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NATURAL CAPITAL INVESTING

MADE SIMPLE GUIDE

ACKNOWLEDGEMENTS

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INTRODUCTION

THIS GUIDE EXPLAINS WHAT NATURAL CAPITAL IS, WHY IT IS IMPORTANT, AND HOW INSTITUTIONAL INVESTORS CAN ASSESS ITS SUITABILITY FOR THEIR PORTFOLIOS.

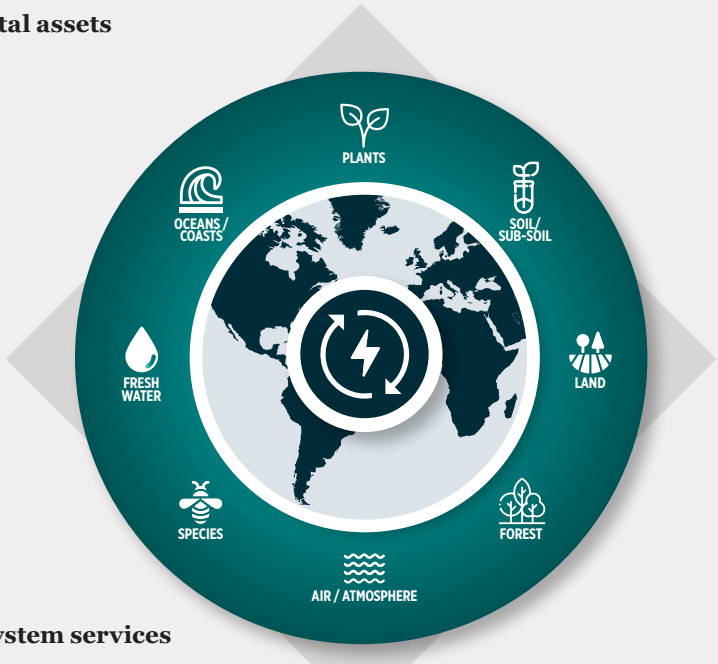
Since the industrial revolution, economic activity has generated tremendous growth but it has also degraded the Earth's natural capital – the air, its lands and waters, and its biodiversity. And we now know that this is severely affecting the planet's capacity to support livelihoods and well-being.

Institutional portfolios can play a vital role in addressing this global challenge. Through investments in sustainably managed timberland and farmland, they can benefit from long-term global trends, delivering returns for their stakeholders and for society as a whole. This guide explores the investment characteristics of natural capital and some of the risks that need to be considered. It explains the different investment vehicles available, and the impact natural capital can have on a portfolio's risk and return profile.

WHAT IS NATURAL CAPITAL?

NATURAL CAPITAL REFERS TO THE EARTH'S AIR, LANDS, WATERS AND BIODIVERSITY. FIGURE 1 ILLUSTRATES THESE ASSETS AND THE SERVICES THEY PROVIDE WHICH HELP SUSTAIN LIFE, LIVELIHOODS AND WELL-BEING.

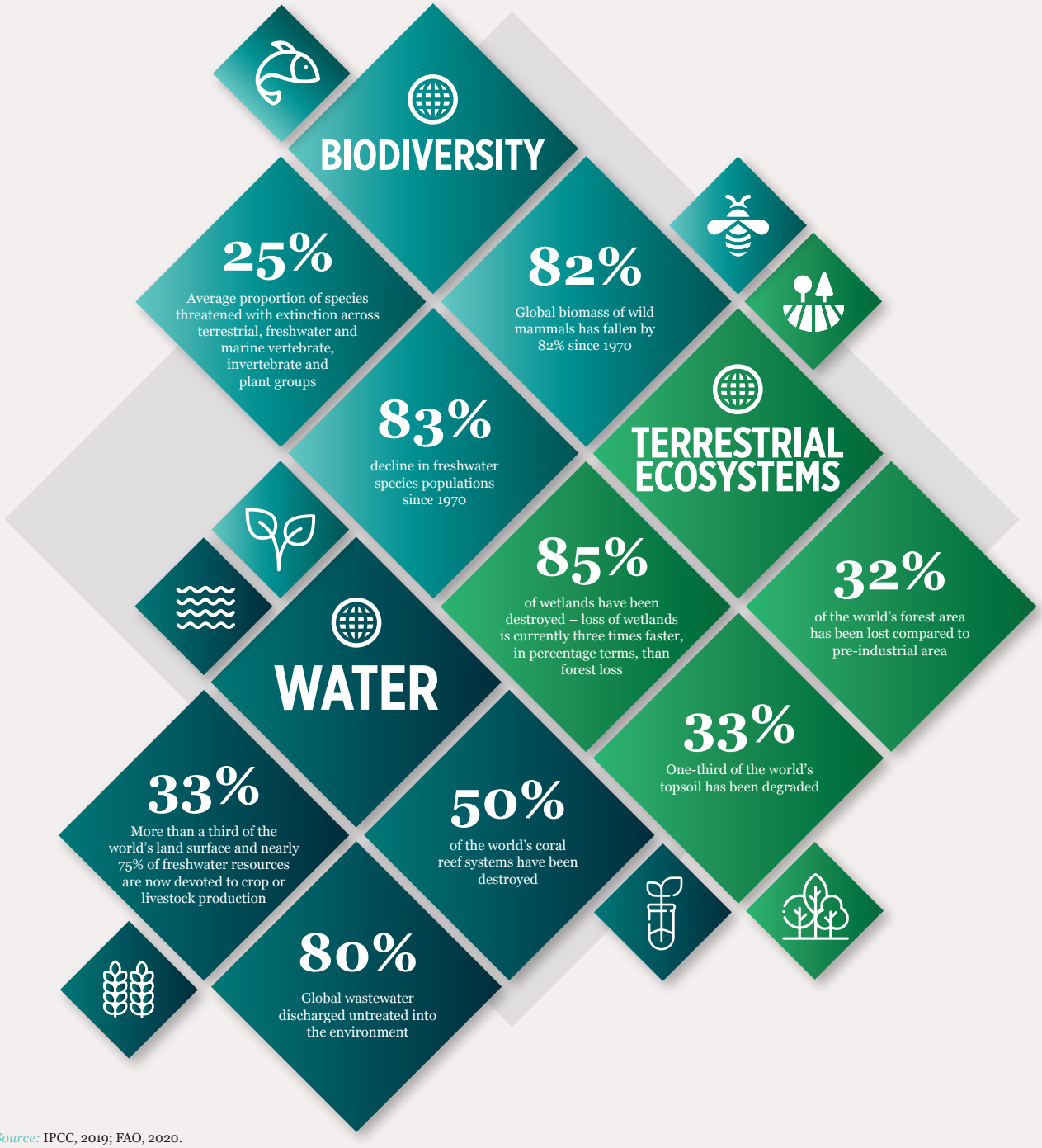
Figure 1: **Natural capital assets**



Natural capital ecosystem services

Past economic development, however, has degraded the Earth's natural capital, altering ecosystems and transforming landscapes (see Figure 2). The increase in economic activity since the industrial revolution has had such an enormous impact on natural ecosystems that nature's capacity to support society in the future is now in jeopardy.

Figure 2: **Global decline in nature**



Source: IPCC, 2019; FAO, 2020.

WHY NATURAL CAPITAL MATTERS

NATURAL CAPITAL PRODUCES FOOD, FIBRE AND TIMBER AS WELL AS PROVIDING A BROAD RANGE OF REGULATING, SUPPORTING AND CULTURAL ECOSYSTEM SERVICES THAT DRIVE THE GLOBAL ECONOMY AND HUMAN WELL-BEING. IN FACT, THE WORLD ECONOMIC FORUM ESTIMATES THAT US$44 TRILLION ANNUALLY – OR OVER HALF OF GLOBAL OUTPUT – IS MODERATELY OR HIGHLY DEPENDENT ON NATURAL CAPITAL. THE GLOBAL DECLINE IN NATURE PUTS THIS ECONOMIC VALUE AND THE WELL-BEING OF PEOPLE ALL OVER THE WORLD AT RISK.

Institutional capital can play a role in the shift from unsustainable land use towards more environmentally-friendly and people-friendly outcomes.

Sustainable land use

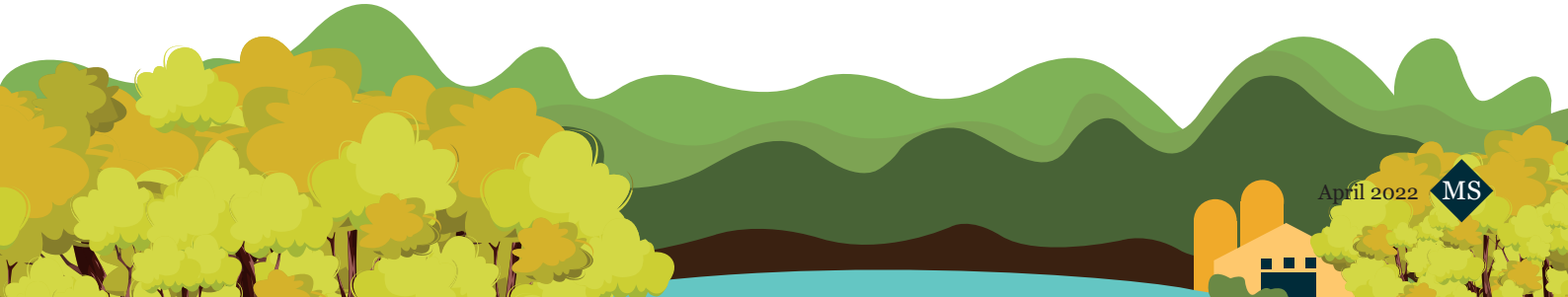
There are clear pathways for investors to direct financial flows towards climate-resilient and restorative natural capital strategies, which include investing in sustainably managed timberland and farmland.

Climate regulation

The natural ability of forests and soils to sequester and store carbon in biomass and organic matter means they have a key role to play in combating climate change. Investments in timberland and farmland have the potential to safeguard existing carbon stocks and provide low-cost, scalable increases in long-term carbon storage.

Greenhouse gas emissions reduction

Reducing emissions from agriculture and land use is another way in which natural capital investment strategies can contribute to solutions. Sustainable management practices, such as installing solar panels on farms to reduce diesel used in irrigation pumping, can also help reduce emissions. Similarly, certain types of regenerative agricultural practices can reduce emissions and also increase storage of carbon in the soil.



REASONS TO INVEST IN NATURAL CAPITAL

THREE LONG-TERM TRENDS SUPPORT THE CASE FOR NATURAL CAPITAL INVESTMENTS.

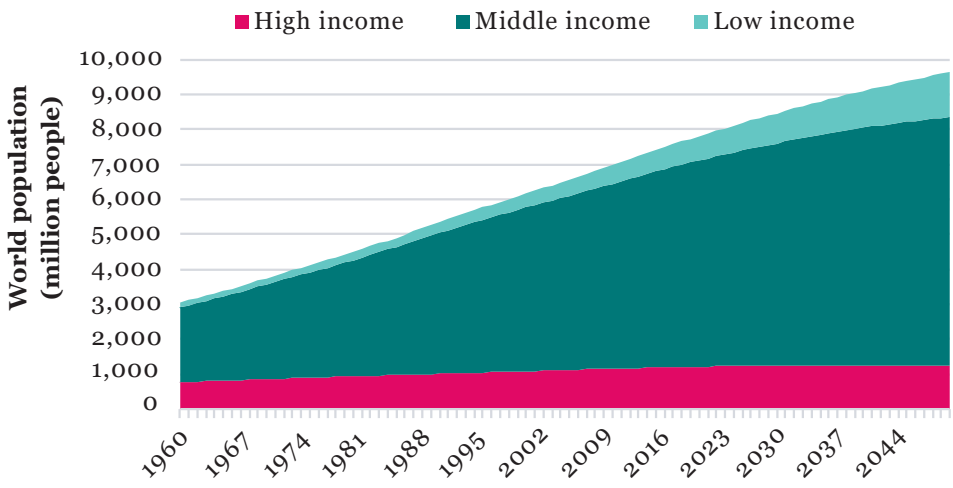
1. GROWING POPULATIONS WILL REQUIRE MORE FOOD, FIBRE AND TIMBER

*Investing in **sustainable** timberland and farmland is a fundamental way to benefit from growing worldwide demand for resources and support environmentally friendly and socially responsible food, fibre and timber production.*

By 2050, food, fibre and timber production will have to support more than 9.7 billion people (Figure 3). Incomes are also expected to rise, with the greatest increases in emerging market countries such as India and China, where the middle class is expanding.

In the face of continuing population growth and given the limited land base, investment is required to make farmland and timberland more productive and sustainable. To meet this growing global demand by 2050, the Global Harvest Initiative 2019 GAP report estimated that agricultural producers would have to double their output from 2010 levels. Increases in productivity will help, but they will not bridge the gap on their own. What's more, the expected shortfall could be amplified by the increasing frequency and severity of climate hazards in major producing regions.

Figure 3: **Projected population growth**



Source: The World Bank, Databank. Accessed January 2022.

Population increases and economic growth will also fuel a growing demand for wood and forest products in a wide range of end-use markets (e.g. housing, furniture, tissue, construction), as illustrated in Figure 4.

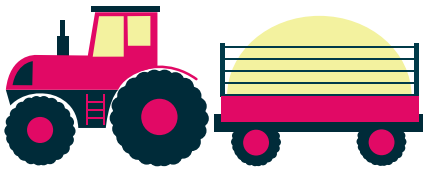


Figure 4: **Demand for forest products will increase with population growth**

2. SUPPLY CONSTRAINTS FOR FOREST AND AGRICULTURAL LAND AND PRODUCTION

A shrinking productive land base will drive increased values for high-quality, climate-resilient timberland and farmland.

Just as global demand for food, fibre and timber is increasing, both timberland and farmland face supply constraints around the world. This is due to a range of factors that vary by region and asset class, including, for example, the need to protect shrinking areas of natural ecosystems, land-use conversion, and increasing climate variability.

According to the UN, the global forest area is shrinking by 4.7 million hectares per year, though the rate of change has slowed since 1990.[1] To combat deforestation and unsustainable management, remaining natural forests are increasingly being protected for biodiversity conservation and climate mitigation. Industrial forest plantations make up a relatively small share of the global forest area. However, they are increasingly relied upon as a verified source of sustainable timber.

Similarly, farmland is being lost to degraded soils. One-third of the Earth's soils are degraded and over 90% could become degraded by 2050 without changes to current practices.[2] Soil erosion can lead to significant losses in crop yields.

Taken together, these supply constraints elevate the benefits of a globally diversified natural capital portfolio focused on sustainable productivity and positioned for climate resiliency.

1 Global Forest Resources Assessment main report, UN Food and Agriculture Organisation, 2020, p.xi
2 *Status of the World's Soil Resources*, Food and Agriculture Organization of the United Nations and Intergovernmental Technical Panel on Soils, 2015

3. GROWING DEMAND FOR SCALABLE CLIMATE SOLUTIONS

Timberland and farmland's sustainable, low-carbon production systems and the capacity to generate verified carbon credits are increasingly valued as climate action ramps up.

As an asset class, natural capital investments such as timberland and farmland have the lowest average carbon intensity among both alternatives and traditional asset classes (as measured by the amount of net CO2 emissions per dollar invested). Allocations to timberland and farmland, 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. These features are fuelling institutional investor demand given the growing awareness of climate risk and adoption of mitigation and transition strategies in investment portfolios. At COP26 in November 2021, over USD 6.6 trillion of assets under management, represented by the Net-Zero Asset Owner Alliance, were committed to transitioning to net-zero greenhouse gas emissions by 2050.

Timberland represents a direct investment in a carbon removal technology and offers the greatest near-term potential to generate real, measurable climate benefits. Trees not only remove CO2 from the atmosphere but can store it for a century or more in long-lived solidwood products.

Payments for ecosystem services, like carbon sequestration and storage, have the potential to enhance both financial performance and positive environmental impact from land-based investments. Most significantly, timberland's demonstrated ability to generate verified carbon credits has the potential to create additional value for investors. Agricultural carbon markets are less well developed than those for timber, but present a growing opportunity. As more companies and organisations commit to net-zero carbon goals, demand for forest carbon credits to meet climate targets is likely to increase.

FARMLAND AND TIMBERLAND: THE INVESTMENT CHARACTERISTICS

WE USE US DATA TO ILLUSTRATE FARMLAND AND TIMBERLAND'S POTENTIAL AS IT IS THE MOST COMPREHENSIVE DATA SET CURRENTLY AVAILABLE. FOR THE PAST 30 YEARS, INVESTMENTS IN US FARMLAND AND TIMBERLAND HAVE ACHIEVED ATTRACTIVE TOTAL RETURNS RELATIVE TO ASSET CLASSES LIKE EQUITIES, BONDS AND REAL ESTATE, WHILE ALSO PROVIDING STRONG DIVERSIFICATION BENEFITS AND A HEDGE AGAINST INFLATION.

A global portfolio of natural capital assets may provide the same advantages, as well as the additional risk mitigation that comes from diversified exposure to different crop types and growing conditions around the world. While we anticipate that demand will steadily grow over time, supply shocks in certain regions or countries support the case for investing on a diversified, global basis.

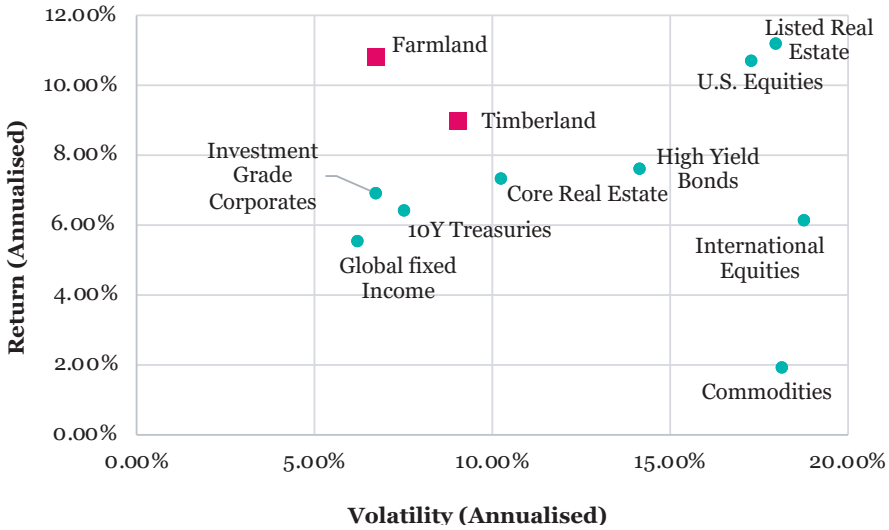
HISTORICALLY STRONG RETURNS

US farmland has delivered, similar returns to US equities and outperformed US bonds on an annualised basis over the last 30 years (see Figure 5), providing both consistent income and capital appreciation. US timberland has outperformed US bonds over the same period.

ATTRACTIVE RISK-RETURN CHARACTERISTICS

When measured on a risk-return basis, farmland and timberland compare favourably to other asset classes, demonstrating strong returns per unit of risk. As Figure 5 shows, farmland's annual volatility is comparable with global fixed income, US 10-year Treasuries and US investment-grade corporate bonds, yet it has delivered a stronger return. Timberland also exhibits higher returns than these three core fixed income asset classes, with slightly higher volatility.

Figure 5: **How farmland and timberland compare with other asset classes**



Sources: TIAA-CREF Center for Farmland Research, Standard & Poor's, Federal Reserve, MSCI, Commodity Research Bureau, Consumer Price Index. U.S. Farmland: NCREIF Farmland; Listed Real Estate: FTSE NAREIT All Equity REITs; Core Real Estate: NCREIF NFI-ODCE; Timberland: NCREIF Timber; Investment Grade Corporates: ICE BofA US Corporate Index; 10 Year Treasuries: ICE BofA U.S. Treasury 7-10 Year; High Yield Bonds: Bloomberg Barclays U.S. Corporate High Yield 2% Issuer Capped Index. Values from start of data 31 Dec 1992.; U.S. Equities: S&P 500; International Equities: MSCI EAFE; Global Fixed Income: BBG Global Agg.; Commodities: BBG Commodity. Values from start of data 31 Dec 1992. It is not possible to invest in an index. Performance for indices does not reflect investment fees or transactions costs. **Past performance is no guarantee of future results**.

DIVERSIFICATION POTENTIAL

Natural capital performs differently from the traditional equity and bond asset classes. This means that adding either farmland, timberland or both to a portfolio enhances diversification and can result in lower volatility as well as boost returns. Both asset classes have demonstrated negative or low correlation to equity and bond indices.

Figure 6: **Low and negative correlations with other asset classes**

	FARMLAND	TIMBERLAND
US equities	0.01	0.16
US bonds	-0.32	0.16
Non-US equities	0.19	0.15
Global bonds	-0.23	0.17

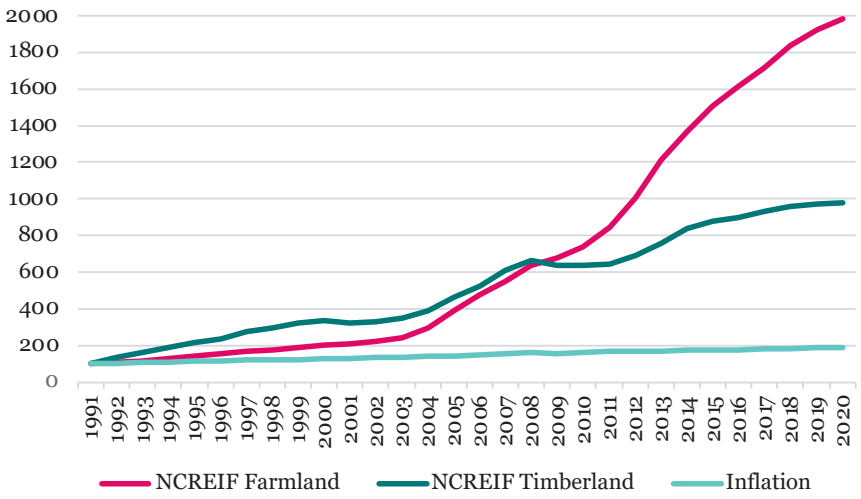
Sources and note: Data based on rolling one-year total returns, calculated on a quarterly basis for periods ended 31 Mar 1992 through 31 Dec 2020. US equities represented by Russell 3000 Index, US bonds by Bloomberg US Aggregate Index, Non-US equities by MSCI World ex-US Index, Global bonds by Bloomberg Global Aggregate Index. Sources: NCREIF, FactSet, Nuveen, LLC.
It is not possible to invest in an index. Performance for indices does not reflect investment fees or transactions costs. **Past performance is no guarantee of future results**.

INFLATION HEDGE

Historical farmland and timberland returns have outpaced inflation in a variety of market environments. Farmland's total return (represented by the NCREIF Farmland Index) was more than double the inflation rate in almost all of the last 30 years. The production of food from farmland is one of the major categories in consumer price indices.

Similarly, timberland assets produce the raw materials for many products in the basket of goods used to calculate inflation (e.g. building materials, furniture, tissue, paper and packaging).

Figure 7: **Farmland and timberland returns outpace inflation**

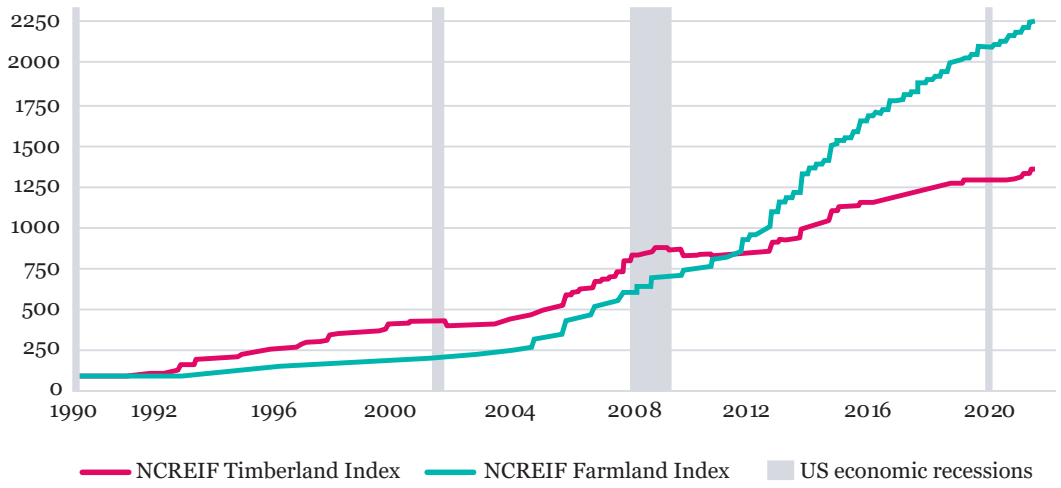


Sources: NCREIF Farmland Index and the Consumer Price Index – Urban. The inception date of the NCREIF Farmland Index is 4Q 1990. The CPI-U produces monthly data on changes in the prices paid by urban consumers for a representative basket of goods and services since 1913. 2008 CPI-U equals 0.0%. NCREIF Farmland Index returns are used for the time frame above to demonstrate income and capital appreciation components, which are not available from the TIAA-CREF Center for Farmland Research database.
Past performance is no guarantee of future results.

A STORE OF VALUE

The combined effect of natural capital's investment attributes means that these assets can be a good store of value and safeguard of wealth. The daily volume of food consumed is relatively unaffected by difficult economic environments. This, combined with a growing global population and a constrained supply of arable land, means the asset class can protect investors' capital in times of economic tumult (see Figure 8). The long-term resilience of timberland as a store of value is also illustrated in Figure 8. This is a result of the dual sources of return (from capital appreciation and cash yield) and the fact that tree growth is not affected by market volatility or the business cycle.

Figure 8: **Farmland and timberland during previous US recessions**



Sources: Macrobond, NCREIF. Data to 31 Dec 2020. **Past performance is no guarantee of future results**.

ENHANCING NATURAL CAPITAL: FARM AND TIMBERLAND CASE STUDIES

THE FOLLOWING CASE STUDIES ARE A SMALL SELECTION ILLUSTRATING HOW NUVEEN IS WORKING TO ENHANCE NATURAL CAPITAL IN OUR CLIENTS' FARMLAND AND TIMBERLAND PORTFOLIOS. MORE DETAILS CAN BE FOUND IN NUVEEN'S *2021 FARMLAND REPORT*[3] AND *2021 TIMBERLAND SUSTAINABILITY REPORT*.[4]

ENERGY USE, AIR QUALITY AND CLIMATE CHANGE

Huddersfield Orchard solar project
Southern NSW, Australia, with benefits in avoided CO2 emissions of about 637 tonnes per year

Huddersfield Orchard, an almond development in Australia, is projected to reach peak production in 2026. At that time, we anticipate that about 60% of the orchard's irrigation water requirements will be supplied by groundwater extracted from four high-capacity wells using powerful bore pumps.

The potential cost and environmental benefits of converting one of the two diesel bore pumps to electric power were analysed, as well as adding on-farm photovoltaic (PV) solar to the energy mix for the two electric-powered bores. Based on the analysis, we chose to invest in three 100 kW PV solar systems, consisting of a PV solar array at three of the four bores located on the orchard. Payback periods for these investments range from three to nine years. This project is forecast to reduce the orchard's CO2 emissions by about 637 tonnes per year.

Key environmental benefits include:

- Reduced carbon emissions and less reliance on coal-fired electricity
- Reduced combustion of diesel on farm
- No waste generated during energy production
- Improved security of electricity supply with on-farm generation and external grid
- Improved air quality may lead to superior tree growth

Other project benefits include:

- Significant cost savings
- Lower maintenance compared to diesel power
- Reduced risks to worker health and safety
- Ability to supply surplus power to the grid to benefit others

SOIL QUALITY

Exploring the potential of regenerative farming practices
Poland, covering over 1,048 acres

We launched a three-year collaboration in 2020 with Soil Capital to transition a 1,048-acre arable farm from operating conventionally to adopting regenerative practices. The project aims to improve soil health while also reducing the farm's carbon footprint. By applying regenerative practices in managing the farm the tenant will gain experience with leading-edge sustainable techniques while also potentially reducing production costs.

3 2021 Farmland Sustainability Report, Nuveen, 2021
4 Timberland Sustainability Report 2021, Nuveen, 2021

LAND

Initial steps in the pilot project included reviewing current farming practices and sampling soils across the farm to assess factors such as macronutrients and organic matter. With this baseline information, we are creating a transition pathway, which will encompass amended crop rotation, establishment of annual cover crops, applications of organic manure, and potential collaboration with livestock farmers.

During the three-year project period we will be communicating the pilot's findings to our tenants in Poland through a quarterly bulletin. The intention is to publicise results to educate and influence other tenants in the region to follow this regenerative example.

REFORESTATION

Reforestation in Minas Gerais, Brazil
Environmental benefits and attractive returns at one of Brazil's most threatened ecosystems

In Brazil, nearly 123 million acres have been identified for potential reforestation. At Nuveen's assets in Minas Gerais, which are located in the Cerrado biome, one of Brazil's most threatened and least protected ecosystems, we have:

- transformed 25,000 acres of degraded cattle pasture into a tropical hardwood plantation
- conserved 10,000 acres of native savannah.

Our aim is to maximize environmental and social impact, and climate mitigation factors, while also producing a certified sustainable source of fine tropical hardwood, thereby offering consumers worldwide a substitute for unsustainably managed or illegally harvested tropical timber from natural forests.

BIODIVERSITY

Natural forest assets at Forrestal Monterrey, Colombia
Preserving biodiversity in some of the last remaining tropical dry forest (TDF) areas in the Caribbean region of Colombia

TDF is one of the world's most vulnerable biomes, and more than 90% of Colombia's TDF has now been destroyed or degraded. The resulting disruption to the TDF's ecosystems puts extreme pressure on native species: under threat are 95% of the 60 mammal species found in TDF, 58 known amphibian species, and at least 30 bird species.

Our team at Forrestal Monterrey is dedicated to preserving this critical habitat, and combines active monitoring, scientific collaboration and operational protections to conserve and support biodiversity throughout its properties. Current conservation initiatives include:

- Permanent plot monitoring of Belencita nemorosa — an endangered, endemic tree with very little previous scientific study
- Partnership with the National University of Colombia to determine the status of the local population of Malagoniella astyanax — a rare, endemic beetle.

The team routinely monitors and annually reports fauna sightings and distribution, which has determined local populations of threatened species such as the cotton-top tamarin (Saguinus edipus). This primate, endemic to the region, is listed as critically endangered with only about 6,000 remaining in the wild. We use satellite imagery, geographic analysis and ground surveying to actively monitor this critical habitat, with the goal of preserving its geographic size, increasing canopy cover and, ultimately, maintaining the ecosystem's health and complexity.

BIODIVERSITY

Bee-friendly farming and cover cropping
California, covering over 1,500 acres with cover crops

In California, we took action in 2020 to support healthy bee populations and greater biodiversity on the US West Coast through a combination of agricultural practices, philanthropy and certifications.

High-nitrogen-generating cover crops were planted on 13 ranches, which comprise more than 1,500 acres. These cover crops help to increase the density, diversity and duration of bee forage, as well as attracting beneficial insects. This practice also helps to enhance soil health by:

- Increasing organic matter and water availability
- Suppressing weeds and boosting nitrogen levels
- Preventing erosion and enhancing water infiltration

HOW TO INVEST IN NATURAL CAPITAL

THE TABLE BELOW SHOWS FOUR DIFFERENT WAYS IN WHICH INSTITUTIONAL INVESTORS CAN GAIN EXPOSURE TO FARMLAND AND TIMBERLAND.

HOW TO INVEST IN NATURAL CAPITAL

	DIRECT	SEPARATELY MANAGED ACCOUNT	CLOSED-ENDED FUND	OPEN-ENDED FUND
Description	Direct ownership of assets which can be managed by own management staff or outsourced to a third party	Land is purchased and managed on investors' behalf by professional farmland and timberland managers	Club structure with small number of likeminded investors, managed by a professional farmland/ timberland asset manager	Pooled capital structure with many investors, managed by a professional asset manager
Diversification characteristics	Low, typically several properties purchased	Low, typically several properties purchased	High: large capital pool allows for crop, geography, operating strategy diversification	High: large capital pool allows for crop, geography, operating strategy diversification

WHAT ARE THE RISKS?

RISK CONSIDERATIONS

1. Farmland and timberland are long-term investments which often cannot be traded readily and where returns may take several years to materialise.
2. As institutional asset classes, farmland and timberland are less liquid compared with the traditional asset classes of equities and bonds. Many deals take place off-market, making reputation and local market knowledge vitally important in accessing and closing transactions.
3. It is difficult to measure relative performance as no global benchmark currently exists. However, established investment managers should be able to provide meaningful data to understand the investment's risk and return.

How to manage these risks:

- Consider natural capital as part of a long-term strategic asset allocation and not for short-term tactical trading.
- Diversify by geography, crop type, species and strategy to help minimise the volatility associated with exposure to specific commodities, weather events and possible government intervention.
- Partner with an experienced natural capital investment manager who can demonstrate a track record of acquiring high-quality farmland and timberland and adding value through capital improvements and effective management strategies over time.

What to look for in a natural capital investment manager:

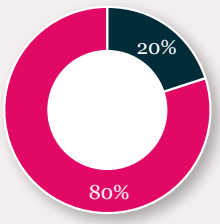
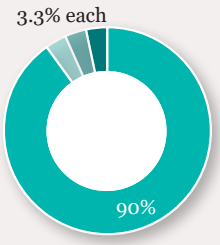
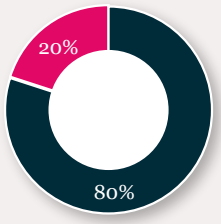
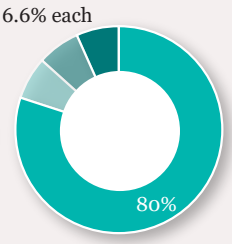
- In-depth knowledge of local conditions and strong relationships with local partners.
- A broad understanding of the global factors that influence agricultural and timber production and marketing.
- Robust compliance and oversight capabilities to address environmental issues, legal, accounting and control requirements, sustainability and labour practices, among other factors.
- Management experience and relationships, which are key differentials in developing, managing and executing a successful natural capital investment portfolio.

ADDING FARMLAND AND TIMBERLAND TO A PORTFOLIO

HOW MUCH NATURAL CAPITAL EXPOSURE IS REASONABLE FOR INSTITUTIONAL INVESTORS? THERE IS NO SINGLE OPTIMAL ALLOCATION FOR ALL PORTFOLIOS. IT DIFFERS BASED ON THE INVESTOR'S SPECIFIC RETURN OBJECTIVES AND RISK PROFILE.

The portfolios shown in this analysis are designed to demonstrate an analytical framework, and illustrations should not be considered investment recommendations.

Figure 9: **Adding farmland and timberland to a portfolio**

	Performance			
Portfolies	Conservative portfolio (20% stock/80% bond)	Conservative portfolio + 10% real assets	Aggressive portfolio (80% stock/20% bond)	Aggressive portfolio + 20% real assets
Allocations				
Average annual total returns (%)	6.78	7.02	10.09	9.99
Standard deviation (%)	4.48	4.07	13.22	10.85
Sharpe Ratio	0.89	1.04	0.55	0.66

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 represent the following indexes: stocks – Russell 3000 Index and MSCI ACWI ex USA Index; bonds – Aggregate Index and Bloomberg Barclays Global Aggregate Index; privately held U.S commercial real estate – NCREIF Real Estate Index; privately held U.S. farmland – NCREIF Farmland Index; privately held U.S. timberland – NCREIF Timberland Index. **Past performance is no guarantee of future results**.
Sources: NCREIF, FactSet, Nuveen, LLC

Using a portfolio modelling technique called mean-variance optimisation, we show the potential impact of adding realistic allocations of farmland, timberland and also real estate to a conservative 20% equity and 80% bond portfolio and to an aggressive 80% equity and 20% bond portfolio. The combined allocations to farmland, timberland and real estate are limited to 10% in the conservative portfolio and 20% in the aggressive portfolio.

The analysis shows that, despite the allocation limits, investments in farmland, timberland and real estate reduced volatility for both the conservative and aggressive portfolios. This resulted in higher risk-adjusted returns as measured by the Sharpe ratio in Figure 9, supporting the case for diversifying traditional portfolios with multiple categories of alternative assets including natural capital.

The views and opinions expressed are for informational and educational purposes only as of the date of production/ writing and may change without notice at any time based on numerous factors, such as market or other conditions, legal and regulatory developments, additional risks and uncertainties and may not come to pass. This material may contain "forward-looking" information that is not purely historical in nature. Such information may include, among other things, projections, forecasts, estimates of market returns, and proposed or expected portfolio composition. Any changes to assumptions that may have been made in preparing this material could have a material impact on the information presented herein by way of example. Past performance is no guarantee of future results. Investing involves risk; principal loss is possible.

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Nuveen provides investment advisory solutions through its investment specialists.

Pensions and Lifetime Savings Association
24 Chiswell Street
London EC1Y 4TY

T: 020 7601 1700
E: plsa@plsa.co.uk

www.plsa.co.uk

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