

Supporting document for Indicators 63 and 66--A review of the capacity to conduct and apply research and development aimed at improving forest management and delivery of forest goods and services

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Introduction

A 2003 report on sustainable forest management in the United States (<http://www2.srs.fs.fed.us/2003/2003.htm>) is to include an estimate of the capacity to conduct and apply research and development aimed at improving forest management and delivery of forest goods and services. This capacity is measured in the report according to a suite of five indicators.

- Development of scientific understanding of forest ecosystem characteristics and functions
- Development of methodologies to measure and integrate environmental and social costs and benefits into markets and public policies, and to reflect forest related resource depletion or replenishment in national accounting systems
- New technologies and the capacity to assess the socioeconomic consequences associated with the introduction of new technologies
- Enhancement of ability to predict impacts of human intervention on forests
- Ability to predict impacts on forests of possible climate change

These indicators are part of the 67 indicators in the Santiago Declaration of the Montreal Process (<http://www.mpci.org>). The 2003 report will review available data on the 67 indicators, including these five. To supplement existing data for these five indicators, the USDA Forest Service worked with the National Association of Professional Forestry Schools and Colleges and the American Forest and Paper Association to administer a query to the Nation's forestry schools, Forest Service Research and Development, and forest industry. The survey instrument is in the appendix.

The 67 indicators in the Santiago Declaration are classed into 1 of 7 criteria for sustainable forest management:

- Conservation of biological diversity
- Maintenance of productive capacity of forest ecosystems
- Maintenance of forest ecosystem health and vitality
- Conservation and maintenance of soil and water resources
- Maintenance of forest contribution to global carbon cycles
- Maintenance and enhancement of long-term multiple socioeconomic benefits to meet the needs of societies
- Legal, institutional, and economic framework for forest conservation and sustainable management

The criteria are a means of organizing what we want to know about the condition of the Nation's forest ecosystems. In the query, we asked the various institutions to class their relevant teaching, research, and extension personnel according to these seven criteria as a means of describing the nature of current capacity to conduct and apply research and development aimed at improving forest management and delivery of forest goods and services.

Caveats

Research and Extension at Federal Institutions

The Federal sector is represented only by Forest Service research and development capacity in this survey. Other Federal agencies such as the U.S. Geological Survey and the Environmental Protection Agency do some natural resource related research that is not included in the study.

The Forest Service research and development capacity recorded in this survey includes only full-time equivalents (FTEs) in the Research and Development (R&D) Deputy area. No attempt was made to survey other Forest Service deputy areas. Although other deputy areas (State and Private Forestry and National Forest Systems) have little formal research capacity, they have significant capacity in outreach and extension activities.

Research and Extension at Academic Institutions

Although we did not receive data from 12 of the 68 institutions contacted, the nonrespondents are small in size and little significant capacity is missing from the survey of forestry-related academic institutions. However, a lot of research goes on through other kinds of colleges and universities that relates to natural resources. This research is obviously not captured by the survey.

From the data reported by academic institutions, it appears likely that extension activity is under reported. For example, some county extension agents associated with universities may not have been included in the reported data.

Results

Academic Institutions

At academic institutions, there were about 1,361 FTEs involved in teaching, research, and extension (table 1 and figures 1-1 and 1-2). About 14 percent of this effort was involved with extension work, and the remaining 86 percent was about equally divided between teaching and research. Biological diversity was the criterion with the most effort involved with the total for teaching, research, and extension (23 percent) followed by work in the

socioeconomics area (22 percent) and productive capacity (16 percent). The more specialized area of carbon cycles accounted for just 6 percent of the total effort at academic institutions. Biological diversity involves many disciplines, so it is perhaps not surprising that it accounted for the most effort. However, forest health also includes many disciplines but accounted for only 9 percent of the total. Work in soil and water, biological diversity, and productive capacity may overlap with work in ecosystem health, so classification by criterion may be somewhat arbitrary.

Forest Service Research and Development

Forest Service R&D reported a total of 701 FTEs involved in teaching, research, and extension (table 2 and figures 2-1 and 2-2). The vast majority (94 percent) of this effort was devoted to research, 6 percent to extension, and less than 1 percent (0.7 full-time equivalents) to teaching. Ecosystem health was the criterion receiving the most effort (24 percent of the total) followed closely by productive capacity (23 percent). As with academic institutions, effort on carbon cycles was relatively low at 6 percent of the total. The institutional framework received the lowest share of the teaching, research, and extension effort (4 percent).

Forest Industry

The forest industry response indicated a total of about 124 FTES (table 3 and figures 3-1 and 3-2). Of the total, 90 percent was devoted to research and 9 percent to extension. Less than 1 percent of the total forest industry effort was allocated to teaching. Not surprisingly, a large portion (60 percent) of the total effort was for productive capacity. Presumably, this work, at least in part, was to improve the efficiency of growing trees. Soil and water was the next most important criterion in terms of effort (17 percent). None of the remaining criteria accounted for more than 10 percent of the forest industry effort with the least effort going to the institutional framework.

Total

Altogether, respondents totaled 2,186 FTEs involved in teaching, research, and extension (table 4 and figures 4-1 and 4-2). Research accounted for 62 percent of the total effort; teaching, 27 percent; and extension, 11 percent. Work associated with biological diversity and productive capacity each accounted for about 21 percent of the total capacity, followed by capacity in the socioeconomics field. Capacity for work on carbon cycles amounted to the smallest component (6 percent).

Academic institutions accounted for 62 percent of the capacity to conduct and apply R&D aimed at improving forest management and delivery of forest goods and services (table 5 and figures 5-1 and 5-2).

APPENDIX

Results

Table 1. Master Table – FTEs at Academic Institutions by Teaching, Research, and Extension by Criterion

Year: 2001						
Academic Institutions	56					
	Teaching	Research	Extension	Subtotal	%	
Criteria 1: Biological Diversity	154.7	136.0	27.3	317.9	23.4	
Criteria 2: Productive Capacity	84.8	95.9	39.8	220.5	16.2	
Criteria 3: Ecosystem Health	49.9	53.1	24.6	127.6	9.4	
Criteria 4: Soil & Water	76.8	83.8	25.5	186.2	13.7	
Criteria 5: Carbon Cycles	27.9	46.7	2.5	77.1	5.7	
Criteria 6: Socioeconomics	130.5	114.4	48.3	293.2	21.6	
Criteria 7: Institutional Framework	71.5	45.1	21.6	138.2	10.2	
Total FTEs	596.0	574.9	189.7	1360.6		
Percentage (%)	43.8	42.3	13.9			
Date: 1 March 2002						

Figure 1-1.

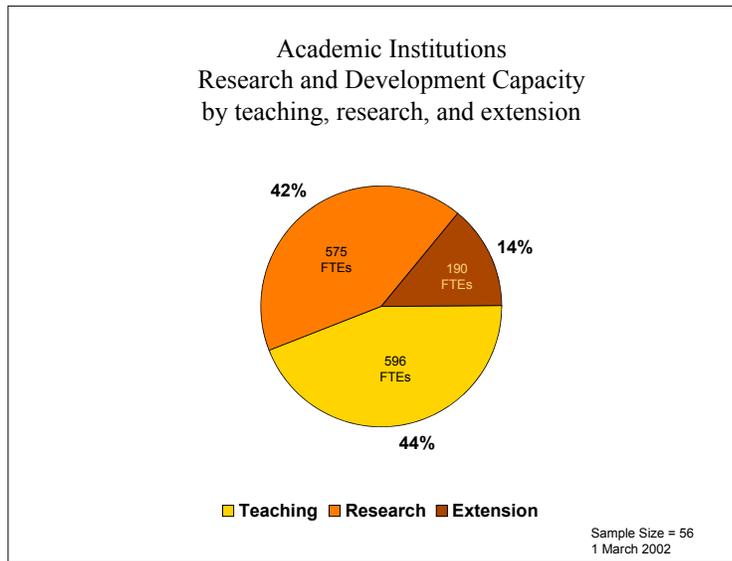


Figure 1-2.

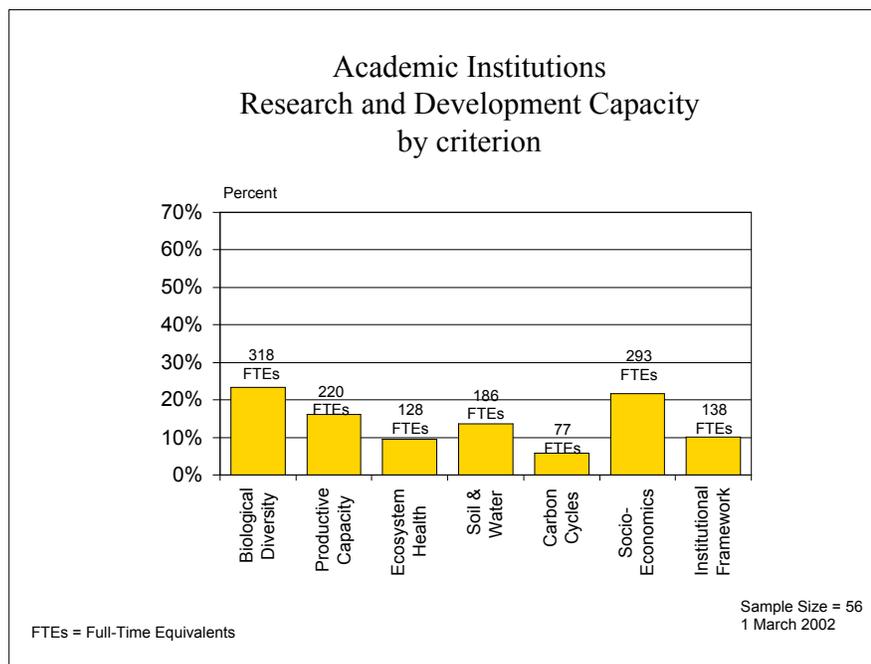


Table 2. Master Table–FTEs for Forest Service R&D by Teaching, Research, and Extension by Criterion

Year: 2001					
Forest Service	8				
Research & Development (R & D)					
	Teaching	Research	Extension	Subtotal	%
Criteria 1: Biological Diversity	0.2	112.3	9.0	121.5	17.3
Criteria 2: Productive Capacity	0.0	158.1	3.2	161.3	23.0
Criteria 3: Ecosystem Health	0.0	156.0	9.5	165.5	23.6
Criteria 4: Soil & Water	0.2	85.8	6.4	92.4	13.2
Criteria 5: Carbon Cycles	0.3	41.4	1.1	42.8	6.1
Criteria 6: Socioeconomics	0.0	79.8	10.2	90.0	12.8
Criteria 7: Institutional Framework	0.0	24.7	2.7	27.4	3.9
Total FTEs	0.7	658.1	42.1	700.9	
Percentage (%)	0.1	93.9	6.0		
Date: 1 March 2002					

Figure 2-1.

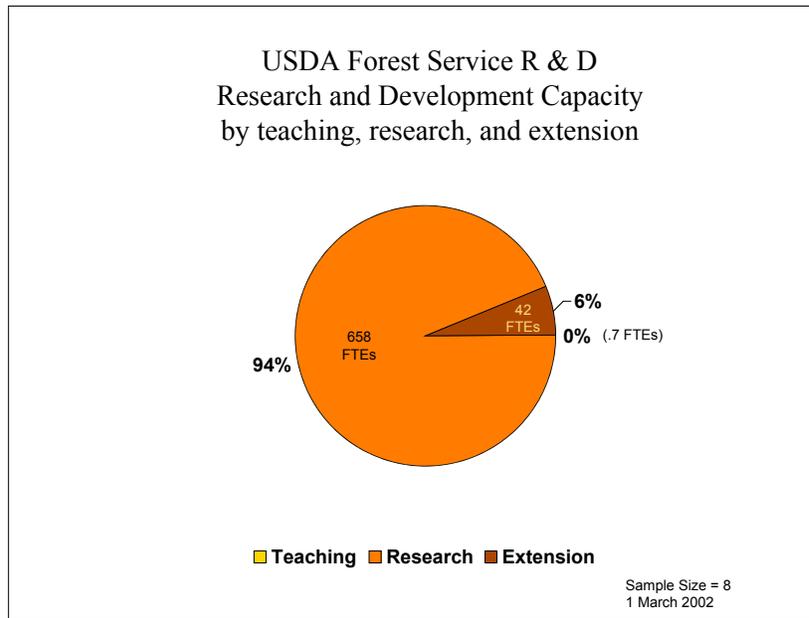


Figure 2-2.

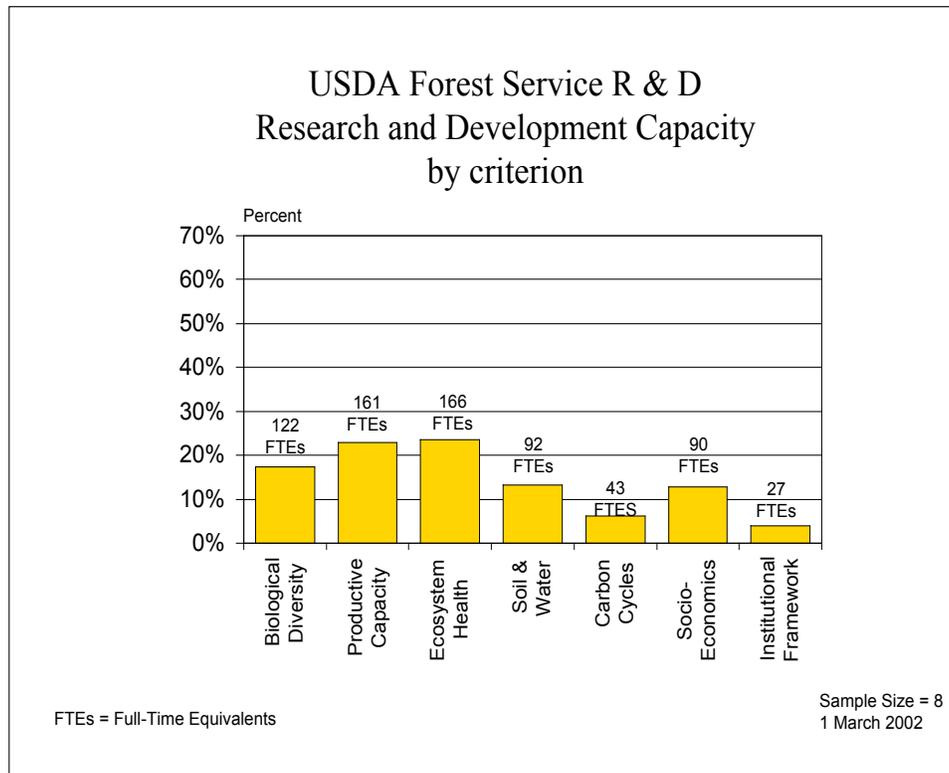


Table 3. Master Table – FTEs for Forest Industry by Teaching, Research, and Extension by Criterion

Year: 2001					
Forest Industry	6				
	Teaching	Research	Extension	Subtotal	%
Criteria 1: Biological Diversity	0.0	9.8	0.5	10.3	8.3
Criteria 2: Productive Capacity	0.0	67.0	8.0	75.0	60.4
Criteria 3: Ecosystem Health	0.0	4.8	0.6	5.4	4.3
Criteria 4: Soil & Water	0.0	19.7	1.8	21.5	17.3
Criteria 5: Carbon Cycles	0.0	2.5	0.0	2.5	2.0
Criteria 6: Socio-Economics	1.0	8.5	0.0	9.5	7.6
Criteria 7: Institutional Framework	0.0	0.1	0.0	0.1	0.0
Total FTEs	1.0	112.3	10.8	124.1	
Percentage (%)	0.8	90.5	8.7		
Date: 1 March 2002					

Figure 3-1.

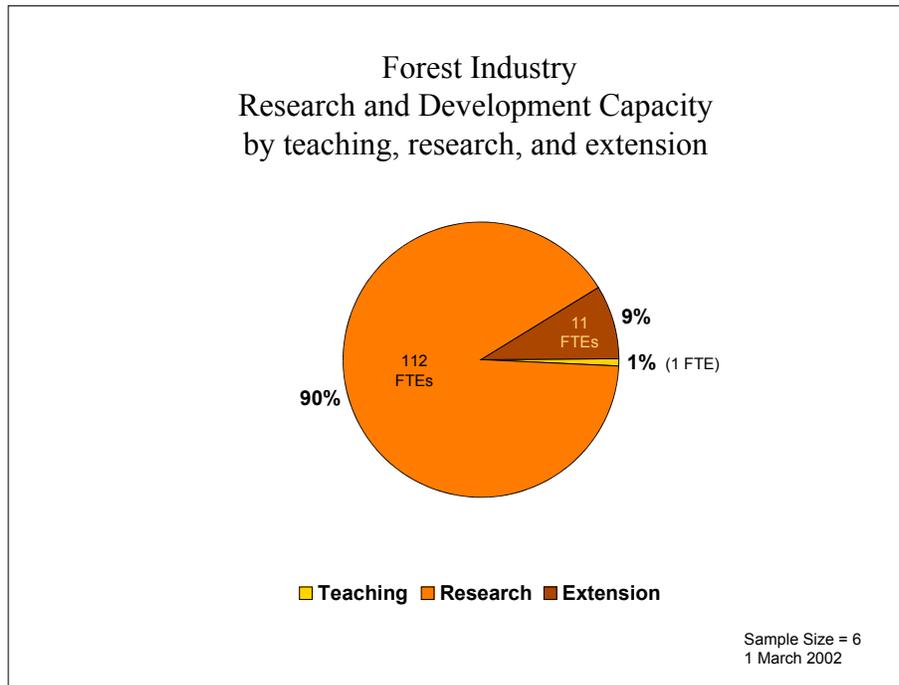


Figure 3-2.

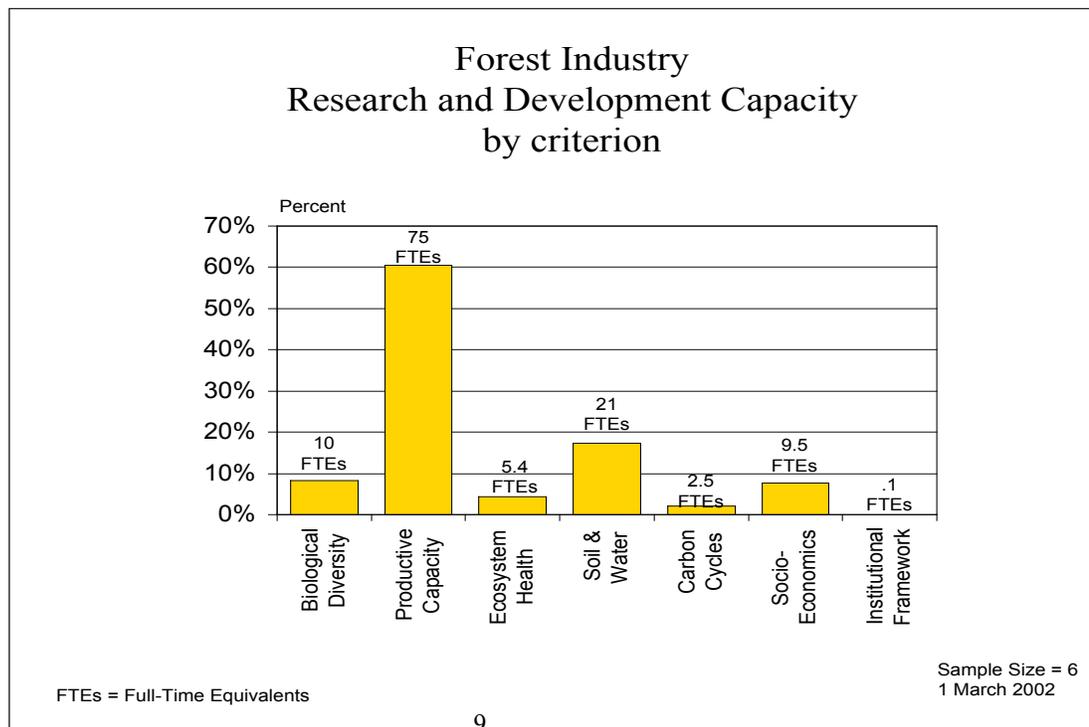


Table 4. Master Table – Total FTEs for Academic Institutions, Forest Service R&D, and Forest Industry by Teaching, Research, and Extension by Criterion

Year: 2001					
Grand Total	70				
	Teaching	Research	Extension	Subtotal	%
Criteria 1: Biological Diversity	154.9	258.0	36.8	449.7	20.6
Criteria 2: Productive Capacity	84.8	321.1	50.9	456.7	20.9
Criteria 3: Ecosystem Health	49.9	213.9	34.7	298.6	13.7
Criteria 4: Soil & Water	77.0	189.2	33.7	300.0	13.7
Criteria 5: Carbon Cycles	28.2	90.6	3.6	122.3	5.6
Criteria 6: Socio-Economics	131.4	202.7	58.6	392.7	18.0
Criteria 7: Institutional Framework	71.5	69.9	24.3	165.7	7.6
Total FTEs	597.7	1345.3	242.6	2185.6	
Percentage (%)	27.3	61.6	11.1		
Date: 1 March 2002					

Figure 4-1.

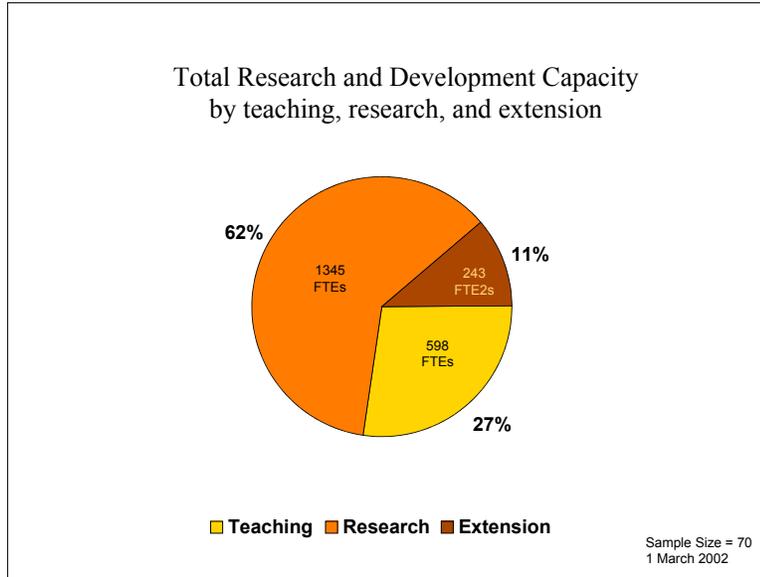


Figure 4-2.

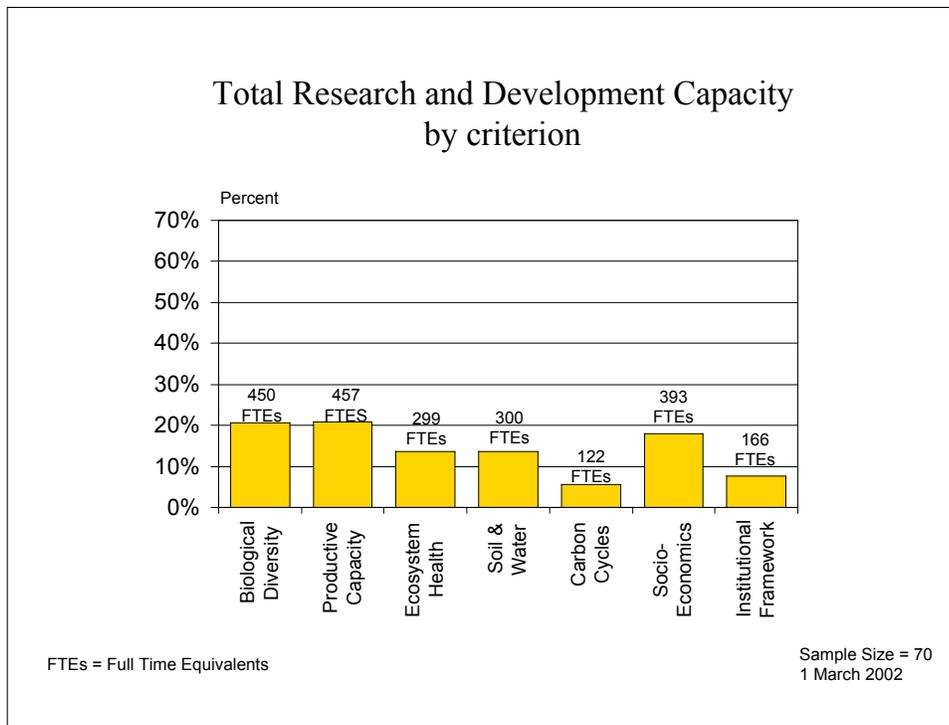


Table 5. Master Table – R&D Capacity by Academic Institutions, Forest Service R&D, and Forest Industry by Criterion

Year: 2001						
Grand Total	56	8	6	70		
		USDA				
	Academic Institutions	Forest Service R & D	Forest Industry	Subtotal	%	
Criteria 1: Biological Diversity	317.9	121.5	10.3	449.7	20.6	
Criteria 2: Productive Capacity	220.5	161.3	75.0	456.7	20.9	
Criteria 3: Ecosystem Health	127.6	165.5	5.4	298.6	13.7	
Criteria 4: Soil & Water	186.2	92.4	21.5	300.0	13.7	
Criteria 5: Carbon Cycles	77.1	42.8	2.5	122.3	5.6	
Criteria 6: Socio-Economics	293.2	90.0	9.5	392.7	18.0	
Criteria 7: Institutional Framework	138.2	27.4	0.1	165.7	7.6	
Total FTEs	1360.6	700.9	124.1	2185.6		
Percentage (%)	62.3	32.1	5.7			
Date: 1 March 2002						

Figure 5-1.

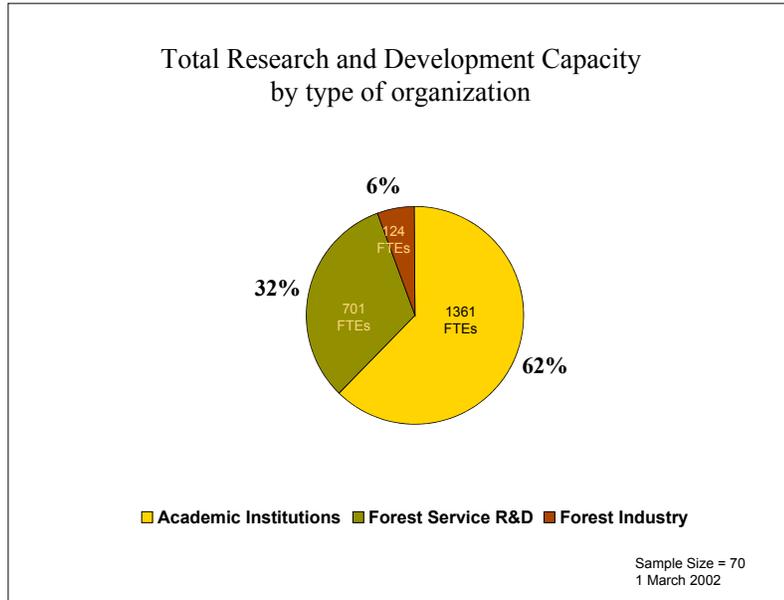
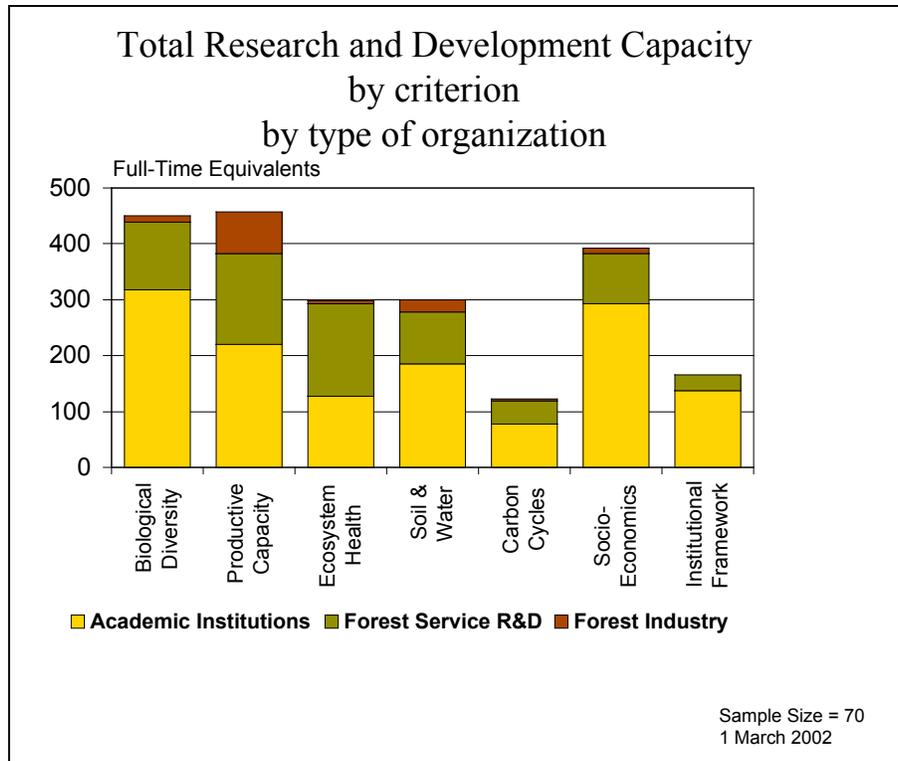


Figure 5-2.



Survey Instrument

Summary of Forestry Faculty Full-Time Equivalents (FTE's) by Sustainable Forest Management Criterion

Academic Institution: _____

Sustainable Forest Management Criteria	Teaching	Research	Extension	Subtotal
1. Conservation of Biological Diversity – ecosystem, species, and genetic diversity				
2. Maintenance of Productive Capacity of Forest Ecosystems – growing stock, net removals				
3. Maintenance of Forest Ecosystem Health and Vitality – insects, disease, fire, air pollution				
4. Conservation and Maintenance of Soil and water Resources – erosion, watershed function, soil chemistry, water quality, toxins				
5. Maintenance of Forest Contribution to Global Carbon Cycles – biomass, carbon budget, climate change				
6. Maintenance and Enhancement of Long-Term Multiple Socioeconomic Benefits to Meet the Needs of Societies – value of wood & non-wood products, recreation, cultural values, jobs				
7. Legal, Institutional and Economic Framework for Forest Conservation and Sustainable Management – laws, organizations, public involvement & education, enforcement, research				
TOTAL FTE's				

Instructions:

- One “full-time equivalent” is represented by either a 9 or 12 month faculty appointment.
- Include any faculty member paid by your institution that has full-time assistant, associate, or full professor appointment, whether from internal or external funds.
- Do not include adjunct professors, retirees or other part-time persons of professional rank.
- FTE's may be assigned in full or fractional faculty years to each of the cells, such that the total represents total number of full-time faculty at your institution.

Completed By: _____ **Date:** _____