Best Practice Codes for Forest Management (Indicator 51)[1]

Extent to which legal framework . . . ***Encourages Best Practice Codes for Forest Management***

Rationale and Interpretation

Forest management practices that are well designed and properly applied are fundamental to the sustainability of forest resources. At all levels (stand, landscape, local, regional, national, global), forests depend on the application of forest practices that are capable of ensuring sustained use, management, and protection of important social, economic, and biological values. Exploitive or destructive forest practices may lead to short-term financial or social gains. However, they may also cause temporary or irreparable harm to ecological and biological processes in forests and ultimately decrease long-term social and economic welfare as well. Well-founded best practice codes, and the forest management practices that compose them, can ensure sustained forest productivity for market goods, protection of ecological values, and protection of the various social, cultural, and spiritual values offered by forests. They can be among the most important tools for responding to national trends and conditions involving forests (Cubbage and Moffat 1997, Roundtable on Sustainable Forestry 1999).

Useful data for measuring this indicator are compilations and descriptions of laws and programs at national and subnational levels that require the establishment of appropriate practices and harvesting activities, specification of practices and harvesting activities to be applied, and designation of the programmatic means by which the practices are to be delivered to landowners and timber harvesters (for example, fiscal incentives, technical assistance, regulations and ordinances). Similarly useful to describing the indicator is compilation and description of processes that encourage monitoring of the rate at which practices are actually being applied and, as appropriate, subsequently updated.

Concepts and principles that are to be identified and addressed are suggested by the indicator. To guide this review, brief definitions of two important concepts are (1) *best practice codes* — set of forest management or harvesting standards (benchmarks, yardsticks, touchstones, measures, criteria) that foster

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sustainable management of forests for various values and benefits (also variously referred to as best management practices, forest practice guidelines, forest practice rules, acceptable practices, and management ordinances); and (2) *encourage code*—conditions promoting the development of best practice codes (leadership, organization, funding) and their subsequent application in response to various types of programs (for example, educational, technical assistance, fiscal incentives, tax incentives, regulatory).

Conceptual Background

Best practice codes are typically summations of various forest practices that are considered to be technically, economically, and politically acceptable for achieving certain desired conditions of forest sustainability. Their development by public and private agencies usually involves collaborative processes wherein the final sets of best practices are those that meet sustainable forest conditions as well as the biological, economic and social interests of those that are engaged in their development. Although initially developed in response to concern over nonpoint forest sources of water pollutants, codes have been developed for nearly all forest practices (for example, roads, pesticides, reforestation, prescribed fire) that are important to the attainment of a variety of values associated with forests, including wildlife, recreation, wetlands, timber, and aesthetic beauty.

Best practice codes have been developed and implemented by a large number of public and private organizations, the diversity of which has often resulted in a variety of best management codes that reflect the interests and requirements of the sponsoring organizations. In some cases the codes are well coordinated whereas in other cases they may be in direct conflict. Privately developed and implemented codes of forest practice include the Sustainable Forestry Initiative of the American Forest and Paper Association (2001a) and the forest certification program of the Forest Stewardship Council (1999). Although private initiatives have occurred, government organizations (responding to various legal mandates) have been most active in pursing the development and application of best practice codes. The U.S. Environmental Protection Agency, responding to requirements of the 1972 Amendments to the Federal Water Pollution Control Act and the Coastal Zone Management Act of 1972, has been (and continues to be) a major stimulus to the development of best management practices, especially those developed by State governments. Similarly, the U.S. Fish and Wildlife Service has developed best practice codes focused on wildlife values, while the USDA Forest Service has best management practices that are applied on forest land that is part of the National Forest System (Anderson 2000).

Best practice codes are useful to the extent they are applied by forest landowners and timber harvesters. In some cases, voluntary acceptance and application of codes is the primary approach to securing their use. Landowner and harvester goodwill and sense of stewardship toward forests are considered the only necessary motivation needed to accomplish the application of appropriate forest practices. On their own initiative, groups of timber harvesters, nonindustrial private landowners, and industrial timber land owners may band together to develop, adopt, and apply best practice codes. In certain situations, however, government may need to play a major role. Uninformed or misinformed landowners and harvesters may require information provided by educational initiatives (often provided by Extension Service programs) or technical assistance programs (provided individually by public or private service foresters) if they are to apply best practice codes. Government sponsored fiscal and tax incentives may also be necessary where landowners and harvesters lack the financial resources needed to apply best practice codes. And where landowners and harvesters are not persuaded of the necessity to apply certain forest practices which are considered essential to sustaining important forest values, a regulatory or mandatory approach may be necessary.

Best practice codes and the programs that foster their implementation are dynamic systems that benefit from careful monitoring. The latter can be most useful in determining if more aggressive delivery of practices via more or better organized programs is necessary or whether there are technical problems (obsolescence, ineffectiveness) with the forest practices that compose a best practice code. Compliance monitoring and effectiveness monitoring have been a key component of most private and public initiatives involving best practice codes. Some States have conducted six or more cycles of compliance monitoring over a period of 10 to 12 years (National Association of State Foresters 2001).

Current Legal Capacity

Private Sector Capacity

Private organizations representing a variety of interests in sustaining forests have developed and implemented codes of best practices for forest management. Embraced by various forest certification programs, these codes of best forest practices clearly demonstrate the private sector's capacity to assume responsibility for assuring the sustainability of forests and the communities that are dependent upon. The motives for their development and implementation are many, including improving the performance of forest management activities and the strengthening of credibility and public acceptance of forestry in general. A significant aspect of all private certification efforts is that they are voluntary, nonregulatory approaches to promoting improved forest practices and forest management systems. Certification of a forest implies that the management

practices being applied meet approved standards of a designated authority (Society of American Foresters 1999).

There exist more than 25 nongovernmental forest certification programs worldwide plus a number of governmental efforts to develop criteria and indicators of sustainable forest management, of which best practice codes are frequently the visible on-the-ground expression of sustainable forest management (Confederation of European Paper Industries 2000, Society of American Foresters 1999).[2] In the United States, five major

[2] Examples of international certification programs and activities are the International Standards Organization (ISO) 14001 Environmental Management System (especially ISO TR 14061), Pan-European Forest Certification, Alliance of World Wide Fund for Nature and World Bank, World Business Council for Sustainable Development, Center for International Forestry Research, and programs in various foreign countries, including Austria, Bolivia, Brazil, Canada, Czech Republic, Denmark, Finland, France, Ghana, Indonesia, Latvia, Malaysia, Mexico, Norway, Sweden, Switzerland and the United Kingdom (Confederation of European Paper Industries 2000, Society of American Foresters 1999).

Table 1. Nongovernmental Forest Certification Programs Promoting Best Forest Practice Standards, by Program Characteristic. 1999.

Program Characteristic	Forest Certification Program				
	Sustainable Forestry Initiative Program	Forest Stewardship Council Program	Environmental Management Systems: Forestry ISO 14000: TC 201	Tree Farm Program	Green Tag Forestry Program
Sponsor	American Forest & Paper Association (AF&PA)	Forest Stewardship Council (FSC)	International Standards Organization	American Forest Foundation	National Forestry Association (NFA) & National Woodland Owners Association
Mission	Promote commitment to sustainable forestry and the measures by which the public can measure this commitment	Improve forest practices through market-based mechanisms	Provide standardized means by which companies can address environmental impacts of their activities	Ensure sustainable forests by providing landowners with information & voluntary verification of sustainable forest practices	Promote landowner recognition of responsibility for sustainable woodland management
Eligible Parties	AF&PA members	Interested forest landowners	Organizations involved in environmental management	Owners of 10 or more acres of forestland	NFA members

Forest Practice Standard Key Principles	Principles: use responsible forest practices, protect forest health and productivity, protect special forest sites, continuously improve practice of forest management	Principles: comply with laws, establish clear tenure to land, respect indigenous peoples' rights, enhance well-being of workers and communities, ensure wide range of environmental & social benefits, conserve biological diversity, develop forest management plans, monitor forestry activities, conserve natural forests, and plan environmentally for plantations.	Principles: give environmental management high priority, communicate externally, comply with laws and rules, assign responsibility for environmental management, promote environmental planning, establish performance discipline, evaluate performance, establish audit systems, encourage vendors to establish environmental management systems	Principles: broaden practice of sustainable forestry; communicate to and involve public; prudently use chemicals; reforest harvested lands; manage for quality water, wildlife, aesthetics, special sites and biodiversity;	Principles: promote forest sustainability and sound management and planning, tree harvesting, road construction, skidding, post harvest evaluations, product utilization, chemical applications, community and employee relations, economic viability, and record keeping
Forest Practice Standard Audits	Voluntary verification or second and third party audits	Third party audits	First, second or third party audits	Third party audits	Third party audits

Source: adapted from Society of American Foresters 1999.

nongovernmental certification programs recommending best practices for forest management have gained considerable attention (Table 1). Although the best practices recommended by these programs can differ substantially in substance, all programs have standards that in some way address planning, management, reforestation, forest operations, special places, pesticides, product utilization, fish and wildlife, and soil and water resources. The programs typically set forth sets of best practice principles or objectives within which participants are given substantial flexibility to develop more exacting practices considered appropriate to specific resource, economic, and political settings (American Forest and Paper Association 2001a and 2001b), Forest Stewardship Council 2000). The exact nature of the practices being applied on-the-ground in response to these principles has not been compiled in a comprehensive sense nor has the effectiveness of the practices been addressed by long-term research activities.

The administration of certification programs varies considerably. Some are directly involved in encouraging the application of best practice codes (Sustainable forestry Initiative, Green Tag Forestry Program) while others are international bodies that accredit certification organizations. An example of the latter is the Forest Stewardship Council which (as of 1999) accredited two national certifiers in the United States, namely Scientific Certification Systems and SmartWood (a program of the Rainforest Alliance), which work through various regionally based organizations. The best practice codes developed by these regional organizations must be consistent with the Forest Stewardship Council's 10 principles of forest sustainability. The Green Tag Forestry Program sets forth principles of best forest practices and then engages the service of foresters who are members of the Society of American Foresters to guide their application to forests owned by participating landowners. The ISO certification process does not specify principles of best forest practices, instead allows their development and adoption by organizations seeking certification (Society of American Foresters 1999).

The best practice standards promoted by programs certifying sustainable forest management conditions are useful to the extent they are actually applied in a forest setting. Except in certain limited cases, information about their ability to actually accomplish principles of forest sustainability is limited. However, the area of forest land enrolled by the programs in the United States is substantial: Sustainable Forestry Initiative Program—56.5 million acres (93.7 in 2001), American Tree Farm Program—85 million acres, Forest Stewardship Council Program—4.6 million acres, and Green Tag Forestry Program—2,100 acres (Society of American Foresters 1999). As interest in encouraging best practices via certification programs continues to grow, so does the number and sophistication of certification programs. These changing conditions (evolution process) pose special challenges to identifying, compiling, and measuring the ability of privately initiated certification programs to encourage the use of best

practice codes (Cook and O'Laughlin 1999). The certification system worldwide has yet to settle on who will be the major organizational players and what set of comprehensive codes will they advocate as being most useful for accomplishing sustainable forestry objectives. This information management task is lessened in some cases by the periodic program status reports that are issued by some sponsoring organizations (for example, American Forest and Paper Association 2001a, Forest Stewardship Council 1999).

Federal Government Capacity

A variety of Federal laws and associated Federal rules and administrative directives represent a significant capacity to influence forest practices applied on public and private forest land (Table 2). Of the 16 Federal laws identified here, all but 3 rely indirectly on State governments to develop and implement best management practice codes that are considered important to accomplishing certain national interests in forests. These laws typically require State actions that favor the establishment of forest practice codes to be implemented in various State-selected ways (for example, Clean Water Act, required programs for controlling nonpoint source pollution; Coastal Zone Management Act, required adoption of enforceable best practice codes). In the case of nine of the Federal statutes identified, Federal law directly promotes or limits the application of certain practices on all forest ownerships (for example, Occupational Safety and Health Act, conditions for felling and skidding; Federal Insecticide, Fungicide, and Rodenticide Act, conditions for pesticide application in wetlands). Only three of the Federal statutes identified call for best forest practice codes to be developed specifically for Federal lands (for example, National Forest Management Act, conditions for growing and harvesting timber on national forests). Most best practice codes of Federal agencies are included in land management plans that guide the use and management of Federal public lands.

The following are more detailed descriptions of example Federal laws that authorize Federal capacity to establish and encourage the application of forest practices considered necessary to sustain forests (Brown and others 1993, Forest Service 1993, West Publishing 1997).

Direct Prescriptions

Occupational Safety and Health Act of 1970: Requires the establishment and implementation of workplace safety and health standards, specifically promulgated as an "occupational safety or health standard . . . any action that would improve the health or safety of employees." As examples, the safety standards (or best practices) cover felling, bucking, limbing, loading, skidding, road and bridge building, and the use of explosives. Federal administrative responsibility for rule promulgation and enforcement rests with the U.S.

Department of Labor.

Endangered Species Act of 1973: Requires prevention of the extinction of endangered species of flora and fauna, and authorizes ". . . regulations as deemed necessary and advisable to provide for the conservation of such species." Where necessary for the conservation and survival of such species, recovery plans are to be developed which include ". . . site specific management actions as may be necessary to achieve a plan's goal." Outright prohibitions are harmful actions, including significant habitat modification, that would (for example) harass, harm, kill, trap, or involve collection of endangered or threatened species of fish and wildlife. Federal administrative and enforcement responsibility for the Act rests with the U.S. Fish and Wildlife Service and the National Marine and Fisheries Service.

Table 2. Federal Statutes Requiring Development and Application of Best Forest Practice Standards, by Resource Focus and Landowner Application.

Federal Statute	Major Forest (or Related) Resource of Concern for Best Forest Practice Code	Federal Statutory Requirements for Application of Forest Practice Code		
		Direct Federal Application to Only Federal Land	Direct Federal Application to All Forest Land	Indirect State Action for Code Development
Clean Air Act of 1990	Air		X	X
Clean Water Act of 1987	Water		X	X
Coastal Zone Management Act of 1972	Comprehensive			X
Endangered Species Act of 1973	Fish and Wildlife		X	X
Federal Insecticide, Fungicide, and Rodenticide Act (as amended 1996)	Comprehensive		X	X
Federal Land Policy and Management Act of 1976	Comprehensive	X		
Fish and Wildlife Conservation Act of 1980	Fish and Wildlife			X
National Park Service Organic Act of 1916	Recreation	X		
National Trails System Act of 1968	Recreation		X	X
National Wildlife Refuge System Administration Act of 1966 (amended 1997)	Fish and Wildlife	X		
Occupational Safety and Health Act of 1970	Comprehensive		X	X
Rivers and Harbors Act of 1890	Water		X	X
Soil and Water Conservation Act of 1977	Comprehensive			X
Superfund Act of 1980	Comprehensive		X	X
Surface Mining Control and Reclamation Act of 1977	Comprehensive			X
Wild and Scenic Rivers Act of 1968	Recreation		X	X

Note: Superfund Act of 1980 is the Comprehensive Environmental Response, Compensation and Liability Act of 1980. Federal Insecticide, Fungicide, and Rodenticide Act includes the Agricultural Worker Protection Standard for the distribution and use of pesticides.
Source: Forest Service 1993, and West Publishing 1997.

National Forest Management Act of 1976: Requires the preparation of land and resource management plans for national forests and requires that such plans include (as examples) guidelines that ensure timber harvest from lands only where ". . . soil, slope, or watershed conditions will not be irreversibly damaged, . . . there is assurance that lands can be adequately restocked within 5 years after harvest, . . . protection is provided for streams, streambanks, shorelines, lakes, wetlands, . . . and cut blocks, patches or strips are shaped and blended with natural terrain." Federal administrative authority for the Act rests with the Forest Service, U.S. Department of Agriculture.

Federal Land Policy and Management Act of 1976: Requires the preparation of land use plans for Federal public lands (land administered by the Bureau of Land Management) that ensure use and management of such lands shall be in ". . . compliance with applicable pollution control laws, including air, water, noise and other pollution control standards or plans," and ". . . minimize adverse impacts on the natural, environmental, scientific, cultural and other resources and values (including fish and wildlife habitats) of the public lands involved." Federal administrative authority for the Act rests with the Bureau of Land Management, U.S. Department of the Interior.

Indirect Prescriptions

Clean Water Act of 1987(amendments to Federal Water Pollution Control Act): Requires States to prepare a nonpoint source management program, specifically to identify waters which require action to control nonpoint sources of pollution, identify nonpoint sources that add significant pollutants, and to develop plans for ". . . identifying best management practices and measures to control each category and subcategory of nonpoint sources." Federal administrative responsibility for the Act rests with the U.S. Environmental Protection Agency. Enforcement of the nonpoint source plans is a State responsibility.

Coastal Zone Management Act of 1972: Requires States to develop plans to implement ". . . economically achievable measures for the control of nonpoint sources of pollutants originating in designated coastal regions of the United States." Forest management measures include preharvest planning, streamside management measures, road construction and reconstruction, site preparation, fire management, revegetating disturbed areas, and wetland management. State implementation of these measures must be with enforceable policies and mechanisms. Federal administrative responsibility rests with the U.S. Environmental Protection Agency and the National Oceanic and Atmospheric Agency. Enforcement of the plans is a State responsibility.

Clean Air Act of 1990: Requires States to develop ". . . a plan which provides for implementation, maintenance, and enforcement of [air quality standards] in each air quality control region within each state." Implementation involves establishing practices that will prevent significant deterioration of air quality (including visibility) in and near national parks, wildlife refuges, and wilderness areas. Smoke management plans address prescribed burning practices. Although major administrative and enforcement responsibility rests with the U.S. Environmental Protection Agency, States are responsible for administering State plans.

State Government Capacity

State governments also have significant legal frameworks for encouraging the development and implementation of forest practice codes. In 2001, all States had some form of forest practice code, of which 60 percent had been revised one or more times since 1994. The specific practices which make up the codes were being applied to forests at a rate of 86 percent (National Association of State Foresters 2001). Many State forest practice codes were established in response to Federal laws that require implementable and enforceable programs focused on the water quality impacts of forest practices, although most now address a variety of forest values and the many forest practices that are used to enhance or protect such values. The State developed codes focused primarily on private forests, although many apply to State-owned public forests (some even to Federal lands, although jurisdictional issues are common) (Ellefson and others 1995).

State governments have the capacity to direct forest practice codes to a variety of forest values and implement the codes in a variety of programmatic ways (Table 3). In 1992, State-adopted best forest practices focused on water quality, reforestation, timber harvesting, forest protection, wildlife protection, and recreation and aesthetic qualities. Most of the guidelines developed to address these values were delivered via technical assistance programs (28 percent of total program applications) with broader educational and extension programs a close second (27 percent). Other program types employed were fiscal incentives (15 percent of applications), voluntary guidelines (13 percent), regulatory (11 percent), and tax incentives (6 percent). State forestry agencies are unlikely to rely on a single type program to deliver their forest practice codes. For example, educational and technical assistance programs were used by 46 and 47 States, respectively, to protect water quality, yet 34 States also used voluntary guidelines and 28 States employed regulatory measures for such purposes.

The number and type of State agencies engaged in the development of forest practice codes is substantial. In 2000, nearly 1,000 State government entities (departments, division, bureaus, governing boards) were engaged in

some form of forest resource management activity that very likely lead to best forest management practices to be applied by public and private landowners and timber harvesters (Ellefson and other 2001a). These agencies ranged from those with traditional resource conservation and management responsibilities (forests, wildlife, parks, recreation, water), to agencies that have broader environmental and public health responsibilities as might be influenced by forest practices. The capacity of those agencies to foster development and implementation of forest practices codes rests in large measure on the variety of State laws they are responsible for implementing. State laws applicable to forestry nonpoint source pollution in 2001 included forest practice and conservation laws — 11 States, lake and stream protection laws — 27 States, wetland protection laws — 23 States, stream crossings laws— 23 States, sediment and erosion control laws — 29 States, chemical use laws — 15 States, persistent problem person (bad actors) laws — 12 States and storm water laws — 10 States (National Association of State Foresters 2001). In implementing these laws, extensive partnering (for example, sharing knowledge and expertise) occurs among State agencies on matters involving codes of best management practices. In 2001, 32 States reported forestry agencies partnering with a State's environmental protection agency, 38 with a State's water quality agency and 24 States with a State's fish and wildlife agency (National Association of State Foresters 2001).

Table 3. State Government Programs Promoting Best Forest Practice Standards on Private Forests, by Forestry Activity, Region, and Type of Program. 1992.

Major Forestry Activity and Type of Program	Number of States in Region Having Program Type									
	North-east				South-east	South Central	Great Plains	Rocky Mountain	West	Total
Protect Water Quality										
Educational Programs	6	3	6	5	5	5	5	5	6	46
Technical Assistance	6	3	7	5	5	5	5	6	5	47
Voluntary Guidelines	5	3	6	4	5	5	1	4	1	34
Tax Incentives	1	1	4	3	0	1	3	1	0	14
Fiscal Incentives	2	3	5	3	1	4	5	4	2	29
Regulatory Programs	6	1	5	1	4	1	0	2	6	26
Promote Reforestation										
Educational Programs	6	3	6	5	6	5	4	5	6	46
Technical Assistance	6	3	6	5	6	5	5	6	4	46
Voluntary Guidelines	1	1	3	2	1	1	1	4	1	15
Tax Incentives	2	3	3	3	1	1	0	1	2	16
Fiscal Incentives	5	2	5	3	4	5	5	5	3	39
Regulatory Programs	3	0	4	0	0	0	0	1	6	14
Improve Timber Harvesting Methods										
Educational Programs	6	3	6	5	5	4	5	5	6	45
Technical Assistance	6	3	7	5	6	5	5	6	4	47
Voluntary Guidelines	4	2	6	1	3	3	2	4	2	27
Tax Incentives	2	2	3	1	0	1	0	0	0	9
Fiscal Incentives	3	0	4	0	0	1	2	2	1	13
Regulatory Programs	4	0	4	0	1	1	0	1	6	16

Protect from Wildfire, Insects and Diseases										
Educational Programs	6	3	6	5	5	5	5	6	6	47
Technical Assistance	6	3	7	4	6	5	4	6	6	48
Voluntary Guidelines	3	0	3	1	2	3	2	4	2	20
Tax Incentives	0	1	3	2	0	0	0	0	0	6
Fiscal Incentives	1	1	4	2	1	0	2	4	2	17
Regulatory Programs	5	2	3	1	3	2	1	4	6	27
Protect Wildlife & Endangered Species										
Educational Programs	6	3	7	5	6	5	4	5	5	46
Technical Assistance	5	3	6	5	6	5	5	5	4	45
Voluntary Guidelines	4	1	3	1	1	2	2	2	2	18
Tax Incentives	0	0	1	2	0	0	0	0	0	3
Fiscal Incentives	3	2	5	3	2	4	5	2	2	28
Regulatory Programs	4	2	2	0	3	1	1	2	5	20
Enhance Recreation & Aesthetic Qualities										
Educational Programs	6	3	6	4	5	5	4	5	3	42
Technical Assistance	6	3	7	5	5	5	5	6	3	45
Voluntary Guidelines	3	1	2	1	1	2	2	2	2	16
Tax Incentives	1	1	1	2	0	1	0	1	1	8
Fiscal Incentives	4	1	6	2	2	4	2	3	1	25
Regulatory Programs	2	0	1	0	0	0	0	0	5	8

Note: Regional groupings of States are Northeast -- CT, ME, MA, NH, RI, VT; Lake States -- MI, MN, WI; Mid-Atlantic -- DE, MD, NJ, NY, PA, VA, WV; Mid-Continent -- IL, IN, KT, MO, OH; Southeast -- AL, FL GA, MS, NC, SC; South Central -- AR, LA, OK, TN, TX; Great Plains -- IA, KS, NB, ND, SD; Rocky Mountain -- AZ, CO, MT, NM, UT, WY; West -- AK, CA, HI, ID, NV, OR, WA.
Source: Ellefson and others 1995.

State capacity to encourage the use of forest practice codes often depends on informed landowners and professionally astute timber harvesters and professional resource managers (foresters, wildlife managers). In 1995, 25 States had active registration, certification or licensing programs for timber harvesters (MacKay and others 1996). Of this total, six States had licensing programs wherein a person was not allowed to conduct timber harvesting activities without demonstrating (written or field exams) an informed ability to do so. In nearly all cases, an understanding of a State's code of best forest practices was the basis for granting a license. In 2001, 26 States reported certification programs for timber harvesters while 13 States reported some form of licensing of professional foresters (National Association of State Foresters 2001).

Table 4. Characteristics of State Programs Monitoring Compliance with Best Forest Practice Standards, by Region 1997.

Monitoring Characteristic	Region (number of States)			Total (Number of States)
	North	South	West	
• Compliance Monitoring Program				
Yes	11	13	10	34
No	9	0	7	16
• Compliance Monitoring Conducted				
All Harvested Sites	2	2	4	8
Sample of Harvested Sites	9	12	5	26
Certain Sites More Intensely	4	2	7	13
• Training Required to Participate in Monitoring	10	11	7	28
• Incentive Provided Private Landowner to Access Property	2	0	1	3
• Individual Landowner Compliance Information Made Public	5	7	9	21

Note: Compliance monitoring may be focused on forest practice guideline programs that are voluntarily complied with, mandatorily required of landowners and harvesters, or both. Nationally, 13 States have compliance monitoring programs part of a voluntary practice program (North -- 4; South -- 8; West -- 1), nine part of a mandatory program (North -- 3; South –1; West – 5), and 12 involve both voluntary and mandatory programs (North -- 4; South – 4; West – 4). North Region: CT, DL, IA, IL, IN, MA, MD, ME, MI, MN, MO, NH, NJ, NY, OH, PA, RI, VT, WV, WI; South Region: AL, AR, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX, VA; West Region: AK, AZ, CA, CO, HI, ID, KS, MT, NB, ND, NM, NV, OR, SD, UT, WA, WY.
Source: Ellefson and others 2001b.

State capacity to develop and encourage the application of best forest practice codes is substantial. Similarly, States have demonstrated considerable ability to monitor the rate at which the codes are being applied. In 1997, 34 States conducted compliance monitoring programs to determine whether the codes were being applied (Table 4) (Ellefson and others 2001b). Although nearly one-third of the States had not initiated a formal compliance monitoring program, this does not mean forest practices are not monitored in those States. In some, monitoring activities (inspections) are carried out when landowners benefit from

cost-share practices (for example, Federal Forestry Incentives Program and Stewardship Incentives Program) or when formally-designed Tree Farms are reinspected. In States where forestry operations are by law incomplete until approved by an inspector, the required preharvest and post harvest inspections are considered compliance monitoring. Legislative directives often compel compliance monitoring. Montana requires determination of "how current forest practices are affecting watersheds," Minnesota requires "a program for monitoring silviculture practices and the application of timber harvest and forest management guidelines," and Washington requires "annual assessment of how regulations and voluntary processes are working." (Ellefson and others 2001b).

Forest practices most commonly monitored by States are those focused on water quality, riparian areas and forested wetlands (Table 5). In 2000, the results of monitoring were found to be used in a variety of ways, including modification of education and training programs — 23 States, targeting of technical assistance programs — 20 States, and modification of existing guidelines — 11 States, and development of additional guidelines — 12 States (National Association of State Foresters 2001). The lead (or traditional) State forestry agency in only 20 States (in 1997) was the only agency engaged in monitoring compliance with recommended best forest practices (Ellefson and others 2001b).

Table 5. Forest Resource Values Subject to State Government Monitoring of Best Forest Practice Standards, by Region. 1997.

Subject Area	Region (number of States)			Total (number of States)
	North	South	West	
Water Quality	11	13	9	33
Riparian	10	11	9	30
Wetland	9	8	7	24
Soil Productivity	1	5	7	13
Wildfire, Insects & Diseases	3	1	9	13
Aesthetics	4	3	5	12
Wildlife Habitat	2	1	8	11
Reforestation	3	1	6	10
Cultural-Historic Resources	2	0	3	5
Recreation	2	0	2	4
Other	1	3	5	9

Source: Ellefson and others 2001b.

Compliance monitoring of forest practice guidelines has occurred over a number years in some States. In the South, for example, some States have conducted five or more statewide compliance monitoring surveys, very often finding compliance rates with recommended best management practices exceeding 90 percent (Greis 2002). Specific for the South:

- Alabama (six statewide surveys, 93 percent compliance)
- Arkansas (two statewide surveys, 1999 last survey, 80 percent compliance)
- Florida (10 statewide surveys, 1999 last survey, 96 percent compliance)
- Georgia (three statewide surveys, 1998 last survey, 79 percent compliance)
- Kentucky (one statewide surveys, 35 percent compliance)
- Louisiana (four statewide surveys, 1997 last survey, 83 percent compliance)
- Mississippi (one statewide survey, 87 percent compliance)
- North Carolina (two statewide surveys, 1996 last survey, 95 percent compliance)
- Oklahoma (monitoring program under development)
- South Carolina (five statewide surveys, 1997 last survey, 90 percent compliance)
- Tennessee (two statewide surveys, 1996 last survey, 63 percent compliance)
- Texas (four statewide surveys, 1999 last survey, 89 percent compliance)
- Virginia (10 statewide surveys, 1999 last survey, 90 percent compliance)

Local and Regional Government Capacity

Local units of government also have significant capacity to develop and implement forest practice codes. As of 1991, Hickman and Martus (1991) identified nearly 400 local ordinances nationwide regulating forestry practices, with more than 70 percent established since 1980 and half established since 1985. In 1993, Martus and others (1993) identified 522 local ordinances in 24 States regulating forestry activities, with 68 percent of them in Northeastern States and 27 percent in Southern States. In 1996, more than 100 local ordinances directing the application of forest practices existed in New York alone. As of 2000, county and municipal governments in 10 of the 13 Southern States had enacted a total of 346 forest-related ordinances (Georgia and Virginia count for one-half the total), which is a marked increase from 7 States and 141 ordinances in 1992 (Spink and others 2001). Some State forest practice laws prohibit or severely restrict local governments from regulating forest practices. Oregon's Forest Practices Act is quite specific in this respect, ". . . no unit of local government shall adopt any rules, regulations or ordinances or take any other actions that prohibit, limit, regulate, subject to approval or in any other way affect forest practices on forest land." Idaho and Washington also restrict local governments from the development of forest practice codes and their implementation via regulatory means.

The magnitude of local development of forest practice codes can be better judged in the context of the total number of local political jurisdictions within a State that could possibly adopt best practice codes and subsequently encourage their implementation. Expanding the following information to a nationwide setting, in 1991 about 8 percent of all local jurisdictions had some form of forest practice guideline embraced by a regulatory program (proportion was probably higher if nonregulatory initiatives were considered) (Ellefson and others 1995): Colorado: 3 of 63 counties, Delaware: 1 of 3 counties, Florida: various of 57 counties, Georgia: 11 of 159 counties, Illinois: 100 of 1,200 municipalities, and 1 of 102 counties, Louisiana: 1 of 64 parishes, Maryland: 20 of 23 counties, Michigan: 10-15 of 1,200 townships, Minnesota: 1 of 87 counties, New Jersey: 300 of 567 municipalities and 15 of 21 counties, New York: 70 of 900 municipalities, North Dakota: 7 of 53 counties, Pennsylvania: 13 of 420 municipalities, Vermont: 2 of 251 municipalities, and Wisconsin: 3-4 of 1,500 municipalities and 2 of 72 counties.

Summary of Conditions

Forestry and related agencies in the United States have recognized the importance of codes that embody best forest practices. Well-designed forest practice codes, whose use is actively encouraged, are often critical to ensuring the sustainability of forest resources. In light of the background and current conditions presented above, the following observations are made about the legal capacity to develop and implement such codes.

• Best practice codes represent a summation of technically effective, economically wise and politically palatable forest practices considered necessary for sustaining forest conditions and values. They are identified by a variety of terms or labels, including best management practices and forest practice guidelines. They are most often developed in response to a legal requirement.

• Best practice codes are applied in order to sustain forests generally and to ensure the sustainability of a variety of important forest values and benefits. However, the legal capacity to develop codes has most often been exercised in response to concerns over the quality and quantity of water flowing from forested areas.

• Legal capacity to develop and implement best practice codes exists among many different types public and private organizations, with government organizations at various levels being among the more active proponents of their development and implementation.

• Application of codes by landowners and timber harvesters is encouraged by legal capacities expressed as a variety of programs, including those involving education, technical assistance, tax incentives, fiscal incentives, and regulatory requirements. In most cases, a mixture of different types of programs has proven to be most effective. Regulatory programs focused on privately owned forests continue to be controversial.

• Codes of best management practices are monitored to determine their rate of application and effectiveness. The information gained from such monitoring is used to improve programs that encourage the use of forest practice codes and to delete, add or modify best management practices so the codes become more capable of sustaining desired forest values.

• Federal agencies have significant legal capacity to develop and promote best forest practice codes for direct application to Federal lands and in some cases to non-Federal lands. Directed by extensive legal frameworks, these agencies also encourage (via required appraisals and subsequent adoption of enforceable mechanisms) State governments to develop and promote the use of best forest practice codes.

• State government legal capacity to develop and implement codes of best management practices is also very extensive. This capacity is expressed via a number of program types, most common of which are voluntary participation by landowners and timber harvesters. Often in response to Federal incentives, States have also been very active in monitoring the use of codes of best management practices.

• Local units of government exercise legal capacity (ordinances) to develop and implement codes of best management practices. This capacity is highly variable in form and the degree to which it is exercised.

• Private organizations are active in the development and implementation of codes of best practice codes. Where initiated, they are generally part of forest certification programs that generally pursue the self-interests of the organizing parties. Certification programs are becoming increasingly more common, involve more sophisticated best practice standards, and are being applied to ever larger areas of forest land.

Issue and Trends

The literature identifies a number of major issues and trends involving best management codes and actions taken to encourage their use. Consider the following (Brown and others 1993, Cubbage and Moffat 1997, Dissmeyer 1994, Ellefson and others. 1995, Ellefson and others 2001a, Hickman and Martus 1991, Ice and others 1997, Martus and others 1993, Mater 1999, National Association of State Foresters 2001, Spink and others 2001).

• Legal frameworks supporting best management codes for forest management have been strengthened in recent decades with the establishment of a large number of Federal laws and regulations that directly or indirectly influence the forest practices of public and private landowners. State initiated programs that legally mandate (regulate) the manner in which forest practices may be applied have especially increased both in number and intensity during the past 3 decades. Local government laws and regulations have also grown significantly.

• Government agencies involved in the development and implementation of codes of best management practices for forestry have increased dramatically over the past 3 decades. In most cases, each agency's involvement is grounded in its responsibility for a single forest value (for example, air, water, wildlife), a situation that poses significant challenges to coordination within and between governments and to understanding of different sets of codes by landowners and timber harvesters.

• Educational and technical assistance programs are increasing in intensity and sophistication, enabling landowners and timber harvesters to become more aware of and sensitive to the importance of codes of best forest practices. These programs take many forms, including registration and certification of timber harvesters, licensing of forestry professionals, and certification of forest property by private organizations that have developed standards of forest sustainability.

• Complexity of the codes that set forth best management practices, and the accompanying increase in cost of applying the recommended or required practices, is increasingly straining landowner and timber harvester acceptance of codes and willingness to apply them. This is so even though educational and technical assistance efforts have made landowners and timber harvesters more and more aware of the existence and virtues of the codes.

• Regulatory programs, especially of State governments, requiring the application of codes of forest practices continue to be controversial yet have increased in number, scope and sophistication over the past 3 decades. Within a regulatory framework, specific trends and issues include increasing specification of best management practices in law (rather than in administrative rules), growing use of collaborative approaches to rule-making and program implementation, increased challenge of coordination among different government regulatory jurisdictions (for example, State and Federal) responsible for forest practice codes, and development of contingent regulations that provide enforcement authority when voluntary compliance with recommended forest practices does not occur.

• Implementation of Total Maximum Daily Load Limit (TMDL) rules and criteria aimed at further reducing nonpoint source water pollutants is increasingly of concern to Federal and State agencies that are responsible for developing and encouraging the use of codes of best management practices. Among specific issues are definitions of impaired waters, legal status of silvicultural sources (point versus nonpoint source) and disparity in agency and program concern over the importance of different sources of water pollutants (for example, forests versus agriculture).

• Monitoring the effectiveness of codes of best management practices is becoming increasingly more common and more sophisticated. Challenges posed to monitoring the effect of forest practices on water quality are increasingly being overcome, yet monitoring the impacts of forest practices on many other forest values (for example, biological diversity, forest aesthetics) continue to pose challenges. The results of monitoring are becoming more widely used as a tool to encourage the use of best management practices and to improve the development of codes that embody more technical sound forest practices.

• Increasingly innovative approaches to developing and encouraging the use of codes of best forest practices are appearing on the scene. They are often considered as alternatives to alleged costly and cumbersome regulatory programs. Included among the approaches are green certification or stewardship programs, industry-sponsored certification programs (for example, Sustainable Forestry Initiative), cost share payments, preferential property and State income tax treatments, technical assistance and extension activities, and conservation easements and land trusts which embody best management practices for forestry.

Information Adequacy

Specification

Information about codes of best management practices and their application has been the focus of attention by many public and private organizations. In 1999, the National Association of State foresters (1999) sought a better understanding of State forestry agency information concerning codes of best management practices. The Association reported 9 States with an abundant amount of information concerning best practice codes, 16 with sufficient information, and the remainder having very little or no information to describe such codes. As for the quality of information about best practice codes, 15 States reported it was excellent, 15 adequate, and 4 reported poor quality information. The Association has also conducted periodic surveys seeking information about the design, application and monitoring of best management practices being implemented by State governments (National Association of State Foresters 2001).

The American Forest & Paper Association(American Forest & Paper Association 1993), National Council of the Paper Industry for Air and Stream Improvement (NCASI 1994, 1995, 1996), Tetra Tech, Inc. (Tetra Tech 1992), and the Environmental Law Institute (Environmental Law Institute 1997, 1998) have also made concerted efforts to collect information about codes of best management practices. Various research organizations have undertaken analyses to determine the status of best practice codes and the programs that

are being used to encourage their application (Brown and others 1993, Ellefson and others 1995, Green and Siegel 1994, Hickman and Martus 1991, U.S. Environmental Protection Agency 2001). And the World Wide Web provides access to current State-by-State compilations of best management practices and forest practice codes (for example, Water Quality and BMPs for Loggers at http://www.usabmp.net).

Given the seemingly wide variety and large number of efforts that have been made to compile information about legal and related structures that promote best practice codes, a logical conclusion might be that an ample supply of information has been accumulated and that informed judgments can be made about legal capacities to establish best practice codes and focus them in positive ways on forest sustainability. This may be true in the aggregate, yet such masks the existence of very serious information shortcomings. For example, current information about best practice codes is seldom capable of describing changing legal conditions within which codes are developed and implemented (very little effort to coordinate compilations and analyses over time) and is not always comprehensive nor capable of being aggregated and usefully summarized (compilations and analyses are randomly undertaken and typically focused on particular programs, forest values, and selected geographic areas such as some, but not all, States). Available information also often lacks a concerted focus on the effectiveness of current legal structures and the programs that they promote (largely unknown is their actual ability to exert influence on sustainability goals). In a more specific sense, information voids of the following types are common:

• *Measurement Information* — Information about which variables and how they should be measured so as to accurately portray conditions involving codes of best management practices has not been assembled (What conditions should be measured and subsequently compiled [for example, compliance rates, area of forest covered, number of landowners engaged, forest value focused on by code]? What conditions to be measured are the best indicators of accomplishing agreed to standards of sustainable forest management? How often are these variables to be measured? Are there special measurement needs associated with different best practice codes?)

• *Extent of Activity Information* -– Information about the legal requirements to develop and encourage application of best practice codes has been assembled in an often uncoordinated way, the result of which is information that depicts only current conditions, lacks local, regional and national consistency, and fails to portray the role being played by private initiatives (What are the legal requirements for conducting best practice codes at various geographic levels and by various organizations? How are these requirements changing over time [if at all]? Are there differences in requirements at different levels of government? Is there consistency across these requirements? Are their legal and constitutional

issues at stake between governments? What is the status of locally developed codes and efforts to encourage their application? To what extent do these activities occur in the private sector? Are compilations as currently carried out useful for guiding policy and program direction?).

• *Responsible Organization Information* — Information about what private and public organizations are actively engaged in the development and implementation of best management codes has not been assembled except in a very modest way (What government agencies and at what levels are they engaged in code development and implementation? What legal authority assigns them responsibility and is such authority being accurately interpreted? Do public and private organizations engaging in code development have similar or differing goals and objectives that foster or hinder code development and implementation? What has prompted private organizations to engage in code development and implementation? Are there organizational patterns in the public and private sector that, if known and publicized, would enhance overall application of code development and implementation?)

•*Coordination Information* -– Information about requirements to coordinate development and implementation of best practice codes among and between various levels of government and various private concerns has not been assembled (What conflicts exist between the various entities engaged in developing and implementing codes of best management practices? How might they be productively resolved? What are requirements for coordination? Do they allow for cross-sectoral, coordinated planning and review? Do they ensure that the cumulative results of local, State, and regionally developed codes will lead to outcomes consistent with national requirements and vice versa? Do they allow incorporation of ad hoc code development activities occurring at various times and undertaken by various levels of government?).

• *Procedure and Specification Information* –- Information about how best practice codes are to be developed and encouraged has not been assembled (Do current statutory requirements prescribe procedures for codes and their implementation? Is such in a detailed format or in a broad framework giving deference to administrators and rule making procedures? Is the full intent of the existing laws that address codes and means for their encouragement expressed in current codes of forest practices? Do national requirements for codes allow for regional and subregional development of such codes? Do requirements specify the need for leadership in their development? Do they give guidance to such leadership?).

• *Scope of Practice Information* — Information about best practice codes for values in addition to water have not been comprehensively assembled (What best management practice codes have been developed for the range of values

associated with forests, in addition to water quality? What approaches have been used to encourage development and application of this broader range of practices? What legal requirements are there that require development of best management practices for the broad range of values associated with forests? Do these legal requirements differ among agencies at the same level of government and between levels of government? Are these differences complementary or competitive? Are there barriers to developing best management practice codes in addition to those focused on water? If so, how might they be overcome?)

• *Investment and Incentive Information* -– Information about resources devoted to best practice code development and implementation have not been assembled except in some very limited cases (What is the magnitude of investment in public and private code development and implementation activities? Are there legal and administrative processes for allocating resources to these activities and are they sufficient? Are there provisions [legally or fiscally] for encouraging these activities, especially encouraging cross-sectoral code development and implementation activities?).

• *Encouragement and Promotion Information* — Information about the appropriateness of various programmatic ways of encouraging use and application of codes of best management practices has not been compiled except in isolated State or regional circumstances (What is the array of programs that might be used to encourage application of best management practices contained in codes? What is the relative efficiency and effectiveness of these approaches in fostering landowner and timber harvester application of them? Are certain categories of landowners and timber harvesters more apt to respond to certain types of programs? What is the appropriate scale and administrative design for successful implementation of a program? What types of programs tend to reward application of desirable practices versus punish undesirable practices?)

• *Effectiveness Information* — Information about the effectiveness of best practice codes and their ability to accomplish sustainable forestry interests has not been compiled except in some very limited cases (Are there legal or administrative requirements to determine efficiency and effectiveness of these activities? What are appropriate measures of success? Are there more effective approaches to accomplishing code development and implementation?).

• *Monitoring Information* — Monitoring the application of codes of best management practices has been carried out by a number of organizations (especially State governments) but could be improved, especially forest practice effectiveness (Are there legal requirements to monitor the results of applying codes of best management practices? Is this information from monitoring activities being used to adapt codes to changing circumstances? Is the

information being collected and analyzed in such a way to be useful to fulfilling legal requirements assigned to an agency? Are compliance surveys [audits] statistically well designed? Are the results of various monitoring efforts capable of being accumulated to portray sound representation of conditions at the landscape, regional and national levels? What is being done to monitor administrative processes used to manage best practice codes? How accurate are practices actually being measured? Is the information robust and truly reflective of actual conditions?)

Recommendations

The ability to influence forest sustainability will depend a great deal on consistent, long-term application of best practice codes for forest management as suggested by Indicator 51. In order to improve the legal setting within which such will occur, there are a variety of information voids that need to be addressed (many described directly above). In order to suitably deal with them, the following actions would seem appropriate.

• *Comprehensive Periodic Reviews*. Conduct periodic and comprehensive reviews of current authorities that give direction and resources to the design, implementation, and monitoring of best practice codes for forest management. Guided by the above suggested information deficiencies, the reviews should give special attention to the collection of information concerning the types of best practice codes, the organizations that implement such codes, the compliance rates for current owners, and the effect of the codes of desired forest values. This information should be gathered to the extent it occurs at Federal, State, and local levels of government. In addition, a systematic review of private sector capability to carryout these activities should be initiated.

• *Responsibility for conducting reviews*. Assign responsibility for conducting reviews (on a continuous basis) of best management codes to a specific (current or new) administrative unit located within a Federal agency (Forest Service's State and Private Forestry or Research and Development), a college or university, or other nonprofit organization (for example, National Association of State Foresters, National Council of the Paper Industry for Air and Stream Improvement). This responsibility should be assigned to an organization that has a proven track record in addressing the complexities of developing, implementing, and applying best forest management codes to public and private forests.

• *Devote resources to reviews*. Invest in the review sufficient resources as are necessary to provide the type and quantity of information necessary to dramatically improve understanding of current abilities to develop and apply best forest management codes considered important to sustainable forestry.

Indicator Appropriateness

Indicator Definition

Unclear definition of the activities specified by Indicator 51 is troublesome, especially the elusiveness of the indicator's major descriptive words and phrases, namely like "encourages," and "best practice codes." These words or phrases supposedly embody an agreed to set of concepts and principles around which information gathering efforts can take place. Such is not always the case as is highlighted by the need to set forth definitions of "encourages" and "best practice codes" earlier in this review. The former is taken to mean conditions promoting the development of codes (leadership, organization, funding) and their application via one or more types of programs (for example, educational, technical assistance, fiscal incentives, tax incentives, regulatory), while the later is viewed as a set of management or harvesting standards (benchmarks, yardsticks, touchstones, measures, criteria) that foster sustainability of forests for various values.

Lacking a clear understanding and definition of Indicator 51 makes the exercise of determining legal capacity to ". . . encourage best practice codes for forest management . . . " difficult at best and the products of compilations of questionable value. Rigorous attention to definitions would set the necessary sideboards so that analysts could clearly focus attention on questions such as: Do we have the capacity to establish codes? And once established, how is their application programmatically encouraged? Compounding the definition problem is the reality that many researchers, analysts and administrators consider "codes" to be synonymous with legal regulations and regard "best practices" the same as best management practices (BMPs), forest practice guidelines or acceptable practices. Suggested here is that the use of the word "code" in the context of forest practices is very much out of date and quite misleading. A suggested and a more appropriate specification of the indicator would be ". . . *encourages the application of the best forestry practices considered suitable for specific forest conditions*."

Cross-Cutting Conditions

Crosscutting indicator issues involving Indicator 51 are frequent, particularly as they relate to concepts involving laws and values, public participation, funding and planning. Among the potentials for difficulty in this respect is Indicator 51's relationship to Indicators 38 (value of investment), 54 (planning and coordination), 57 (enforce laws, regulations and guidelines), 58

(investment in forests), 60 (information and data), 61 (forest inventories), 62 (foreign country monitoring), 63 (scientific understanding), 64 (value integrative methods), 65 (new technologies), and 66 (human intervention impacts). Such are obvious sources of crosscutting implications for Indicator 51. There may be other indicators that are also relevant in this respect.

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