nuveen
NATURAL CAPITAL

Investing in *timberland*

Enduring principles support the fundamental case for timberland investing.

FIVE PRINCIPLES

The argument for investing in timberland rests on five principles:

1. *Strong market fundamentals*
2. *Attractive returns with a stable cash yield*
3. *Portfolio diversification*
4. *A hedge against inflation*
5. *Quantifiable climate benefits*

CPI

Timberland — and the wood fiber it generates — is vital to the global economy, providing a renewable resource for housing, furniture, packaging, tissue, heat and energy. In addition to their providing a source of wood fiber, we depend on forests for environmental services like air and water purification, nutrient cycling and climate regulation. For many decades, timberland was owned primarily by governments, wealthy families and corporate operators. But that began to change about 50 years ago, creating a timberland investment landscape that continues to evolve and adapt to changing markets, climate and investor preferences.

In response to the U.S. Employee Retirement Income Security Act of 1974, pension funds began to view timber as a way to fulfill their legal obligations to diversify plan investments as a means of minimizing the risk of large losses. Rising demand for timberland in the 1980s corresponded with the restructuring of the forest products industry in the U.S., resulting in a shift in timberland ownership from operating companies to financial investors. Timber investment management organizations (TIMOs) emerged to facilitate these transactions and organize and manage investment partnerships.

These investment strategies built compelling track records over the subsequent years, demonstrating timberland's ability to produce strong, consistent returns through cash yield and capital appreciation. In response to the globalization of the forest products sector, in particular growing demand for fiber in Asia, timberland investment markets developed outside the U.S., in Latin America, Oceania and Europe. Worldwide, there is increasing recognition that timberland can be managed for both commercial timber and a broader set of ecosystem services. In particular, timberland investment can be a powerful source of climate mitigation and carbon diversification for investors. The asset class's unique characteristics provide portfolio-level benefits that make timberland an enduring part of many institutional portfolios.

> *"The asset class's unique characteristics also provided **portfolio-level benefits** that have made timberland an enduring part of many institutional portfolios."*

Why timberland now?

Institutional portfolios include a mix of traditional and alternative assets.The typical institutional allocation is about 40% fixed income, 36% equities and 16% alternatives.[1] The allocation to alternatives may include private equity, real estate, infrastructure, farmland and timberland.

Capital allocation across industries is competitive and, like all alternative asset classes, timberland must earn its position in an institutional portfolio. The case for investing in timberland rests on five principles:

1. Strong market fundamentals
2. Attractive return profile with a stable cash yield
3. Portfolio diversification
4. A hedge against inflation
5. Quantifiable climate benefits

The first four make up the traditional case for timberland and have endured over several decades of institutional investment. The carbon benefits from timberland, driven by trees' natural ability to sequester and store carbon, are increasingly valued as climate action ramps up—through voluntary commitments or regulations — and markets for forest carbon expand. Using current data and in the context of recent market trends, we examine how the first four principles have held up over time and how inherent carbon benefits of the asset class further enhance the case for timberland.

PRINCIPLE 1: Strong market fundamentals

Investing in timberland is a fundamental way to benefit from growing worldwide demand for wood. As populations expand and become wealthier, their large and growing wood demand provides attractive opportunities for timberland investors in key geographies.

In both emerging and developed market countries, the world's expanding population and economic growth support the demand for wood and a wide range of forest products. Beyond 2020, GDP per capita is expected to increase, rising from about US$10,500 today to over US$16,500 by 2040. Increases in per capita income are expected to be greatest in emerging market countries like India and China, where demand for forest products for domestic consumption and export is expected to rise. In developed markets like the U.S. and E.U., economic growth is also expected to increase demand for wood, increasingly as a low-carbon input to production.

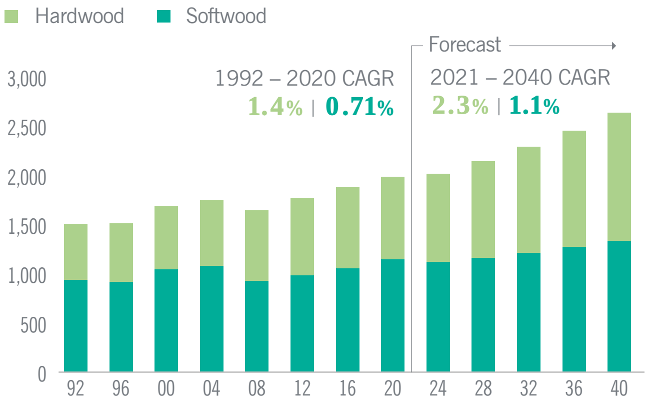
Timber demand is driven by industry's need for a range of wood-based products:

- **Lumber**
- **Veneer and plywood**
- **Wood-based panels**
- **Chemical pulp**
- **Mass timber**

Major end-use markets for these products include housing, furniture, tissue and packaging. In addition to traditional forest products markets, engineered wood or "mass timber" products (e.g., cross-laminated timber), biofuels and renewable alternatives for plastics and chemicals represent rapidly growing new markets for timber.

Worldwide, global consumption of "industrial roundwood," which refers to wood used in manufacturing a broad range of products, is increasing. The UN Food and Agriculture Organization (FAO) reports that between 1992 and 2020, industrial roundwood consumption increased at an average annual rate of 1.4% for hardwoods and 0.71% for softwoods **(Exhibit 1)**. Growth in hardwood consumption has been driven primarily by demand for consumer products such as tissue and packaging, which are less sensitive to economic cycles. By contrast, industrial softwood

Exhibit 1: Worldwide industrial roundwood consumption (Volume: million cubic meters)



Sources: UN FAO; The World Bank; Nuveen Research.

Exhibit 2: Timberland has outperformed most traditional asset classes since 1992

28-year performance of timberland and traditional asset classes
(Annual returns, 1992 – 2020)

	Mean	Standard Deviation	Sharpe Ratio
U.S. Equities	11.16%	16.54%	0.51
Non-U.S. Equities	7.49%	18.80%	0.26
U.S. Fixed Income	5.81%	4.29%	0.73
Non-U.S. Fixed Income	5.49%	5.76%	0.49
Timberland	9.26%	9.62%	0.68

Past performance is no guarantee of future returns. It is not possible to invest in an index. Data are based on rolling one-year total returns calculated on a quarterly basis for periods ended 31 Mar 1992 through 31 Dec 2020. Asset classes reflect the following indexes: U.S. equities – Russell 3000 Index; non-U.S. equities – MSCI ACWI ex-U.S. Index; U.S. fixed income – Bloomberg Barclays U.S. Aggregate Index; Non-U.S. fixed income – Bloomberg Barclays Global Aggregate Index; Timberland – NCREIF Timberland Index.

consumption is related to housing construction and was more volatile during the Global Financial Crisis (GFC) and collapse in the U.S. housing market.

Based on the historical relationship between per capita income and industrial roundwood consumption along with the World Bank's Global Prospects (2021) economic outlook and population growth estimates, worldwide demand for wood is expected to continue increasing. Between 2021 and 2040, hardwood and softwood consumption is expected to increase at compound annual rates of 2.3% and 1.1%, respectively.

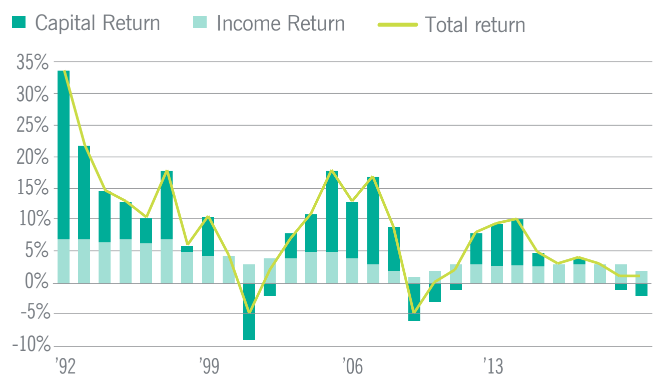
PRINCIPLE 2:
Attractive returns with a stable cash yield

Preservation of capital in downturns and strong income generation driven by cyclical and structural factors.

Over the past three decades, U.S. timberland returns have been highly competitive with traditional asset classes. For the period 1992 – 2020 and across a range of asset classes, timberland outperformed U.S. and non-U.S. fixed income and non-U.S. equities by between 177 and 377 basis points. On a risk-adjusted return basis, timberland outperformed U.S. equities **(Exhibit 2)**.

The cash yield component of total timberland return tends to be resilient over time independent of economic cycles, whereas the capital appreciation component of return tends to be more sensitive to economic cycles **(Exhibit 3)**. Between 1992 and 2020, U.S. timberland generated an average annual income return of 4.0%; 3.0% in the South and 5.7% in the Pacific Northwest.

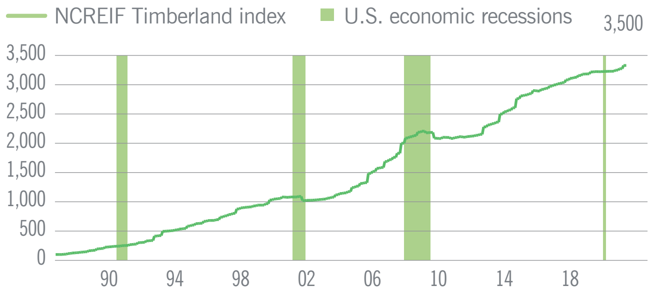
Exhibit 3: NCREIF Timberland Index returns, 1992 – 2020



Past performance is no guarantee of future returns. It is not possible to invest in an index. Source: NCREIF.

From an investment standpoint, net income is directly linked to annual harvest volume, operating costs and timber prices. As shown in the figure below, the NCREIF Timberland Index income return has remained a relatively steady component of total return. In contrast, the capital return component of total timberland return showed greater volatility in the 1990s due to market inefficiencies in the emerging asset class and more recently in response to broader economic cycles and investor preferences. Over the nearly three-decade period (1992-2020), U.S. equities have had almost twice the volatility of U.S. timberland. The income component of total timberland return is even less variable year to year, averaging 4% over the same period with a standard deviation of just 1.7%.

Exhibit 4: U.S. Timberland Total Return, 1987 – 2020



Past performance is no guarantee of future returns. It is not possible to invest in an index.
Source: Macrobond; NCREIF.

Finally, as a store of value, timberland has been resilient over the last four U.S. recessions **(Exhibit 4)**. This long-term resilience is the result of the dual sources of return (capital appreciation and cash yield) and the fact that tree growth is not affected by market volatility or business cycles. The steady increase in commercial timber volume year after year is independent of variable economic conditions. Additionally, if timber pricing in a given quarter or micro market is unfavorable, timberland owners may have the option to delay harvest, storing the timber "on the stump" until prices improve. However, applied over large areas and longer periods, storing timber "on the stump" may lead to a build-up of inventory and ultimately prolong timber price recovery (as seen in many parts of the U.S. South in the decade plus following the Global Financial Crisis).

PRINCIPLE 3: Portfolio diversification

Over the past several decades, U.S. timberland returns have exhibited limited correlation with traditional asset classes.

Investors seek asset classes with low and negative correlations to improve diversification and reduce risk to improve portfolio efficiency. Research continues to show that private investments in relatively illiquid categories of real assets — timberland, farmland and commercial real estate — have exhibited low or negative correlations to equities and fixed income.[2] Indeed, between 1992 and 2020 and in the years since the global financial crisis (2008-2020) low and negative correlations between timberland returns and traditional asset classes show that timberland provided efficiency gains for institutional investors **(Exhibit 5)**.

Exhibit 5: Low or negative correlations with traditional asset classes

Long-term correlations
(Annual returns, 1992 – 2020)

	U.S. Equities	U.S. Fixed Income	Ex-U.S. Fixed Income	NCREIF Timberland	Ex-U.S. Equities
U.S. Equities	1				
U.S.Fixed Income	-0.06	1			
Ex-U.S. Fixed Income	0.06	0.70	1		
NCREIF Timberland	0.16	0.16	0.15	1	
Ex-U.S. Equities	0.77	-0.28	0.05	0.17	1

Post-Global Financial Crisis
(Annual returns, 2008 – 2020)

	U.S. Equities	U.S. Fixed Income	Ex-U.S. Fixed Income	NCREIF Timberland	Ex-U.S. Equities
U.S. Equities	1				
U.S.Fixed Income	-0.16	1			
Ex-U.S. Fixed Income	0.07	0.66	1		
NCREIF Timberland	-0.33	-0.28	-0.31	1	
Ex-U.S. Equities	0.92	-0.09	-0.26	-0.13	1

Data are based on rolling one-year total returns calculated on a quarterly basis for periods ended 31 Mar 1992 through 31 Dec 2020. Asset classes reflect the following indexes: U.S. equities – Russell 3000 Index; non-U.S. equities – MSCI ACWI ex-U.S. Index; U.S. fixed income – Bloomberg Barclays U.S. Aggregate Index; Non-U.S. fixed income – Bloomberg Barclays Global Aggregate Index; Timberland – NCREIF Timberland Index.

One of the main drivers behind this lack of correlation is that a portion of the investment return is generated through biological growth, which is independent of market movements. Payments for ecosystem services, like carbon credits, provide an additional source of uncorrelated return and have the potential to enhance diversification benefits from timberland investment.

PRINCIPLE 4:
A hedge against inflation

Timberland continues to provide investors with a reliable hedge against inflation.

Institutional investors have historically been attracted to timberland as a hedge against inflation (see, for example, Washburn and Binkley, 1993; Zhang et al., 2011; Rubbaniy et al., 2014) and we find that relationship remains firmly intact. Between 1992 and 2020, the correlation between the U.S. CPI and timberland was positive and exceeded the correlation between inflation and traditional asset classes — a pattern that remained consistent when looking only at the years since the Global Financial Crisis (GFC), 2008 – 2020 (**Exhibit 6**). In contrast, the correlation between U.S. and non-U.S. equities and inflation remained strongly negative over both periods.

What are the underlying drivers behind the positive correlation with inflation? Timberland assets produce the raw materials for many products in the CPI basket of goods (e.g., building materials, furniture, tissue, paper and packaging). Rising inflation reflects increasing prices for these goods and an ability to pay more for timber. Higher prices for timber increase cash yields and ultimately lead to higher values for the underlying asset, supporting the positive correlation between inflation and timberland performance. Higher timber prices can also increase the capital appreciation component of return as they are incorporated into asset valuations.

The correlation between timberland returns and inflation has remained reliably positive for many decades, suggesting that as inflation increases timberland performance should keep pace with or even outpace inflation.

Exhibit 6: Positive correlation with inflation

Correlation coefficient between U.S. inflation and traditional asset classes and timberland return

	1992–2020	2008–2020
U.S. Equities	-0.36	-0.62
Non-U.S. Equities	-0.30	-0.66
U.S. Fixed Income	0.19	0.19
Non-U.S. Fixed Income	0.06	0.18
Timberland NCREIF	0.47	0.35

Data are based on rolling one-year total returns calculated on a quarterly basis for periods ended 31 Mar 1992 through 31 Dec 2020. Asset classes reflect the following indexes: U.S. equities – Russell 3000 Index; non-U.S. equities – MSCI ACWI ex-U.S. Index; U.S. fixed income – Bloomberg Barclays U.S. Aggregate Index; Non-U.S. fixed income – Bloomberg Barclays Global Aggregate Index; Timberland – NCREIF Timberland Index.

PRINCIPLE 5:
Quantifiable climate benefits

Timberland's low carbon intensity and potential to generate verified carbon credits may help investors efficiently achieve climate targets.

Timberland represents a direct investment in a carbon removal technology. Trees' natural ability to sequester and store carbon is currently the only proven and scalable technology to remove greenhouse gas emissions from the atmosphere. Climate scientists, along with major environmental NGOs, agree that over one-third of near-term, cost-effective mitigation can come from forests, food and land.[3] Approximately 2.6 billion tons of carbon dioxide, one-third of the CO2 released from burning fossil fuels, is absorbed by forests every year; and trees not only remove CO2 but can store it for a century or more (FAO 2021). As demand for low-carbon building materials and sustainable inputs to production increases, demand for timber from sustainably managed forests is expected to grow.

Over $6.6 trillion assets under management, represented by the Net-Zero Asset Owner Alliance, are committed to transitioning investment portfolios to net-zero greenhouse gas emissions by 2050.[4] An allocation to timberland, with a net negative carbon profile, can balance more emissions-intensive sectors within an institutional portfolio, helping to achieve climate targets efficiently and without having to unnecessarily sacrifice returns.

Beyond these portfolio-level benefits, timberland's potential to generate verified carbon credits creates additional value for investors. Credits can be monetized to boost financial returns, retained by the landowner to offset their emissions or simply retired. Major U.S. corporations such as Apple, Microsoft, Amazon and Google, which together represent over US$6.7 trillion in market capitalization (as of 31 Dec 2020), have announced ambitious carbon neutrality goals. Corporate demand for forest carbon credits to meet climate targets from these four companies among many others could fundamentally alter production forest management, the size of the investable universe and the timberland ownership framework.

Timberland investing in today's markets

The case for investing in timberland remains compelling, but it requires new approaches to address the changing market environment. Timberland investments must deliver competitive performance, low correlations and quantifiable climate benefits to justify their role in institutional portfolios. Our approach to timberland investing builds upon three core beliefs: active management, diversification and sustainability.

An active approach to management

Through a disciplined approach to timberland investment, we seek opportunities to maximize timberland value, over and above that arising from general market appreciation. We seek to deliver this value-creation through the improvement of assets acquired and realization of carbon and conservation values. Strategies that improve asset value may include consolidation of small holdings around anchor properties to improve economies of scale, development of infrastructure and operating systems, increases in productivity through improved silviculture, the addition of offtake agreements and/or improvements in timber market access. Through natural capital accounting, carbon project development and conservation easement sales, we seek to generate "alpha" by monetizing ecosystem service values alongside ongoing sustainable forest management.

Globally diversified portfolio

We believe that diversification by market, geography, species and development phase improves risk-adjusted returns. This multi-tiered approach to diversification intends to mitigate location- and market-specific risks associated with forest operations, climate hazards and commercial timber production.

Despite moderating U.S. returns, timberland exposure across the country continues to offer attractive risk-adjusted U.S. dollar-denominated returns as the result of structural changes, scale and access to some of the world's largest wood markets. In addition to core U.S. market exposure, investors should consider opportunities in globally competitive timberland markets to boost returns. Our global timberland portfolio optimization modeling results suggest that risk-efficient portfolios should include a substantial allocation to non-U.S. investments. Exposure to non-U.S. timberland investments with uncorrelated returns offers the potential to improve portfolio-level returns, benefiting from expected growth in global wood demand and increasing diversification benefits.

Commitment to sustainability across the portfolio and providing climate solutions

Nuveen is committed to analyzing and integrating ESG into the investment management process to reduce investment risk and enhance long-term value. Demonstrating this commitment, all our forestry investments are aligned with TIAA/Nuveen RI principles, both signatories to the UN-backed Principles for Responsible Investment and seek third-party sustainable forestry certification. Beyond our commitment to ESG integration and third-party certification, we provide investors with opportunities to achieve climate targets through investments in timberland. Annual carbon reporting, following the GHG Protocol Land Sector and Removals Guidance and in alignment with Science-Based Targets Initiative Net Zero Standard, allows investors to track progress toward climate targets. In addition, participating in carbon credit markets creates opportunities for investors to benefit from the growing demand for climate mitigation. Our research and experience demonstrate that carbon credit sales has the potential to materially increase timberland returns and provide exposure to uncorrelated carbon markets.

Creating value through our distinctive investment approach

RESEARCH TO UNDERSTAND THE MARKET

Primary research to inform strategy development and investment management is critical to a fully developed understanding of global timberland markets. In addition to traditional supply, demand and price studies, portfolio optimization modeling, spatially explicit market analysis and stochastic financial models of risk and return generate actionable insights and support effective decision-making.

BUILD SCALE AND RELATIONSHIPS

Capturing efficiencies through the timber value chain with scaled operations, from planting and merchandising to transporting harvested wood, may reduce operating costs. Strong networks of local and global relationships across the industry provide a competitive advantage in sourcing and executing on proprietary opportunities. Relationships spanning industrial-scale forest products manufacturers and small-scale log buyers create growth opportunities to increase revenues. These advantages in the market can increase both the income and capital appreciation components of total returns.

APPLY FLEXIBLE VERTICAL INTEGRATION MODEL

Our vertically integrated timber management company operates on a global platform with its own regional subsidiaries that source, develop and manage assets locally. Because Nuveen's investment projects are implemented using uniform systems and knowledge, experience and sales networks are retained and leveraged across the business. This integration is particularly valuable outside the U.S. In the U.S., we maintain the flexibility to outsource forest management to a select group of highly skilled third-party forest managers.

Key Takeaways

Portfolio-level benefits and carbon value drivers support the case for investing in timberland:

- Demand for wood and related products is likely to increase with global economic growth, particularly in emerging market countries and expanding markets for low-carbon inputs to production and forest carbon itself.
- Although U.S. timberland returns have moderated in the past decade with the prolonged housing recovery, timberland outperformed U.S. equities on a risk-adjusted basis due to its low volatility and steady income returns.
- The asset class has provided powerful diversification benefits based on consistently low or negative correlations with traditional asset classes.
- Timberland is likely to remain a reliable hedge against rising inflation.
- As a natural climate solution, timberland offers asset owners and managers a powerful source of portfolio decarbonization, with the potential for verified carbon offsets.

Our global footprint

UNITED STATES 424,511	**BRAZIL** 218,269	**URUGUAY** 80,916
COLOMBIA 60,089	**POLAND** 18,134	**PANAMA** 16,593

*Acreage managed by Nuveen, as of 31 Dec 2022.

Three strategies that may help enhance timber returns:

1. Construct optimally diversified portfolios with U.S. exposure to maximize stable cash yield and global exposure to access faster-growing markets.
2. Maximize timberland's environmental benefits and potential as a natural climate solution through active management for carbon and conservation values.
3. Deploy yield enhancing improvements while maintaining commitment to sustainability.

About Nuveen

Nuveen is the global asset management arm of TIAA, managing $1.1 trillion[5] in assets for over 1,200 institutional clients in 32 countries worldwide,[6] across fixed income, equities, alternatives and solutions-based strategies.

Nuveen Natural Capital is a land-focused investment manager with $12.4 billion of assets under management.[7] Managing assets across diverse geographies, crop and tree species, commodity, value-add and environmental markets, and operating strategies, we provide investors access to global farmland and timberland opportunities. With over 35 years of investment experience and more than 220 employees located across 10 countries globally,[8] the platform offers unparalleled geographic reach married with deep sector expertise.

For more information, please visit nuveen.com/naturalcapital.

Endnotes

1 Natixis, 2021. Notes: 8% to cash and other. Survey included 500 institutional investors in 29 countries across North America, Latin America, the United Kingdom, Continental Europe, Asia and the Middle East.

2 The Power of Private Real Assets, Nuveen January 2023

3 Bastin et al. m 2019; Griscom et al Natural Climate Solutions 2017.

4 United Nations Environment Programme Finance Initiative Website https://www.unepfi.org/net-zero-alliance/

5 As of 30 Sep 2023. Nuveen assets under management (AUM) is inclusive of underlying investment specialists.

6 As of 31 Dec 2022; updated annually.

7 AUM is reflective of Fair Market Value for farmland and Invested Capital for timberland as of 31 Dec 2022. Sums may vary slightly due to rounding.

8 As of 31 Dec 2022

A word on risk

Timberland investments are illiquid and their value is dependent on many conditions beyond the control of portfolio managers. Estimates of timber yields associated with timber properties may be inaccurate, and unique varieties of plant materials are integral to the success of timber operations; such material may not always be available in sufficient quantity or quality. Governmental laws, rules and regulations may impact the ability of the timber investments to develop plantations in a profitable manner. Investments will be subject to risks generally associated with the ownership of real estate-related assets and foreign investing, including changes in economic conditions, currency values, environmental risks, the cost of and ability to obtain insurance and risks related to leasing of properties. Certain products and services may not be available to all entities or persons.

Responsible investing incorporates Environmental Social Governance (ESG) factors that may affect exposure to issuers, sectors, industries, limiting the type and number of investment opportunities available, which could result in excluding investments that perform well. ESG integration incorporates financially relevant ESG factors into investment research in support of portfolio management for actively managed strategies. Financial relevancy of ESG factors varies by asset class and investment strategy. Applicability of ESG factors may differ across investment strategies. ESG factors are among many factors considered in evaluating an investment decision, and unless otherwise stated in the relevant offering memorandum or prospectus, do not alter the investment guidelines, strategy or objectives.

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