Timberland Investment Outlook

2015-2019

NewForests

About New Forests

New Forests* is a sustainable real assets investment manager offering leading-edge strategies in forestry, land management, timber processing, infrastructure, and conservation. Founded in 2005, we offer institutional investors targeted opportunities in the Asia-Pacific region and the United States and have over AUD 2.5 billion in assets under management, as of 1 July 2015. Our assets include sustainable timber plantations, rural land, and conservation investments related to ecosystem restoration and protection. New Forests seeks to deliver investment outcomes with shared value—where we not only execute investments that generate excellent returns to our clients but also enrich the landscapes and communities where we operate. New Forests manages more than 600,000 hectares of land and forests and is headquartered in Sydney with offices in San Francisco and Singapore.

New Forests has a staff of more than 45 professionals, with a diversity of experience and backgrounds encompassing timberland investment, forest management, financial services, governance and risk management, and responsible investment.

The company offers three distinct regional investment strategies relating to Australia-New Zealand forestry and rural land; sustainable tropical timber plantations in Southeast Asia, and US environmental markets and conservation forestry investments.

Each investment strategy is resourced by a regional team that includes a complementary set of skills in due diligence, investment analytics, operations, and social and environmental management. These teams bring local expertise and presence to investment originations, due diligence, and operational management. All of our investment products are supported by our Sydney headquarters, which provides centralised executive management, finance, governance, risk management and compliance, client relations, research, and sustainability functions. This approach ensures consistency and efficiency across our investment programs.

If you are interested to learn more about New Forests' business, please contact us.

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NewForests

*New Forests refers to New Forests Pty Ltd (ACN 114 145 274) and all of its subsidiaries.
For more information see back inside cover of this report.

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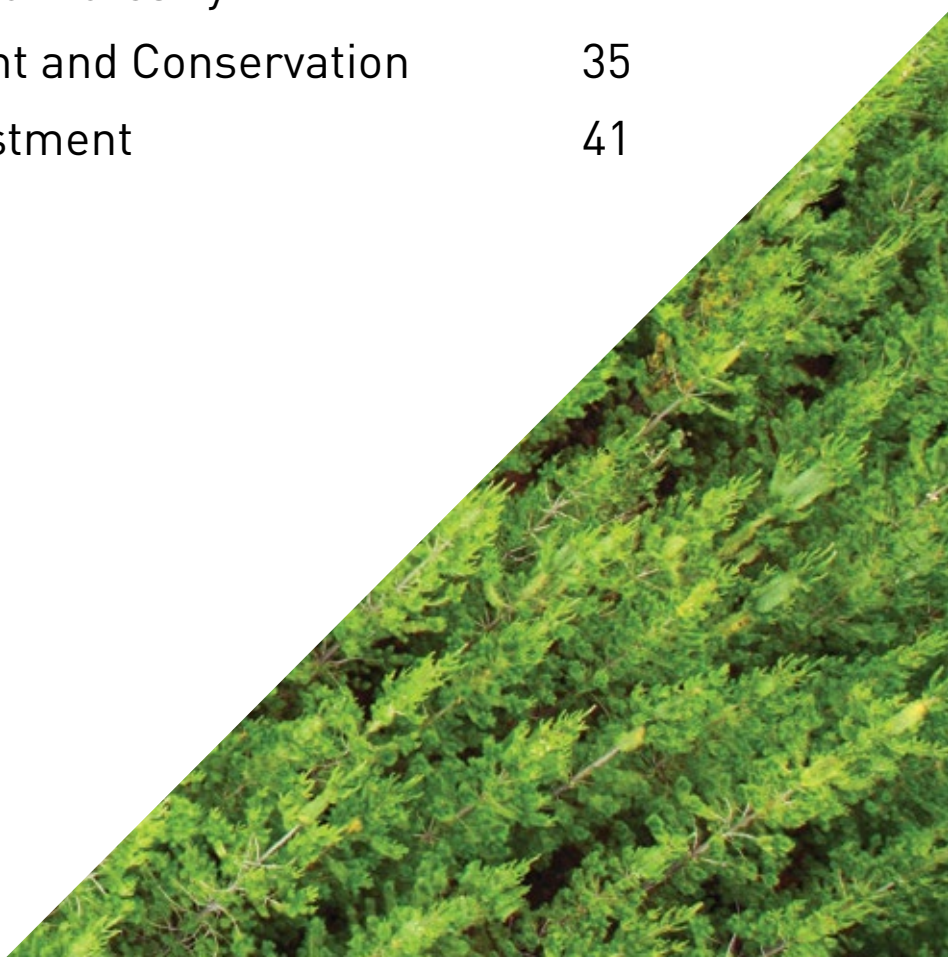
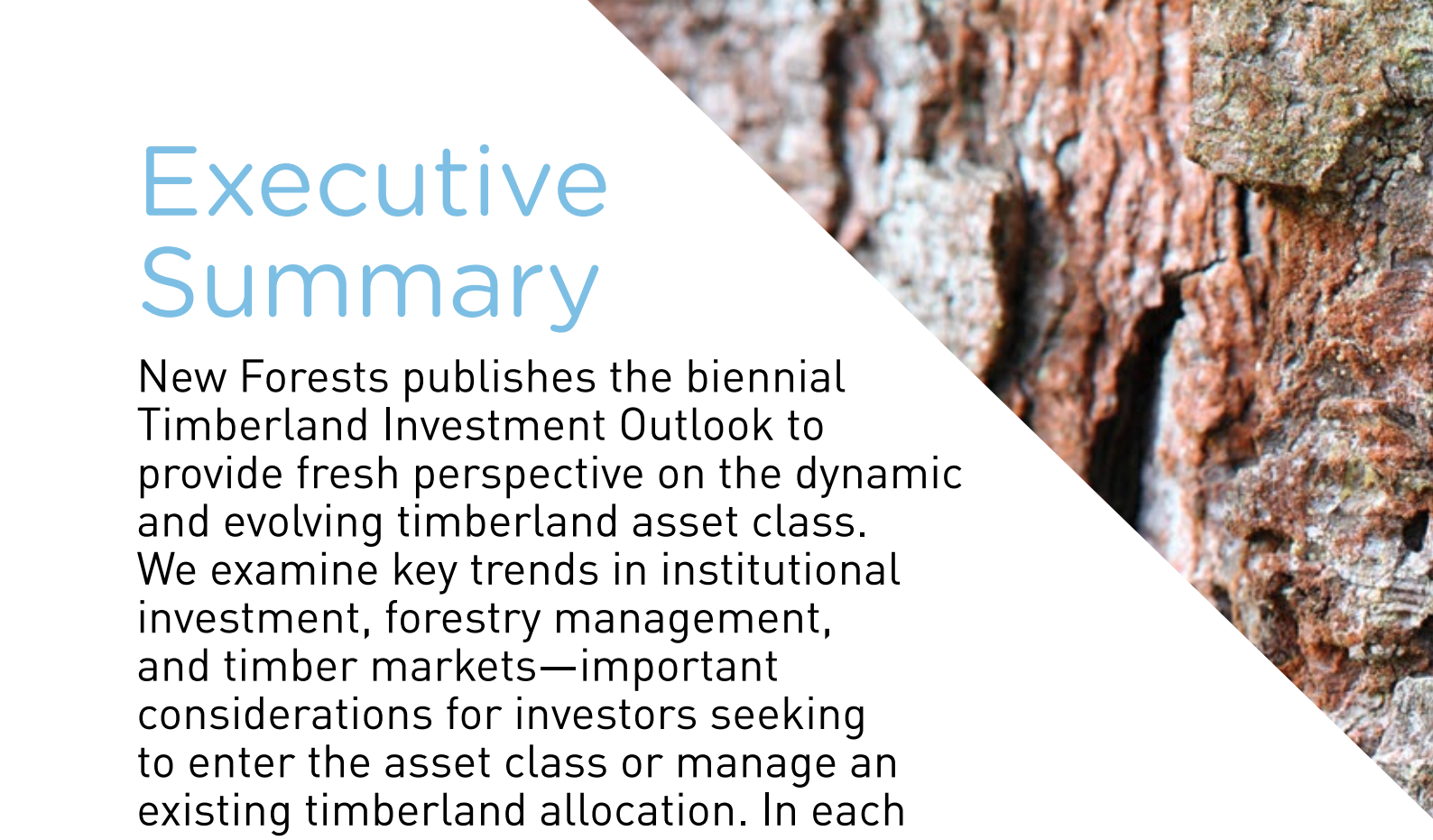




Executive Summary

New Forests publishes the biennial Timberland Investment Outlook to provide fresh perspective on the dynamic and evolving timberland asset class. We examine key trends in institutional investment, forestry management, and timber markets—important considerations for investors seeking to enter the asset class or manage an existing timberland allocation. In each Timberland Investment Outlook, New Forests also presents a five-year outlook on investment opportunities. We believe this five-year horizon is meaningful for investment strategy, yet short enough to identify current opportunities.

In this our third Timberland Investment Outlook, we provide our view of a maturing forestry investment industry seeking to accommodate continuing institutional investment interest in the asset class. While investment in timberland grows returns will remain underpinned by the level and nature of global timber demand. Investment in productive, high-quality timber plantations will be an essential part of meeting future needs for wood for timber, energy, and biomaterials industries.

Timberland Investment Update

Timberland has grown steadily as an asset class since the turn of the millennium – the value of assets under management (AUM) by timberland investment management organisations (TIMOs) has doubled in the past ten years. Forestry has developed to be a truly international asset class, with more than USD 100 billion invested. Continued investor interest is driving competition for forestry assets in key countries such as the United States, Australia, and New Zealand, where investors now hold a substantial proportion of forestry assets. New capital allocations have also led to a growing internationalisation of the asset class, as well as an expanding secondary market for timberland sales between institutional investors.

Since the 2013 Timberland Investment Outlook, there has been a surge of investor interest in real assets such as timberland. It has been suggested that two-thirds of large institutional investors plan to increase allocations to real assets to 20% over the next two decades.[1] New Forests' own experience has been a steady to increasing appetite from our clients for more timberland investment as interest rates sit at record lows and yields in traditional asset classes fall. Portfolio diversification, good risk-adjusted returns, and inflation hedging remain attractive benefits of forestry in the portfolio of existing and new timberland investors.

Timber Market Update

Global timber demand is growing, supported by rising world population, increasing per capita consumption especially in Asia, and traditional and new timber uses that make wood an increasingly important raw material.

Since our last Timberland Investment Outlook, the forecast rebound of North American lumber markets in line with anticipated US housing recovery has not eventuated to the level of earlier estimates. Instead, the recovery to pre-financial crisis levels now appears pushed out to around 2018. Meanwhile, strong softwood demand from China has continued to shape global softwood markets. New Zealand has become the largest supplier of softwood to China, while exchange rates have supported some marginal suppliers, like Australia, to grow market share.

The Asia-Pacific woodchip trade, which is more than 90% hardwood, saw a rapid rise of production from Southeast Asia through 2013, but this trend faltered in 2014. Vietnam appears to have hit its chip production peak in 2013 while traditional suppliers like Australia regained market share in 2014. Expectations for China's woodchip demand forecast have moderated somewhat, but demand is expected to increase with China and Japan continuing to dominate Asia Pacific woodchip markets.

Globally, pulp and paper markets are evolving with newsprint, printing, and writing papers declining, but packaging, tissues, and other biomaterials demand rising. Demand for bioenergy, biofuels, and other bio-products has increased as a range of public policies encourage a shift away from fossil fuels, though issues remain around the use of government subsidies and the net environmental impacts of bioenergy. If developed on a sustainable basis, the bio-economy is poised to be a major source of wood fibre demand and a significant boon to certified timber producers that can meet both regulatory and consumer demand for sustainable feedstock. We anticipate potentially transformational shifts as some products and technologies in the spheres of biofuels and biomaterials such as Cross Laminated Timber for construction achieve commercial scale.

Investing in the Future of Forestry

New Forests believes rising timber demand and limits to natural forest wood supply will drive investment into high-productivity plantations. Intensive plantation management and productivity gains will be driven by a combination of technological advances and a concerted focus on improved growth, yield, and wood quality. However, any significant increase in timber output must be balanced with demand for the environmental services that forests and other ecosystems provide. Investors today are starting to see opportunities in conservation management strategies within the forest sector, including carbon markets, mitigation banking, and other conservation finance mechanisms. Land is a finite resource, and the demands on ecosystems are growing. In order to ensure long-term outcomes and de-risk investments, investors must account for increasing land competition, the value of ecosystem services, and the imperative to produce more goods without further deforestation and habitat loss. New and innovative approaches to forestry and land investment could help support a shift to responsible landscape-level management strategies.

The Landscape of Investment Opportunities

The maturity of timberland investment markets has contributed to increased competition for assets, discount rate compression, and reduced investment returns. North America, Australia, and New Zealand remain the most significant regions for forestry investment, but much of the expansion in the asset class is expected to come from emerging and semi-mature forestry markets, such as Latin America, Asia, Africa, and Europe. However, while we expect that institutional forestry investment in markets other than the US, Canada, Australia, and New Zealand will continue to grow, 80-90% of the timberland investment activity will remain in those four countries over the next five years.

As investment in timberland grows and the market matures, we expect the rise of secondary markets, where TIMOs, Real Estate Investment Trusts (REITs), and direct investors sell assets among themselves. This is already evident in the US, but we see this extending to other regions like Australia and New Zealand. In a maturing market, the liquidation of assets in a timberland fund may mean that it will be difficult to re-invest in a new portfolio of assets at the same or better level of pricing as those being disposed. This dynamic is now leading some investors to consider ways to convert funds or investment programs into permanent capital vehicles, offering long-term and stable exposure to quality assets secured at attractive pricing. We also expect greater specialisation and differentiation by managers and continuation of the trend in industry consolidation.

Investors must consider a range of factors when investing in timberland. The asset class now offers a variety of market exposures, management strategies, and a range of risk-adjusted returns. This third Timberland Investment Outlook provides insight as to how the forest sector and institutional investment trends may combine to provide attractive investment opportunities. We also look to encourage the ongoing shift of forestry to a high-quality, well-capitalised sector with long-term management horizons that generate not only attractive risk-adjusted financial returns but also result in benefits for our society and our environment.

Forestry – The Growing Asset Class

Institutional investment in forestry is now a USD 100 billion industry. Investors acquire timberland to generate returns from a combination of harvest income and long-term capital appreciation. Timberland has been an attractive asset class for institutional investors due to favourable portfolio attributes including low correlation to other asset classes, natural inflation hedging, and low volatility of returns. Assets can also be managed on an environmentally and socially sustainable basis, which is of interest to the growing responsible investment community.

New Forests produces the Timberland Investment Outlook every two years. The 2015 Timberland Investment Outlook seeks to provide readers with a fresh perspective on the upcoming opportunities, strategies, and challenges facing institutional investors in forestry. Most of the major trends identified in earlier editions of the Timberland Investment Outlook remain. An overarching trend that has continued over the last two years is the growing portfolio allocation to real assets by institutional investors, which drives demand for forestry assets.

New Forests believes that as institutional ownership of forestry assets increases, access to primary asset sales (e.g. government privatisations, corporate sales, and consolidation of small private forest holdings) will decline and there will be more secondary transactions among and between TIMOs and REITs, more internationalisation of the asset class, and more direct investment by large institutional investors seeking to minimise transaction and management costs in maturing markets. This will also push TIMOs to expand into new geographies and markets, as well as to seek out value-adding investment strategies and management approaches to generate better returns. We explore some of these opportunities in this Outlook, including emerging markets, the bio-economy, new technologies, and conservation finance. The Timberland Investment Outlook also reviews global timber production and trade, recent transactions, and market conditions. We welcome your review and feedback on our 2015 Timberland Investment Outlook and hope this publication spurs fruitful debate around the opportunities for the further expansion of the forestry asset class.

Timberland Investment Update

While timberland investment has been growing steadily since the first transactions by institutional investors took place in the 1980s, the sector is now further buoyed by rising institutional interest in alternatives to traditional financial assets such as equities and fixed income. Investment in what are known as real assets—such as forestry, agriculture, infrastructure, and real estate—is growing. In this section, we review key trends underpinning rising interest in timberland investment, the diversification of the asset class in terms of geography and investment structures, and how investment managers are responding to the market.

Real Assets on the Rise

Real assets are set to ride the trend of increasing investments in alternative assets, an investment category that includes a range of non-traditional financial assets, such as hedge funds, private equity, commodities, and real assets. Investment in alternatives has grown at double the rate of traditional financial investments since 2005—contributing to a total doubling of assets under management (AUM) in alternatives and reaching an all-time high at USD 7.2 trillion as of 2013.[2] The alternatives market is expected to grow at an average annual pace of 5% over the next five years, and larger, sophisticated investors may look to investments in illiquid alternatives where they can seek illiquidity premiums and be exposed to beta-driven strategies.[3] It has been reported that two-thirds of institutional investors who manage at least USD 2 billion plan to increase allocations to real assets and that individual portfolio allocations to real assets would grow to 20% over the next two decades.[4]

New Forests' own experience has been a steady to increasing appetite from our clients for more timberland investment. We have seen our clients—typically large public and private pension funds in Europe, Australia, and North America—invest increasingly into forestry, agriculture, infrastructure, energy, and real estate. New Forests recently asked 30 of our clients about their real asset allocations, which suggested large institutional investors were now targeting portfolio allocations of around 10-15% for real assets.

The driving force behind the real assets trend is a confluence of factors including record-low interest rates in many economies, falling yields in traditional asset classes, more sophisticated portfolio allocation policies, and the ever-increasing track record of returns from real assets like forestry.

Since the global financial crisis of 2008, investors have seen a decline in interest rates as monetary policy in key regions has sought to support growth amid difficult global financial conditions. This has diminished investors' capacity to earn strong, non-volatile returns. While yield has fallen and the outlook for growth has declined, demand for low-risk and income-producing assets has increased. The growing number of pensioners in the aging societies of OECD countries has created more demand for stable sources of income. Many institutional portfolios within the pension or defined-benefit sector are facing long-term liabilities but are also significantly underfunded, as expected returns from traditional asset allocations fall short of rising liability requirements. This asset-liability mismatch has led to financial strain and a boost in demand for longer-term real asset investments. There is a view that long-term institutional investors can gain an illiquidity premium by holding real assets. Real assets may offer defensive characteristics in a recessionary climate due to their long investment horizons and generally predictable cash flows. Real assets display a low correlation against other traditional asset classes and can offer a natural hedge against inflation. In the case of timber, value is derived in large part from biological growth, so the asset is naturally appreciating in value over time.

Also driving interest in real assets are longer-term concerns about climate change, population growth, resource scarcity, and food security. Growing populations mean more demand for housing, furniture, food, and fibre, all of which are likely to translate into greater demand for timber and agricultural products. The growing environmental crisis and climate change will force societies to deliver technological solutions around energy and resource use. As a response, institutional investors are seeking to invest in real assets that have long-term exposure to these trends, in some cases to position their portfolios to not only manage future risk but also to invest in assets that can provide sustainability solutions.[5]

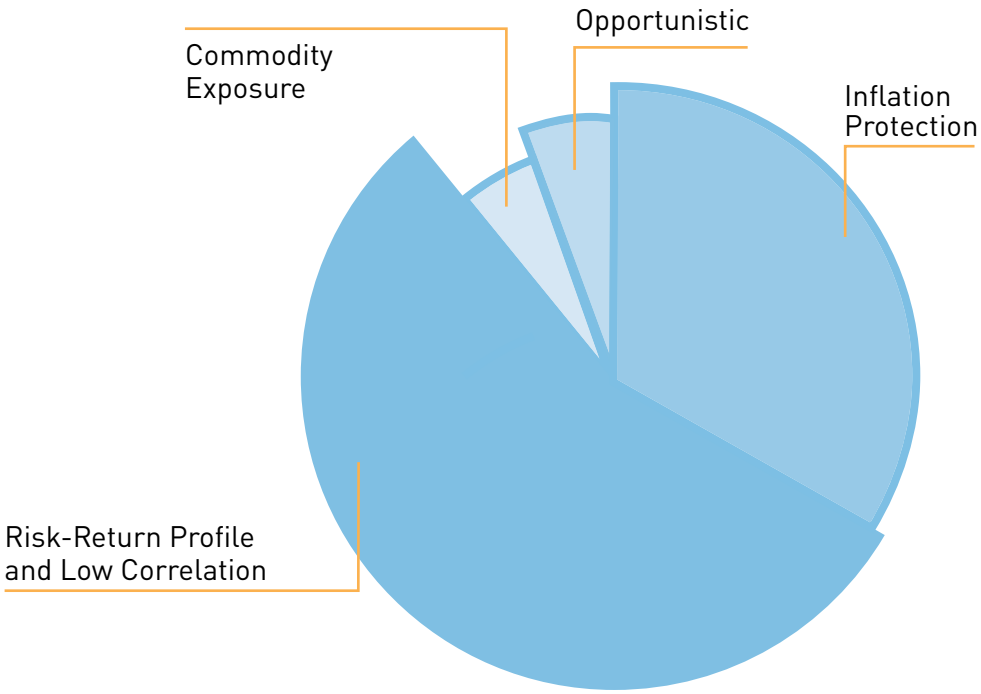
Investor Appetite for Timberland

Timberland exemplifies real asset investment characteristics. Analysis shows that the asset class can provide a hedge against inflation, has low correlation with other assets, and has better risk-adjusted returns compared to other assets. In a 2014 survey of timberland investors, KPMG found that 85% of participants anticipated being net buyers in 2014, and 72% anticipated making significant timberland acquisitions in the next 12 months.[6] This sentiment is supported by a recent survey of New Forests' clients in which we asked what role timber played in constructing their real asset portfolios. The primary reason identified for investing in timberland is the attractive risk-return profile, followed by inflation hedging characteristics of the asset class.

In addition to the portfolio considerations above, our clients noted that the sustainability of the asset class was also an important driver of interest in forestry investments. Our clients were not only interested in assets achieving third-party forest certification but also in understanding the net positive environmental and social impacts of the forestry assets in which they have invested.

The majority of our clients indicated that they would invest more in timberland over the next one to two years with a few noting they would opportunistically invest. Most of our clients have timberland allocations at 1-3% of their overall portfolios with a few targeting 3-8%.

Figure 1: Primary Purpose of Timberland in Portfolio



Source: New Forests data, January 2015. Chart shows number of responses with one response per client.

Investible Universe of Timberland Assets

Today, 30 years after the first investments were made in the United States, institutional timberland investment has reached the USD 100 billion mark. From the 1990s and into the mid-2000s, institutional timberland investment took root in the US forest sector as vertically-integrated companies sold down assets to TIMOs, real estate investment trusts (REITs) came to prominence, and institutional buyers found that timberland offered portfolio diversification alongside returns with low volatility. In North America today TIMOs manage nearly 11 million hectares of forests and REITs manage a further 7 million hectares.[7]

Timberland has grown steadily as an asset class since the turn of the millennium—the value of assets under management by TIMOs has doubled in the past ten years. Around USD 35 billion is held by timberland REITs today with another USD 65 billion invested through TIMOs or held in direct investments by large institutions. This totals around USD 100 billion of current investment

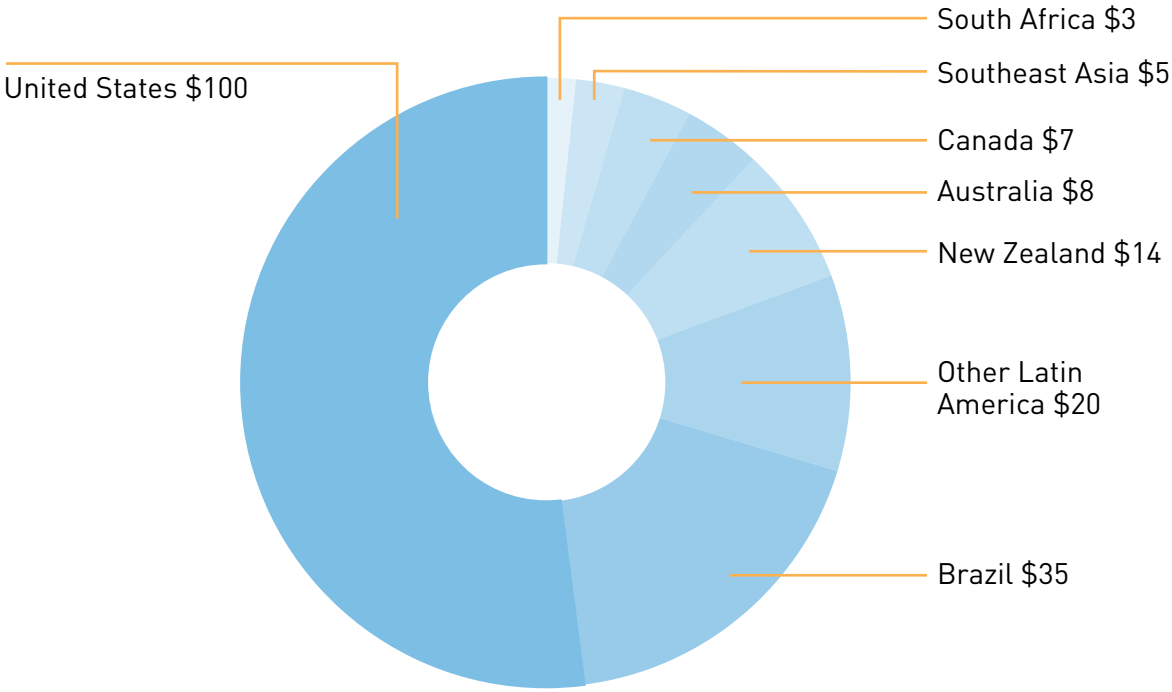
while New Forests estimates the total timberland investment universe at around USD 190-200 billion **(see Figure 2)**, based on the area and value of potential assets suitable for institutional investor ownership, i.e. investible assets. Other estimates of the timberland investment universe may range much higher, depending on the boundaries. In our view, the possible investment universe has increased in value moderately over the past two years, primarily as a result of higher prices being paid per hectare in the US and New Zealand. New Forests suggests that roughly half the possible timberland investment universe is in the US, with the remaining half across the rest of the world.

To get from USD 100 billion already invested to the larger universe suggested above, institutional ownership of forests will have to expand through the further privatisation of government assets, exit by corporate owners from their forestry holdings, consolidation of smaller private forest holdings, and development of new plantations.

A significant proportion of the high-quality timberland estates in the US, Australia, and New Zealand is already in institutional ownership, and these countries represent the most mature forestry investment regions.

Much of the expansion in the asset class is expected to come from emerging and intermediate forestry markets, such as those of Europe, Latin America, Asia, and Africa. In Europe, growth potential may be found in the consolidation of private landholdings and by efforts to address scale and market barriers that may hamper large investments. In Latin America, there has already been significant institutional investment in Brazil, Chile, and Uruguay, and expansion may come from investment in more emergent markets such as Colombia and through joint ventures by institutional investors with local corporate and financial owners. Asia and Africa offer investors the potential to support a transition out of poorly managed natural forest exploitation to a sustainable plantation-based industry. New Forests' experience in Asia is that most opportunities are related to buying assets from other foreign owners; entering into joint venture partnerships with local corporate and government owners; and establishing greenfield developments where land is available and relatively inexpensive. However, the investment environments in some areas of Latin America as well as in the developing economies of Asia and Africa present additional challenges for managing environmental, social, corporate governance, and other risks. For this reason, emerging forestry markets must meet investor risk-adjusted returns that are as much as two to three times the returns sought for US forestry investments.

Figure 2 - Timberland Investment Universe by Region (USD Billion)



Source: New Forests data, June 2015. NB: Does not include Europe.

Forestry Funds, Direct Investments, and REITS

Institutional investors have several options for timberland investment types and structures. These options include subscribing to commingled funds, pursuing direct investments or separate accounts, and investing in timberland REITs. As noted in our 2013 Timberland Investment Outlook, New Forests has seen a push by some of the largest institutional investors to pursue direct investments, which aligns with a trend toward internal management of assets and efforts to reduce fees. This sentiment is also reflected in the rising interest in co-investment opportunities. Overall, however, few institutional investors have in-house timberland investment experts, and most continue to lack the scale and capacity to undertake direct investments in timberland. Therefore, the majority of investors must rely on structures offered by external managers. Most externally managed timberland investments are managed by TIMOs, while some large general asset managers may include forestry investments as part of broader real assets or combined forestry and agriculture mandates.

Figure 3 - Top 10 TIMOs by AUM

TIMO	Value (B USD)	Area (M Hectares)	Headquarters
Hancock Timber Resource Group	11.7	2.6	USA
Campbell Global	6.7	1.3	USA
Resource Management Services	4.5	1.1	USA
Forest Investment Associates	4.2	1	USA
Brookfield Timberlands Management	4	1.5	Canada
Global Forest Partners	3.4	0.5	USA
BTG Pactual	3	0.8	Bazil
The Forestland Group	2.4	1.5	USA
New Forests	2.1	0.6	Australia
GMO Renewable Resources	1.8	0.5	USA

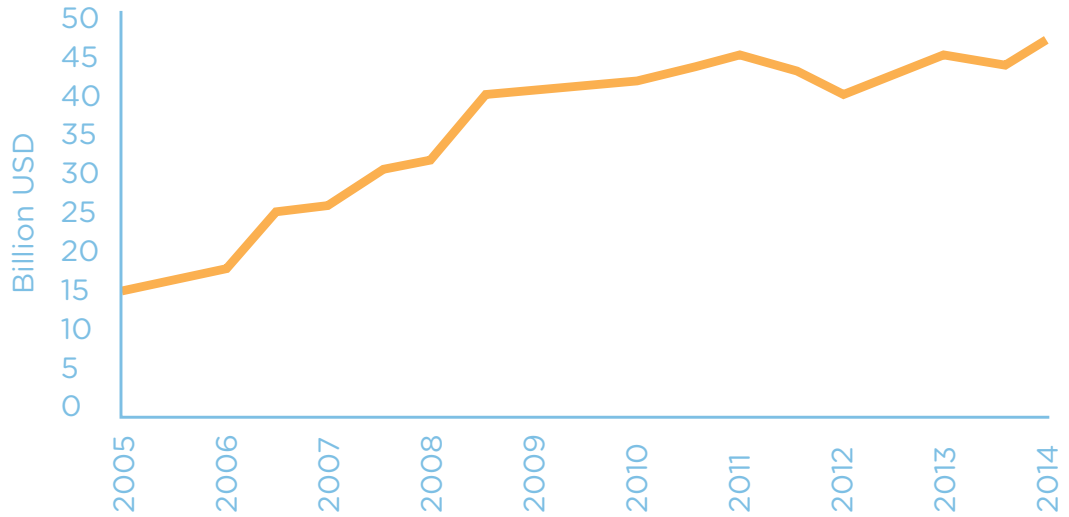
Source: RISI 2014 and New Forests June 2015 data.

The other significant buyer of US corporate timberlands has been REITs. Today's timber REIT marketplace is largely consolidated into four publicly traded companies, with market capitalisation of just over USD 28 billion.[8] Generally speaking, REITs seek to create value through maximising operating revenues and by consolidating higher-quality portfolios, which means selling off non-core or less strategic assets and improving cash yield efficiency in the portfolio. With the slowdown in US timber markets following the global financial crisis and an extended downturn in US homebuilding, both asset values and turnover were low in 2009 and 2010. However, with low interest rates timberland asset values have recovered. The Forisk Timber REIT Index reported returns of 5.71% for 2014; including dividends the total returns were 9.94%.[9] In the near term the expectation is that timber REIT performance may be boosted by the US housing recovery. However, a rising US interest rate may create volatility of returns as REITs come under pressure to improve cash yield.

TIMOs Are Consolidating and Diversifying Geographically

Over the past decade, TIMOs' AUM have more than tripled from around USD 15 billion in 2005 to at least USD 47 billion by 2014.[10] Reports on total AUM by TIMOs vary among sources, with US-based investment consultant TimberLink LLC tracking 22 TIMOs with AUM of USD 48 billion at 2014 year-end and RISI documenting USD 57 billion in AUM by the 30 largest TIMOs.[11] At this scale, TIMOs appear to currently manage around one-quarter to one-third of the potential pool of industrial timberland and plantations.

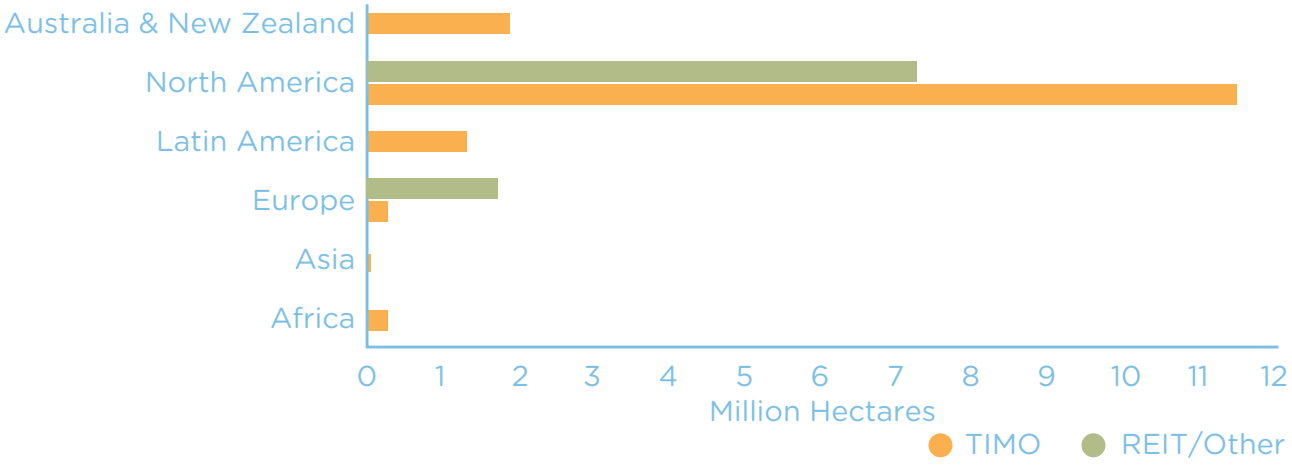
Figure 4 - Growth in TIMO AUM 2005-2014



Source: TimberLink LLC.

With the vast majority of TIMOs having originated in the United States and invested in US timberland assets, timber investments in South America have been a natural next step for many managers seeking to expand. TIMOs now manage more than 1.3 million hectares in Latin America, while the region remains dominated by privately-held and listed companies that account for more than 6 million hectares.[12] As TIMOs face challenges in expanding significantly in the Americas, some managers have been growing through buyouts of competitors. In 2012, the Molpus Woodlands Group and Hancock Timber Resource Group purchased the 1.88 million acre timberland portfolio of Forest Capital Partners and split the assets between them.[13] In some cases, mergers and acquisitions have led to the combination of separate geographic investment portfolios into complementary companies with broader range. For example, the 2013 acquisition of Regions Timberland Group by BTG Pactual saw one of the US South's largest timber managers purchased by a Brazilian asset manager with an existing portfolio focused in South America.[14]

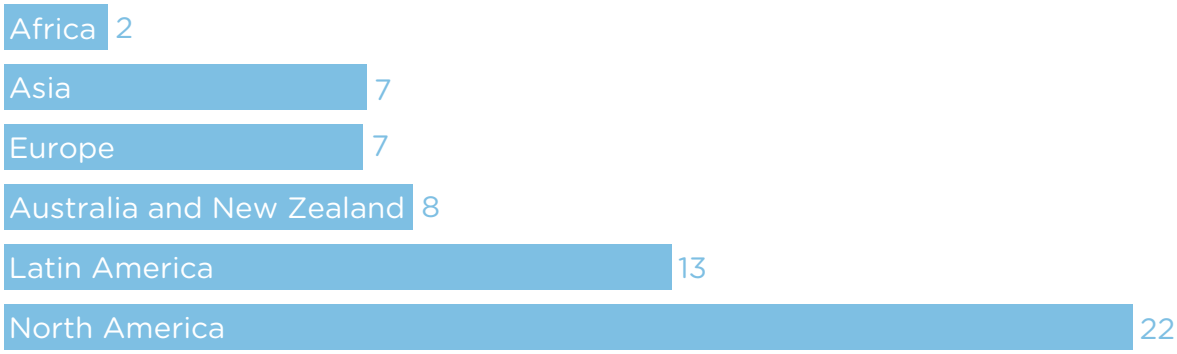
Figure 5 - Global Private Forest Investment Ownership in 2014



Source: RISI International Timberland Ownership and Investment Database, 2014.

Secondly, well established TIMOs that are already diversified within North America are in some cases acquiring, or seeking to acquire, entry assets in Latin America, Australia, and New Zealand. Several TIMOs have entered new regional markets through single acquisitions, typically on a separate account basis, followed by offering commingled funds that are either global or targeting expanded geographies. In the case of New Forests, we established our business in Australia and New Zealand and have expanded into a broader Asia-Pacific region with our Tropical Asia Forest Fund, which was closed in 2013. Also in 2013, large asset manager Brookfield – with significant holdings in both South and North America – set the stage with a USD 1 billion global fund. This was followed by American TIMOs that had previously dipped their toes in international waters with individual investments or smaller global funds making more concerted efforts to take larger global positions. In 2015, the US-based Campbell Global announced an expansion into new markets with a global fund that will invest in Latin America and Australasia.[15] As another example, RMS announced in 2015 it will be marketing its second international fund, targeting up to USD 500 million while also offering a separate US-only fund.[16] As **Figure 6** shows, the largest TIMOs are now diversified across several regions or at least seeking to acquire assets in more regions.

Figure 6 - TIMO Diversification: Number of Top 30 TIMOs Operating by Investment Region



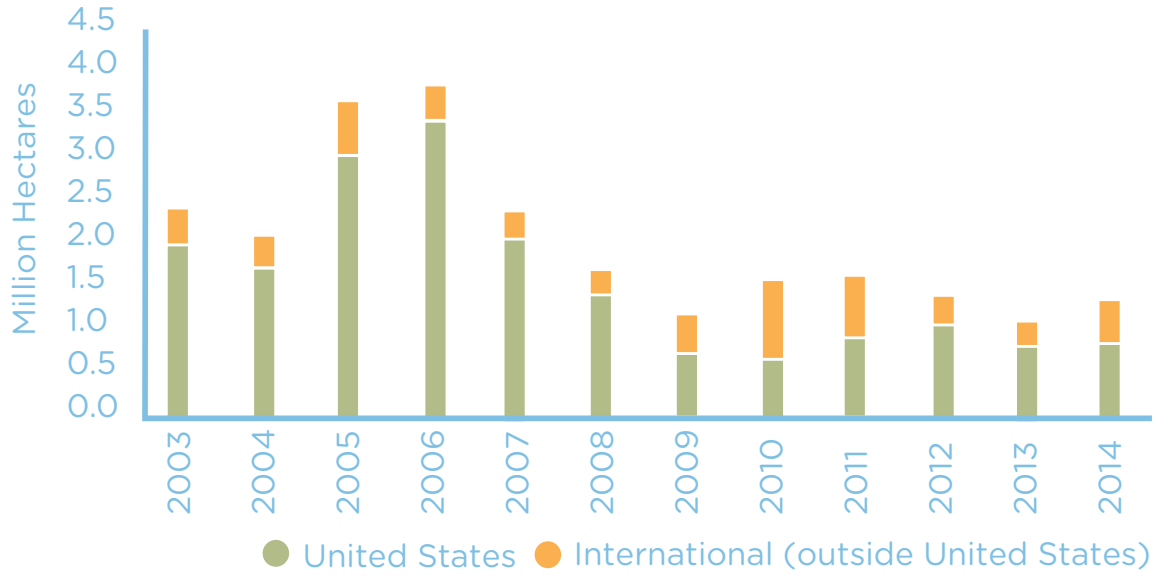
Source: RISI 2014 and New Forests June 2015 data. N.B.: Shows the number of TIMOs operating in each region, with most TIMOs operating in more than one region. Includes data for the 30 largest TIMOs globally.

Timberland Market Trends

In our 2013 Timberland Investment Outlook, New Forests reported on how the nature of timberland returns is changing. We predicted that declining discount rates, mainstreaming of secondary revenues, and the search for higher returns outside the US would continue to push timberland investors to seek new opportunities in a maturing asset class. These conditions remain largely in place, and the drive for attractive forestry investment opportunities is only stronger in light of the current economic environment. As **Figure 7** shows, the annual area of timberland transactions

has not yet recovered from a peak in 2006. Over the past five years, annual total global timberland transactions have averaged about 1.4 million hectares per year. However, as investors feed the drive for new acquisitions, the proportion of transactions occurring outside the US has increased dramatically. From 2010 to 2014, the average proportion of timberland transactions occurring outside the US averaged 39% per year (by area), compared to only 20% from 2000 to 2010.[17]

Figure 7 - Timberland Transactions in the United States and Internationally



Source: New Forests' analysis of RISI data.

New Forests expects transaction volume to continue to rebound. The recovery in asset prices will support a decision by investors to exit from investments made between 2000 and 2010. While timberland markets remain relatively opaque, the US market has by far the greatest availability of transaction and returns data by which to measure the asset class. US timberland transactions totalled USD 2.6 billion in 2014.[18] In 2014, the National Council of Real Estate Investment Fiduciaries (NCREIF) also reported total returns for its US private timberlands index of 10.48%. This marked four years of improved returns.[19]

Rising Competition and the Outlook for Discount Rates

There is ongoing evidence that discount rates are in a downward trend in all heavily traded timberland regions, led by discount rate compression in the US. Discount rates vary by region, in line with differences in sovereign, market, physical, and other risks. KPMG's 2014 annual timberland investor survey found that almost 60% of US timberland investors were applying real discount rates of 5-6% (down from expectations of 6-8% discount rates in 2012).[20] However, the survey suggests the downward trend may not continue, with more than half of respondents expecting real discount rates to stay stable over the next two to three years.[21] Anecdotal evidence suggests that actual transactions are occurring at real discount rates as low as 4% in the US South, suggesting investor demand is exceeding asset supply.

In Australia and New Zealand, New Forests has found strong transaction evidence of downward pressure on discount rates in both softwood and hardwood assets. While Australian hardwood assets had previously traded at higher discount rates to softwood assets—reflecting distress in the now defunct managed investment scheme (MIS) industry—discount rates have declined as all major forestry MIS assets have been sold out of receivership and the market has stabilised. In some cases, New Zealand pine assets are selling at implied discount rates of around 5-6%, which is in line with return expectations for similar softwood assets in the US Pacific Northwest.

Given that the New Zealand and Australia timberland market is now maturing with more active investment managers competing on deals, there may be continued pressure on investors to keep discount rates low to secure assets. It could also be argued that discount rates in Australia and New Zealand may converge with those in the US market given the comparable political and business risk environment, higher tree growth rates, and exposure to the important Asian markets.

In Latin America the most established plantation growing areas such as Chile, Uruguay, and parts of Brazil are now transacting at real discount rates of around 7-10%. Discount rates in the region are considerably lower than a decade ago as the market has gained experience with investment in plantations. Chile can now be considered a mature forestry market similar to Australia or New Zealand, with a significant plantation base and some initial transactions occurring between domestic corporate owners and institutional investors. Elsewhere in Latin America, in countries with less mature or developed forestry plantation infrastructure and markets, discount rates are more on par with those found in other emerging markets.

Asia and Africa still represent the most emerging edge of forestry investment. There is little institutional investment in forests in either region. Both regions have relatively high discount rates, with real discount rates in Indonesia and Malaysia for example ranging from 9-15%. It is important to note that the discount rates applied by institutional forestry investors are also different from the cost of capital associated with forestry investment by other entities. Domestic or regionally-based corporations may apply a lower discount rate to projects in their home region or have access to debt finance at a much lower cost than foreign equity investment. As forestry investment matures in emerging markets, we may begin to see a convergence of the discount rates applied by institutional investors with the cost of capital available to local forestry companies.

Seeking Value beyond Timber

In the 2013 Timberland Investment Outlook, New Forests noted that growing competition for deals has intensified the need for managers to further enhance secondary revenues to augment core timber value. Revenue streams from highest and best use (HBU) sales strategies, recreational use of timberland, sale of conservation easements, and environmental markets are now commonplace across timberland portfolios. These upside opportunities are increasingly being realised in large scale transactions. For example, in late 2014 Plum Creek agreed to sell approximately 165,000 acres of forestland in Montana and Washington to The Nature Conservancy (TNC), enabling TNC to meet conservation objectives and Plum Creek to sell off less productive timberlands that had higher value in ecological and recreational use. In Australia and New Zealand timberland managers must carefully balance HBU in the context of plantation estate rationalisation and competing land use. Some of New Zealand's high-quality plantation timberlands have been reverted to dairy farming as part of the country's dairy boom. In Australia as much as 400,000 hectares, or around 40%, of the country's eucalyptus plantations, are expected to be reverted to agriculture rather than be re-established to timber plantations after harvest.

In the US where HBU strategies have become mainstream sources of secondary revenues, TIMOs are now pushing the boundaries to seek more value beyond timber. For example, timberland owners that can create strategic partnerships with conservation organisations can benefit from expertise in conservation management and potentially greater access to grant funding and novel sources of finance to support asset management. In addition, there is also growing in-house capacity within TIMOs in areas such as payments for ecosystem services, bioenergy markets, and application of new technologies. New Forests expects to see more specialist investment managers targeting assets that meet requirements for multiple revenue streams in the coming years. This is supported by a spate of recent large-scale combined conservation and timber transactions and the emergence of specialist consultancies as well as the mainstreaming of secondary revenues in traditional timberland investment strategies.

Timber Market Update

Forestry asset value is largely driven by tree growth rate and the value of timber products, and so investors must understand how changing patterns of global timber consumption intersect with shifting production of timber products from the world's forests. Global timber demand is increasing, supported by a rising world population, increasing per capita consumption especially in Asia, and traditional and new timber uses that make wood an increasingly important raw material. Nowhere is this more prevalent than in Asia, with China continuing to require increasing volumes of imported timber. China's growth is slowing – but still positive – and timber markets are responding to this sustained appetite. In this timber market update, we focus on some of the key trends in place since our 2013 outlook was published.

Key timber market trends since our last Timberland Investment Outlook

• Softwood demand in China remains strong, but substantial changes in underlying currency exchange rates have reduced the competitiveness of US log exports and supported increasing market share for New Zealand, which is now the largest log exporter to China, as well as other countries like Australia.

• The US housing market has not recovered as strongly as expected, and there remains substantial excess softwood timber supply in both the US South and Europe.

• China and Japan continue to dominate hardwood chip demand. China has surpassed Japan as the leading hardwood chip importer. Combined China and Japan import volumes of both softwood and hardwood chips increased in 2014. Vietnam became the largest hardwood chip exporter, but appears to have peaked and future supply may be restricted by policies seeking to encourage domestic processing.

• Pulp and paper markets continue to evolve with newsprint, printing, and writing papers declining, but packaging, tissues, and other biomaterials rising.

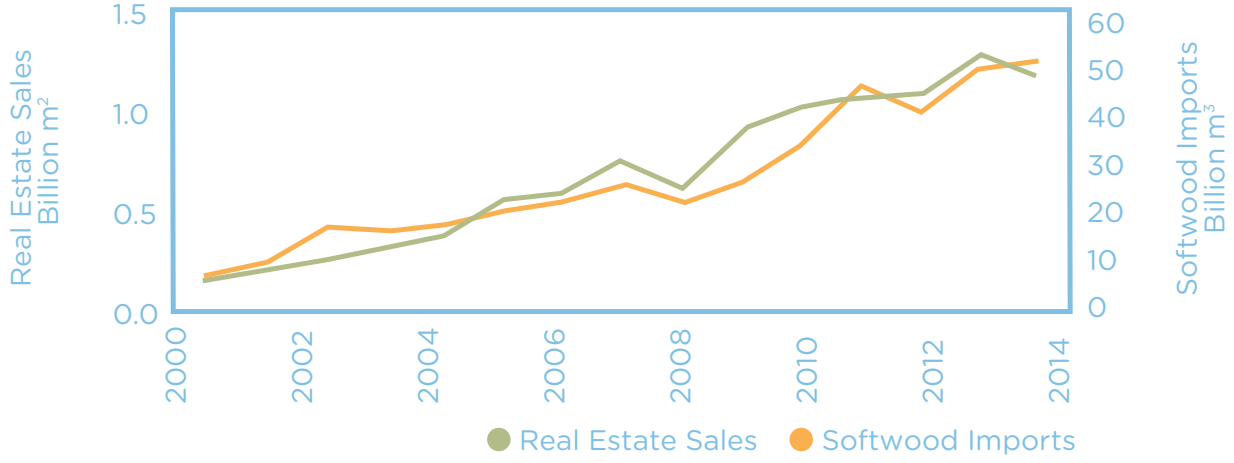
China as a Magnet for Global Softwood Trade

The volume of both softwood logs and lumber imported by China ended at all-time highs in 2014. This included nearly USD 12 billion of logs, representing 51.4 million cubic metres and an increase of 26% by value and 14% by volume from 2013. Of this, softwood logs represented 70% of 2014 log imports by volume.[22] Over the past decade, China's imports of logs have increased at a compound annual growth rate of 4.5%, while imports of lumber increased by an average of 21% annually.[23] The main driver of softwood log consumption in China has been the growth in the real estate market, underpinned by population growth, rural to urban migration, and speculation in the property market.[24] Although there was a 9.3% drop from 2013, investment in real estate in 2014 totalled RMB 9.5 trillion (USD 1.5 trillion) and has had an average growth rate of 24.6% since 2000.[25] The tremendous rate of development means that even with some slowdown in the Chinese economy and residential construction, timber consumption is still growing at an impressive rate.

Chinese Real Estate Development and Softwood Demand

China's softwood timber demand is supported by the country's construction market, with residential housing growing around the country's many urban centres. It has been estimated that 70-80% of imported softwood log and lumber is used in the construction market,[26] which means the trade to China is closely tied to levels of construction.

Figure 8 - China Softwood Imports and Real Estate Sales



Source: National Bureau of Statistics of China and AgriHQ. March 2015.

Softwood log and lumber imports tend to be cyclical and move in tandem with real estate development. Real estate development slowed in 2014 with a rate of growth of 9.9% (real) in 2014, 9.3% lower than in 2013.[27] Government policies directed at the real estate development industry are being gradually loosened to try to prevent a housing market collapse. Early indicators suggest this has been effective. The IMF expects China's real estate market to remain soft in 2015 before slowly recovering.[28] This suggests potential softness in softwood imports over the short term, but the long-term outlook remains strong due to supply-demand fundamentals in the global softwood market.

Rising Softwood Imports to China

China's increasing timber consumption has led to growing demand for imports over the past decade, with the value of imported logs more than doubling from USD 2.2 billion in 2009 to USD 5.4 billion in 2014.[29] Over the past five years, log volumes arriving at Chinese ports have almost doubled and the source of logs has diversified greatly with softwood log imports to China in 2014 supplied by 45 countries. As recently as 2009, logs from New Zealand, Russia, and the US accounted for 93% of all softwood logs imported to China, but by 2014 these former "big three" accounted for only 76% of the market.[30] This represents a smaller share of a growing market,

although overall volumes traded continue to be strong. Some of the major dynamics accounting for these changes include:

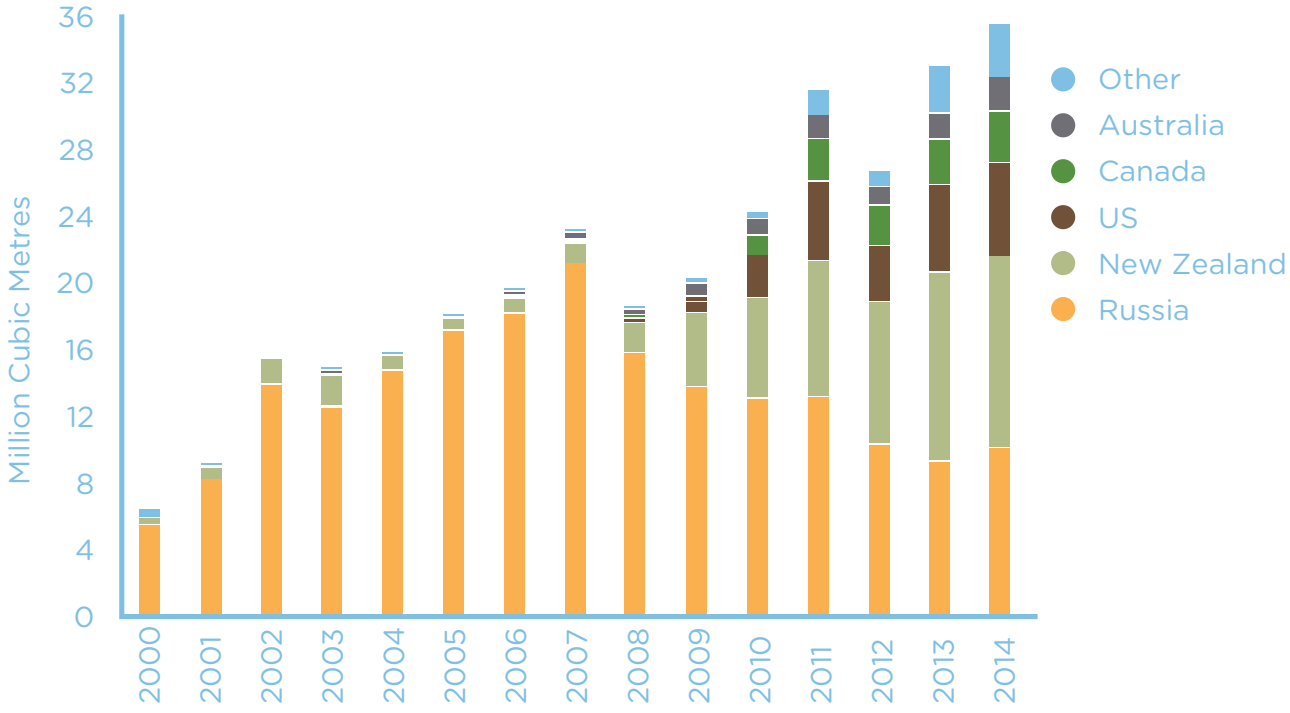
- As a result of a reduction in supply from traditional sources like Russia, together with a sharp increase in domestic softwood use for construction, China's imports of New Zealand softwood increased from 1.2 million m^3 in 2007 to 11.6 million m^3 in 2014.[31] New Zealand has now become the largest softwood log supplier to the Chinese market.

- A slower rate of recovery in the US housing market, resulting in greater capacity to export logs and lumber to growing Asian markets. US softwood log exports to China are up from just 100,000 m^3 to 5.5 million m^3 between 2007 and 2014. Canada's log exports grew from 110,000 m^3 to just over 3.0 million m^3 over the same period.[32]

- As US dollar strength has reduced the competitiveness of US softwood exports, countries like Australia and New Zealand with declining currencies are diverting softwood supply to export markets and are increasing sales in response to Chinese demand.

In 2014, New Zealand was the largest supplier of softwood logs to China, accounting for 32% of supply, followed by Russia (28%), the US (15%), Canada (8%) and Australia (6%).[33]

Figure 9 - Growing China Softwood Log Imports



Source: RISI, April 2015.

US dollar strength has reduced the competitiveness of US log exports and has supported an increasing market share for New Zealand and Australia. The US dollar index rose by 9% in value in 2014[34] and is likely to remain strong in 2015. Positive US macroeconomic data such as low inflation, lower energy costs, and an improving job market helped the US dollar rise against other major currencies in 2014.[35] Through 2015 a relaxation of quantitative easing and a subsequent increase in interest rates is likely to provide further US dollar support.[36] A rising US dollar reduces the competitiveness of US exports, including logs and lumber, on global markets. Since 2012 the spread between prices for Russian and New Zealand logs and North American logs has been widening. As US prices continue to rise, not only do other supply sources become more competitive, but there is an incentive for previously marginal sources, such as Australia and Ukraine, to increase their supply.

US Housing Market Shows Modest Recovery

The US housing market has suffered its most significant and prolonged downturn in more than 60 years, as shown by low levels of housing starts over the past seven years.[37] As housing starts continue to recover, US demand for softwood lumber is expected to pick up; however, the pace of recovery is slower than most had anticipated.

At the time of our last Timberland Investment Outlook in 2013, the "super-cycle" theory led to forecasts for a sustained period of elevated softwood prices. This expectation was supported by predictions that US housing would recover strongly in the 2015-17 period and reach 1.5 to 1.7 million units. Over the last two years, US housing starts have slowly gained momentum but have not accelerated to the extent needed to validate the super-cycle theory. In 2014, housing starts reached 1.1 million,[38] up around halfway from the bottom of about 550,000 but still well short of expectations. The outlook for a full housing recovery to long-run levels of around 1.5 million units has now been pushed out to 2018-20. While the potential exists for cyclical peaks in log and lumber demand and prices if housing starts pick up, the more likely scenario is muted in the near term.[39]

Globally, the outlook for softwood prices suggests room for upward movement from 2016-2020. Combined with strong Chinese demand, there is an anticipated tightening of the market on forecasts that Canadian production will decrease. Although Canadian timber harvest has risen each year between 2009 and 2014,[40] production is expected to peak in 2017 and then permanently decline as a consequence of the impact of the Mountain Pine Beetle infestation and increased policy constraints reducing harvests by around 40% from 1990 highs by 2020.[41]

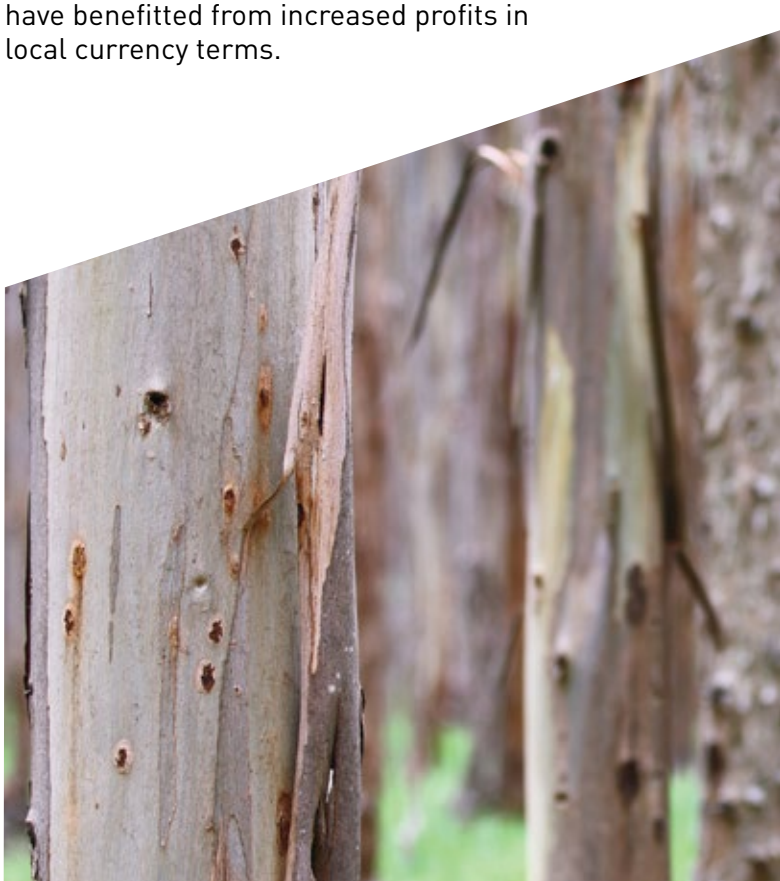
Pulp and Paper Driving Strong Trade Flows

Over the last decade, global trade in woodchips has increased steadily, reaching highs of close to 24 million tonnes in 2014.[42] The bulk of this consumption has come from Asia, with the two largest woodchip importers being Japan and China. Asia's position as a significant net importer of woodchips is consistent with the large amount of pulp and paper capacity that has been built in the region, most recently in China. As Asia's forest resources cannot keep up with demand, the region relies heavily on imports.

Woodchip Trade

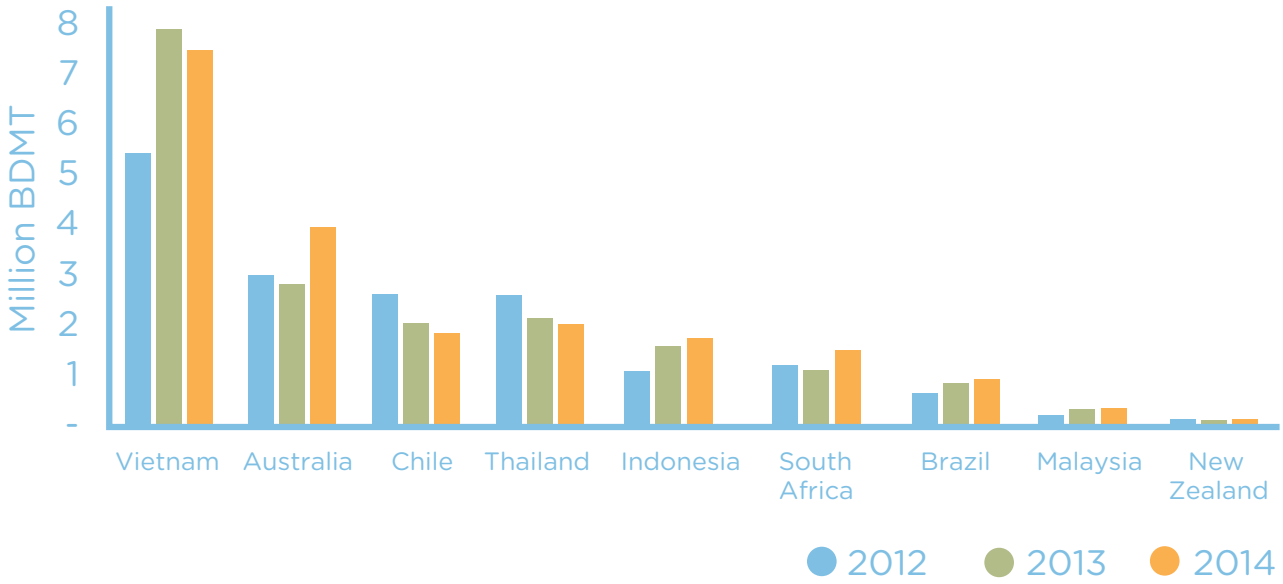
The Pacific Rim woodchip trade comprises 90-95% of the global market and is primarily a hardwood chip market supplying Asian demand hubs. The largest net hardwood chip exporting region is the Asia Pacific, with approximately 60% market share.[43] Vietnam has emerged as the top global hardwood chip exporter, having surpassed Australia, although there is now evidence that Vietnam's exports have peaked, with a fall in exports in 2014.[44] This supply peak is due to the country having rapidly logged much of its available production forest, the impact of two major cyclones, and a slowing in new plantation establishment. A government policy to limit woodchip exports from Vietnam is another major factor expected to curb Vietnamese supply. This suggests that high volumes exported by Vietnam in 2013 and 2014 may not be sustainable in the future.

At the same time, Australian exports are back on the rise since 2014, supported by a combination of factors, including favourable currency movements, new larger woodchip vessels, and the maturing of almost 1 million hectares of plantations established in the late 1990s and early 2000s. With the Australian dollar having fallen more than 25% against the USD since a peak of AUD 1.10 in 2011, Australian woodchip exporters have benefitted from increased profits in local currency terms.



Woodchip exports from New Forests' Australian estate, which accounts for roughly 40% of the country's hardwood plantations, are forecast to increase from approximately 350,000 BDMT in 2014 to 1.5-2 million BDMT by 2017.[45]

Figure 10 - Top Global Hardwood Chip Suppliers

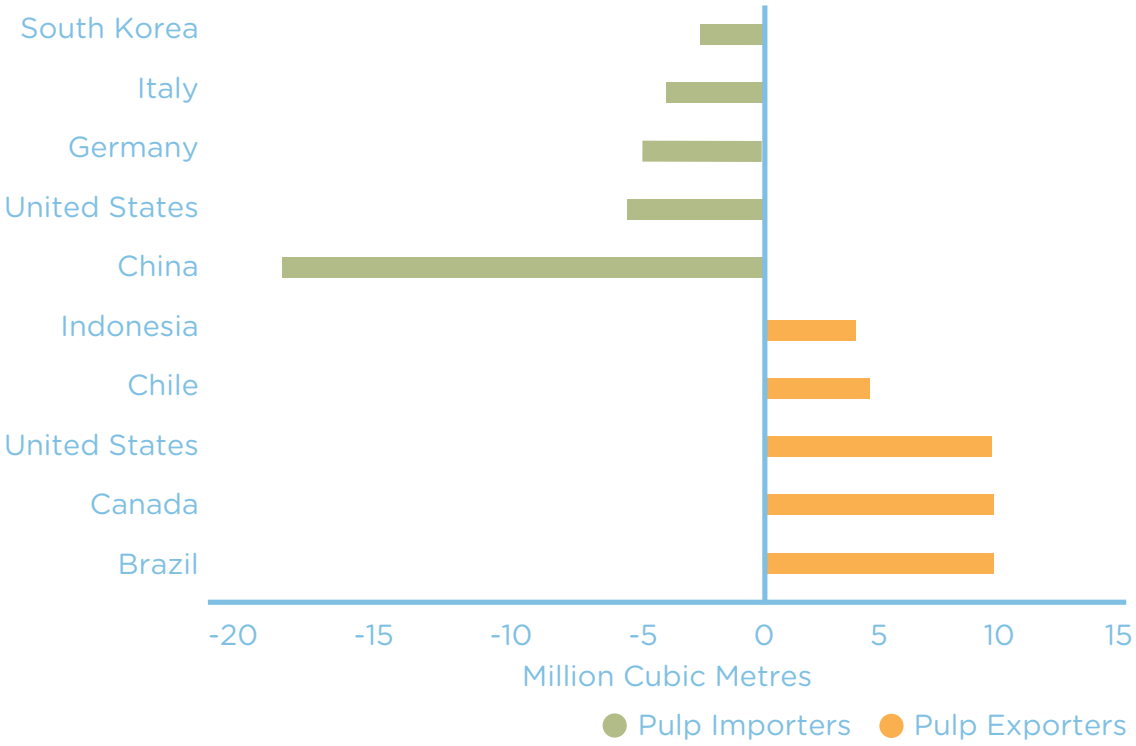


Source: RISI Monthly Woodchip Trade Review, December 2014.

Pulp Production

Pulp production is an important segment of the global forest products industry, with some 173 million tonnes produced annually on average over the past decade.[46] Global pulp market demand is expected to grow 1.5% in 2015 and 2.0% in 2016.[47] The price of wood pulp is forecast to increase at an annualised (real) rate of 1% between 2014 and 2017, driven by a worldwide increase in demand for paper-based packaging resulting from rising wealth in Asia.[48] The growth of internet-based e-commerce has been a significant part of this trend, spurring the need for paper-based packaging such as boxes and packaging papers used both in shipping and product packaging.[49] Population growth is also driving demand for packaging of essential goods such as processed food products, toiletries, and other consumer items.[50] However, an increase in the value of the US dollar relative to the euro and other major pulp-trading currencies so far in 2015 could adversely affect pulp forecasts.

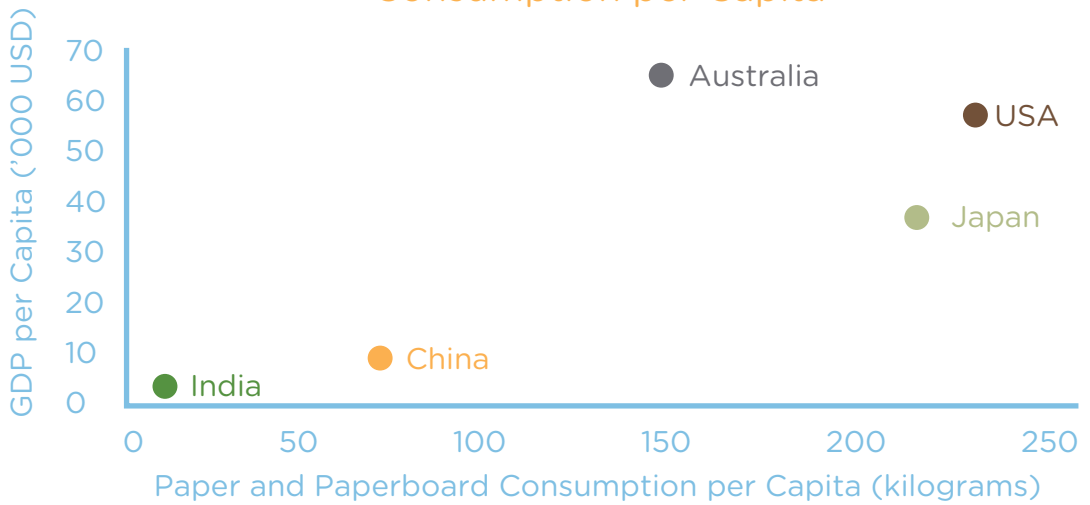
Figure 11 - Top 5 Global Importers and Exporters of Pulp



Source: New Forests' analysis of FAOstat data. Chart shows 2013 values.

As **Figure 12** shows, per capita consumption of paper-based products in developing countries like China and India is far below that of developed nations, indicating significant potential for growth. China is expected to account for one-third of global paper demand by 2019.[51] At present, per capita Indian paper and paperboard consumption is still very low, at less than 10 kg per person. This rate of consumption is comparable to that of China in the late 1980s and is only a fraction of China's current per capita consumption of more than 75 kg per person.[52]

Figure 12 - GDP and Paper and Paperboard Consumption per Capita



Source: New Forests analysis World Bank data and FAOstat data. Chart shows 2013 data.

Small Log and Pulp Log Processing in Asia

Since 2013 there has been a distinct upturn in small log and pulp log trade throughout the Asia-Pacific region. New Forests has observed this with small diameter logs from Australia and New Zealand being exported to China and India, as well as Malaysian logs being shipped to India. The first shipments of softwood logs from New Forests' Australian pine assets commenced in late 2013. While volumes have dropped off slightly as of early 2015, we believe additional processing capacity for small diameter logs in China and India may provide an ongoing opportunity to realise value, with plantation thinning operations increasingly producing small logs for export markets. Similarly, in 2013 New Forests' Malaysian plantation asset began exporting acacia logs to India. We believe this sale was among the first shipments of Malaysian plantation logs to India and provides an alternative market to domestic pulpwood markets.

China

China suffers a chronic timber deficit despite ongoing attempts to implement policies that will increase both production forests and conservation areas. At present, the plantation forestry base of China is characterised by young forests, which produce relatively low volumes of timber. The domestic industry is dependent on manual labour in many cases, which reinforces the need to produce small logs. These combined factors of labour and timber supply have led to a domestic processing sector that is organised around small log processing. The country's extensive eucalypt resource is used for pulp production but can also be peeled for panels or used as sawn wood. Growers tend to focus on the shortest possible rotation, so very little of the plantation resource in China is being managed in longer rotations to produce higher-quality and large-diameter timber. As a result, there has been a proliferation of small-scale eucalypt veneer mills processing young (i.e. less than five or six year old) small-diameter logs.

India

While the Indian market is expected to experience a slower rate of growth than China, this growth will nevertheless be sustained for many years. India has a large and growing population but has relatively scarce forest resources to service this population. Timber production and processing in the country are constrained by access to credit and infrastructure. Forest productivity is low, with a vast network of farm forests servicing small, regionally based mills.[53]

The Indian pulp and paper industry is dominated by small-scale producers and is in the process of building a more efficient and effective fibre supply through farm forestry programs. This involves amalgamating tens of thousands of individual landowners to ensure a flow of pulpwood supply. Despite this initiative, India faces an ever-widening gap between domestic wood resources and demand. Timber supply from these farm forestry plantations is expected to increase rapidly, with most companies sourcing at least 75%, if not all of their wood fibre from these plantations.[54] However, this local supply is not yet sufficient to meet market demand and the industry is dependent on pulp log imports.[55] India presents a potential opportunity for the forest products industries elsewhere in Asia as well as Australia. In many cases, the pulp facilities are designed for intake of pulp logs, and so India represents a log trade rather than woodchip trade opportunity.

Bio-economy Update

There is a rising bio-economy that offers new and potentially expanded markets for timber as a renewable input to many innovative and value-added products. These products now range from the significant wood pellet industry—which continues to apply technological advances to improve calorific load and efficiency in transport and use—to applications that were undreamt of even years ago across the energy sector, pharmaceuticals, construction, packaging, and consumer goods. New Forests anticipates the bio-economy will continue to grow, driven by the demand for renewable fibres and a shift away from fossil-fuel based energy and materials. While the emerging bio-economy is still in its early stages, there are promising technological advancements that are beginning to influence timber markets, which we discuss in the following subsections. Over the next five to ten years we anticipate key developments in the bio-economy will remain linked to more established bioenergy, dissolving pulp, and fluff pulp applications. Opportunities from more recent developments, such as nano-cellulose and new multi-story timber construction techniques, are likely to grow steadily off a relatively small base, but over time we expect these new innovations to gain scale and offer potential for increases in timber demand.

It is worth noting that there has been considerable debate about the sustainability and environmental impacts of bioenergy and biofuels, which may affect the overall viability and success of wood as a major feedstock for renewable energy. A primary concern is the origin of source material, including factors such as whether the harvest is legal, provides for a sustained yield, and includes material from native forests. A related issue is the risk of creating incentives for increased harvest or land grabbing, which could increase the rate of deforestation in some areas or lead to expansion of bio-crop plantations into areas not currently under timber production. Furthermore, there are concerns about ensuring the climate neutrality of bioenergy and biofuels. Theoretically, bioenergy combustion is carbon neutral, provided that all the biomass used for energy is replaced by an equivalent amount of new vegetation that re-absorbs the CO_2 emitted as a closed cycle. However, many bioenergy processes and biofuels are inefficient, which can lead to short-term increases in emissions as well as associated air pollution. For this reason the total life cycle assessment of the feedstock should be considered as well as factors such as processing and transportation that may contribute to overall greenhouse gas emissions in the supply chain. Generally speaking, these concerns can be addressed through incorporating sustainability criteria into renewable energy policies, as has been done for biofuel feedstock in the European Union.[56]

When using timber as a biomass input it must be sourced from responsibly managed forests in order to meet high environmental standards. The bio-economy can expect opposition if it depends on the use of illegal and/or irresponsibly harvested timber products that further drive deforestation and the loss of ecosystem services. On the other hand, if developed on a sustainable basis, the bio-economy is poised to be a major source of renewable materials and a significant benefit to certified timber producers that can meet both regulatory and consumer demand for sustainable feedstock.

The Emerging Bio-economy

Biorefinery Products

- Resins
- Platform chemicals
- Polymers

Biomaterials

- Textiles
- Nano-cellulose

Biofuels

- Cellulosic ethanol
- Biodiesel

Engineered Materials

- Cross laminated timber
- Veneers
- Glulam

Bioenergy

- Wood pellets

Bioenergy and Wood Pellets

The cost-competitiveness and low-carbon profile of bioenergy (when sourced from sustainably managed forests) are poised to continue to drive rising bioenergy demand. Traditionally, biomass demand has focused on emerging markets where biomass has been a dominant energy source for cooking and heating. Although these traditional uses are relatively inefficient for energy production, they will likely remain important in total bioenergy demand. More modern bioenergy applications can unlock greater energy efficiency from biomass supply. Potential large-scale commercial markets for alternative uses of bioenergy, such as in manufacturing, home heating, and the energy power sector, are significant and expected to grow.

Worldwide, the total installed biomass capacity exceeds 87 GW and accounts for around 5% of renewable energy capacity.[57] Approximately one-third of the installed capacity is located in Europe, with 29% in the Asia-Pacific region, and almost 20% in North America. With government policies supporting a drive for low carbon development, total bioenergy capacity may reach 130 GW by 2025.[58]

Commercial bioenergy markets are currently centred on wood pellets, which provide a moderately high calorific load considering their energy to density ratio and can be used in residential heating, co-firing applications, or dedicated bioenergy plants. Demand for wood pellets is rising, driven by government mandates for renewable energy, which vary from country to country, but include policy instruments such as feed-in tariffs, tradable renewable energy certificates, and direct government subsidies. Wood pellets made from by-products, such as sawdust and forest waste, offer attractive bioenergy material as they come from waste products, offering both economic and environmental benefits. The US South has established a growing and strong wood pellet industry, primarily supplied by wood waste from existing timber businesses.

Global wood pellet production reached a record high in 2013 at 22 million tonnes,[59] yet the current wood pellet industry is fairly concentrated. For example, the US is the world's largest wood pellet exporter, but in 2014 one plant alone accounted for more than 60% of the US's entire pellet exports.[60] That plant is the UK-based Drax energy plant, which has been progressively transitioning its fuel from coal to wood pellets. Demand from Drax helped spur a 40% increase in US wood pellet exports from 2013 to 2014.[61] The company is developing integrated pellet production and storage facilities in order to secure biomass supply. While Drax is remarkable for its large capacity, renewable energy targets of 15% in the UK and 20% in the EU by 2020 have successfully spurred infrastructure investment in bioenergy plant conversions that will require a steady supply of wood pellets. Together, Europe and North America account for almost all global pellet production and consumption. Europe is a net importer, producing 62% of global wood pellet supply, but consuming 81%.[62] North America accounts for 34% of global production but only 15% of consumption, with most of the difference being exported to the EU.[63]

New bioenergy policies in Asia and growing energy demand are now also driving growth in Asian biomass energy demand. The **case study** on the following page highlights the anticipated wood pellet demand from Japan and South Korea as the governments in both countries strive to meet their renewable energy targets. In addition, China is also a major consumer, with demand forecast to outpace North America, increasing from less than 1 million bone dry metric tonnes (BDMT) consumption in 2009 to 10 million BDMT by 2020.[64] Recent estimates of wood pellet demand to 2020 suggest that total trade in wood pellets could rise from approximately 22 million tonnes per annum in 2013 to between 50-80 million tonnes by 2020.[65,66]

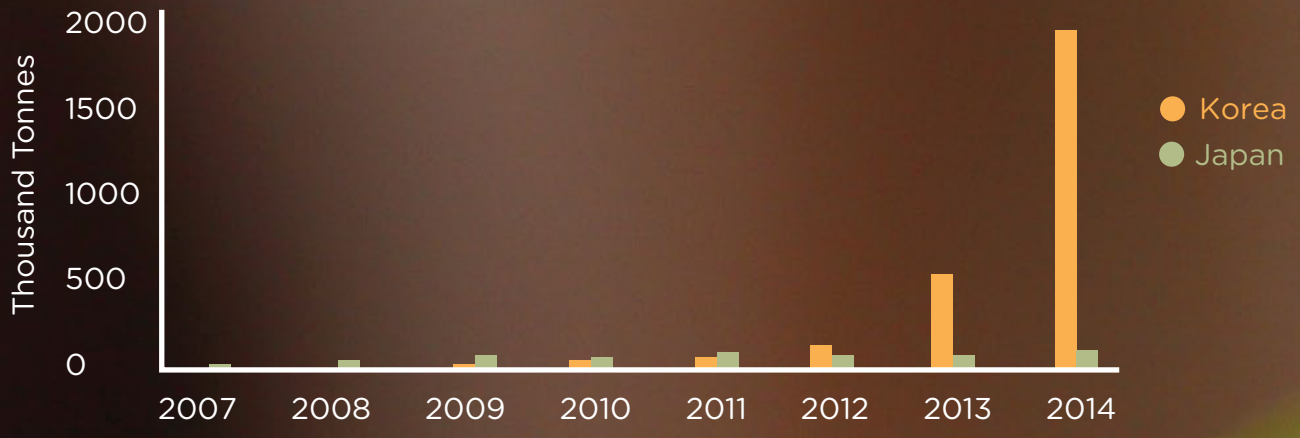
Asian Wood Pellet Demand – A Potential Game-changer for the Pacific Rim WoodchipTrade?

Wood pellets are already widely used in Europe to generate renewable energy, but renewable energy policies in Japan and Korea have prompted these countries to look both domestically and overseas for pellet supply from countries such as Vietnam and Australia.

South Korea has set a goal of importing 5 million tonnes of pellets by 2020 to support its compulsory renewable energy targets, which started in 2012, and demand for pellets has substantially increased since then. In 2014, South Korea was the fastest growing market for wood pellets in the world, with imports reaching 1.85 million tonnes, up from just 122,000 tonnes in 2012. In mid-2014 there was a shipment of biomass chip from Vietnam to Korea, suggesting rapid and growing demand for wood pellets in Asia could divert more Vietnamese hardwood from pulp markets to energy markets.[67] Exports of wood pellets from Southeast Asia to South Korea have surged in recent years, to 1.1 million tonnes in 2014, worth about USD 180 million in South Korea.[68] However, market participants have reported that as of mid-2015, many are viewing the government renewable energy targets as too ambitious. The market has slumped, with prices reportedly dropping by nearly half for wood pellets into the country, on expectations that the government may backtrack or ease commitments.

After the Fukushima nuclear disaster in 2011, Japan began to look to renewable energy to reduce its heavy reliance on nuclear power. In July 2012, Japan introduced a feed-in tariff to promote the use of renewable energy, which has resulted in an 80% increase in investment in renewable energy.[69] Japan is expected to meet 35% of its demand for electricity generation from renewable energy by 2030. [70] Some large-scale coal fired power plants have transitioned to the use of wood pellets. These pellets have been sourced from both domestic production and imports. 85% of the wood pellets have been imported, primarily from Canada, raising expectations that Japan will become one of the largest consumers of wood pellets in Asia.[71]

Figure 13 - Japan and South Korea Wood Pellet Imports



Source: RISI International Pulpwood Trade Review, 2015.

New Forests has been working with a number of parties in relation to development of new markets, such as biofuels and bioenergy. The main target for these industries is the lower grade (small dimension) material produced as part of sawlog regimes, but is also applicable to pulpwood plantations (as an alternative market) and forest or processing residues. In these markets, timber traceability will be important to ensure the Yen 24/ kWh Government feed-in tariff can be accessed. Japanese companies have suggested to New Forests that wood pellet demand in Japan within five years is likely to reach at least 5 million tonnes. Already, New Forests has seen strong indications of interest from prospective developers or bioenergy facilities who want to establish their pellet supply as part of project feasibility studies.

Biofuels

Biofuels include solid, liquid, and gas fuels that are derived from plant biomass and other living organisms. While biofuels can utilise a variety of feedstock, the issue of securing stable supply continues to be problematic for developers of new biofuel technologies who are seeking to achieve scale. To date, the most common biofuels and applications are ethanol and biodiesel for use in transport fuels. At present, most timber to biofuel technologies are not yet proven at commercial scale—at least not without subsidies. Forest management and wood processing produces by-products that are potentially of use for biofuel development, but it is likely that any significant biofuel production will require dedicated feedstock, which could come from a mix of waste streams and fast-growing timber crops, grasses and bamboos, and other crops.

While the early 2000s saw rapidly rising interest in liquid biofuel investment and development, since our last Timberland Investment Outlook the industry appears to be slowing due to a combination of factors. One such factor may be the strong backlash against biofuel expansion that came from environmentalists concerned about land grabbing, food security, and the vast area of land that might be recruited into feedstock crop development. Furthermore, falling oil prices as well as decreased momentum for international carbon markets and repeated setbacks of climate negotiations have stunted investment in renewables. However, over the medium to long term, biofuel technology is likely to play an important role in transport fuel supply. New Forests finds limited but continuing interest from biofuel developers in exploring future potential feedstock supply to support their developing technology.

Wooden Buildings Reach for the Sky

Cross Laminated Timber (CLT) is a wood composite building material that is used for construction in single or multi-story buildings. CLT is created by bonding together timber boards with adhesives to produce a solid timber panel, with alternating grain directions in each layer of timber. This type of bonding creates a stronger, more consistent product than other traditional timber products. CLT is manufactured using mostly small diameter timber. The process is energy efficient and environmentally responsible, as prefabricated panels virtually eliminate waste.

In recent years there has been a steady rise in the construction of larger CLT buildings. CLT panels have been used to build hundreds of structures across Europe and, more recently, in North America.[72] There is now a queue of developments aiming to be the largest and/or tallest wooden structures. In Melbourne, Australia in 2012 Lend Lease completed the Forté[73] building, which is Australia's first, and currently the world's tallest, timber apartment building. In addition, Lend Lease is currently developing Australia's first public CLT building, a library at the Docklands in Melbourne. Construction of a CLT residential block has commenced in the United Kingdom and when complete, will be the largest CLT structure in the world at its expected completion.[74] As of March 2015, plans to build the world's tallest wooden skyscraper emerged. The 84-metre development in Vienna comes with a EUR 60 million price tag and would house a hotel, apartments, offices, a wellness centre, and a restaurant.[75]

Figure 14 - Forté: Australia's First Timber Apartment Building

Source: Lend Lease. Reproduced with permission.

Biomaterials

The world of biomaterials is ever expanding and includes a vast range of materials derived from plant sources (e.g. timber, grasses, or agricultural crops). Innovation in this area is not only exciting but offers great potential from industrial applications to consumer goods and even to pharmaceutical uses. Biomaterials can include, for example, bio-chemicals, bio-plastics, polymers, cellulose-based fabrics, and cellulosic fibres as additives. In many cases biomaterials can substitute for or supplement another material, such as those derived from petroleum, which positions biomaterials as a sustainable alternative.

Some governments are funding research and development into biomaterials in part to offset declines in traditional pulp and paper sectors and to promote a shift to renewable-based economies while supporting primary industry. This has been the case in Canada where the federal and provincial governments as well as industry associations are making a strong push to re-orient the forest sector to a biomaterials future that could dwarf the size of the traditional industry. Example programs include the national CAD 1 billion Pulp and Paper Green Transformation Program, which ran from 2009-2012 and funded demonstration plants for new cellulosic products[76] and the Government of British Columbia in 2014 providing CAD 2.25 million to FPInnovations, a research institute focusing on applications of cellulose filaments from the province's wood pulp sector.[77]

Biomaterials innovation is also driven by large corporations seeking to diversify or recover from declining traditional forest industry sectors, such as newsprint. New products offer the possibility to re-purpose existing processing plants by shifting from traditional products into innovative biomaterials with seemingly endless applications. Large pulp and paper companies in particular are looking to the potential biomaterials boom. Stora Enso, a top five pulp and paper company, has launched a dedicated cellulosic fibre research "Innovation Centre" in Sweden[78] and has positioned itself as "the global rethinker of the paper, biomaterials, wood products and packaging industry."[79] As another example, the Metsa Group announced plans to build the world's largest "bio-products mill" that could process some 4 million cubic metres of wood with a pulp production capacity of 1.3 million tonnes.[80] Located in Finland, the mill is expected to be operational in 2017 and be affiliated with a number of bio-products businesses in addition to exporting premium pulp. Such mixed product bio-mills can produce fluff pulp for hygiene markets, dissolving pulp for textiles, and potentially a range of high-value bio-chemicals.

A well-developed segment of the biomaterials market is plant-based fabrics, such as rayon. High demand from the textile industry is now a major driver for cellulose fibre demand. Fabrics made from cellulose fibres are soft, have a smooth appearance, have similar water absorption ability to cotton, and are preferred to petrochemical based fabrics such as polyester. Lesser known textile materials made from cellulose include tencel and viscose fibres, triacetate, and acetate. A study on the cellulose fibres market forecasts the market to grow by 9.8% annually between 2012 and 2018.[81]

In summary, biomaterial markets are diverse and developing. As some forest industry players make a concerted effort to transition their businesses into new bio-products, governments are seeking to bolster research and development for the forest sector. The drive for renewable, green alternatives pushes investment into new biomaterials, and we can anticipate potentially transformational shifts as some products and technologies achieve commercial scale and demonstrate success. For example, one possible near-term success is Cross Laminated Timber, which uses wood composite panels made from cross-laminated layers as a construction material with great strength and low-embodied carbon value. The use of CLT has risen quickly over the past several years, with major developments ranging from Australia to Singapore to Europe **(see previous page).**

Investing in the Future of Forestry

New Forests believes rising timber demand and declining natural forest wood supply will drive investment into high-productivity plantations. Plantations are growing in prominence and scale, particularly in regions once dominated or entirely based on natural forest supply. As natural forest availability continues to decline, almost all incremental supply will need to come from timber plantations. Productivity enhancement and plantation area must increase for this to happen. Over time, we expect this will lead to a transition toward higher quality consistent plantation products with steady supply outpacing lower quality natural forest products from a diminishing resource base. Fast growing, capital efficient, and sustainably managed plantation estates will become increasingly vital for downstream industry.

The shift to highly productive and efficient plantation production systems is essential for addressing key environmental challenges and needs, including providing for watershed management, climate change mitigation and climate regulation, and ensuring the maintenance of biodiversity. Strategic investment in plantations can play an important role in productive landscapes that support these vital ecosystem services. We anticipate forestry investment will increasingly need to account for its environmental impacts at this landscape scale and to align with broader multi-stakeholder landscape-level planning initiatives.

Intensive Plantation Management and Productivity Gains

To meet future timber demand the world's forests must be managed to achieve high levels of productivity, using concerted efforts to improve growth, yield, and wood quality. These efforts are naturally aligned with plantation investment, as significant increases in total timber output at the scale needed would be unachievable from the sustainable harvesting of natural forests alone. Intensive plantation management strategies that focus on silviculture, nutrition, risk management, and genetics may hold the potential for significant productivity uplift. Furthermore, by increasing productivity per hectare, we can reduce pressure on natural ecosystems and seek to minimise the expansion of cultivated area used for production.

There is evidence that the most productive plantations in the world have increased their yields by 3.5% annually.[82] Over a decadal time scale Brazil's relatively young eucalyptus sector has achieved remarkable gains, with mean annual increments now in excess of 40 cubic metres per hectare per annum. This aligns with a study showing that the productivity of Brazilian eucalyptus plantations has quadrupled in just 40 years.[83] Radiata pine plantations in Australia have shown 33% increases in productivity from tree breeding in the first rotation and another 10% in the second rotation.[84] With evidence of steadily improving growth and timber recovery, plantation yields would appear poised for continued growth; however, the question is now whether such productivity gains can continue. While it is impossible to predict future breakthroughs that may positively disrupt timber production, it is expected that there will likely be some decline in the rate of yield improvement, perhaps to around 1.5% per annum.[85]

Expansion of the Plantation Forest Resource Base

The world's natural forest supply is diminishing and under pressure from resource extraction as well as the need to conserve natural ecosystems and the services they provide. Today's global forest base includes over 4 billion hectares, covering approximately 27% of the global land area.[86] However, only a small portion of this (264 million hectares) is classified as plantation forest and a further subset still would be considered industrial timber plantations capable of generating sustained, reliable, and high-quality wood fibre. Timber has a long investment horizon and rotations range from five to seven years at a minimum for pulp-quality timber to as much as 60-100 years for high-quality, slow growing, feature grade timbers. These facts beg the question of when and where a plantation forest resource base will be established to meet anticipated timber demand.

New Forests estimates that the investment needed in new plantations over the next 20-30 years could range between USD 100 and USD 500 billion to meet forecast levels of timber demand.

There is a tremendous opportunity to expand global plantation forests to the level needed to meet current estimates of future roundwood demand. New Forests has developed a conceptual model to begin to address this investment challenge.

Figure 15 shows industrial roundwood demand (including timber products, pulp and paper and industrial energy, but not including subsistence fuelwood) for three future scenarios based on per annum increases in demand of 1.5%, 2.5%, and 4%. The base 1.5% per annum demand growth represents a business as usual scenario and appears in line with expectations of various forecasting agencies. The middle scenario represents a modest increase in wood and fibre usage, especially for energy, at 2.5% and, in the highest 4% per annum scenario, a major transition to a bio-economy as forecast by WWF in their Living Forest Report.[87] The supply side is based on existing timber supply at the current production levels coming from natural and semi-natural forest of around 1 billion m^3 per year along with about 500-700 million m^3 from plantations.* The key assumption for increasing wood supply is that all incremental supply will come from timber plantations.

This conceptual analysis indicates that if industrial roundwood demand exceeds a growth rate of 1.5% per annum, then conventional timber plantation investment is unlikely to meet the supply gap. It would then be reasonable to expect that new innovations and increased investment in genetically modified trees, high yielding hyper-plantations like bamboo, and higher levels of agri-waste collection would emerge to bridge this gap. This also seems to point to a convergence of forestry and agribusiness as ever more productive crops and biomass plantations seek to meet human needs from a finite land base.

Figure 15 - Global Timber Demand Scenarios vs Potential Supply

Source: WWF Living Planet Report 2014 and New Forests estimates.

* It is worth noting that there is not a clear distinction between what constitutes semi-natural management and intensive plantations. We have set as a rough guide that plantations are human established forests generating a growth rate of more than 10 m^3 per hectare per year. Even with this proviso, the relative allocation between semi-natural forest production and plantation forest production is an estimate based on the authors' experience.

New Forests believes that plantation areas will expand across key timber producing regions, with some exceptions in temperate or Northern areas where timber regimes will remain based on managed natural forest supply, e.g. Russia, Canada, parts of the US, and much of Europe. Our analysis suggests that globally, intensive timber plantation area could exceed 100 million hectares by 2030 and produce more than 2 billion m^3 of timber by 2050.

Figure 16 - Forecast of Intensively Managed Plantation Areas and Estimated Timber Production**

Country	Potential Plantation Area 2030 (M Hectares)	Estimated Timber Production 2050 (M m^3)
US	25	500
China	20	300
Brazil	12	360
Europe*	5	75
Indonesia	5	100
Other Africa	5	75
Other Southeast Asia	5	75
India	5	75
Chile	3	75
Other S. America	3	60
Vietnam	3	60
Canada	3	40
New Zealand	2	50
Australia	2	40
Uruguay	2	40
Argentina	2	40
South Africa	2	40
TOTAL	**104**	**2,005**

Source: New Forests' estimates, June 2015.
**Europe includes exotic plantations in Ireland, UK, France, Portugal, and Spain.*

** Note that this chart is based on estimated plantation area statistics netted down by New Forests staff based on our expectation of the proportion of plantations that might meet a commercial return threshold (e.g. MAI of 10-15 cubic metres per hectare per year), then incremented in regions where we expect further plantation development, and with some increase in current plantation yields to account for new technologies, genetic improvements and management improvements. These are coarse estimates that serve mainly to explore the potential for future timber production from commercial, investment grade plantations.

Technology and Enhancing Returns

If we look at the world today there are three major areas of innovation that are transforming many sectors of the global economy: genetics and biology, energy and materials, and information technology. Development in each of these fields will have substantial impacts on the evolution of timber plantation management and the structure of forestry markets.

Genetics and Biology

The ability to sequence entire genomes, identify the functions of genes, and deploy that knowledge in a range of ways has significant implications for plant productivity across agriculture and forestry. The traditional process of tree breeding took decades to steadily improve growth rate, wood properties, and tree form. Today, specific genes that control these features can be identified and directly selected. In the more controversial area of genetic research, genes can be inserted via biotechnology to fundamentally change tree characteristics. Examples of genetic modification (GM) include inserting genes that convey herbicide tolerance (allowing herbicide overspray to control weeds without damaging the crop species), repel insect herbivory, and support drought tolerance and frost tolerance. Genetic modification also offers the potential to enhance lignin content for trees destined for bioenergy and to enhance cellulose structural qualities for trees destined for fibre production. These GM trees are already being trialled in some countries. Genetic sequencing of fungi, diseases, and insect pests is also leading to the development of synthetic bio-pesticides that are designed to have little or no environmental impact beyond the target species. In the future we may also see progress in understanding and improving mycorrhizal fungi that help trees absorb nutrients and nitrogen-fixing bacteria found in root nodules of certain plants like legumes and acacias. These types of genetic advances could dramatically alter the efficiency and rate of wood fibre production.

Energy and Materials

As discussed earlier in this report, there has been substantial work across a range of bio-based materials and engineered wood products that promise to dramatically extend the range of uses for biomass, wood fibre, and wood products. The recent history of the forest industry has seen a continuous substitution of reconstituted and engineered wood products from smaller and lower grade timber for larger timbers from older larger trees. This trend will continue as we see a range of panel, laminate, and composite products form the basis of future building systems. At the same time, innovations in architecture and building engineering are allowing substitution of wood for concrete and steel.

There is also a substantial amount of research into bio-processing of woody biomass into ethanol, biodiesel, bio-butanol, and other liquid fuels. While these liquid fuels may be facing temporary setbacks, they will ultimately prevail because they are based on a low carbon, renewable feedstock. Biochemistry is now also yielding a range of basic chemicals from wood that can be the basis of bio-plastics, resins, pharmaceuticals, food additives, sweeteners like xylitol and xylose, and flavourings. Much like the economics of petroleum refineries are based on the value of petrochemicals, we may see the pulp and paper industry evolve into a bio-refinery industry that produces a core product of cellulosic fibre, along with a fuel product such as ethanol or biodiesel and a third bio-chemical stream that produces a range of specialty platform chemicals that are sold on to the food, pharmaceutical, and materials industries.

Information Sciences

There is now evidence that substantial economic value can be unlocked by information systems and the associated deployment of information capture technologies and robotics in the forest sector. Relatively simple drones can provide near continuous surveillance of plantations to identify early insect or disease problems that can be corrected before they cause substantial damage. Remote sensing technologies such as LiDAR, Unmanned Aerial Vehicle (UAV)-based optical sensors, and even chemical sensors can reduce inventory and monitoring costs, improve accuracy and precision of estimates, and provide early warning signals of health or productivity problems.

New sensors attached to tree harvesting machinery can determine and record the length and diameter of every log cut, and in the future may even be able to assess timber strength before the log is sent to the mill. This will create additional value once implemented, as modern sawmills rely on structural lumber for profit. By conducting log sorting at the moment of

harvest, new efficiencies between forest supply and mill input can allow re-pricing of logs and higher returns to both forest owners and sawmilling assets. Moving further into the future, there may ultimately be a substitution of robotics and information sensors for sawmill and forestry workers. This might evolve from remote controlled harvesting machines to fully autonomous vehicles planting trees, removing weeds, thinning and pruning, and ultimately harvesting trees.

The rise of big data also may unlock further productivity enhancement in forestry by correlating tree species, genotypes, and even specific genes that confer optimum productivity in various soil types, climate conditions, and hazard environments. The overall expectation is that multi-decadal productivity gains of 1.5% per annum are achievable based on the experience in agriculture, but this may be exceeded in future.

In summary, the application of new technologies will allow us to grow trees faster, reduce risks, and create more value from every unit of biomass produced.

Integrating Environment and Conservation

Forestry investment has evolved beyond traditional timber management to also encompass returns driven by conservation management strategies and the valuation of ecosystem services in growing environmental markets. This market evolution is by far the most prominent in the US where significant regulatory frameworks and market-based mechanisms are now in operation. Opportunities with potential to augment traditional timberland management may include conservation easements, water trading, carbon markets, tax credits and concessions, and government conservation funding programs.

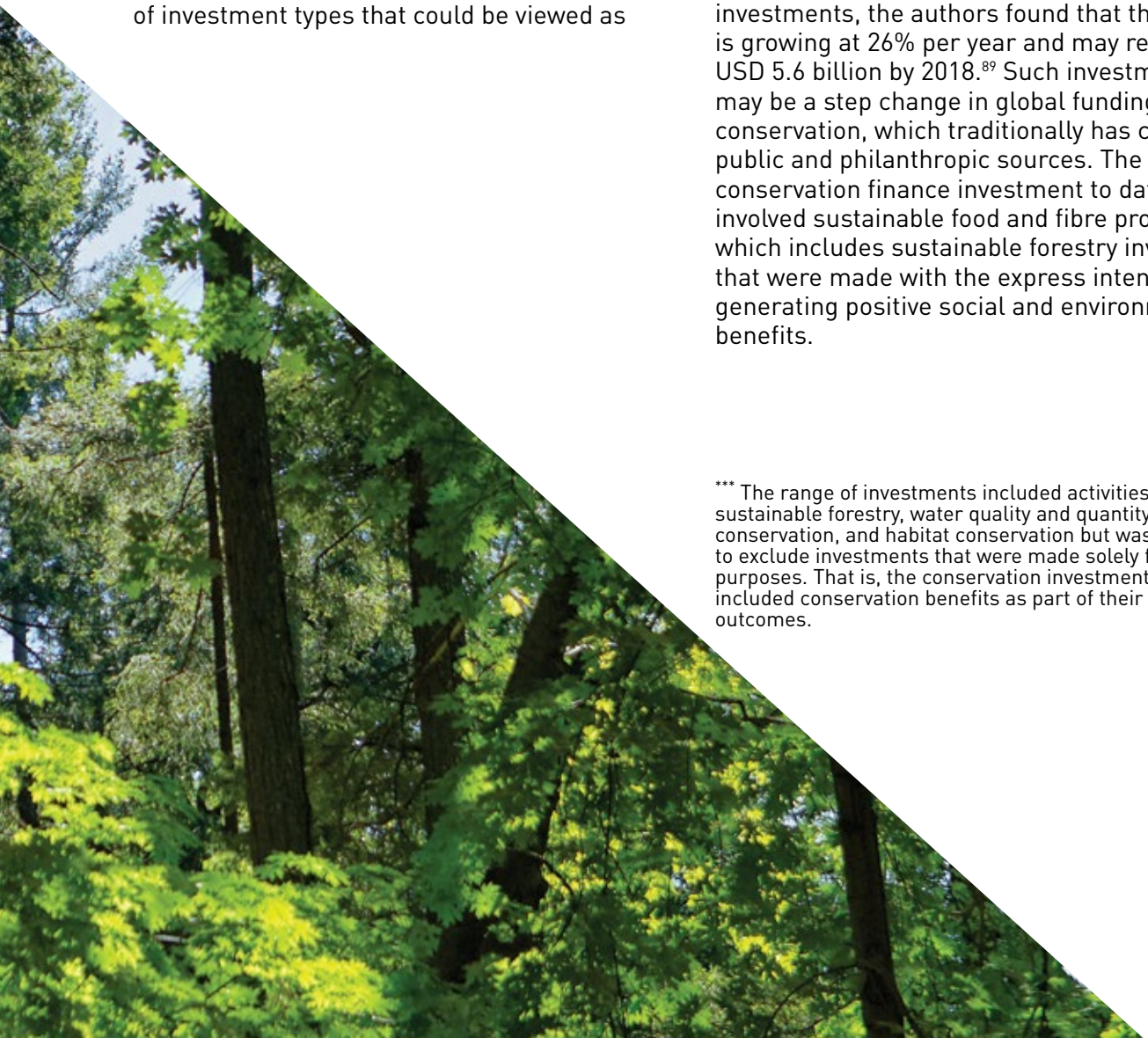
New Forests has seen a shift since our establishment in 2005 when only a few TIMOs were using market-based tools for conservation. Primary strategies at the time included selling off high-conservation value land to land trusts or securing conservation easements in exchange for management restrictions, such as committing to not subdividing properties. Today, it is not uncommon for timberland managers to include revenue from conservation strategies as a core offering, and some TIMOs even offer focused investment strategies that target conservation-related opportunities. The market is now also seeing transactions of significant scale that combine timber investment with conservation activities supported by non-profits and government. However, it does not yet appear that forestry asset valuations have advanced to account for the full potential of such secondary revenues.

As mainstream TIMOs have come to recognise the value of including conservation strategies in their timberland investment programs, there has also been progress on more innovative approaches to conservation in forestry investment and even an expansion of investment types that could be viewed as a sub-asset class or part of broader land-based investment approaches. The rise of environmental market opportunities is of particular note, including mitigation banking and forest carbon, as well as a growing track record in the field of conservation finance.

Conservation Finance Is Gaining Momentum

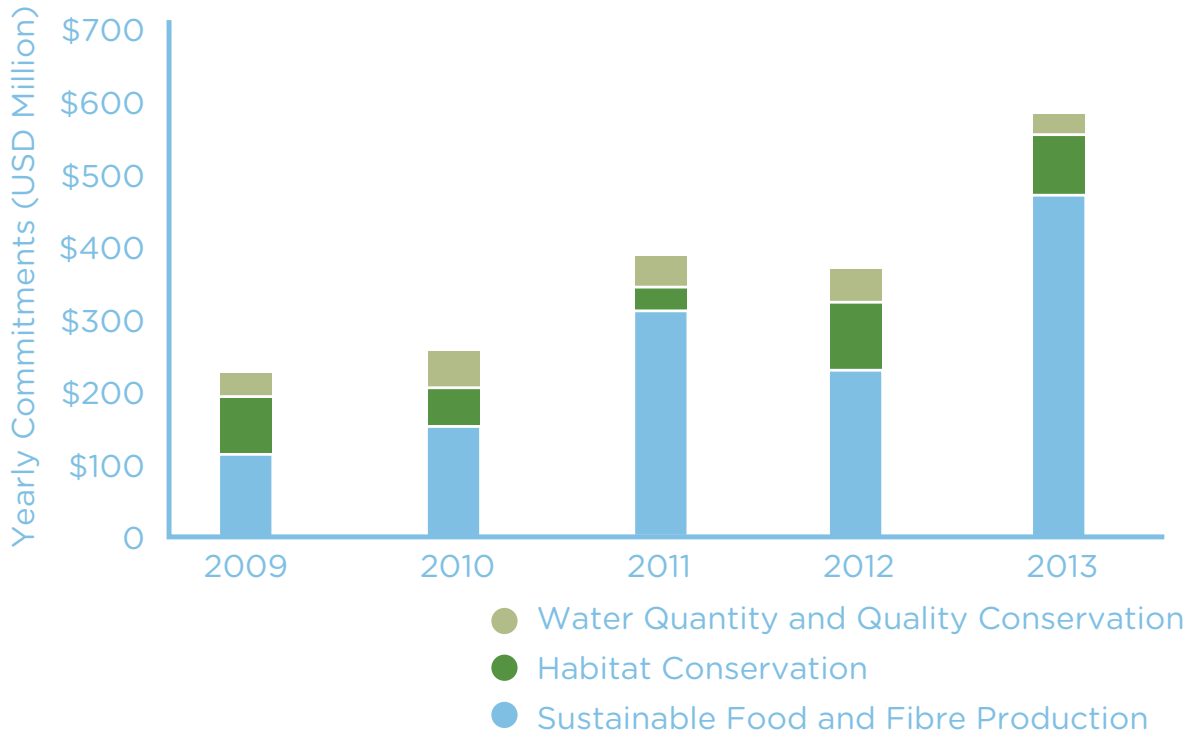
Conservation finance seeks to generate profit while also driving a positive impact on natural resources and ecosystems. New Forests believes that forestry investment managers are likely to be among the major players in a growing conservation finance industry. This is owing to the experience in sustainable land management and the fact that, as discussed above, many forestry managers have at least some experience with incorporating revenue from conservation-related sources into their investments.

Recently, the first broad survey of conservation finance revealed that over the 2009-2013 period respondents invested approximately USD 23 billion in conservation investments.[88,***] While only about USD 2 billion came from private investments, the authors found that the market is growing at 26% per year and may reach USD 5.6 billion by 2018.[89] Such investment may be a step change in global funding for conservation, which traditionally has come from public and philanthropic sources. The bulk of conservation finance investment to date has involved sustainable food and fibre production, which includes sustainable forestry investments that were made with the express intent of generating positive social and environmental benefits.



*** The range of investments included activities in sustainable forestry, water quality and quantity conservation, and habitat conservation but was restricted to exclude investments that were made solely for financial purposes. That is, the conservation investments must have included conservation benefits as part of their intended outcomes.

Figure 17 - Conservation Finance Investments by Type of Investment



Source: EKO Asset Management Partners and The Nature Conservancy (NatureVest).

Forestry investors are in an advantageous position to benefit from this increasing prominence of conservation in investment. There is already significant scale in key market segments of conservation finance that may complement sustainable forest management:

- Carbon markets – The California carbon offset market alone has potential for USD 1.5 – 3 billion in value through 2020, with California Carbon Offsets trading from around USD 10 per metric tonne of CO2e today and trending upward to an expectation of around USD 14 per metric tonne of CO2e in 2020. Other regulatory and voluntary markets also provide opportunities to monetise carbon values as part of conservation investments or alongside sustainable forestry investments

- Conservation easements – Easements are well established in the US based on a common law system and providing incentives through tax deductions for private landowners. In the US today there are more than 100,000 easements in place across 9 million hectares (22 million acres).[90] Easements and similar property covenants are also possible in some parts of Latin America and Australia.

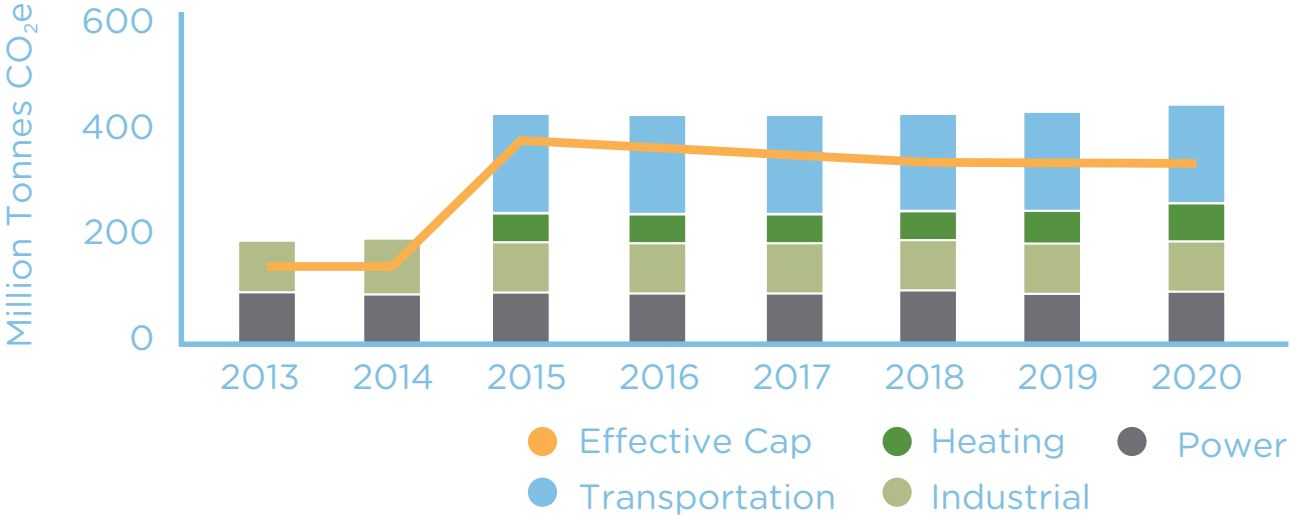
- Mitigation banking – The value of compensatory mitigation is difficult to ascertain due to limited market information. New Forests' analysis suggests that the annualised value of third party wetland and stream banking sales across the US South is currently in the order of USD 40 million per year on average and that over the past two decades nearly USD 1 billion in wetland and stream credits have transacted in that region.[91] While the US South has consistently ranked at the top of mitigation credit sales, the inclusion of the broader market including species banks, permitee-responsible mitigation, and other regions across the US would increase this overall compensatory mitigation market size considerably. For example some estimates place the overall compensatory mitigation market in the US at USD 2.0 to 3.4 billion per year.[92]

Carbon

Carbon management has become a prominent environmental issue in the finance sector and is an increasingly mainstream investment consideration, including across the forestry asset class. Forests can act as carbon sinks and provide carbon sequestration and long-term storage, which can be augmented through careful forest management. Forests are included in voluntary and regulatory carbon markets, which offer potential for ancillary revenue streams to supplement traditional timber returns. Since our last Timberland Investment Outlook the expansion of the carbon market in California has led to a significant role for forestry in a regulated carbon market. While some other regulated markets do include forestry, the carbon prices in these markets as well as the market rules have constrained the opportunities to encourage forests as a source of emissions abatement. For example, the New Zealand Emissions Trading Scheme includes forestry as a capped sector. Carbon prices have been considered too low in recent years to encourage investment in new forest establishment but do present some opportunity to manage combined carbon and timber values. In 2014, Australia's legislature voted to repeal its carbon pricing mechanism (known as the Carbon Tax) and instead has implemented an Emissions Reduction Fund, which held initial auctions in 2015. Forest and land activities can create offsets in this system, but the regulatory framework is not currently supportive of commercial forestry inclusion in the scheme. While these markets remain small opportunities for forestry investors, we focus on the California market in this outlook as it has shown the most growth and progress to date.

In 2005, then California Governor Arnold Schwarzenegger by executive order set a series of targets to reduce the state's greenhouse gas emissions to 80% below 1990 levels by 2050.[93] In response to this, in 2006 the State of California adopted the California Global Warming Solutions Act, also known as Assembly Bill 32 (AB32), which capped greenhouse gas emissions from the oil, gas, and power sectors. The legislation seeks to reduce California greenhouse gas emissions to 1990 levels by 2020, and in 2015 the state's current governor Jerry Brown established a further target to reduce emissions to 40% below 1990 levels by 2030.[94] AB32 created a greenhouse gas emissions trading market that covers all entities that pollute 25,000 metric tonnes or more of greenhouse gasses annually in the state. Since becoming fully operational in January 2013, the California greenhouse gas emissions trading market has become the largest such market in North America and the second largest in the world by value.[95]

Figure 18 - Expected California Greenhouse Gas Emissions and Statutory Cap

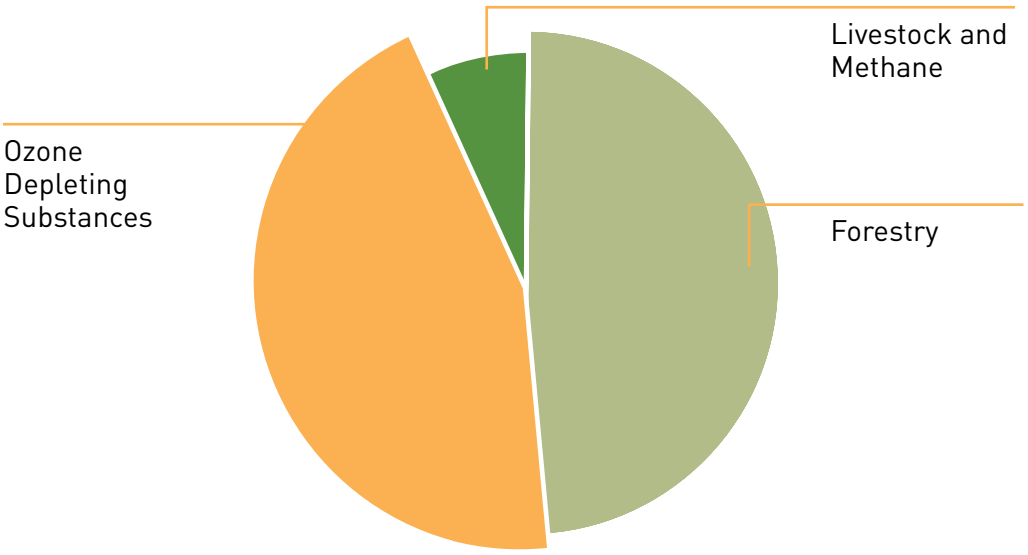


Source: California Air Resources Board

The market includes the use of project-based offsets, known as California Carbon Offsets (CCOs), which can come from project types including US forestry, destruction of ozone depleting substances (ODS), capture and flaring of livestock methane, capture and flaring of coal mine methane, and improved rice production methods that reduce emissions. Polluters are expected to demand 150-200 million offsets through 2020, with a total forecast market value of USD 1.5-3 billion.[96] In total more nearly 20 million CCOs had been issued as of May 2015.[97] **Figure 19** illustrates issued offset supply by project type.[98]

Forestry projects have supplied almost 50% of CCOs issued to date, and the rate of forestry CCO issuance is increasing.[99]

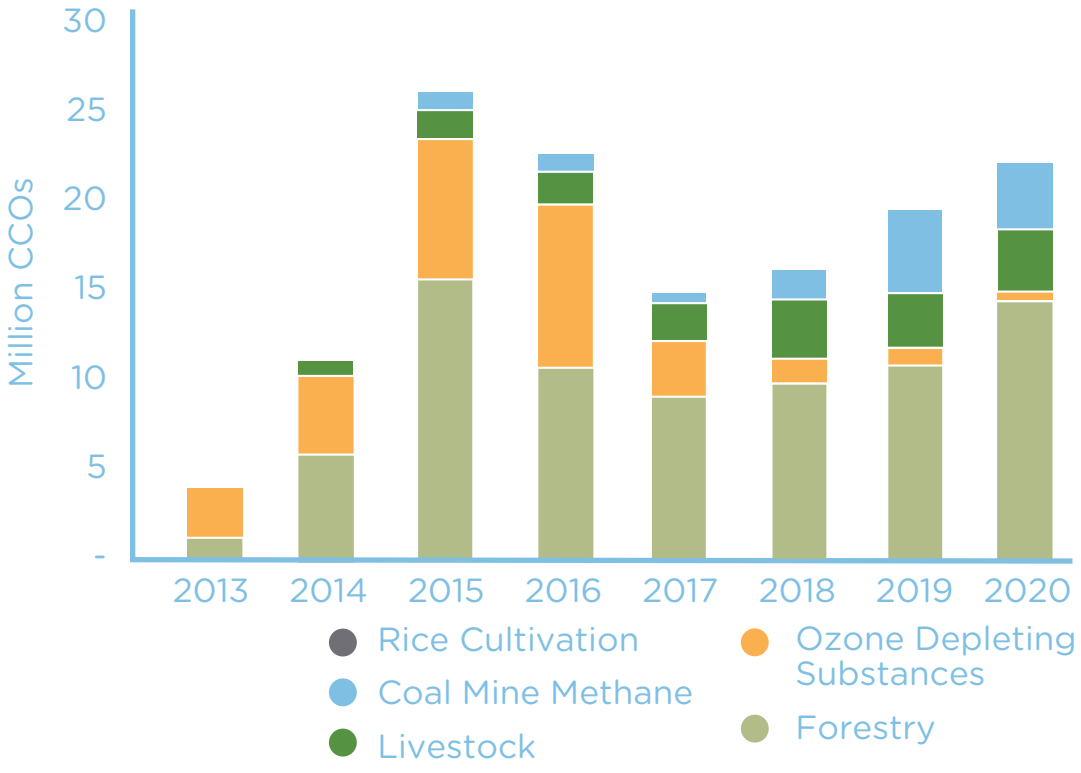
Figure 19- Issued California Carbon Offsets Supply by Type



Source: California Air Resources Board May 2015.

Forward offset supply can be estimated from a combination of issuance to existing (announced) projects and forecasting likely (unannounced) projects through a diffusion model. **Figure 20** illustrates existing and forecast offset supply by project type through 2020.[100] Estimates range from around 180-220 million offsets expected to be used through 2020.[101]

Figure 20 - Existing and Forecast Offset Supply by Project Type



Source: Bloomberg New Energy Finance.

Additional abatement demand is expected from linkages between California's market and other jurisdictions. The California system linked with Quebec in 2014, and in April 2015 Ontario announced the intention to link as well, creating a broader North American market that is expected to increase demand for offsets.

New Forests' Forest Carbon Partners investment program was created to finance and develop forest carbon offset projects on private, tribal, and family forestlands for the California market and affiliated markets. We launched this program in 2011, and Forest Carbon Partners has successfully registered four projects in the system,[102] including the first forest carbon project developed using the California forest carbon project protocol. These first projects have been issued 2 million offsets, which have provided meaningful income to the forest owners. New Forests expects that over time carbon value will increasingly be integrated into asset valuations and factor into transactions. At this time, however, the intellectual property and expertise to manage carbon projects successfully—including navigating the complex regulatory system and successfully marketing credits to sophisticated buyers—appears to be a barrier to entry for most TIMOs.

Mitigation Banking

Mitigation banking has developed as an industry in the US under federal legislation that supports market-based mechanisms for conservation and protection of wetlands, waterways, and species habitat. Buyers of mitigation credits need to compensate for certain unavoidable environmental impacts to wetlands, streams, and endangered species habitat that are protected by US federal and state law. Commercial mitigation banks have been operating in the US for nearly two decades, and the industry is growing due to strengthened enforcement of federal requirements.

In 2008, New Forests commenced investing the first institutional fund that was dedicated to mitigation banking and forest carbon investment, known as the Eco Products Fund. Since that time, the fund has acquired and managed a portfolio of five mitigation banks. There are also specialist fund managers that have arisen to invest in this growing asset class. New Forests has found that for many institutional investors it is difficult to find an appropriate portfolio allocation for a novel investment type, which crosses traditional asset class boundaries. However, traditional forestry investors also engage in mitigation banking via mainstream timberland investments as one of the possible avenues to achieve HBU value, and at least one TIMO offers mitigation banking investment strategies. The mitigation banking industry remains largely unconsolidated and characterised by small, regionally-focused operators that can lack access to capital and the technical know-how to advance projects through a complex regulatory system. New Forests expects that with the recent emergence of some dedicated mitigation banking investment strategies, we may see further proliferation of specialist investors in this area as well as increasing recognition of the role that mitigation banking already plays in US timberland investments.

The Landscape of Investment Opportunities

Regional Investment Opportunities

In this section, we explore the investment opportunities in North America, Australia and New Zealand, Latin America, and Asia over the next five years.

North America

North America is expected to remain the largest segment of institutional timberland portfolios. The year 2014 saw some resurgence in transactions; approximately USD 2.7 billion in turnover covering just short of 1 million hectares.[103] However, most transactions were small and only seven sales were larger than 20,000 hectares.[104] We would expect that the next three or four years may see a continuing rebound in timberland sales, as some major investments made in the 2000-2007 period begin to roll over. New Forests believes investment vehicles may also adapt, for example, with more TIMOs seeking to convert time-limited funds into permanent capital models. We may ultimately see a timberland vehicle continuum from listed REITs, unlisted REITs, permanent capital vehicles, open-ended unlisted funds, and closed-ended funds. Finally, if the US begins to raise interest rates over the next two years, then asset pricing may trend downwards. The TIMO industry may continue to consolidate; however, increased asset competition could lead to more specialised managers, such as new market entrants seeking to pursue niche investment strategies.

The Canadian forest sector is undergoing a period of contraction driven by declining harvest from the effects of Mountain Pine Beetle infestation, provincial government policy decisions, and a continuing decline in demand for newsprint, printing, and writing papers. Although total timber production is declining, the country will remain a significant international player (Canada produces more than twice as much timber as Australia and New Zealand combined). Canada may therefore provide further investment opportunities as the forest sector restructures and repositions to a future based on a broader bio-economy concept. Canada is one of the few low-risk countries with substantial forestry assets and is relatively unique in having approximately 90% of the forestland owned by government.[105] Investors might move toward buying out long-term forestry concessions from industry and explore new commercial models, new industry partnerships, and rebalanced conservation and production business models.

Australia and New Zealand

There are approximately 2 million hectares of commercial timber plantation in each of Australia and New Zealand. New Zealand is almost entirely softwood, while Australia is evenly split between eucalyptus and pine. In New Zealand, about half of the plantation assets are in institutional ownership, while in Australia, the figure is now closer to 70%. As such, Australia and New Zealand are probably the most concentrated markets with institutional ownership. Over the next two years further expansion of institutional ownership in both markets is set to occur as state governments in Australia sell the last of their timber plantation assets, as corporate exits continue, and as consolidators facilitate acquisition of smaller plantation assets by institutional buyers. In Australia there is also some niche investment in tropical hardwoods in the north, which presents a higher risk-return profile and would represent only a very small portion of institutional investment in the country's forest sector.

There are now six TIMOs active in the region, which leads to more competition and likely convergence of Australia-New Zealand discount rates with those of the US timberland market. As this is an attractive market with high-quality assets, low technical risk, stable governments, and exposure to the Asian growth markets, we expect that these assets will begin to coalesce into permanent capital models. We also see efforts by investment managers to capture more returns from the supply chain, incorporating processing, infrastructure, and export logistics into investment models or expanding investment mandates into related assets such as agriculture. New Forests estimates that forestry-related assets may represent about USD 2.5-5 billion of institutional capital investment over the next five years.[106]

The question going forward is whether plantation forestry can expand in Australia and New Zealand. Despite the attractive conditions, greenfield forestry (buying land and establishing new plantations) generates real returns of only 4-7% over the rotation. This may be improved by accepting lower returns from the land asset but higher returns from the plantation assets. However, with steadily rising living standards in Asia, continuing urbanisation, and many bio-economy opportunities, Australia and New Zealand could become an expansion opportunity for forestry investors.

Latin America

Latin America holds a valuable pool of timber plantation assets. It has been suggested that Latin America could represent USD 40-50 billion of investible forestry assets.[107] Almost all investment to date has been in Brazil, Uruguay, and Chile with many US TIMOs having assets in these countries.[108] Chile now has a similarly sized forestry sector to that of Australia or New Zealand, utilising the same species (*Radiata pine, Eucalyptus globulus,* and *Eucalyptus nitens*) and trading in the same markets.

However, Latin America has also been a challenging environment to place capital with entrenched domestic industrial owners, often supported by low-cost government finance. Brazil has made it difficult for international investors to acquire assets by preventing foreign land ownership. At this point there appears to be more demand for high-quality, high-yielding Latin American plantations in a diversified portfolio than can be delivered. Whether this will change in the coming years is uncertain.

Asia

For many investors, the promise of high growth and vibrant economies makes Asia an attractive opportunity in many sectors including forestry. However, such expectations are tempered by the challenges in the investment and business environments within the market, including insider business dealings, corruption and bribery, government intervention and regulation, and ineffective legal systems. Despite these challenges, there remains demand for investment managers who can navigate the business environment of Asia. New Forests was the first timberland manager to raise a dedicated Asian investment strategy, and we expect to continue to develop that business as a unique offering to our clients.

While the region is young in terms of institutional investment, there is potential for scalable investment opportunities. The technical capacity to manage extensive plantation assets is well developed in the region. The challenge for timber plantations has been competition for land and the stronger economic fundamentals of oil palm and rubber relative to timber species such as eucalyptus, teak, jabon, and acacia. New Forests estimates that there is at least USD 150 billion worth of rubber and oil palm plantations in Malaysia and Indonesia alone. Forestry investors appear willing to include rubber in a timberland portfolio, given that returns come from both latex tapping and timber in the tree stem. There are also government land use restrictions that can favour forestry over oil palm on many licence areas. Governments recognise that the native forest logging industry has been unsustainable and needs to be replaced with an internationally competitive plantation forestry sector. However, it is also well recognised that further conversion of natural forests to oil palm, rubber, or timber plantations is not acceptable.

Therefore the entry point is existing plantation assets that are either owned by industrial companies, government-owned enterprises, or family conglomerates. In the recent market, with plentiful low-cost debt, these assets have been difficult to acquire. However, highly leveraged plantation owners may be forced to sell assets in the next two or three years as the US begins to raise interest rates.

Institutional Investment Opportunities Arising in Asia

Southeast Asia offers a competitive cost base for growing timber and has historically been the world's largest supplier of tropical timber. Almost USD 29 billion of forest products (excluding wooden furniture) were exported from Southeast Asia in 2013.[109] The region's strong furniture sector now relies extensively on cross-border log trade to replace supply that once came from natural forests, which are now depleted. Southeast Asia is a diverse region with many different political, business, and operating contexts, but the Association of Southeast Asian Nations (ASEAN) aims to facilitate the free flow of goods, services, investment, and skilled labour. However, given the challenges of operating across the region we expect the markets will remain fragmented, with some possible benefit in trade conditions resulting from the ASEAN efforts or other regional trade agreements under negotiation, such as the Trans-Pacific Partnership.

Shifts in consumer demand are driving both industry self-enforcement and government regulatory initiatives to eliminate illegal or unsustainable timber harvesting and trade. Importers in the EU, the US, and Australia are already required to seek verification that timber was sourced through a process that complies with European Union Timber Regulation (EUTR),[110,111] the US Lacey Act,[112] and Australia's Illegal Logging Prohibition.[113] Such legislation favours producers with the capacity to operate legally on a third-party verified sustainable basis and will influence the future level of timber harvesting in natural forests of Southeast Asia.

Plantation production accounts for a minor portion of total timber production in the region, and institutionally owned forests and plantations are vastly outnumbered by private sector forest concessions and plantations held by state-owned enterprises, local corporations, and small holders. Timber plantations account for only about 6% of the forest area in Southeast Asia.[114] There is, however, great potential for institutional investors to contribute to the transformation of the industry in Southeast Asia by recapitalising struggling companies, upgrading technology and management systems, and placing an emphasis on the long-term stability of resource management through sustainability measures. Only a handful of international TIMOs have entered the Asian market to date. New Forests is aware of current international TIMO holdings in China, Cambodia, and Malaysia. Entry into the Asian markets for foreign investors differs from country to country, but transaction types generally take one of the following three forms.

Multi-national corporations seeking to divest of non-core assets – Several large pulp and paper companies in Japan, China, and India have attempted to establish pulp supply at scale by seeking large concessions, i.e. 25,000 – 50,000 hectares, in Southeast Asia. However, many of these investments have underperformed relative to expectations, leading to parent companies seeking to exit. In New Forests' experience, such companies may have invested vastly more than the current value of their plantations, owing both to difficulties in securing land and poor planting and management regimes.

Privatisation of government assets – Some governments needing to recapitalise their forest businesses and bring in modern silviculture, technology, and forest certification are seeking foreign joint venture partners. For example, Vietnam is in the process of privatising rubber and timber companies. These often involve smaller holdings on the scale of 2,000 – 10,000 hectares.

Joint venture with domestic companies - In Indonesia and Malaysia, larger assets can be found on the scale of 25,000 – 100,0000 hectare concessions. In both countries, we find larger conglomerates and family businesses continue to be important sources of potential transactions, given that these businesses can effectively transact within the local business operating environment and generally are more advanced in licencing. These businesses are seeking equity finance and view foreign forestry expertise as a means of internationalising their businesses and further enhancing their sector-based expertise.

Investment Strategies for the Next Five Years

The forestry or timberland asset class is a small and specialised area of investment. The USD 200 billion of existing opportunities and potential for another USD 100 billion or more of plantation development investment in the next 10 to 20 years is dwarfed by the value of agriculture, infrastructure, and real estate assets. While the timberland investment industry overall has been able to steadily grow by rationalising pools of assets first in the United States, then New Zealand and Australia, the industry is finding growth in Latin America, Europe, Africa, and Asia more difficult. New Forests expects that countries in these emerging timberland markets will take time to understand the benefits of attracting institutional capital to develop new timber plantation assets that support their respective forest industries. However, in many parts of the world there is concern about foreign investment in land. Land ownership and tenure rights can be complex. In some cases unclear tenure rights and competing land claims effectively make such areas un-investible for foreign investors. In these situations, economic growth can ultimately be stymied by an inability to facilitate investment in the forestry and agribusiness sectors.

Therefore, while we expect that institutional forestry investment in markets other than the US, Canada, Australia, and New Zealand will continue to grow, the bulk of the timberland industry will remain in those four countries over the next five years. Outside those core regions, we may see up to USD 1 billion per annum invested in aggregate. So what does the timberland investment sector look like as a mature industry? We provide the following trends for investors to consider.

Transition to a Secondary Market: The US timberland market today is essentially a secondary market, where TIMOs, REITs, and direct investors sell assets among themselves. The turnover of assets has fallen from about 1.8 million hectares per annum in the 2000s to less than 1 million hectares per annum in the 2010s.[115] This represents about a USD 3 billion per annum market in secondary transactions.[116] In Australia and New Zealand over the past ten years there has been between 300,000 and 500,000 hectares per annum turn over, with values ranging from USD 1-2 billion per annum.[117] As we are only now seeing the end of the primary market in Australia and New Zealand, we expect that turnover will decline by half, much like in the US, to about USD 500 million to USD 1 billion per annum over the next three to five years.

Competition among REITs, TIMOs, and Direct Investors: In general, REITs are listed vehicles that hold forestry assets on the basis of generating annual cash yield. While the quality of the underlying assets should influence the pricing of these securities, they tend to be priced as a multiple of cash yield. With some REITs trading at up to 30 times cash yield, they have been successfully acquiring mature cash yielding assets from TIMOs. TIMOs usually acquire assets on the basis of total return and may have greater flexibility to acquire immature assets that have a greater component of their returns from capital appreciation and less dependence on current income. However, the competitive dynamic between REITs and TIMOs is a function of how the stock market prices assets. Recent buoyant market conditions, driven by US quantitative easing and low interest rates will at some point REITs will trade at lower multiples of their cash yield. At that point REIT managers will be under pressure to shed assets to TIMOs that can pay a higher price than that inferred by the stock market. In competition to both of these investment management business models is the rise of direct investors. Many large investors that wish to own real assets for the long term are beginning to insource investment teams or create captive managers that can reduce fee drag in a competitive secondary market environment. While direct investors are a rising element in timberland investing, the small investible universe makes it difficult for many investors to justify an in-house team.

Transition to Permanent Capital: In the past, most unlisted timberland was held in separate accounts, commingled funds, and to a lesser extent in commingled vehicles like unlisted companies. Separate accounts were generally sought by investors who wanted to have discretion over the hold period of their assets, while funds were designed to provide a vehicle to create diversification but with a fixed term to hold the assets. Managers offering separate accounts often had to deal with investment queueing, where individual investor commitments could become stale, often taking years to be drawn. Fund investments were effectively at the front of the queue, and as long as managers had access to quality deal flow, could be drawn down and invested in two or three years.

The problem now arising for investors is that in a secondary market, the liquidation of the fund often means that it will be very difficult to re-invest in a fresh portfolio of assets or that assets will be fully priced. This is now leading to an increasing consideration of ways to convert funds or investment programs into permanent capital vehicles.

Specialisation and Differentiation by Managers: The other outcome we expect to occur as the timberland market matures is re-segmentation of investment managers to extract additional value. Below we briefly discuss some of the investment business models that we see in the market.

- **Mainstream:** There remains a group of global timberland managers, such as Hancock Timber Resource Group, Campbell Global, RMS, and Global Forest Partners, that aim to operate in all major timberland regions. Such a model attracts smaller investors that seek straightforward options to outsource their timberland portfolio. The model is also attractive to US-based investors that want a domestic manager for both domestic and international investments.

- **Geographic Specialists:** Firms like FIA, Molpus, BTG Pactual, and New Forests have tended to focus on specific geographic regions. These managers cater for larger investors that are seeking to build a multi-manager portfolio or that have less incentive to rely on US-based managers for non-US timberland investment.

- **Greenfield:** Several smaller to mid-sized managers such as Greenwood Resources, Green Resources, and Futuro Forestal have sought to carve out a niche in greenfield plantations development.

- **Conservation Finance Specialists:** In the US there has been an opportunity to combine timberland with conservation finance, such as sale of conservation easements, carbon offsets, mitigation banking, and other specialised instruments. Key companies in this area include Conservation Forestry, Lyme Timber, and New Forests.

- **Multi- or Cross-Asset Models:** Some timberland managers are expanding into other asset classes such as agriculture, infrastructure, and private equity. Examples include Hancock Natural Resource Group, which has investment strategies across timber, agriculture, and renewable energy, and Stafford Timberland, which has become part of a wider investment group including agriculture, infrastructure, venture capital, and private equity. Brookfield has also launched larger combined asset class strategies in timberland and agriculture. In New Forests' experience, we see increasing opportunities to incorporate timber processing, supply chain infrastructure, and agro-forestry within timberland investment vehicles as a way to add value to core timberland assets.

- **Venture Capital and Private Equity:** While somewhat ancillary to the core timberland business, there are opportunities for timberland managers to consider either embedding technology development into permanent capital vehicles or to use private equity investment structures, particularly in emerging markets where the typical property management services are not easily retained. As we have noted above, some disruptive technologies may provide significant competitive advantage. Private forestry firms like Suzano in Brazil and UPM Kymmene in Finland have developed or acquired key capacities in genetics, biomaterials, and other technologies. This approach may also gain traction in timberland investment management, allowing managers to capture the value of technological disruption to create competitive advantage.

Manager Consolidation and Capture: The ultimate end game for a mature industry is consolidation. Already there has been consolidation with forestry investment managers such as Pru Timber, Forest Capital Partners, and RMK either being broken up or sold. We expect this to become a more prevalent trend, and see potential for timberland to be pulled into much larger multi-asset class platforms. Examples of this would be the sale of Campbell Group (now Campbell Global) to Old Mutual, the sale of RMK to BTG Pactual, and the situation of Hancock within Manulife as a potential aggregator of other managers.

Asset Management and Client Relations: The business of timberland investment management, much like investment management in other asset classes, will also evolve. Investors will seek increasing transparency, higher frequency of reporting (e.g. monthly vs. quarterly), more diagnostics of manager performance, and more pressure on management fees and performance fees. At the same time, managers must deal with an ever increasing regulatory and compliance

environment. These trends put further pressure on managers, especially those still striving for scale. We expect that it will be increasingly difficult for independent managers to meet growing client relations, compliance, and regulatory requirements.

Conclusions

In this 2015 Timberland Investment Outlook we have provided insights into a more mature asset class, with increased competition for assets as well as new investment opportunities in Asian market growth and new markets for bioenergy, biofuels, and biomaterials. As institutional capital continues to flow toward forestry investments, we will continue to see a strengthening of long-term management focus across the forest sector. The growing competition and complexity of the timberland market means that investors must now account for these factors with more sophisticated investment strategies. A core emphasis on forestry investment discipline must be complemented by an understanding of higher and better use strategies, a focus on productivity, active accessing of new timber markets, and adept management of environmental and social factors. At the core of the asset class, portfolio diversification, good risk-adjusted returns, and inflation hedging remain among the most attractive attributes for investors. We hope that our 2015 Timberland Investment Outlook is useful for new forestry investors and provides beneficial insight for existing forestry investors who are considering their long-term exposure to timberland.

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