

Criterion 6, Indicator 41: Rates of Return on Investment

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The purpose of this report is to provide information on the rationale and data provided for Indicator 41 in 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 of the U.S. Roundtable on Sustainable Forests Criteria and Indicators Technical Workshops. Data that have been developed are displayed and sources are provided. A summary of the data is contained in the *National Report on Sustainable Forests—2003*.²

A. Rationale for use of the indicator

1. Rationale from the Technical Advisory Committee (TAC)

The internal rate of return on investment is an indicator of the financial attractiveness of the forest sector to capital.

Approaches to measurement—Relevant data might include rates of return on investment for forest sector activities, such as forest land investment, saw and paper mills, and ecotourism, or emerging opportunities such as bio-prospecting or carbon sequestration. This indicator has potential for use in plantations and natural forests although measurement may be more complex for natural and multiple-use forests. Information could be obtained from government and private sector sources.

2. Interpretation of the indicator as proposed by the TAC

Rates of return must be competitive to attract investment in the forest sector. Interpretation is related to other indicators, including Indicators 6.3.a, 6.3.b, and 6.3.c (Indicators 38, 39, 40). Access to relevant data may be difficult, especially from some private managers, if such information is proprietary.

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

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

3. U.S. Clarification from the Roundtable Workshops

To ascertain the relative attractiveness of investment in the forest sector requires fine-scale analysis of specific forestry activities. Aggregate indicators in the forest sector may fail to accomplish this because they reflect long-term rates of return across a sector, thus averaging the returns from active and relatively passive forest investors into a single rate of return. For this reason, the indicator may provide an overall assessment of trends in investment returns and differences in returns between regions, but not an accounting of the attractiveness of investment in the forest sector.

B. Data provided to quantify the indicator

Ideally, data would be provided for local areas comparing rate of return for holding land in forests (e.g., timber, nonwood products, recreation), to rate of return from other uses (agriculture, housing, business development). In addition, data would be provided on rate of return for wood and non-wood products businesses, recreation, and other businesses compared to rate of return for their local, national, and international competitors to discern how readily the businesses may provide jobs in local areas. Such detailed data are not currently available. We present data that explains, in general terms, rate of return to forestland for timber values by region. These data, along with data on return for other values such as recreation (both monetary and intangible), could be used to evaluate, in general, where returns are highest to support retaining land in forest.

Estimating rates of return for timber values requires measures of total returns from and asset values of the resources dedicated to forest production. Resources dedicated to timber production can be estimated by summing up the asset values of all forests within a region. Calculating asset values requires estimates of the quantity and asset prices of forests of various types. The preferred method for valuing forest capital is to use estimates of harvest age, anticipated revenues, and the value of subsequent rotations to calculate rents for forests of different types (Wear 1993). However, data required for this approach are not available except for the U.S. South. An alternative approach is to use stumpage prices and inventory volumes to provide a rough estimate of forest asset value. We apply this method to the four major regions of the U.S.

Asset values were calculated by multiplying forest inventory volumes by stumpage prices for four components of the inventory (both hardwood and softwood sawtimber and non-sawtimber). Returns from holding forests were measured as the sum of direct revenues and implied capital gains. Measuring the revenues derived from forests required detailed estimates of the timber products produced and their stumpage prices. Because stumpage prices are the value of delivered logs minus relevant harvesting and hauling costs, these values define net revenues to forest owners. Implied capital gains were estimated as the average annual change in asset value within the measurement period. One measure of the rate of return to forest production was estimated as the ratio of net revenue to asset value. A measure of the long-run implied rate of return was estimated as the ratio of total returns (revenue plus capital gains) to forest asset value. These were generated for individual regions and for the United States as a whole.

Price and volume data are required for each component of the inventory by region and year. Volume data were taken from Smith et al. (2001). Prices were taken from Haynes (2003, table 15). Data were available for the RPA benchmark years. We report forest asset values, timber revenues, and rates of return by region and for the U.S. as a whole for the years 1952, 1962, 1977, 1987, 1992, and 1997. The quantities of timber products by species group and region for benchmark years were taken from various USDA Forest Service reports (Smith et al. 2001, Powell et al. 1993, Waddell et al. 1989, and USDA Forest Service 1965, 1982). Values for sawlogs, veneer, pulpwood, fuelwood, and miscellaneous products were tracked. Sawtimber prices were used to value sawlogs and veneer. Pulpwood prices were applied to all other products.

Table 41.1 shows asset values of standing forests, total net revenue of timber products, and two rate of return (ROR) indices for forests in the United States by region. The first ROR index is the revenue to assets ratio and the second index is the capital gains plus revenue to asset ratio. The value of standing timber has generally increased since 1952, reflecting both volume accumulation and real increases in timber prices. The latter was especially strong between 1992 and 1997.

The first ROR index—the revenue to asset ratio—was relatively stable for the United States as a whole between 1952 and 1997 (between 1.2% and 1.4%), but with important changes within and between regions. The North and the Rockies regions have relatively low revenue to asset ratios ranging from 0.4% to 0.8%. The South and the Pacific regions are substantially higher by comparison. The South has the highest revenue to asset ratio—about 2.0% between 1987 and 1997. Rates of return in the western regions of the U.S. (Rockies and Pacific) fell substantially between 1992 and 1997.

Capital gains have fluctuated more than timber revenues and reflect changes in market conditions between measurement periods. Capital gains were negative between 1977 and 1987 but were strongly positive between 1987 and 1997.

The second ROR index—the capital gain plus revenue to asset ratio—has been more volatile than the first ROR index. The second index has risen to about 9% for the U.S. as a whole and recently has ranged from 5.1% in the Rockies to 12.7% in the South.

C. Interpretation of data relative to rationale from TAC

Stable revenue to asset ratios indicate a stable forest products sector and therefore a positive investment climate. Increasing long-run rates of return coupled with stable to increasing inventories (see Indicator 11) indicate that investment proceeds in a manner that anticipates scarcity and that growth in production has not depleted forest assets.

D. Limitations of data

Because these aggregate indices reflect the net results of investment across a wide variety of forest owners—e.g., public and private, active and passive—they do not provide a means for assessing the comparative attractiveness of investment in the forest products sector versus other

sectors of the economy. These measures focus strictly on returns to timber production and so are limited in their scope. However, this seems to have been the intent of the indicator.

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

Additional analysis could be conducted to isolate lands that are being managed solely for timber production and to use these assets to evaluate rates of return. This would provide a more precise estimate of the returns to timber production. Fine-scale analysis of prototypic forest investments might also be constructed to evaluate returns within specific regions.

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Table 41.1. Asset value of standing forests, total net revenue from timber production, and rate of return index for forests in the United States, by region, for 1962, 1977, 1987, 1992, and 1997

Year	(a) Value of standing forest inventory (million 1982 dollars)				
	North	South	Rockies	Pacific	U.S. Total
1952	54,386	80,577	17,691	77,409	230,063
1962	54,058	86,302	12,744	83,030	236,134
1977	68,004	122,509	35,174	175,496	401,182
1987	87,144	108,204	25,463	110,547	331,357
1992	105,671	130,308	37,387	249,867	523,234
1997	184,578	240,428	47,955	342,359	815,321

Year	(b) Timber revenues (million 1982 dollars)				
	North	South	Rockies	Pacific	U.S. Total
1952	372	1,369	75	870	2,686
1962	274	913	72	1,086	2,346
1977	370	1,989	277	2,985	5,621
1987	633	2,246	177	1,593	4,650
1992	733	2,443	286	3,192	6,654
1997	1,317	5,150	202	3,407	10,077

Year	(c) Before tax real rate of return on assets without capital gains (timber revenues divided by value of standing forest)				
	North	South	Rockies	Pacific	U.S. Total
1952	0.7%	1.7%	0.4%	1.1%	1.2%
1962	0.5%	1.1%	0.6%	1.3%	1.0%
1977	0.5%	1.6%	0.8%	1.7%	1.4%
1987	0.7%	2.1%	0.7%	1.4%	1.4%
1992	0.7%	1.9%	0.8%	1.3%	1.3%
1997	0.7%	2.1%	0.4%	1.0%	1.2%

Period	(d) Average annual capital gain (average annual change in value of standing forest, million 1982 dollars)				
	North	South	Rockies	Pacific	U.S. Total
1952-1962	-33	572	-495	562	607
1962-1977	930	2,414	1,495	6,164	11,003
1977-1987	1,914	-1,431	-971	-6,495	-6,983
1987-1992	3,705	4,421	2,385	27,864	38,375
1992-1997	15,781	22,024	2,114	18,498	58,417

Year	(e) Before tax real rate of return on assets including capital gains (capital gains plus revenue divided by value of standing forest)				
	North	South	Rockies	Pacific	U.S. Total
1962	0.4%	1.8%	-3.2%	2.0%	1.3%
1977	1.9%	3.7%	5.3%	5.5%	4.3%
1987	3.0%	0.8%	-3.0%	-4.2%	-0.7%
1992	4.4%	5.6%	7.7%	14.2%	9.4%
1997	10.2%	12.7%	5.1%	6.8%	9.2%

Note: Values in section (e) are calculated as indicated by the following example:

$$\begin{aligned} \text{ROR in 1962 (North)} &= (\text{Revenue in 1962} + \text{average capital gain per year 1952 to 1962}) / (\text{Timber asset value in 1962} - \text{average capital gain for one year 1951 to 1962}) \\ &= (274 + (-33)) / (54,058 - (-33)) = 0.044 \end{aligned}$$