

Indicator 38—Value of Investment, Including Investment in Forest Growing, Forest Health Management, Planted Forests, Wood Processing, Recreation, and Tourism

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The purpose of this report is to provide information on the rationale and data provided for Indicator 38 for the U.S. *National Report on Sustainable Forests—2003*. Information on the rationale for the Indicator and recommended data to be developed are taken from the report of the Technical Advisory Committee of the Montreal Process¹ and from reports from the technical workshops of the U.S. Roundtable on Sustainable Forests Criteria and Indicators. Data that have been developed are displayed and sources are provided. The data are summarized in the *National Report on Sustainable Forests—2003*.²

A. Rationale for use of the Indicator

1. Rationale from the Technical Advisory Committee (TAC)

This indicator measures the short- and long-term commitment of societies to forest management, processing of forest products, and the use of forests for environmental, economic, and social purposes.

Approaches to measurement—Useful data might include the following:

- Plantation establishment and maintenance
- Silviculture
- Forest management activities related to protection and conservation objectives
- Forests managed for recreation and conservation, e.g., parks
- Plantation and natural forest harvesting and transport equipment
- Recreation and tourism facilities

¹ See http://www.mpci.org/tac/mexico/tn1-6_e.html

² See <http://www.fs.fed.us/research/sustain/>

- Wood processing
- Non-wood products
- Other forest management infrastructure

This indicator may be measured by analysis of current and historical investment data using standard commercial accounting methodologies. Data for this purpose may be available from government and private sector sources. It may be useful to differentiate between capital investment and operating costs and between sub-sectors such as wood production in natural forest and plantation, conservation forests, and non-wood products and uses. Countries may wish to report domestic and foreign sources of investment separately.

2. Interpretation of the indicator as proposed by the TAC

Increasing investment may result in multiple benefits that can be documented with a number of other indicators. Investment trends should be considered in the context of forest management objectives. For example, growth in expenditure in forest recreation and tourism facilities may reflect an emphasis on forest management for recreation.

3. U.S. Clarification from the Roundtable Workshops

- The TAC Rationale is not explicitly correct. A suggested rewrite of the indicator would be that it “reflects a variety of influences and mandates to forest management...”
- CTC 6 (the Roundtable review group) assumed that the appropriate measurement of this indicator is capital investment.
- In the TAC Approaches to Measurement, some examples are not normally considered as capital investments (e.g., periodic operating costs related to forest management).
- Investment data for Non-Timber Forest Products (NTFP) should be comparable to those used for timber products.
- There are no national forest management objectives in the United States.

The variables from the First Approximation Report (FAR) are an appropriate starting point for this indicator:

- Forest investment
 - Investment in forest establishment: Annual tree planting reports
 - Net investment: Change in total stock of forests
- Investment in wood processing sectors—Data bases: Standard Industry Codes (SIC) 24 and 26; detailed investment by industry
- Investments in recreation and tourism (e.g., private sector and government spending on infrastructure including facilities, public expenditures on eco-tourism and ski resorts, hotels/accommodations, campgrounds including recreational travel vehicle (RTV) sites, and private and public investments on restoration)—Data base: Government agencies

The investment in NTFPs would be captured primarily by recreation/tourism and other activities.

B. Data provided to quantify the indicator

Limited indicators of investment were developed for three areas: (1) forests, (2) wood processing, and (3) recreation and tourism. These areas are discussed separately in the following text.

(1) Forest investment—Direct investment in forest establishment and regeneration is measured. In addition, we measure changes in the total stock of forests to estimate net investment. This measures the contribution of direct investment and growth, net of activities that reduce forest stocks such as land use conversions, and timber harvests.

(a) **Investment in forest establishment** is tracked and reported by the USDA Forest Service in annual tree planting reports (e.g. Moulton et al. 1995, Moulton 2000). We report the area of tree planting for the United States from 1930 through 1998. The area of forest planting has grown substantially since the 1930s, with peaks occurring in conjunction with special Federal programs (Table 38-1).

In 1997, total planted forest area in the East (North and South Regions) comprised 40.1 million forest acres of a total 384.4 million forest acres or 10%. Of the 40.1 million planted acres, 30.0 million (3/4) consist of Southern Pine. Planted forest acres in the West (Rocky Mountain and Pacific Coast Regions) comprised 13.6 million acres of a total 240.0 million forest acres or 6% (Background Report for Indicator 12; Smith et al. 2001).

Short rotation woody crops are a special type of plantation that have been planted just recently. In 1996, about 118,000 acres of short rotation woody crops planted in the United States were operated by forest products industry. An additional 11,000 acres were run by Federal research programs in the United States or were located in Eastern Canada (Wright and Berg 1996).

(b) **Net investment**—The net value of investment is indicated by change in the total stock of forests. One crude approximation of net investment is simply the change in forest inventories over time. However, inventory alone does not capture changes productivity and value. To capture these effects—i.e., changes in forest quality as well as quantity—a value-weighted index of total forest inventory was constructed for each of the four large regions (North, South, Pacific Coast, and Rocky Mountain as defined by USDA Forest Service RPA Assessment) and for the United States as a whole. We call this index a forest capital index.

The value index of forest inventory weights the contribution of hardwood, softwood, sawtimber, and non-sawtimber components of inventory using their respective stumpage prices (sawlog prices are applied to sawtimber and pulpwood prices are applied to non-sawtimber). Components are aggregated using a standard Divisia (Tornqvist) index approach to measuring capital stocks of different types and ages (see Wear 1994 and 2002 for details). The result is an index of forest capital that was set at 1.0 for each region in 1952.

Price and volume data are required for each component of the inventory for each year evaluated. Volume data were taken from Smith et al. (2001). Prices were taken from Haynes et al. (2003, table 15). Data were not available on an annual basis but were available for the RPA benchmark

years. We report the volumes of growing stock and the forest capital indices by region and for the United States as a whole for 1952, 1962, 1977, 1987, 1992, and 1997.

Table 38-2 shows growing stock volumes and forest capital indices in the United States. Total U.S. softwood inventories were relatively stable between 1952 and 1997. However, softwood inventories in the Pacific Coast Region declined while they increased in the East and the South. Hardwood inventories expanded strongly in the North and South, and in the United States as a whole. Total inventory grew accordingly, reflecting a strong shift toward hardwood composition.

The forest capital index, which accounts for changes in both the quantity and quality of the inventory, shows growth in value between 1952 and 1997, but at a lowered rate between 1987 and 1997 (Table 38-2). Strong declines in forest capital in the Pacific Coast region were offset by capital accumulation in the South and the North between 1952 and 1987. Since 1987, however, forest capital has accumulated in all regions of the United States.

Taken together, these data indicate that investment efforts in the forest sector have been and remain strong in the United States (evidenced by a planting rate of about 2.5 million acres per year). However, net investment measures indicate that investment between 1987 and 1997 was largely replacement investment; i.e., replacement of harvested or otherwise depleted forest stocks. Nevertheless, the value of forest inventories grew at a rate of 0.6% to 0.7%/year.

(2) Investment in wood processing sectors

Investment in wood and paper processing is measured by new capital investment in the following industry sectors:

Through 1996

- Lumber and wood products (SIC 24), which includes logging
- Paper and allied products (SIC 26)
- Wood furniture (parts of SIC 24)

Beginning in 1997

- Logging (NAICS 113)
- Wood products (NAICS 321)
- Paper products (NAICS 322)
- Wood furniture (parts of NAICS 337)

The groupings of industries changed in 1997 from SIC codes to NAICS codes, so similar groupings are not strictly comparable before and after 1997. For example, NAICS 321 and NAICS 113 together contain about the same industries as SIC 24 but they are not an exact match, so capital expenditures are not strictly comparable between the groups before and after 1997.

New capital expenditures in lumber and wood products and in paper and allied products increased in real terms from 1962 to 1996—from \$0.9 and \$2.0 billion in 1962 to \$1.6 and \$6.2 billion in 1996 (Table 38-3).

Investment as a percentage of the value of shipments decreased for lumber and wood products industries from 2.5% to 1.5% between 1992 and 1996. This percentage for paper and allied products has varied around 4% (Table 38-3 values divided by value of shipments in Table 29-8 from the background paper for Indicator 29).

The extent of investment in new capital in 1997 is shown by region and industry group in Tables 38-4 and 38-5. Total investment in all industries was highest in the South followed by the North, Pacific Coast, and Rocky Mountain regions. Investment per acre of timberland was almost the same for the South and North. Investment per acre was about 30% lower in the Pacific Coast region and about 80% lower in the Rocky Mountain region.

The effect of investment on industry assets is indicated by the change in assets over time. Data are shown on the gross value of depreciable assets over time by industry (Table 38-6).

U.S. industry invests in U.S. plants and may also invest in plants overseas. The data in Table 38-7 show the capital investment in foreign affiliates of U.S. companies by industry group. Not enough data have been developed to indicate trends in overseas investment.

(3) Investment in recreation and tourism

Investment in recreation facilities includes expenditures by the USDA Forest Service (\$40 million in 2001) and the USDI National Park Service (\$367 million in 2002) for both forest and non-forest areas.

The amount of deferred maintenance for Forest Service recreation facilities was \$291 million in 2002 and has been increasing. All deferred maintenance, except roads and bridges, was \$1.5 billion for the Forest Service and \$2.3 billion for the National Park Service (USDA Forest Service 2002, USDI National Park Service 2002). Deferred maintenance is an imperfect indicator of need for capital improvement since it is based on standards for site capacity and quality rather than what is particularly needed to meet demand for capacity.

Information on State, county, and local, and private business investment in the forest-based portion of outdoor recreation was not developed. Further effort could develop such investment information.

C. Interpretation of data relative to rationale from TAC

Forest investment—Increases in the forest capital index would indicate that net investment has been positive (i.e., the effects of direct investment and growth have exceeded the effects of forest land conversions and timber harvesting). If this value is stable over time, then investment is maintaining the stock of forests, though composition could be changing. A declining value index would indicate net disinvestment in the forest sector.

Investment in wood processing sectors—An increase in industry assets would indicate that net investment has been positive in an industry; i.e., investments have exceeded depreciation of assets. As Table 38-6 indicates, assets in lumber and wood products and wood furniture

industries were roughly stable between 1977 and 1992, whereas assets for the paper and allied products industries increased by a factor of 2.6.

Investment in recreation and tourism—The data on National Park Service and Forest Service deferred maintenance are an imperfect indicator of unmet needs for investment in recreation infrastructure on selected Federal lands, some of which provide forest-based recreation. It is imperfect because it is estimated based on standards for site capacity and quality rather than on what is particularly needed to meet demand for capacity.

D. Limitations of data presented

Forest Investment—Tree planting is only one type of forest management activity. Timber stand improvement activities also are direct investments in forests and are not captured by available data sets.

Measures of inventories and of forest capital provide an evaluation of investment relative to timber production alone. While growing stock may also proxy for growth in the provision of other benefits, this is an incomplete assessment of the accrual of all forest values.

Investment in wood processing sectors—Data on new capital investment are primarily, but not entirely, investment in assets. There is also a smaller amount of investment in used capital equipment. Investments are offset by retirements of equipment. The net effect is the degree of change in assets, as indicated in Table 38-6.

In addition to a change in the industry coding system in 1997 from SIC to NAICS, the measurement of capital assets changed from “gross book value of depreciable assets” to “gross book value of total assets.” The latter measure is larger. Consequently, changes in assets after 1997 are not strictly comparable to changes before 1997.

Investment in recreation and tourism—Data on investment in recreation infrastructure and maintenance backlog for the National Park Service and to a lesser extent the Forest Service include investments and backlog for some non-forest-based recreation.

E. Options available for remedy if current data are not adequate to measure the indicator

Forest investment—Fine-scale assessment of plot data is possible but data availability differs between regions. More data are available for the South than for other regions.

Investment in wood processing sectors—More detailed data on investments by industry may be prepared with additional research.

Investment in recreation and tourism—With additional research, data could be developed on investment in forest-based recreation by State, county, and local governments and by private businesses.

III. Cross-cutting issues/relationships with other indicators

The potential for new capital investments is influenced in part by the level of research (Indicator 39) that develops innovations. The level of investment is determined in part by changes in the level of consumption of forest products, Indicator 31. The degree of investment is influenced by the profitability of firms as indicated in Indicator 29. The level of new capital investments determines in part the degree of adoption of innovations identified in Indicator 40. Investment in forest-based recreation is influenced by trends in demand for recreation, Indicator 37.

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Table 38.1. Tree planting in the United States, 1930–1998

Year	Area (acres)
1930	138,970
1935	292,033
1940	519,051
1945	138,944
1950	497,507
1955	812,588
1960	2,137,460
1965	1,325,063
1970	1,599,819
1975	1,930,468
1976	1,892,309
1977	1,978,170
1978	2,088,568
1979	2,061,373
1980	2,266,956
1981	2,351,389
1982	2,374,794
1983	2,453,386
1984	2,553,029
1985	2,695,423
1986	2,753,176
1987	3,033,159
1988	3,394,478
1989	3,021,948
1990	2,862,207
1991	2,558,025
1992	2,544,862
1993	2,419,691
1994	2,477,479
1995	2,421,861
1996	2,406,700
1997	2,636,102
1998	2,624,681

Sources: Moulton et al. 1995,
Moulton 2000.

Table 38.2. Volume and aggregate value index of forest inventories in United States, by region, for 1952, 1962, 1977, 1987, 1992, and 1997

Softwood growing stock (billion cubic feet)^a					
Year	North	South	Rockies	Pacific	U.S. Total
1952	27.1	60.5	87.5	256.7	431.8
1962	33.7	75.1	93.2	247.8	449.8
1977	43.9	101.2	95.1	226.8	467.0
1987	47.6	105.6	100.3	214.05	467.6
1992	51	102.9	101.5	214.1	469.5
1997	49.4	104.8	114.7	215.2	484.1

Hardwood growing stock (billion cubic feet)^a					
Year	North	South	Rockies	Pacific	U.S. Total
1952	76.7	88.0	5.1	14.3	184.1
1962	94.6	99.0	5.6	16.6	215.8
1977	119.2	122.2	6.1	18.6	266.1
1987	142.4	139.0	7.7	24.9	314.0
1992	156.1	147.7	8.7	24.8	337.3
1997	164.9	151.5	10.6	24.8	351.8

Total volume of growing stock (billion cubic feet)^a					
Year	North	South	Rockies	Pacific	Total
1952	103.8	148.5	92.6	271.0	615.9
1962	128.3	174.1	98.8	264.4	665.6
1977	163.1	223.4	101.2	245.4	733.1
1987	190.0	244.6	108.0	239.0	781.6
1992	207.1	250.6	110.2	238.9	806.8
1997	214.3	256.3	125.3	240.0	835.9

Forest capital index (1952 = 1.00)^b					
Year	North	South	Rockies	Pacific	U.S. Total
1952	1.000	1.000	1.000	1.000	1.000
1962	1.254	1.208	1.048	0.944	1.109
1977	1.580	1.571	1.045	0.844	1.213
1987	1.783	1.656	1.091	0.818	1.256
1992	1.938	1.643	1.103	0.838	1.292
1997	1.989	1.681	1.267	0.864	1.337

Annual rates of change in forest capital^c					
Years	North	South	Rockies	Pacific	Total
1952–1962	0.023	0.019	0.005	-0.006	0.010
1962–1977	0.016	0.018	0.000	-0.007	0.006
1977–1987	0.012	0.005	0.004	-0.003	0.004
1987–1991	0.017	-0.002	0.002	0.005	0.006
1991–1997	0.005	0.005	0.028	0.006	0.007

^a Smith et al. 2001.

^b Timber values from Haynes 2003 and timber volumes from Smith et al. 2001.

^c Annual rates of change from forest capital index.

Table 38-3. New capital expenditures for selected forest products industries by SIC (1954–1996) and NAICS (1997–2000)

Year	New capital expenditure (millions 1996 dollars)										
	Lumber & wood products	Paper & allied products	Wood furniture parts of	Total SIC 24	Total SIC 24, 25 + 26	Logging NAICS 113	Wood products NAICS 321	Paper products NAICS 322	Wood furniture parts of NAICS 337	Total logging, wood, paper NAICS 113, 321, 322	Total logging, wood, paper, wood furn. NAICS 113, 321, 322
	SIC 24	SIC 26	SIC 25	+ 26	24, 25 + 26	113	321	322	NAICS 337	321, 322	321, 322
1954	852	—	—	—	—	—	—	—	—	—	—
1955	836	—	—	—	—	—	—	—	—	—	—
1956	1131	—	—	—	—	—	—	—	—	—	—
1957	696	—	—	—	—	—	—	—	—	—	—
1958	957	1927	—	2884	—	—	—	—	—	—	—
1959	961	1996	—	2957	—	—	—	—	—	—	—
1960	1094	1958	—	3051	—	—	—	—	—	—	—
1961	777	2098	—	2875	—	—	—	—	—	—	—
1962	868	1979	—	2847	—	—	—	—	—	—	—
1963	1205	1910	—	3115	—	—	—	—	—	—	—
1964	1033	2523	—	3556	—	—	—	—	—	—	—
1965	1290	3476	—	4765	—	—	—	—	—	—	—
1966	1226	3929	—	5155	—	—	—	—	—	—	—
1967	929	4451	—	5380	—	—	—	—	—	—	—
1968	1069	2912	—	3981	—	—	—	—	—	—	—
1969	1257	3184	—	4440	—	—	—	—	—	—	—
1970	964	3034	—	3998	—	—	—	—	—	—	—
1971	1308	2474	—	3782	—	—	—	—	—	—	—
1972	1529	2643	364	4172	4536	—	—	—	—	—	—
1973	1675	2970	420	4645	5065	—	—	—	—	—	—
1974	2348	4254	477	6602	7078	—	—	—	—	—	—
1975	2124	4894	254	7018	7272	—	—	—	—	—	—
1976	1886	5377	282	7263	7545	—	—	—	—	—	—
1977	2156	5257	334	7413	7747	—	—	—	—	—	—
1978	2348	5429	438	7777	8214	—	—	—	—	—	—
1979	2560	6091	447	8651	9098	—	—	—	—	—	—
1980	2185	6461	398	8647	9044	—	—	—	—	—	—
1981	1653	6302	339	7955	8294	—	—	—	—	—	—
1982	1033	5738	337	6771	7109	—	—	—	—	—	—
1983	923	5346	314	6269	6583	—	—	—	—	—	—
1984	1295	5169	369	6465	6834	—	—	—	—	—	—
1985	1137	5798	413	6935	7348	—	—	—	—	—	—
1986	1110	5348	391	6458	6849	—	—	—	—	—	—
1987	1200	4851	445	6051	6497	—	—	—	—	—	—
1988	1069	6391	492	7460	7952	—	—	—	—	—	—
1989	1169	9111	495	10280	10775	—	—	—	—	—	—
1990	1176	9603	383	10780	11163	—	—	—	—	—	—
1991	921	7563	310	8484	8793	—	—	—	—	—	—
1992	964	6233	351	7197	7548	—	—	—	—	—	—
1993	1031	5236	384	6267	6651	—	—	—	—	—	—
1994	1281	5029	402	6310	6712	—	—	—	—	—	—
1995	1554	5402	429	6956	7386	—	—	—	—	—	—
1996	1610	6200	449	7810	8259	—	—	—	—	—	—
1997	—	—	—	—	—	766	2814	8431	693	12011	12704
1998	—	—	—	—	—	NA	2712	8282	701	NA	NA
1999	—	—	—	—	—	NA	2971	6766	865	NA	NA
2000	—	—	—	—	—	NA	2881	7567	808	NA	NA

Note: NA indicates not available. Sources: USDC BOC 1981, 1985, 1990, 1995, 1999, 2001; deflated by the GDP price deflator. SIC 25 includes SIC 2541 and SIC 2542.

NAICS 337 includes four categories: Wood Office furniture (337211), Custom Architectural Woodwork & Millwork (337212), Wood Kitchen Cabinet & Counter Top (337110), and Nonupholstered Wood Household Furniture (337122).

Table 38-4. Total capital expenditures for selected forest products industries for 1997 by RPA region^a

Industry (NAICS code)	Capital expenditure (thousand dollars)					Total
	North	South	Rocky Mountains	Pacific Coast	Not disclosed by State	
Logging (113)	112,878	394,068	41,694	227,552	4,409	780,601
Wood products (321)	807,230	1,378,977	125,115	557,417	495	2,869,234
Paper products (322)	3,500,183	4,201,151	182,627	696,124	15,048	8,595,133
Wood furniture ^b (parts of 377)	296,330	243,495	37,767	68,155	60,915	706,662
Total	4,716,621	6,217,691	387,203	1,549,248	80,867	12,951,630

^aSource: USDC BOC 2001, Table 2.

^bNAICS 337 consists of three categories: Wood Office furniture (337211), Custom Architectural Woodwork & Millwork (337212), Wood Kitchen Cabinet & Counter Top (337110), and Nonupholstered Wood Household Furniture (337122).

Table 38-5 Capital expenditures per acre of timberland for selected forest products industries for 1997 by RPA region^a

Industry (NAICS code)	Capital expenditure (\$/acre)					
	North	South	Rocky Mountains	Pacific Coast	Not disclosed by State	U.S average
Logging (113)	0.71	1.96	0.59	3.15	0.01	1.55
Wood products (321)	5.06	6.86	1.76	7.72	0.00	5.70
Paper products (322)	21.96	20.90	2.57	9.64	0.03	17.07
Wood furniture ^b (parts of 377)	1.86	1.21	0.53	0.94	0.12	1.40
Total	29.59	30.93	5.45	21.46	0.16	25.72

^aSource: USDC BOC 2001, Table 2.

^bNAICS 337 consists of three categories: Wood Office furniture (337211), Custom Architectural Woodwork & Millwork (337212), Wood Kitchen Cabinet & Counter Top (337110), and Nonupholstered Wood Household Furniture (337122).

Table 38-6. Year-end gross book value of depreciable assets for 1977–1992 and total assets for 1997 for selected forest products industries (1996 dollars)

Value (1996 dollars)

Year	Lumber and wood products (SIC 24)	Paper and allied products (SIC 26)	Wood furniture (parts of SIC 25)	Logging and wood products (NAICS 113, 321)	Paper products (NAICS 322)	Wood furniture (parts of NAICS 337)
1977	15,272	35,461	4,147	—	—	—
1982	14,587	38,887	3,007	—	—	—
1987		68,260	4,532	—	—	—
1992	14,602	93,320	4,260	—	—	—
1997	—	—	—	37,720	136,713	7,612

Sources: USDC BOC 1981, 1985, 1990, 1995, 1999.

SIC 25 includes SIC 2541 and 2542.

Note: Capital assets values deflated using the GDP deflator.

Table 38-7. Capital investment in foreign affiliates of U.S. companies overseas, 1995–1999

Capital investment (million 1996 dollars)

Year	Lumber and wood products (SIC 24)	Paper and Allied products (SIC 26)	Wood products (NAICS 321)	Paper products (NAICS 322)
1995	296	1707		
1996	315	1254		
1997			262	1392
1998			656	1573
1999			247	1510

Source: USDC BEA annual. Deflated using the GDP deflator.