.
4. General recommendations.	a. Best management practices. b. Forest practices guidelines. c. Smoke management guidelines for prescribed burning.
5. Management activity schedule and tracking (management activity by schedule date, stand cost, and expected cost share).	
6. Organizations providing local natural resource management assistance.	

the capstone course with these core forest sustainability concepts:

- Development of an active and adaptive plan that meets the forest owner's management objectives and is consistent in the size of the forest and the scale and intensity of activities.
- Development of a plan that complies with all federal, state, and local laws and regulations.
- Development of a plan that ensures timely reforestation and afforestation with desired tree species that meet the forest owner's management objectives.
- Development of a plan that protects the environment (air, water, and soil), that follows state best management practices, that considers integrated pest management, and that uses prescribed fire only in terms of management objectives.
- Development of a plan that conserves biodiversity (fish and wildlife protected).
- Development of a plan that recognizes forest aesthetics.
- Development of a plan that protects special sites (historical, archeological, cultural, biological, and ecological).
- Development of a plan where forest products harvests and other activities are conducted in accordance with management objectives and consider other forest values.

Conclusion

Forestry students in the United States are introduced to the topics of forest sustainability and forest certification in various ways. Forestry curricula rarely include specific courses on these topics; they are usually integrated into the course work. Their importance is apparent and appears to be increasing as public pressure and market demands create a need for these educational programs to focus on sustainability principles. The topics are capstone in nature and it is appropriate that they be the center of the forestry capstone course.

Utilizing the ATFS management template and sustainable forest management certification system works very well to integrate the concepts into the capstone course. Especially ef-

fective is introducing the sustainability and certification subjects sequentially through the forest policy, economic, and management courses. Student feedback was very positive for the process and the capstone course. Forestry students quickly realized the importance of the topics and the relevancy to their careers. The training as an ATFS auditor is an actual credential they add to their resume and today's students love credentials. They also appreciate the practical nature of the capstone course and the skills learned from dealing with actual family forest owners.

Sustainability is being integrated into more and more college courses. It has always been part of forestry curricula. However, its importance has never been higher and the need to stress to the public forestry's sustainability foundation has never been greater. This is an example of sustainability principles being enhanced in the academic field of renewable natural resources, a field that has always been sustainability-driven. It illustrates how the concept of sustainability can change and how its importance is continuing to develop over time.

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