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Timberland – a Stable Asset Class

A photograph of a birch forest with white bark and green leaves, serving as the background for the entire page.

25 Year Jubilee

The International Woodland Company
1991-2016

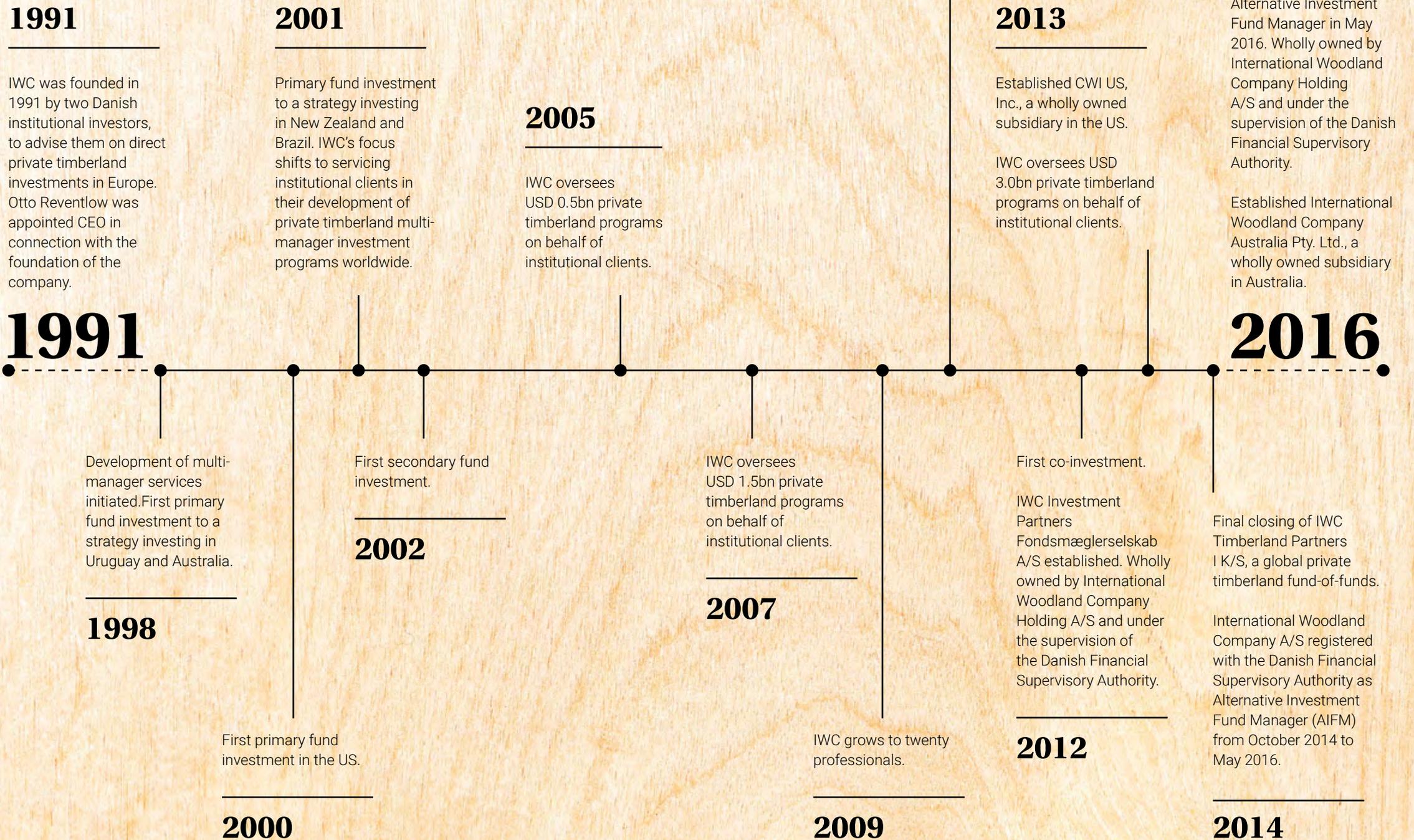
Dear reader,

It is with great pleasure that we have carefully chosen a selection of articles that we believe represent what IWC is all about in order to celebrate our 25th anniversary. We thank you for your continued support and cooperation and hope that you will enjoy your reading.

Kind regards,
The IWC team

OUR HISTORY

Timberland investments *since 1991*



Features



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Timberland – a Stable Asset Class

25 Year Jubilee

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A Dose of Irish Blend



IWC Reaches 25 Years in Business

One of the investors who saw forest investments as a promising asset class was the Danish Teachers' Fire Insurance Company (Lærerstandens Brandforsikring – "LB"). Soon they were joined by the Danish Pension Fund for Engineers (Danske Ingeniørers Pensionskasse – "DIP"). They called their joint-venture "DanWood". To manage their investment of DKK 45 million, spread over 2,200 hectares of land in two different Irish locations, they hired Otto Reventlow. Otto, a young forester in the Danish Forest Association, was to oversee the investment in close collaboration with the Irish forestry management company, Woodland. To keep Otto on board, LB and DIP established the International Woodland Company A/S, with Otto as CEO.

For the next seven years, Otto worked as a one-man band focusing solely on LB's and DIP's Irish investments. In 1998, he was joined by two other foresters, Henrik Lundqvist, who is now Chief Investment Officer of IWC, and Peter Vind Larsen, who was to stay with IWC for thirteen years. Soon, they were followed by a breadth and depth of skills and experience with more foresters, economists, lawyers, MBAs, chartered financial analysts, due diligence and CSR specialists joining the team. Today, as IWC celebrates its 25th anniversary, the company's main asset is 26 employees representing more than 10 nationalities, who basically cover four investment regions – Europe, North America, Oceania and Latin America, including wholly owned subsidiaries in the US and Australia.

Early TIMO commitment

In 1998, the first commitment to a Timberland Investment Management Organization ("TIMO") was made with IWC as an adviser by DIP,

It all started in Ireland, in some former farmland areas, which in 1990 were converted into forestry by primarily planting them with Sitka spruce, valued for its fast growth and great suitability for timber and paper production.

committing USD 5.8 million. Two years later, our first "external" client, the Danish Teachers' Pension Fund (Lærernes Pension), made its first USD 3 million commitment to a TIMO.

Today, Lærernes Pension is still a valued client of IWC as well as a very professional and experienced forestry investor. Fund commitments are now typically more than 10 times

the size. Over the years, IWC has advised and managed forestry investments on behalf of 20 clients with cumulative commitments totalling USD 3.7 billion, spread over 50 funds and 20 different TIMOs.

Sound growth and services

The economic progress of IWC has also shown growth and now constitutes a sound basis for further development of our market knowledge and services, as well as looking into new areas that could be seen as a natural extension of current business for IWC.

Today, our services to investors cover direct investments, sourcing, selection, negotiating terms and conditions, monitoring including frequent on-site visits and reporting of forestry investments – be that directly or through TIMOs.

Since 2008, IWC's employees – including the Board of Directors – together have the majority of the shares in the company. However, LB is still the largest individual shareholder, holding 43 percent of the shares. DIP left IWC as the other founding shareholder in 2004 but is still a valued client of ours.



A milestone celebration

Celebrating our 25th anniversary cannot be done without thanking the many people who have been essential in reaching this milestone – or at least groups of people, as the full list would be too extensive.

Internally obviously, it is our employees, whose efforts form the very core of everything we do – commitment and dedication as well as curiosity and creativity – are vital components in ensuring a positive development for both our clients and our company.

External parties have been equally essential – first and foremost, our clients who are our "raison d'être". We are very grateful for their loyalty and support. Without them, we would not have been able to develop IWC to what we believe is a highly professional and acknowledged player in the world of forest investments. This development of course never stops, and we are looking forward to continue our shared journey.

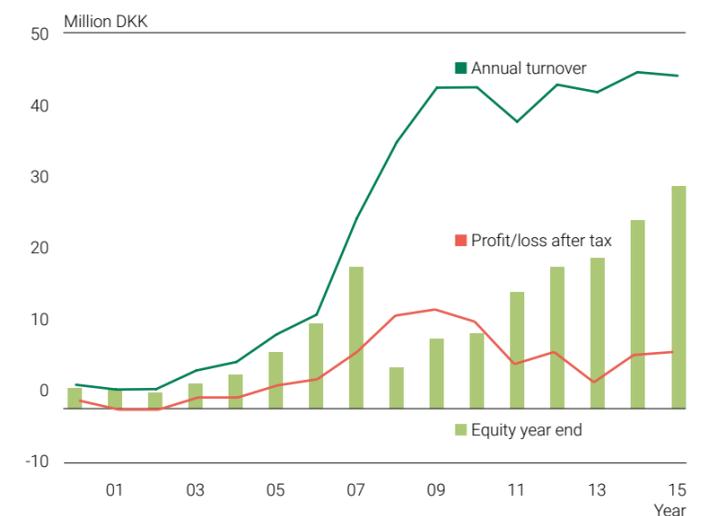
Other people and groups, ranging from individual academics to commercial parties and political institutions to TIMOs with whom we have had extensive and treasured relations, have also been vital for IWC, and we thank you all for being such a valuable part of our network.

We hope you will enjoy this anniversary publication,
Steen Villemoes, IWC Chairman

Men at work

For many people, wood is not only a product, but an important and critical input to sustain their livelihoods, as is the case for these contractors, removing thinning wood from the Irish Danwood investment.

An overview of IWC's turnover, profit and equity (2000-2015)



Competences and Experience

– the Backbone and Future of IWC

Working extensively with timberland investments for 25 years has provided the International Woodland Company with a unique platform of information and experience. CEO Otto Reventlow has been with the company since its birth.

At the outset, some large Danish institutions took an early interest in timberland investments and established IWC to look after their investments, initially in Ireland and to further develop the concept of institutional timberland investment management. Today, IWC's investment professionals look after timberland investments in Europe, the US, Latin America, Oceania, and other regions. For more than two decades, IWC has been developing, and now oversees private timberland investment programs representing a value of approximately USD 3.5 billion.

After all these years, is IWC still considered a Danish company?

– I believe, it is fair to say that today we are a global company where the sun never sets on our operations, says Otto Reventlow. Our team of employees is truly international, representing 10 different nationalities. They, together with local managers on the ground, and from our offices in Copenhagen, North Carolina, and Melbourne, work around the clock to provide services and insights of the highest quality to our clients – all the way through the value chain. We are actively involved from idea generation, over due diligence, through monitoring and active management until project exit 10-20 years later, all the while, looking into the future too. It is part of our DNA to work with long time horizons.

IWC's first investment reflected an aggregation strategy in Ireland with a focus on buying bare land and planting it with Sitka spruce. Focus was on acquiring the best suited soils for the highest production of this species, which is named after a location in Alaska, though its natural range is all along the north western coast of North America.

Our ambition was to obtain a biological yield of 24 cubic metres annually of high quality spruce timber, a yield nowhere else to be found in the northern hemisphere. Over the years, we have followed the production closely, and we can now demonstrate production capacities in some cases in excess of 30 cubic metres per annum. One of the Irish investment structures has just been sold realizing a net internal rate of return to investors of 5.7 percent annually over a 20 year period, states Otto Reventlow. (See Case 2 in adjoining article).

Long track record in the US

Planting a tree is not only about getting the roots down and the top up. One also needs to know the markets. The most mature timberland markets are found in the southern part of the US, and this is also the cradle of institutional investments in forests. Originally, the lands were covered with native forests. But development of the western US, including mining, and building of railways across the North American continent changed both landscape and vegetation. After a period of extensive tobacco and cotton growing in the south, suitable lands were planted with pine trees from the 1920s onwards, as the US' natural forests became overexploited. Forest industries were established, and today, the US South sustainably supplies the highest wood consuming country in the world with wood. 25 percent of IWC's investors' assets are placed in these areas and provide investors with a steady return.

Photo on opposite page

To get a better understanding of the large scale of plantations such as in Mato Grosso do Sul, Brazil, inspections from the air are often the most effective way to get an overview.

*"We are a global company, where the sun never sets on our operations"
– See second paragraph of the article.*

IWC CULTURE

CLIENTS ARE IN FOCUS

- We acknowledge that the long term success of the firm relies on the long term satisfaction of our clients through the services we provide and the relationships we build and maintain.
- At all times we aim to act responsively to client requests.
- Feedback and requests from any client are always taken seriously and acted upon in a timely, prudent and professional manner.
- IWC strives to be proactive in delivering improved services to its clients.

EMPLOYEE SATISFACTION

- Working at IWC should be fun, inspiring and focused on the long term benefits of clients.
- At IWC, we support a mutually supportive working environment, where all professionals work together rather than compete with each other.
- We support open and frank dialogue that encourages constructive critique in order to ensure continual improvement.
- There is a culture of inclusion and participation at IWC as well as an employee shareholder programme. A clear majority of the employees are shareholders in IWC, together owning a majority of the firm.
- We support all employees in maintaining a proper work-life balance.

CLEAR COMMUNICATION

- IWC is committed to communicating in a professional, constructive, and mutually respectful manner, both with regards to external parties and between colleagues within IWC.



Will the US South still be a major region for IWC to focus on in the future?

– Absolutely, confirms Otto Reventlow. We have a long standing track record from this region, and we believe these to be core assets in an institutional timberland portfolio. We have built relationships with top-tier managers and have a deep understanding of the regional forest practices and markets. Although the US South is generally without big surprises, biological yields have improved more than 25 percent over the past 25 years, and much more is expected to come. Furthermore, industries have consolidated and currently new capacity is coming online. However, certain areas are left behind as transportation costs become too high. As in many other investments, infrastructure is of extreme importance. Besides the US South, we also regularly see potentially attractive opportunities in other US regions, such as in the US Pacific Northwest and US Northeast. (See Case 1 in adjoining article).

Oceania and South America

Several new markets are developing. Especially Oceania and South America, where 15 years ago, IWC was involved in some of the first institutional timberland investments in these regions. (See Case 3 in adjoining article).

Oceania, consisting of Australia and New Zealand, provides a stable political environment with good access to the Chinese, South Korean, Japanese, and other Asian markets. Trees are growing well, as is especially the case for the high quality New Zealand radiata pine, a conifer originating from the US. The growth of this tree is remarkable and is well sought after in South Korea and China. Here, the biological growth rates and climatic conditions sustain a continuity of harvesting. Of particular importance here is access to the markets, where shipping costs account for 25 percent of total costs when the wood hits the harbor in Shanghai.

In Brazil, the timber industry and research organizations are consistently improving biological yields from eucalyptus species, originally from Australia. Wood production has grown from an average of 25 to 50 cubic metres per hectare over the past 25 years.

The pulp industry in southern Brazil invests huge amounts of capital in production capacity. With the current low currency, cheap freights rates, and a significant Chinese consumer demand, Brazil has become the major player in short fiber pulp. About 6 million tonnes of extra pulp capacity is expected to come on line in Brazil up until 2020, of which most is to be exported to the growing tissue industry in China.

New products

Working with forest investments for more than a decade in emerging markets, such as Central America, Africa, and Asia, has not only given valuable, local experience and expertise, it has also provided IWC with insights for innovation and new products.

– We are currently developing a project in Kenya that brings together IWC's skills and network with the purpose to improve African charcoal production – where the demand for this energy source is expected to more than double over the next two decades, explains Otto Reventlow.

The purpose is complex as it will include carbon storage, protection of natural forest and biodiversity, improved livelihood of the locals, and improved local business opportunities.

Our long term aim is to prepare the timberland business in Africa to be able to take advantage of the growing need from institutional investors to obtain decent low risk returns.

Another field IWC is gaining increased experience in, is payments for environmental services such as compensation payments for conservation easements, mitigating carbon credits, and other environmentally based credits. (See Case 4 in adjoining article).

Is IWC looking into new assets?

– Timber and forestry are definitely our core competencies and will remain so. But another asset, which might be on our map for the future is agriculture, as this asset class shares a lot of the same characteristics as timber. Time will show, says Otto Reventlow.

Last but not least, IWC's services are provided under Danish and EU legislation governing alternative investment fund managers (the "AIFM Directive") which regulates transparency, compliance, and risk management to the highest standards.

Working under such strict public regulations, with established in-house functions and procedures, enables IWC – on a selective basis – to offer administration and risk management services (so-called "FAIF services") to external project providers. For IWC, this can potentially provide further operational scale to the benefit of both IWC and its clients, says Otto Reventlow.

IWC investor tour Cambodia

From left: Steen Villemoes, Chairman IWC, Paul Brüniche-Olsen, CEO Lærernes Pension, Otto Reventlow, CEO IWC, Wayne Wren, Nursery Development Manager. The group is looking at an Acacia hybrid clonal mother garden for the investment's acacia trials.

IWC CEO, Otto Reventlow

at an IWC employee professional development day.

IWC due diligence

Pär Hansson, Pia Bastrup and Edvard Fång visit some eucalyptus trials showing incredible growth rates in Pernambuco, Brazil.

IWC investment Cases

CASE 1

Appalachian hardwoods – Scale and quality

Appalachian hardwoods

Patience and discipline lead to a higher return than targeted.

In the early 2000s, some of IWC's clients already had built up international timberland exposure. Based on market evaluation and portfolio balancing and diversification considerations, it was desirable for them to also have exposure to hardwood timberland investments in the northeastern United States.

Therefore, IWC contacted and visited a number of potential US based managers to identify the best possible manager to set up an investment fund, specifically tar-

geting Northeastern hardwood investments of institutional scale and quality, and with at least – due to ownership percentage restrictions among IWC's clients – one external (non-IWC) investor.

When the best manager was identified, the dedicated fund was set up with considerable assistance from IWC with regards to strategy, terms, and conditions.

The manager worked diligently on deal sourcing the best assets for the fund. In particular, the manager worked to negotiate a North Appalachian deal into their pipeline. However, after two years of continued, but unsuccessful discussions, the manager decided to walk away, and started negotiations on another deal – also in the Northern Appalachian region. This deal was eventually closed. Though it took more than two years for the fund to invest, IWC was pleased with the patience and discipline shown by the manager in this regard.

Although the fund term was 12 years, some of the assets were sold off a few years after acquisition for higher and better use in accordance with the original investment model. In 2007, IWC started having strategic discussions with the manager about a full asset sale, as the timing and opportunity for this appeared favorable. Eventually, the asset was sold in late 2007 at a very favorable price compared to book value, and the investors realized a higher total return than originally targeted from this investment.



Since the firm's establishment, IWC has been involved in many different types of timberland and ecosystem investments. Below we present four cases, which illustrate some of the company's experiences with different types of investment structures, different access to assets, and examples of the importance of understanding the underlying assets and investment assumptions.

One investment example (Case 1) is a distinct strategy primary investment fund targeting US Northeastern hardwoods. Another example (Case 2) is from some of IWC's early investment activities in Ireland from which the assets have recently been sold. Also, there is an example (Case 3) of an investment in a primary fund with investments in Uruguay and Australia and, subsequently, a secondary investment in the same fund. Finally, there is an example (Case 4) of an investment with other main products than timber, although still related to land and nature.

CASE 2

Spruce plantations in Ireland – Direct investments by IWC clients

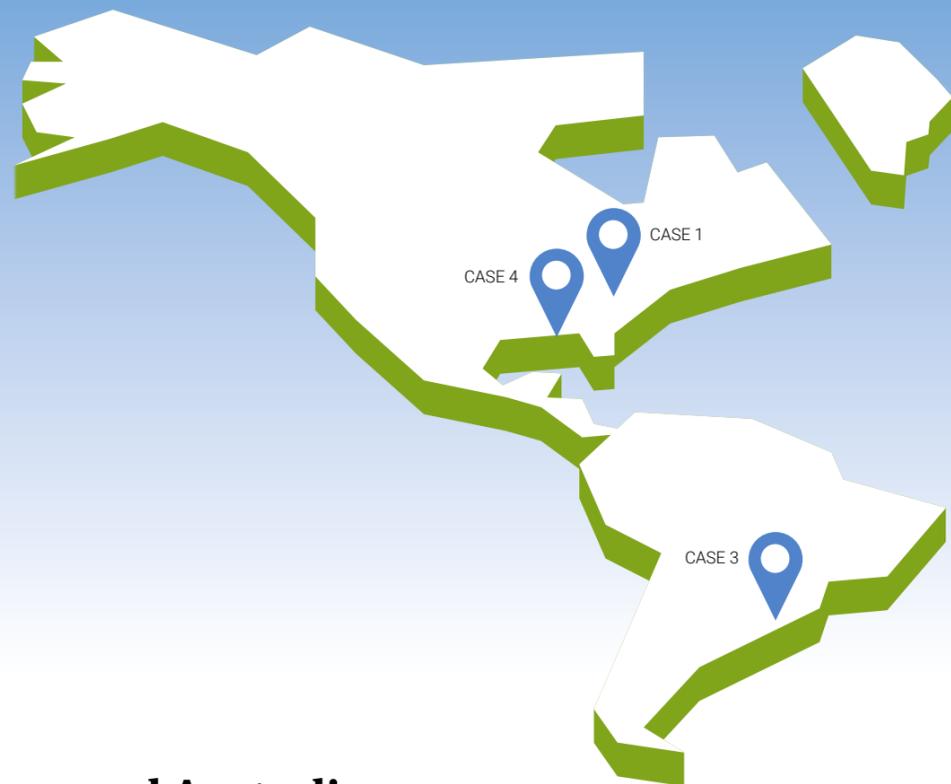
In 1994, a few years after IWC's establishment, a new company was set up with three Danish institutional investors to build a portfolio of Irish timberland properties through land acquisitions and establishment of Sitka spruce plantations. As IWC had already worked for several years with a local Irish manager, he was again asked to implement the strategy for this project. During the following three years, the portfolio was built up with a careful amalgamation of assets based on property specific recommendations from IWC to the company's Board of Directors.

In 2015, the assets had matured; the plantations had grown to reach the first commercial thinning, management was well established, and favorable growth was proven. Considering these factors, combined with the fact that Ireland was now more developed as a timberland investment region, with increased expected investor demand for these types of timberland plantations, it was deemed a suitable time to consider a full asset sale. IWC coordinated the sales process, together with the local manager, and in 2016, the assets were successfully sold, 22 years after establishment of the company, and the investment obtained a total Internal Rate of Return ("IRR") since inception in line with original return targets.

Ireland Sitka spruce

10 years into the investment, this is one of the plantations within the Irish portfolio.





CASE 3

Uruguay and Australia – Secondary in a diversified timberland fund

Australian pine

Pictured with Henrik W. Mogensen, CFO and Helle Ærendahl Heldbo, Senior Portfolio Manager of Lærernes Pension, key clients of IWC. This is a 3-year old Radiata pine plantation in the Green Triangle, South Australia.

In 1998, based on IWC's advice, one of IWC's clients invested in the final closing of a diversified timberland fund with assets in Uruguay and Australia.

IWC monitored and visited the assets in the following years, and in early 2004, through IWC's network, IWC was asked if we were interested in buying an existing share in the fund – a secondary investment – with a book value of about USD 10 million.

Among other tasks, IWC analyzed the reported valuations of the underlying assets, local market outlooks, as well as the manager and performance to date. Based on this, IWC was granted the mandate to negotiate a potential deal on behalf of the client.

Deal negotiations were lengthy and complex, with parties involved in many regions of the world, including Denmark, the United States, Great Britain, the Cayman Islands, and the Arabian Peninsula. Finally, a sales and purchase agreement was made with a price discount to the latest book value, and the deal was subsequently executed.

Following the secondary deal, IWC continued following the assets; now on behalf of two clients. Over the years, the assets have been restructured, and significant proceeds from operations have been distributed to investors. Assets in this investment are still held, as this is deemed to be the most beneficial for the investors. So far, the fund has achieved a satisfactory IRR since inception, and due to timing and price negotiations, the secondary deal has provided an additional IRR of almost two percentage points.



CASE 4

US based biodiversity properties with environmentally based monetary values

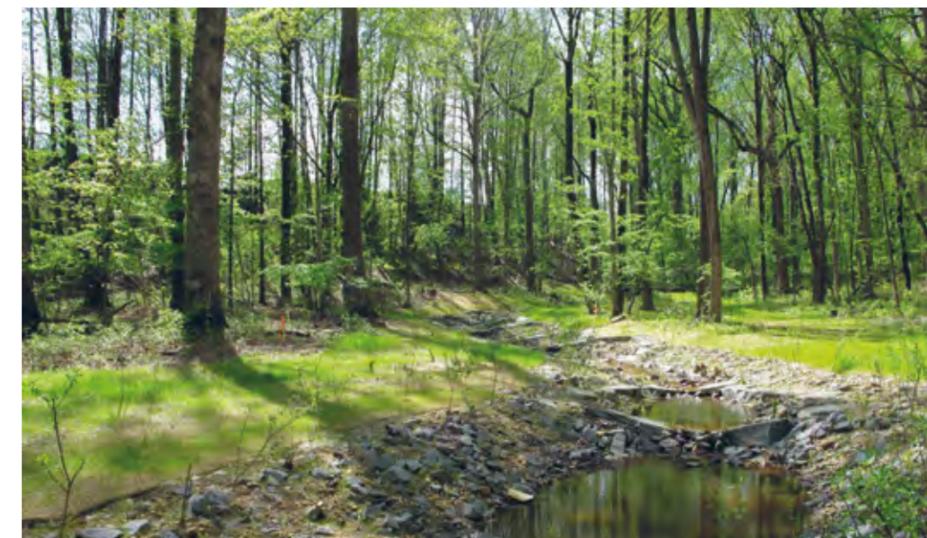
Through the years, IWC has gradually increased its knowledge on and experience with various types of monetizing environmental products and services (Payment for Environmental Services, "PES"). In 2012, this led to a commitment from two of IWC's clients to a primary fund, which had been established in 2010. This fund specifically targeted ecosystem investments into so-called "mitigation banks".

When establishing a mitigation bank, you invest in restoring natural habitats which are, subsequently, sold as environmentally based credit units to public and private development construction projects that negatively impact protected ecosystems in the same region as the mitigation bank. These development projects are required by law to restore habitats as nature is interrupted by these development activities.

The fund is now fully invested with seven projects in different types of ecosystems and regions of the US. The majority of these investments are in wetland protection projects. Most investments have so far been selling environmentally based credits at, or above, the underwriting price assumptions. Total environmental credit volume is higher than originally expected, and the fund is well on track to realize its double-digit target returns until its expected liquidation around year 2024.

Virginia stream mitigation bank

The stream is restored after being degraded from water runoff inside a neighborhood. The rocks that look like "stairs" in the stream form small pools with some 5-10 meters of separation to slow the speed of the water. This, together with the planting of stream-side vegetation helps to prevent stream bank erosion.



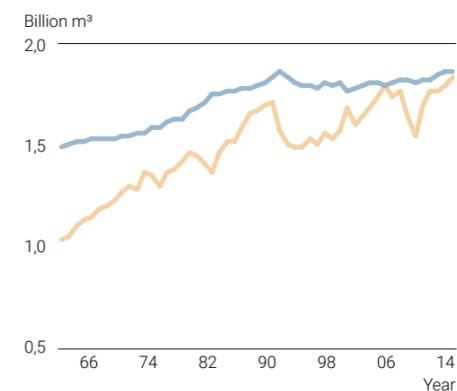
A BRIEF HISTORY OF WHAT DRIVES MODERN WOOD CONSUMPTION

The world consumes about 3.4 billion cubic meters of wood on an annual basis, which means that every human on average uses almost 500 kilograms of wood per year. For most of us, wood consumption goes unnoticed, despite that in our daily life, we are surrounded by wood.

Global wood production development (1962-2014)

Figure 1 (Source: FAO Stat)

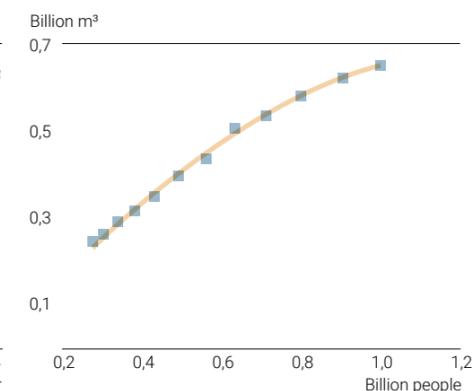
■ Industrial roundwood in billion m³
■ Fuelwood in billion m³



Fuelwood consumption and population growth in Africa (1964-2014)

Figure 2 (Source: World Bank and FAO Stat)

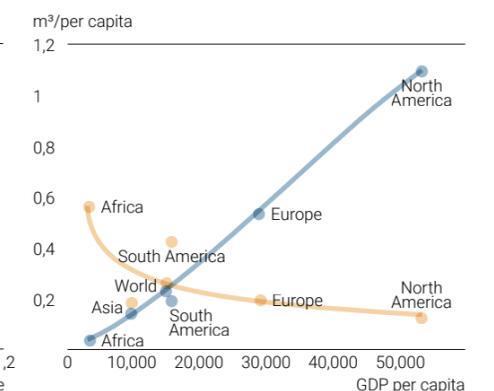
■ Population in billion
■ Fuelwood consumption in billion m³



GDP and wood consumption per capita across regions (2014)

Figure 3 (Source: World Bank and FAO Stat)

■ Industrial roundwood
■ Fuelwood



Furniture, flooring, and decking are some of the most visible products, but wood is also used in applications that are less apparent, including tissue, packaging, hidden woodframes in construction, and concrete forms. Wood industries are also slowly promoting new wood products to accommodate the growing demand for eco-friendly products. A prime example is the pulp industry that continues to expand its exposure into textile, plastic, biofuel, diaper, and even biodegradable furniture markets.

Recent trends also indicate an increasing demand for wooden houses – in particular among the younger generation that understands and appreciates the long term sustainability of using wood.

Wood for basic needs and the industry

For many people, wood is an important and critical input to sustain their livelihood. In fact, about half of the annual global wood production is consumed for heating and cooking, predominantly by people in less developed regions. The other half is consumed by the wood industry, labelled industrial roundwood, to produce higher value wood products (Figure 1). Roughly speaking, industrial roundwood is produced in sustainably managed semi-natural forests or plantations, while fuelwood (charcoal and fire wood) comes from natural forests.

Fuelwood consumption has remained fairly flat over the last 25 years, with an increase in fuelwood use in Africa (Figure 2). This is counter-balanced by an equally large opposite trend in Asia, where wood deficit and economic development have pushed demand for alternative energy sources. Africa is projected to increase their population by one billion people over the next 30 years, which suggests fuelwood demand to increase further – in particular for charcoal, as a growing number of more affluent households are expected to prefer this over fire wood.

Industrial roundwood consumption is still growing. The drivers behind this growth are many and will be described in more detail in the follow-

ing sections. However, industrial roundwood production is currently at new historical highs –largely attributed to China's wood demand.

Wood consumption and development

As societies progress into more advanced economies with higher living standards and income, fuelwood is being replaced by other energy sources, while a growing construction and consumer product market drive demand for industrial roundwood (Figure 3). In Africa, wood consumption is composed 90 percent of fuelwood and 10 percent industrial roundwood. In Europe and North America, industrial roundwood is the main component with per capita wood consumptions over 33 and 16 times larger, respectively, than the industrial per capita wood consumption in Africa. Interestingly, industrial roundwood demand is more elastic to and more correlated to economic progress, while fuelwood demand shows a more modest decline in demand when GDP per capita rises, perhaps because it remains a cheap energy source in all regions.

Figure 3 illustrates that in North America, the higher industrial roundwood consumption is due to their preference for wood framed construction, whereas in Europe bricks are the main building material preferred. Asia's chronic wood deficit shows up in its lower level of fuelwood consumption, compared to South America for example, that uses part of their industrial wood as a source of fuelwood to dry agricultural products.

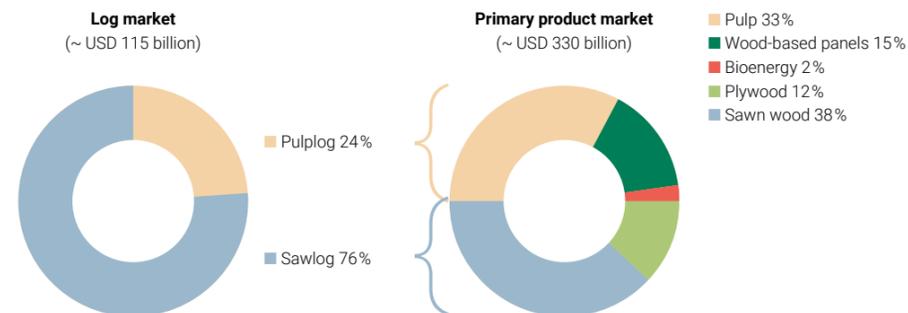
Industrial roundwood production

Industrial roundwood can be characterized into two grades:

1. Sawlogs (sawtimber and chip-n-saw) produced from larger and older trees of generally higher quality with regard to wood characteristics and form.
2. Pulplogs that are smaller trees of lower quality removed from the forest at an earlier stage to nurse the existing trees into sawlogs. Sawlogs are predominantly used to produce sawn wood and plywood for construction or further refined products like furniture and flooring.

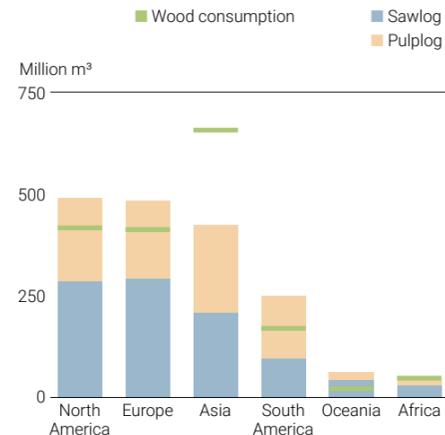
Value chain from log to primary product market (2014)

Figure 4 (Source: FAO Stat)



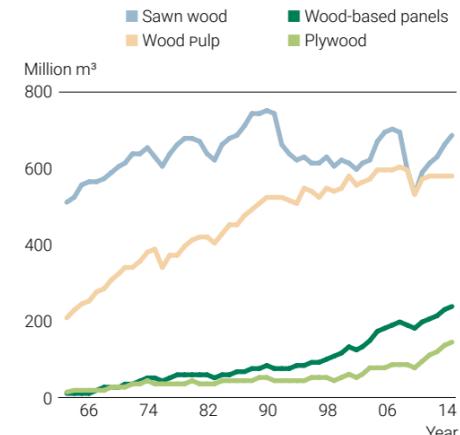
Regional saw- and pulplog production and wood consumption in million m³ (2014)

Figure 5 (Source: World Bank and FAO Stat)



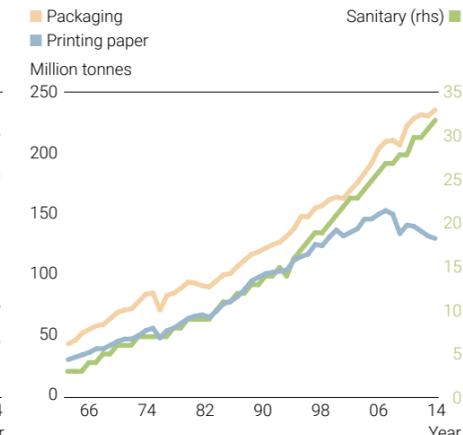
Global primary wood product production in million m³ roundwood equivalent (1962-2014)

Figure 6 (Source: FAO Stat)



Global paper production in million tonnes (1962-2014)

Figure 7 (Source: FAO Stat)



Pulplogs are primarily used for producing pulp, a highly refined wood product used by the paper industry, or wood-based panels (“WBP”), a low-cost material for producing furniture, doors, and flooring. For timberland owners, sawlog production is one of the most important value drivers. The sawlog market is over three times larger than the pulplog market in value terms due to a price premium around twice the value of pulplogs and greater volume harvested (Figure 4). However, significant value is added in the processing of logs and relatively more for pulplogs; due to the costs associated with refining them into higher value products such as pulp. This implies that the primary product market for pulplogs in value terms is only slightly smaller than the sawn wood and plywood market that sawlogs are produced for. The wood industry also produces pellets from residues or pulplogs, but this market is small.

Where pulp and sawn wood industries are located in industry clusters, some of the wood for producing pulp comes from sawn wood residues. This means that the pulplog exposure to the primary product market is slightly overstated in Figure 4.

The regional distributions in saw- and pulplog production show that North America, Europe and Asia are the major log producing regions (Figure 5). Markets in Europe and North America are highly mature with a sustainably managed forest resource and a modern forest industry. Asia also has a comparatively large industrial roundwood production, which in part is attributed to plantation development in China.

Still, some 45 percent of Asia’s wood production comes from tropical forests that likely suffer from over exploitation and dwindling supply. China’s recent log ban in natural forests, estimated to remove a supply equivalent to seven percent of Asia’s current log production, will put greater reliance on domestic wood plantations and a continued demand for wood product imports to meet domestic demand. Other regions are wood net exporters, to the Asian market primarily, except for Africa, which is also a small net importer of wood. High yield plantation

establishment by a growing pulp industry is the main reason for a relatively high pulplog production in South America.

Primary wood product development – sawn wood

Historical developments of the main primary wood products are depicted in Figure 6. The sawn wood and pulpwood markets are almost equally large in terms of the volume of wood (i.e. roundwood equivalents) required to produce the two products. Global sawn wood production has more or less been flat over the last 40 years due to several notable events. Historically, North America has consistently increased their consumption of sawn wood – but demand was greatly offset by the financial crises in 2009. Europe was not hit as hard because of a more diversified end-market exposure to Europe, North Africa, the Middle East, and Asia. The dissolution of the Soviet Union in 1991 had a notable effect, although the drop in demand could also be related to data reliability of the former Soviet Union. The rebound in sawn wood production after the financial crises is to a large degree due to housing starts in China. The rebalancing of the Chinese economy to a more consumer driven economy is expected to drive sawn wood demand going forward. US housing starts are the primary driver of global sawn wood demand, which is expected to increase slowly.

Expansion of the wood-based panel industry has mainly taken place in Asia, to service a growing furniture industry for domestic consumer markets. Plywood production has to a large degree been used to produce concrete forms for construction in China, and with the expected slowdown in the Chinese economy, plywood demand could level off.

Primary wood product development – wood pulp

Wood pulp for paper is the other large primary product market for log producers. Generally, print paper demand is going through a secular decline due to mainstream digital media. Because print paper has a higher virgin wood fiber content compared to other paper grades, the decline in print paper production has had a significant impact on pulp production

that has remained stagnant over the past 10 years (Figure 6). Other paper markets are however growing, which have offset the decline in print paper production – notably sanitary and packaging paper that make up 67 percent of the paper market today (Figure 7). An increasing number of pulp mills will attempt to convert to these paper grades, or expand their production in market pulp (pulp produced for the global market) to broaden their exposure to paper industries in growing consumer economies. Brazil’s pulp industries, one of the lowest cost market pulp producers in the world, are broadening their end-market exposure beyond South America, into markets in Asia. Significant mill expansions are coming online in the coming years that will be counterbalanced by some closures. However, the overall net global pulplog demand is expected to increase as a result.

Wood demand drivers

Fundamental wood demand drivers are essentially those that also dictate GDP growth, namely population and productivity growth. The later provides the foundation for increases in real disposable income that in-turn increases household consumption. Population growth also adds to household consumption growth.

The shorter-term cyclical factors affecting sawn wood demand are construction and remodeling activity (Figure 8), while wood for industrial purposes and interior decoration takes up smaller proportions of overall demand. The long term fundamental driver for construction is household formation – a function of adult population growth. Regions with higher income levels that show consistent adult population growth include North America and Oceania, while Europe is projected to see a minor decrease from the current level (Figure 9).

Wood-based panel production is exposed to both the consumer and construction markets. The use of panels in interior decoration implies that demand closely follows growth in household consumption (Figure 10). In more mature markets like the US, where wood-based panels are

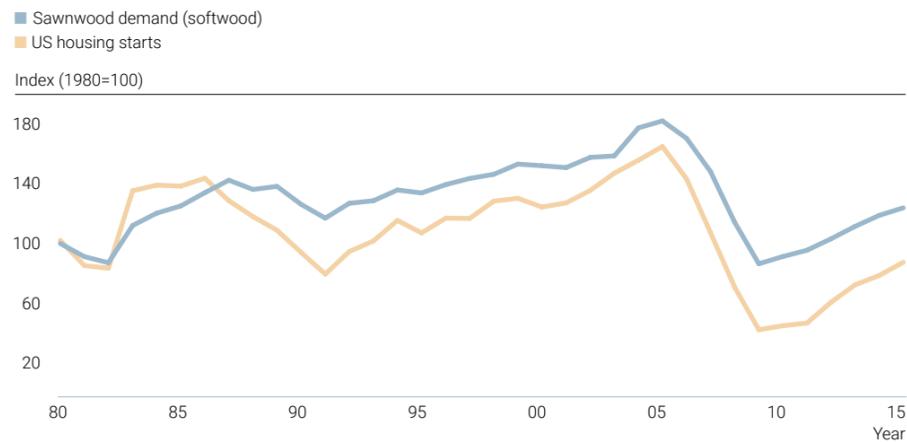


Woodchips for export

The harbour in Uruguay’s Montevideo.

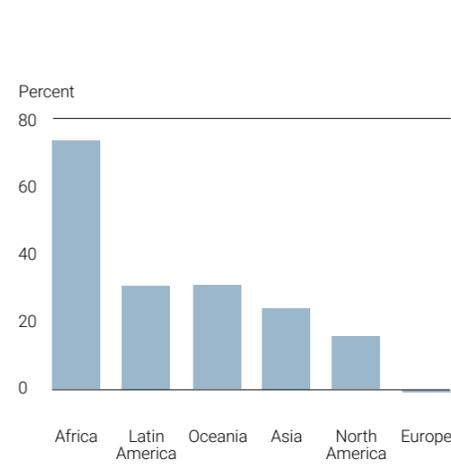
Sawn wood demand and housing starts in The US (1980-2015)

Figure 8 (Source: FAOSTAT and US Census Bureau)



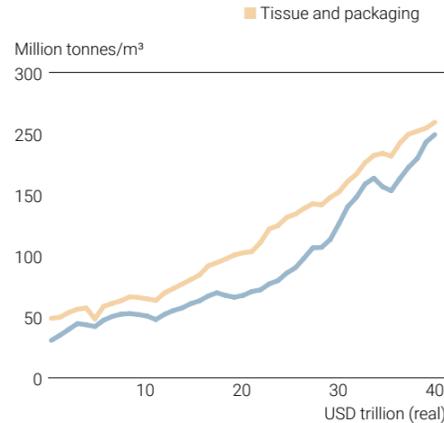
Adult population growth by region to 2035

Figure 9



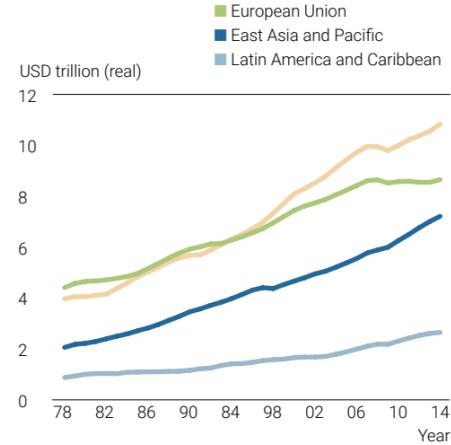
Global paper and wood-based panel demand relative to global household consumption (1970-2014)

Figure 10



Household consumption growth across regions (1978-2014)

Figure 11



an important component in construction, demand tends to be more correlated with the cyclical patterns of construction activity. Finally, pulp demand is exclusively a function of household consumption and population growth. As mentioned previously, tissue and packaging are expected to drive demand going forward (Figure 10). Regions with growing household consumption include North America, Asia and Latin America (Figure 11).

Solid future: Asia - and a greener use of wood

Global wood consumption today is evenly divided between wood used for fuel and heating and industrial wood used to produce higher value products. Both products are important to sustain and improve livelihoods around the globe. The fundamental drivers of wood demand; population and household consumption growth, suggest that Asia will be an important wood market region for wood producers going forward. At the same time, Asia is in a wood deficit situation that simultaneously

also constrains wood industry development in the region. This allows other regions with a developed industry to benefit from the Asian growth story. North America and Oceania may not have the same potential to increase per capita income, but population growth in these regions still provides a fundamental demand for housing starts and therefore, wood demand. This article does not highlight movements into new markets that are more difficult to quantify and predict. However, should the industry find new technologies to utilize wood into biofuels for example, it would undoubtedly have a high impact on wood demand – perhaps more than what the current supply situation can accommodate. We are more likely to see incremental steps towards “greener” and more efficient uses of wood, including greater utilization of by-products and production of wood-plastic composites, packaging material, absorbency materials in diapers, and viscose for textiles that can substitute oil related products and cotton. Overall, the long term trend in global wood demand is solid.



Did you know that the country Brazil is named after a tree? (Pau Brazil)

Pictured are eucalyptus clonal plantings from one of IWC's investments in Mato Grosso do Sul, Brazil.

MODERN FORESTRY

– and What it Takes to Stay on Top

At a recent timberland conference, one of the speakers made an interesting comparison, stating that forestry is not rocket science, it is much more complicated than that! While this could be stretching it, there may be some truth to the underlying statement. Today, satellites and drones are part of advanced forest management practices.

Simply speaking, forestry is no different than most other businesses; returns are optimized by balancing the maximization of outputs with an efficient input of resources. Modern forestry complicates this rationale as it strives to manage objectives that are sometimes conflicting. In addition to sustainable production of forest products, forest management needs to address important derived outputs to society such as protection of forest areas, water and soil resources, and maintenance of vulnerable ecosystems.

To assist in this complexity, IWC sees new technologies emerging, which allow the forestry sector to optimize economic, social and environmental decisions throughout the value chain. As a natural part of IWC's services, we strive to stay on top of these technological advancements, while maintaining our classic forestry competencies in order to assess and evaluate the potential for timberland assets we oversee on behalf of our clients. The rest of this article will highlight a few of these key developments.

Remote sensing inventory

Modern, efficient forest management is a highly data intensive discipline. After having established a plantation, there is need for continuous and accurate forest information collection, which comprises detailed data of tree diameter, volume, height, and number of trees as well as tree growth at the forest level. Traditionally, collection of such forest inventory data has been acquired through subjective, on-the-ground manual surveying. This inventory method is highly labor intensive, and with rising wage levels, it is becoming increasingly expensive.

An alternative to this traditional method of field inventory is to use remote sensing data acquired by, for example, satellites, airplanes and

drones. Airborne laser scanning ("LiDAR") is likely the most promising remote sensing technology for providing an estimation of forest resource information, such as tree volume and height data. By integrating a small set of information collected manually from the field with the LiDAR technology, forest managers can consistently and repeatedly monitor forests over large areas, while reducing time and labor costs significantly. Most importantly, research indicates that new upgraded LiDAR sensors can provide more precise descriptions of the forest compared to the traditional manual field inventory method. What's more, this technology is becoming more accessible to forest companies as drones with laser scanning equipment have now been developed for forest inventory purposes. This innovation gives forest companies the opportunity to perform comprehensive LiDAR inventory themselves, without waiting for an external party to fly over with a conventional airplane, which is both difficult to access and prohibitively expensive.

GIS for daily decision making and planning

As modern forestry requires multiple objectives to be reached while at the same time accounting for numerous constraints, forest managers need an advanced tool to process the large amount of highly detailed data now being gathered from these aforementioned satellites, planes and drones. For that purpose the Geographical Information System ("GIS") technology which integrates hardware, software and data for capturing, managing, displaying and analyzing all types of geographically referenced information is essential. Today, GIS that has been specially developed for the forest sector provides crucial information about forest resources and has become a very important tool for many, advanced forest managers in their daily work and decision-making throughout the supply chain.

Mechanization and optimized harvesting

Modern forestry often entails intensive plantation management in order to generate the highest yield and returns possible. To keep subsequently large workforces and high labor costs at bay, manual operations are gradually being replaced by mechanized methods. This is particularly the case in harvesting, where fully mechanized harvesters have replaced manual felling. Today, a common mechanized harvesting system typically consists of two machines; a harvester that is felling, debranching and cutting the trunk into logs, and a forwarder that is transporting the logs from the felling site to the roadside. This system is called the cut-to-length ("CTL") method and requires advanced machines with on-board computers to provide information to the machine operator. In the CTL method, the harvester is cutting the trunk directly in the forest into various log assortments based on current price lists and client order stocks. The computer system receives frequent updates with new client orders and price data in order to always optimize the revenue generated from each harvested tree.

New developments in mechanization

Harvest machine developers are constantly trying to develop new techniques and systems. A new system called Besten has recently received some attention. In this system, the operator of the forwarder is remotely controlling an unmanned harvester, with the purpose of felling the trees and loading the logs directly on to the forwarder's loading

bed. An integrated harvester and forwarder, a so-called harwarder, has also recently been developed, where the same machine fells the tree and places the processed logs directly on to its loading bed.

With that being said, it should be emphasized that approximately 50 percent of harvested volumes worldwide are still handled by manual fieldworkers using hand tools such as chainsaws. The remaining half is processed by mechanized harvesting systems, such as the CTL system and the tree-length method where the entire tree trunk is transported directly to a mill.

Site matched genetic material

Naturally, modern forest management is not only about detailed inventories, effective decision making systems, and digitalized harvesting hardware. To effectively turn tree growth into cash returns, a forest manager first of all needs to have a good understanding of the local soil and climatic conditions and to select the appropriate site matched genetic material that is expected to feed into a well-paying future market. This classic competence is crucial for any successful forestry business.

In this respect, major achievements have been reached in developing high yield, site matched tree clones in recent decades. In short, tree cloning is the science of creating several, identical plants with superior growth and quality characteristics, which originate from the same mother plant. As an example, eucalyptus super clones have been developed by the pulp and paper industry in Brazil, where the average productivity gains have increased up to 40 percent reaching yields as high as 40-60 cubic metres per hectare per year. Other species, such as pine, acacia and teak have also experienced improved productivity levels through the implementation of modern clonal programs. Over the years, IWC has developed a considerable understanding of the importance of utilizing the appropriate site matched genetics. From our experience, there are great benefits in choosing high yielding clones, which have contributed to higher growth rates, shorter rotations and ultimately higher financial returns to our clients.

What the future will bring

It is evident that new technical developments within the modern forestry sector are developing rapidly with decision support tools, logistic solutions, water and soil map analysis tools, and high resolution satellite imagery to name a few.

The modern forestry supply chain encompasses a broad range of complex issues and interactive processes. Timber value increases throughout the comprehensive value chain, which means there is great incentive for forest managers to adopt technologies that allow them to keep costs down and increase profitability in all stages.

At IWC, we believe that the digitalization and mechanization trend will continue at a fast pace and spread into new geographical regions going forward. In order to be a successful and profitable forestry company over time, it will be increasingly important to follow technical developments closely and to take advantage of emerging techniques in order to remain a competitive player on the global timber market.



Sun and Forests Hold Energy which can Replace Oil and Coal

As a team of scientists at the University of Copenhagen discovered a very special process in plants, fueled by the sun's rays, they faced a discovery that may have far reaching implications for the energy sector and the chemical industry. The discovery is known as reverse photosynthesis, and may eventually make wood a much more attractive commodity.





An interview with Claus Felby

"We can only capture 15 percent of the sun's energy in a solar cell, whereas we can harvest 50 percent of light energy with this process."

My first impulse was that it had to be an error in the sample ...

Scientific team

The first trials demonstrating the reversal of photosynthesis were carried out by Postdoc David Cannella, and professor Claus Felby both from The Department of Geosciences and Natural Resource Management at the University of Copenhagen, together with Ph.D. student Klaus Benedikt Möller, from the Department of Biology at the University of Copenhagen.

Collaborators in on-going studies including publicizing are: Assistant professor Niels-Ulrik Frigaard, Department of Biology, Department of Biology, University of Copenhagen; Professor Poul Erik Jensen, Department of Plant and Environmental Sciences, University of Copenhagen; and, Professor Morten J. Bjerrum, Department of Chemistry, University of Copenhagen

Professor Claus Felby is in his laboratory in the Department of Geosciences and Natural Resource Management at the University of Copenhagen, where he explains "reversed photosynthesis" – a groundbreaking discovery, which has received tremendous attention worldwide.

Actually, Claus Felby and his team were intrigued by something completely different, but by coincidence, they realized that what they were looking for gained entirely new properties if it was exposed to strongly enhanced light.

That it was a breakthrough discovery became immediately clear not only to the team, but also to scientists outside the University of Copenhagen. When the first article about reversed photosynthesis was published on April 4th of this year, it was downloaded more than 3,000 times in less than 24 hours.

It is fairly commonplace knowledge that the sun's rays, together with water and nutrients build plant biomass in a process known as photosynthesis. Reversed photosynthesis instead happens when the rays of the sun combine with the chlorophyll of the plants, and a spe-

cific enzyme that breaks down plant biomass. The process allows for the easier conversion of biomass into biofuels and other chemicals. This mechanism opens entirely new perspectives, says Claus Felby.

– For a very long time, we have made efforts to create energy from the sun. Now, we can step directly from the sun to chemistry. The big difference is that we can only capture 15 percent of the sun's energy in a solar cell, whereas we can harvest approximately 50 percent of the light energy with this process within the plants. The consequences are hard to quantify.

Will it have any impact on future forestry?

– Not in a short term perspective. But if we assume that continued research will demonstrate proper results, we will see enormous impact later. In reality, the forest is a huge solar cell, and if we can take advantage of the sun's rays and the processes in the plants, we will be able to generate energy from trees. And we can – because the loss of energy is far less than when using wood today – use the energy far more efficiently. In other words, we will be able to substitute coal, oil, and gas. Consequently, forests will be much more sought after, and therefore also become more valuable, predicts Claus Felby.

Thor's hammer

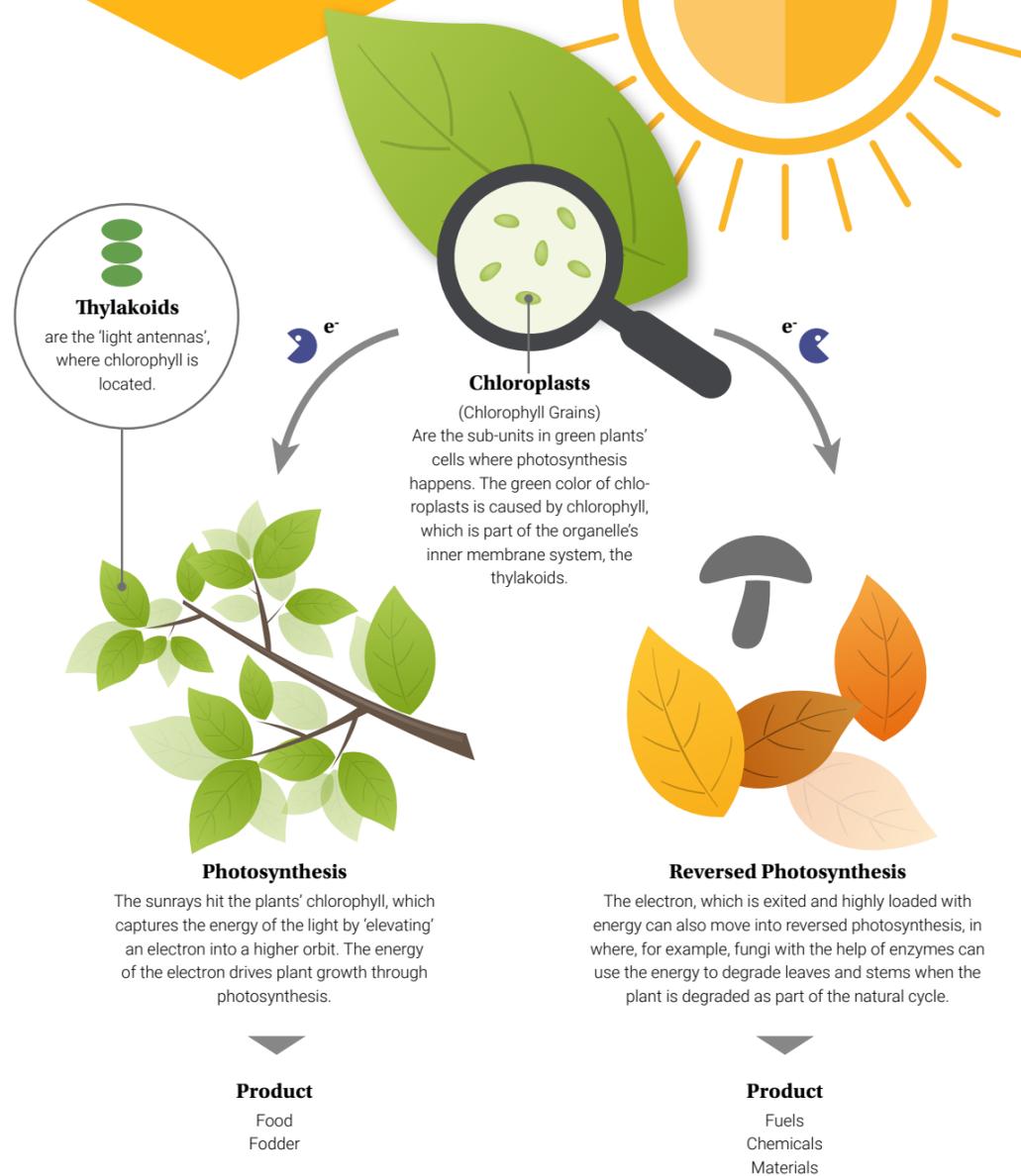
The reason reversed photosynthesis was only discovered quite recently is because the instrumental enzyme in the process was not recognized until six years ago. In fact, it is a class of natural enzymes containing copper, so-called "monooxygenases", which were identified by Norwegian scientists. These enzymes are now commercialized by the Danish biotech company Novozymes for clients producing bioethanol from plant residues. Adding monooxygenases doubles the efficacy of the process.

In 2010, it was unknown that sunlight can increase the activity by up to 100 times if chlorophyll is added. Chlorophyll gives the green color to plants, because it absorbs the red and blue in sunlight. When chlorophyll absorbs sunlight, the energy in the light can trigger chemical reactions – for example, when plants build their biomass. From this standpoint, Claus Felby and his team assume that chlorophyll can transfer energy to monooxygenases and thereby increase activity in the enzymes.

Still, there are questions to be answered, and the scientists do not yet know how widespread reversed photosynthesis is in nature. Many things indicate, that fungi and bacteria use reverse photosynthesis as a sort of "Thor's hammer" that can knock holes into the plants' sugar and nutrients. The reason Claus Felby and his colleagues are still in doubt is because the process happens fast and may even be rare, which is also the reason why reversed photosynthesis may not have been discovered until now.

Danish Researchers Find Photosynthesis' Reverse

The discovery of a process in nature whereby biomass is degraded by sunlight may lead to more efficient production of e.g. fuels and chemicals based on plant materials.



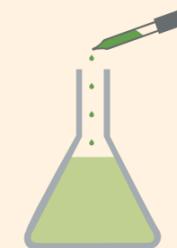
Nature's discovery becomes usable

So far, the experiments with reversed photosynthesis have been executed on a very small scale in the department's laboratory. But in collaboration with Novozymes, Claus Felby and his team are now scaling up. In theory, the practical use of the discovery is abundant. As mentioned, the process can create new sources of energy but it can probably also be used for developing new pharmaceuticals and a variety of other products from the chemical industry, which are likely to be produced faster, more effectively, and more sustainably.

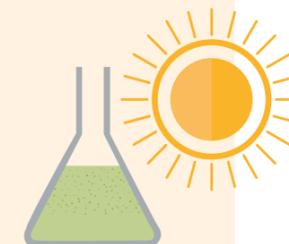
From biomass to ethanol by using light



Biomass is pre-treated
as in a standard ethanol process.



Pigment
chlorophyll is added together with different enzymes (oxygenases and hydrolases).



Light!
Light together with the oxygenase drives the degradation of the biomass so that it becomes more accessible for the hydrolases.



Hydrolase
The enzymes have degraded the biomass to green sugar which can be fermented to e.g. ethanol.



– A Stable Asset Class

Timberland investments have been growing substantially since institutional investors made their first transactions in the 1980s. Today, the value of timberland assets managed on behalf of institutional investors globally is close to USD 100 billion compared to 20 billion in 2000 – and is still growing. Not least, because investors are looking for alternatives to traditional financial assets such as equities and bonds.

Since the financial crisis of 2008, and because of declining interest rates due to monetary policies to support growth in many regions, investors have not been able to earn strong, non-volatile returns. As earnings have dropped, and the prospects of growth have decreased, investors increasingly have looked for low risk and stable income generating assets. That is where investments in real assets, such as forestry, agriculture, infrastructure, and real estate, come in. IWC Chief Investment Officer, Henrik Lundqvist explains:

– From a portfolio perspective, investments in timberland are good stores of value and therefore provide investors with defensive attributes in volatile markets such as inflation hedging and reliable returns (Figure 1 and 2). Understandably, timberland investments are becoming more and more attractive for institutional investors, not least among investors facing long term pension and insurance liabilities.

Natural appreciation in value

In financial terms, timberland has a low correlation with listed assets (Figure 3). This means that timberland provides diversification benefits to the overall portfolio when combined with listed assets. This is partly due to its illiquid nature, but is also a result of its biological growth that guarantees that the asset is naturally appreciating in value over time.

Adding to the portfolio perspective of timberland investments is also the ability to enhance returns in periods of strong demand for forest products, which positively impact timber and log prices.

– Harvest flexibility and active management enable timberland owners to respond to market demands. In periods with weaker demand, biological growth compensates for reduced harvest volumes and, together with land values, acts defensively and capitalizes value.

Sustainability a complement

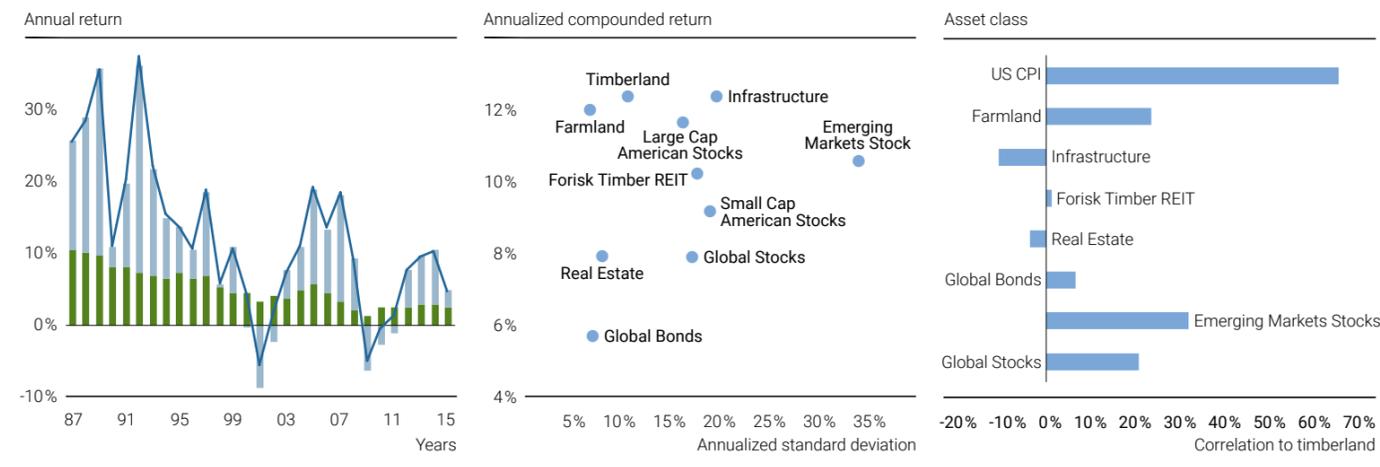
Henrik Lundqvist also stresses that the global concerns about climate, demography, and resources have an increasing importance for timberland investments.

– The long term concerns about climate change, population growth and global scarcity of resources is a growing interest for the expanding responsible investment community, because the real asset class can be managed sustainably; through addressing environmental and social factors. As timberland embodies these characteristics, we also see a growing number of institutional investors that are investing in forestry as a sustainability complement in a portfolio primarily comprised of equities and bonds.

Attractive outlook for timberland

Timberland asset value is by far driven by tree growth rate and the value of forest products. The long term outlook for timberland assets and forest products is promising both on the demand and supply side, as is explained in the fact box on the following page.

– Global timber demand is growing with a robust demand for wood in mature markets and also with a clear growth upside in developing



NCREIF timberland index – income and capital appreciation (1987-2015)

Figure 1
According to the National Council of Real Estate Investment Fiduciaries (“NCREIF”) – that provides a measure of returns for US private timberland dating back to 1987 – timberland returns are resilient in providing both income and appreciation from operations, although returns have compressed over recent years.

■ Income return
■ Capital appreciation
■ Total return

Favorable risk / return profile

Figure 2
The above data is based on quarterly historical returns that have been annualized, of the following indices: NCREIF Timberland Index, US CPI ex food and energy, NCREIF Total Return Farmland Index (1992), Dow Jones Brookfield Global Infrastructure Composite TR Index USD (2003), Forisk Timber REIT Index (2000), NCREIF property Index, EFFAS Government Bond Indices – Global Bond Series in USD, MSCI EM Total Return (1988), and MSCI World Total return. Correlations are calculated on returns since the beginning of 1987 or since inception for indices introduced at a later date.

Timberland, low correlations, diversification and inflation protection

Figure 3
The correlations are based on annual historical returns of the NCREIF Timberland Index, US CPI ex food and energy, NCREIF Total Return Farmland Index (1992), Dow Jones Brookfield Global Infrastructure Composite TR Index USD (2003), Forisk Timber REIT Index (2000), NCREIF property Index, EFFAS Government Bond Indices – Global Bond Series in USD, MSCI EM Total Return (1988), and MSCI World Total return. Correlations are calculated on returns since the beginning of 1987 or since inception for indices introduced at a later date.

markets, says Henrik Lundqvist. Basically, we have three clear, long term demand drivers. First of all, we have a rising world population and increasing economic growth per capita in emerging markets. Despite China's slowing growth, we see a growing middle class in both China and the rest of Asia, which is expected to drive increased demand for forest products for construction, household products as well as packaging. Secondly, as a consequence of the incremental forest product industry in mature parts of Latin America, we are seeing an increased demand for timberland raw materials in this part of the world. Thirdly, in the US, which is a large mature timberland region, we experience a robust, long term demand for residential construction which also requires raw timber materials.

Supply side deficit

On the supply side, Henrik Lundqvist foresees higher competition for quality assets in mature markets, and establishment of timberland assets in maturing markets, where industry capacity is expanding.

– High quality timberland plantation resources will experience a supply deficit over the longer term due in part to the increasing competition for land from alternative uses, such as agriculture. Also, an increasing emphasis on processing and deleveraging by forest product companies may result in divestments of upstream timberland assets which act to provide a supply of assets on a global basis. All in all, this will support a favourable long term price development for well positioned timberland assets of high quality.

Expanding Institutional ownership

– The process of expanding institutional ownership has already taken

place in the US, where most of the owned timberland plantations are located. These are largely owned by Timberland Investment Management Organizations ("TIMO"s), and public Real Estate Investment Trusts ("REIT"s). The later representing a way to invest in timberland from listed equities. Timberland investments from an institutional perspective are less mature outside of the US, but there is potential scope to expand this universe through e.g. industry divestments and plantation establishments, says Henrik Lundqvist.

Historically, the universe of timberland managers has been US-centric focusing on US investments. Despite the US being a huge and somewhat transparent market, it is also highly competitive in terms of it being costly to buy quality timberland assets. However, the timberland industry has become increasingly global and now includes US managers investing outside the US.

– A recent, internal IWC analysis of transaction data and timberland investment proposals has shown that the saturated and mature US timberland market has started a globalization process, where investors and managers are expanding their expertise to other regions, in particular Australia, New Zealand and South America. Additionally, non-US managers located primarily in South America and Oceania are investing in their respective "home" regions, says Henrik Lundqvist.

Fragmented timberland investment universe

Traditionally, the timberland investment universe has been characterized by established investment managers who have been around for many years. They have well rounded experience in investing and managing brownfield i.e. existing assets, in more mature markets, such as

the US. Therefore, there has only been a limited range of either established or new managers with the ability to invest globally in both brownfield, and greenfield (new plantation) assets. Now, a shifting pattern is emerging, says Henrik Lundqvist.

– These days, the timberland investment manager universe is becoming more and more fragmented and diverse, and an increasing number of new managers with deep forestry management backgrounds are coming out. Often, they provide access to timberland assets from non-institutional sellers. This development is characteristic for parts of Latin America.

Through its long standing timberland investment activities, IWC has developed deep relationships and insight into the timberland investment universe, which facilitates the identification of key investment manager trends. Henrik Lundqvist believes two trends will define IWC's relationships with managers:

– First of all, forest managers will have a growing demand for investment experience, which can help them create investment opportunities and raise capital for specific market opportunities. These types of openings are increasingly offered to preferred partners that can devote investment resources at short notice. But we also see newer managers, who are looking for investors with strong resources that contribute with both capital and experience. Secondly, we see a trend for complimentary sources of capital, such as co-investments, investing alongside a commingled fund, and buying into an existing structure. Typically, these types of investments are also offered to preferred investment partners.

The universe is growing

Based on wood plantation availability and forest area under institutional ownership the value of timberland assets, appropriate for institutional investment, is nearly USD 225 billion as is shown in Figure 4. The US remains the region with the largest availability of timberland, followed by Latin America, and Oceania. Henrik Lundqvist comments:

– The size of the investment universe of assets accessible for institutional timberland investments is to some extent subjective and depends on the criteria used for land suitable for timberland investments. Suitability criteria typically covers both commercial aspects such as if it is possible to commercially manage the forest, but also if the assets are placed in jurisdictions that provides sufficient legal comfort.

According to a 2014 report from the forestry resource information system organization RISI, the value of timberland assets currently under management by investors globally is about USD 97 billion, which represents a substantial increase in size from about USD 20 billion in 2000. As Figure 5 illustrates, USD 75 billion is invested with TIMOs, while USD 43 billion are invested with public REITs. The remaining 50 percent is currently owned directly by the timber industry, government, and other private entities.

– Investors with investment information, sourcing relationships, and an understanding of forestry assets should be able to tap into the expanding timberland investment universe that provides a range of alternatives for institutional investors to access quality timberland assets, Henrik Lundqvist concludes.

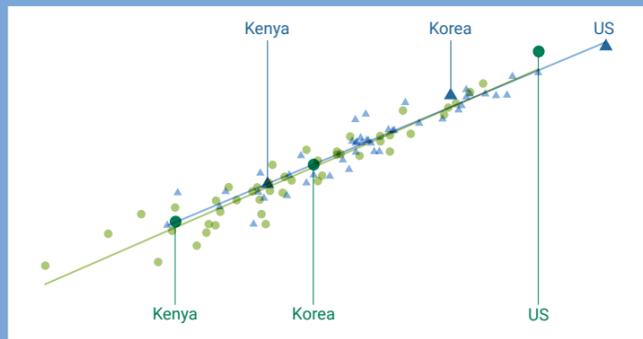
FACT BOX

Resilient global demand

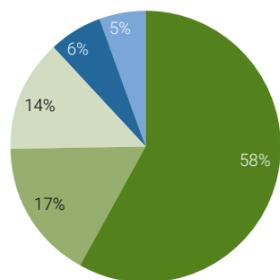
Timberland investments are exposed to various end-markets and drivers. Sawn wood consumption is supported on a global basis by fixed asset investments motivated by urbanization, household formation, and infrastructure investments. Paper and wood panel consumption growth is supported by household consumption, ultimately a function of population and income growth as illustrated in the World Bank and FAOSTAT figure below.

- ▲ Country averages (2011-13)
- Country averages (1971-73)
- Trend (2011-13)
- Trend (1971-73)

Paper and wood panel consumption m³ (log scale)



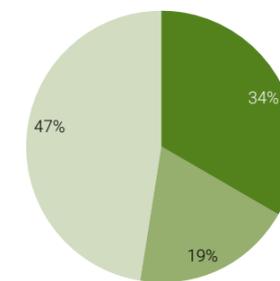
Household consumption USD real (log scale)



Timberland investment universe (USD billion)

Figure 4 (Source: RISI, ABARES, MPI, IBA, IWC proprietary data)

Region	Billion USD
US	129
Latin America	37
Oceania (Australia & New Zealand)	30
Europe	14
Emerging (Asia & Africa)	12
Total	223



Ownership of the timberland investment universe (USD billion)

Figure 5 (Source: RISI, IWC analysis)

	Billion USD
TIMO	75
REIT	43
Industry – private	106
Total	223

IWC due diligence in Chile

Lars Holm Simonsen, Director of Non-US Investments and Timber Research, discusses the potential purchase of a 3 year old radiata pine plantation with local managers.



An increasing number of new managers with deep forestry management backgrounds are coming out. Often, they provide access to timberland assets from non-institutional sellers. This development is characteristic for parts of Latin America.



Structures, Terms and Trends

in Global Timberland Investments

Institutional investors have various alternatives for timberland investment types and structures. Basically, they can invest in forest owning companies, or they can rely on structures and services offered by independent timberland investment managers.

As few institutional investors have their own timberland investment experts, a common approach for investing institutional capital into timberland is through committing to a private equity fund managed by a Timberland Investment Management Organization ("TIMO"). In practice, before committing the capital, the investor performs an extensive financial, legal, and forestry technical and market due diligence, as well as a manager selection. Thereafter, the investor outsources the actual decision-making control, and asset management to the TIMO, which will execute on a pre-defined strategy governed by the pre-set terms and limitations.

Fundamental differences

The terms and investment structures of such timberland funds are much inspired by the general private equity fund industry. However, there are some fundamental differences due to the special characteristics of the timberland asset which in many ways stand apart from traditional buy-outs and venture capital funds. A general observation is that timberland investment terms are becoming more sophisticated, better tailor-made for the asset class, and by that, also differentiate themselves from other private equity classes' terms. Typically, what we see today is that fund life-time in timberland can be almost perpetual compared to other private equity classes where, for instance, traditional end of fund life happens after 10 years and where investment in real estate and infrastructure normally lasts for 15-20 years.

Specialized role for managers

When IWC began advising institutional investors on timberland investments in 1991, timberland was a relatively new asset class. The TIMO industry was in its early days; opportunities, terms, and structures were few, and were less sophisticated compared to what we see now. It is also fair to say that investors were not as experienced with the industry at that time. Since then, IWC has observed significant development in how professional and institutional timberland investments are made, compared to the early 1990's, and we like to think that we have been part of driving that progress through IWC's fund negotiations with, and education of, the TIMOs throughout the years.

One of the most significant alterations has been that in the earlier days, the scope of investment mandates was very broad. Today, we see that limited and pre-defined strategies are calling for more known and specific assets and assumptions instead of commingled blind funds. Institutional investors tend to favor Limited Partnerships, with a General Partner ("GP") as the manager, and the investors themselves as the owner or Limited Partner ("LP"). They more often prefer strategies that are niched and focused, which can offer returns above the normal average, and can securely deploy the committed capital.

Consequently, we see that the role of the large "can do it all" investment manager has transitioned to become much more specialized. However, timberland investment funds are still typically managed by the investors' "alternatives" or "real assets" investment teams; in other words, timberland, as an asset class, is still not big enough for the institutional investors to have separate specialized teams.

Better due diligence and detailed reporting

Today, several institutional investors are more experienced with the asset class and bring skills from general private equity fund areas, such as financial, legal, tax, and team assessments. These are combined with forestry and market investment oriented aspects for a complete due diligence.

The resources spent in a thorough investment due diligence are increasingly considered as a way to add value to an investment. In addition, the investor benefits from a more secure, swift deployment of capital committed, and the terms and investment structure can much better be tailor-made and negotiated for the specific investment.

The Institutional Limited Partners Association ("ILPA") came out about 10 years ago with Best Practice guides and principles, including specific tools for investors and their advisors, to use in due diligence. This has increased not only focus and standardization to the fund/manager selection process but also spurred many investors to require better transparency

and disclosure by the private equity investment manager. IWC is a keen supporter of these best practices.

As today's investors require more control and visibility into what they are committing capital to, we also see significant changes in reporting. In many cases, traditional financial audits are no longer enough. Instead, far more detailed financial and descriptive reports, often tailored to secure compliance with guidelines and standards for example, sustainability reporting, are now considered standard procedure.

Reporting and transparency from the investment manager to the investors also has improved over the past two decades. However, work remains to be done for many GPs to meet institutional investor requirements. Importantly though, IWC has noticed a better understanding by many investment managers and willingness to supply its investors with more detailed reporting when requested. Again, IWC believes the ILPA Best Practices and guidelines have helped a lot in this improvement.

Secondary deals

An alternative way of investing into known underlying timberland assets with immediate deployment of capital is to acquire interests in already existing funds, so called secondary deals. Although still a relatively new phenomenon in timberland, the number of secondary deals available in the market has been increasing over the past few years along with the size of the deals. However, there is still only a relatively small circle of buyers able to analyze and finance these opportunities in a timely manner. IWC concluded five secondary transactions in 2015, all on the buy side.

Comprehensive investor control

In the private equity fund business, terms, such as fees, alignment of interest, and investor control, broadly speaking, can be categorized as ranging from investor-friendly to manager-friendly. This is also what IWC has seen within timberland investments over the past two decades, and especially so since the global financial crisis. Moreover, we have experienced that in timberland, this focus also includes disclosure and rights to take action

in potential conflict of interests, powers of the investors’ advisory committee, incorporation of clearly defined limits to what the fund manager may do and not do, and how to terminate a poor performing manager.

Focus on costs and fees

Generally, there is much more attention today on costs, both from an annual asset management fee (“AMF”) and fund expenses point of view. Initially, the AMF was more based on the current net asset value (“NAV”) or even on the

whole commitment, while today, the trend is to base the AMF on the lower of NAV or invested equity capital (excluding debt). The carried interest structure is developing more into stepwise performance structures, rather than a single hurdle rate, where the investment manager can be rewarded for performance at lower hurdle rates but also at a lower share (e.g. 5 percent over 6 percent, 10 percent over 8 percent, and so forth). A well designed carried interest structure is a strong tool to align the interests between a GP and its LPs – and to keep the GP motivated.

Another trend to align interest between the manager and investors is that the manager is required today to contribute (co-invest) a sizeable stake into the investment. By that, the manager has a strong incentive to maximize returns during the whole investment life-time and at all situations.

Lower leverage

How much leverage a manager can deploy on the property and fund level has always been a focus, but it is generally lower today (0-30 per-

cent of invested capital) than 10-20 years ago (some up to 50 percent). From experience, it is the general notion today that timberland is not an asset class with characteristics that fit well with leverage and debt service cover requirements.

Typical differences between timberland and other private equity classes

The table shows a few typical differences between timberland and other PE-classes*:

	Timberland	Other private equity classes
Fund life-time	12-15 years, or even evergreen/perpetual structures	Traditional buy-out/VC – 10 years Infrastructure/real estate – 15-20 years
Extension possibilities	Multiple 2-3 year periods	2-3 x 1 year
Typical holding periods of underlying assets	10-15 years	3-7 years
Investment periods	3 years	4-6 years
Asset Management Fees (“AMF”)	0.5-1.5%	1-2.5% · Typically traditional buy-out/VC is in the higher range, and real estate/infrastructure is in the lower range
Performance/incentive fees (“Carried Interest”)	10-20% over a hurdle of 6-8% nominal IRR, or stepwise hurdles starting at 5%	20% over a hurdle of 0-8% IRR
Fees on co-investments	Typically AMF and carried interest, but lower than in a primary fund	Typically no AMF and no carried interest
Common investment structures	· Commingled funds · Co-investments · Separate accounts · Club-deals	Commingled funds Co-investments Side-funds
Target returns (IRR)	6-10%	· Buy-out/venture capital +20% · Real Estate/infrastructure 5-10%
Leverage	Less commonly used, and to a lesser extent, 0-30% of acquisition value	· Commonly used as part of value-creating strategy, 20-80% of acquisition value · Traditional buy-out in the higher range, while Real Estate/infrastructure in the lower range
Secondary opportunities	Less opportunities and fewer investors	Many opportunities and investors, developed market for transactions

*Terms can vary significantly between the different asset classes and are dependent on the type of opportunity.

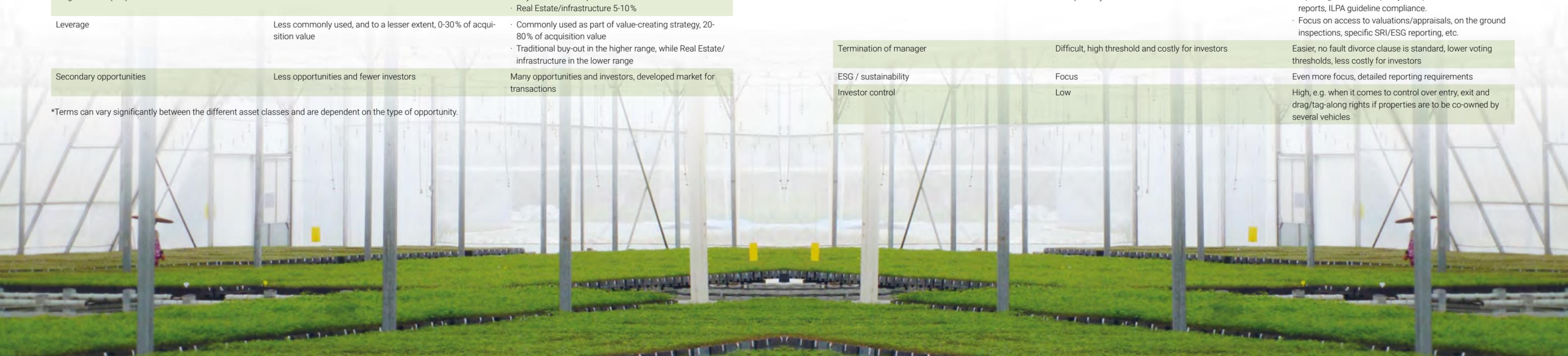
Term and structures in timberland over time

The table below shows how terms, attractive investment structures and other conditions have generally developed within private equity timberland:

	Old Times	Current Trend
GP / LP balance of terms	Manager-friendly	Investor-friendly
Investment scope/strategy	Broad mandate	Pre-defined and limited
Investment structures, investor preference	· Commingled blind-pools · Low visibility of expected acquired assets · Capital deployment pace of 3-5 years	· Separate accounts, club-deals, co-investments, secondaries, direct investments · Investments into visible targeted assets with known underwriting assumptions · Immediate capital deployment
Fund size	Larger (> USD 0.3 billion funds)	Smaller (< USD 0.3 billion funds)
Type of manager	Large “can do it all”, multiple strategies and funds simultaneously	Small niche/specialized, one or just a few funds/accounts simultaneously
Returns	Focus on Beta	Beta + Alpha
Leverage (on invested capital)	< 50%	< 30%
Alignment of interest	AMF and carried interest	Focus on low AMF and instead well structured carried interest scheme combined with the GP’s out of pocket contribution
Transparency, reporting	Financial reporting, great variation in reporting quality and transparency between GPs	· Investors require more detailed financial and descriptive reporting, increase in quality, with possible tailor made reports, ILPA guideline compliance. · Focus on access to valuations/appraisals, on the ground inspections, specific SRI/ESG reporting, etc.
Termination of manager	Difficult, high threshold and costly for investors	Easier, no fault divorce clause is standard, lower voting thresholds, less costly for investors
ESG / sustainability	Focus	Even more focus, detailed reporting requirements
Investor control	Low	High, e.g. when it comes to control over entry, exit and drag/tag-along rights if properties are to be co-owned by several vehicles

Pictured below

A eucalyptus nursery in China, which produces 600,000 plants per month, developed over a 14 week growing cycle. Once outplanted, they will be grown for 7 years before being cut for veneer logs to supply the growing panel industry in China.



Terms [tərmz]

Frequently used terms in private equity timberland investments

Carried Interest [kærid Intrəst]

A share of the profits of an investment or investment fund that is paid to the investment manager (the GP) in excess of a threshold, the so called hurdle. It is a form of performance fee that rewards the GP for enhancing performance

Catch-up [kætsj əp]

When an investment exceeds the IRR hurdle rate for carried interest (for example 8%), a pre-agreed share of the carried interest distributions (for example 50%) is allocated to the GP until the GP reaches an IRR equal to the hurdle rate

Club-deal [kləb di:l]

Club deals in this perspective is meant when few large and equally minded LPs pool capital commitments into one single Private Equity structure. It can also be defined as when several GPs joint-invest into one single asset

Co-investment [ko Investmənt]

An investment made by existing fund LPs or sometimes external LPs directly into an operating company alongside the Private Equity fund Typically, this allows the GP to make larger investments without deploying too much of its fund's capital to one single investment

Commingled Private Equity funds [ko mingəld prajvət ekwəti fəndz]

A fund consisting of capital from several investors (LPs) that are blended together Typically referred to as "pooled funds". Commingled funds exist to reduce the costs of managing the portfolio of assets and provide diversification

Due diligence [du dilədʒəns]

Due diligence is an investigation of a business investment opportunity prior to signing an investment contract

ESG [iesdʒi]

Environment, Social conditions and corporate Governance; three central factors in measuring the sustainability and ethical impact of an investment in a company or business

GP [dʒipi]

General Partner, the agents of a limited partnership with management authority, typically the PE-fund's investment manager

IRR [əjarar]

Internal Rate of Return, the internal rate of return on an investment is the "annualized effective compounded return rate" or rate of return that makes the net present value of all cash flows (both positive and negative) from a particular investment equal to zero

LP [elpi]

Limited Partner, shareholder in a limited partnership with no management authority, typically institutional investors the commit capital to a Private Equity fund structure

Private Equity [prajvət ekwəti]

An asset class consisting of equity securities and/or debt in operating companies that are not publicly traded on a stock exchange

Secondary investments [sekəndəri Investmənts]

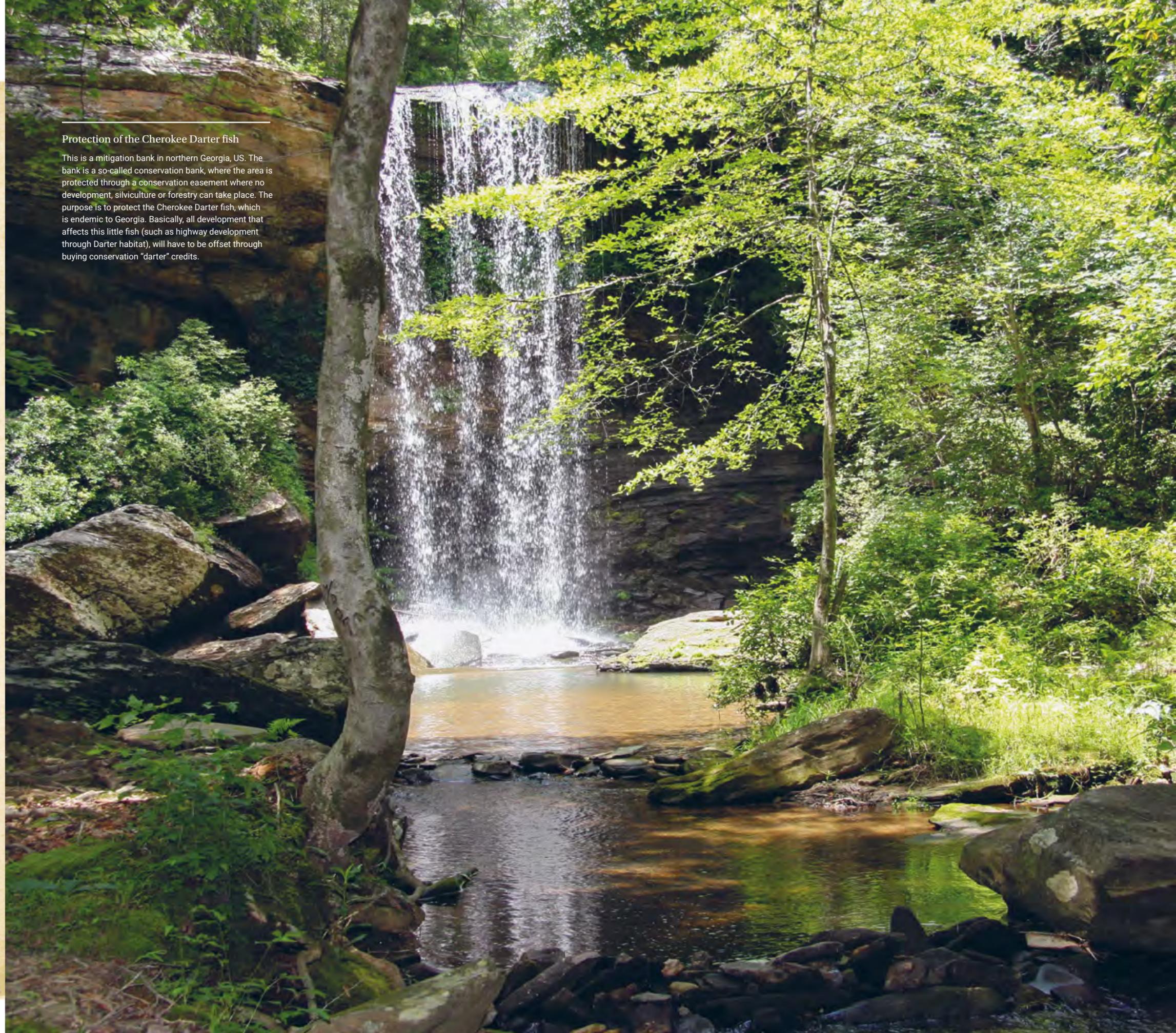
Illiquid fund shares that are sold by and transferred from one institutional investor to another

TIMO [tijmo]

Timberland Investment Manager Organization

Protection of the Cherokee Darter fish

This is a mitigation bank in northern Georgia, US. The bank is a so-called conservation bank, where the area is protected through a conservation easement where no development, silviculture or forestry can take place. The purpose is to protect the Cherokee Darter fish, which is endemic to Georgia. Basically, all development that affects this little fish (such as highway development through Darter habitat), will have to be offset through buying conservation "darter" credits.



THE ROAD TO SUSTAINABLE FORESTRY

Today, sustainability and forestry are closely interlinked and timberland investments are associated with the green growth agenda. Comprehensive sustainability policies and procedures help investors expand the universe, but this has not always been the case.

Until the early 1990s, forestry was not associated with green or sustainable management practices to the broader public. Before that time, natural forests of the tropical world were utilized beyond their capacity. Harvesting practices and the lack of sound management resulted in destruction of enormous natural values. The damages to some of the world's most precious resources were increasingly broadcasted to the western world by the media. In 1992 however, with "the Earth Summit" – the United Nations Conference on Environment and Development – in Rio de Janeiro the winds began to change.

IWC's external Sustainability Adviser, Mogens Pedersen from Green Hill Advice explains:

– The Earth Summit did not reach a binding agreement on natural forest protection. This of course was a huge disappointment to the many NGOs attending the forum. Indirectly, the lack of a UN agreement served as a catalyst for the development of a non-governmental, market based and international forest management certification scheme.

In 1993, the Forest Stewardship Council® ("FSC") was founded in Toronto with many of the same NGOs which had travelled to Rio to promote a binding UN forestry agreement. Since then, FSC has established itself as one of the world's two leading forest management certification schemes. The other was formed in 1999 when a like-minded group of small, family forest owners in Europe came together to form the Program for the Endorsement of Forest Certification ("PEFC"). Today, the FSC and the PEFC represent the most recognized and credible forest management certification schemes worldwide.

IWC and sustainable forestry

Responsible foresters rightly argue that the concept of sustainability has been understood for hundreds of years, being fundamental for

maintaining forests in perpetuity, as well as providing for steady production of wood and energy. As such, and since its founding in 1991, IWC has always believed that careful attention to sustainability in a broad sense is extremely important in connection with long term, responsible timberland investments.

By early 2000, attention on the deforestation of Latin America's natural tropical forests peaked, and the focus of the sustainable forestry magnifying glass was turned towards the management of plantation forests and natural forests in temperate regions. As IWC was invested in these types of forests, it was essential to address the topic, and IWC adopted its first formal policy on forest management certification in 2007. Today, IWC has established comprehensive sustainability policies covering environmental, social, and governance issues.

When IWC developed and formalized its policy on forest management certification it was decided to recognize PEFC and FSC as the leading 3rd party, independent schemes. IWC's sustainability policies are therefore committed to actively strive towards having all investments under management or advice certified by either PEFC or FSC. As these schemes are not prevalent in some of IWC's investment regions, other certification schemes that are more locally applied are recognized by IWC, so long as they have equally high standards.

In 2007, over 40 percent of IWC's investments were certified by either PEFC or FSC. In 2016, 82 percent of investments under management or advice are certified, while the majority of the remaining investments are in the process of becoming so.

Expanding the universe

IWC's overall sustainability policy, including the policy on forest management certification, dictates how environmental, social, and gov-

ernance issues are addressed in pre- as well as post investment situations. This allows IWC staff to include sustainability as one of the many criteria to assess when new opportunities or existing investments are evaluated. This has also proven to be a valuable tool for expanding the investment universe.

Identifying and assessing timberland investment opportunities, while holding paramount sustainability issues could in theory limit the investment universe. However, during the past nine years, IWC has learned that working with a strict approach to certification gives investors the necessary comfort to invest outside traditional timberland markets, thereby expanding the scope of the space. At the same time, a clear policy eases the tasks of investment managers, as they have clear guidelines for how to interpret sustainability.

IWC's comprehensive sustainability policy includes guidelines on strategic CSR, forest management certification, Socially Responsible Investing ("SRI"), and a Code of Conduct. However, as the recognized certification schemes become ever more robust, as of 2016, forest management certification plays the most crucial role when assessing sustainability in timberland investments, and acquiring certification has become a proxy for a manager's capability to address sustainability issues and provide proper documentation. The bottom line is that forest management certification has become the most important milestone in the process of securing responsible and sustainable timberland investments, Mogens Pedersen concludes.

Photo on opposite page

Natural redwood forest in California. Characteristic of the forests under sustainability scrutiny in post-2000 era.

CLIMATE CHANGE IS BOTH AN OPPORTUNITY AND A THREAT

Timberland investments have a positive impact on the environment and climate. On the global scale, forests are constantly in focus for their ability to offset greenhouse gas emissions, while at the local level they are known to have a positive effect on microclimate and biodiversity. IWC is well positioned to take advantage of these opportunities.



A magnified glimpse into the biodiversity of the Peruvian Amazon, where the ecology relies on regular rainfall patterns that are being disturbed by climate change.

Rio 1992 – at The "Earth Summit", UN's Conference on Environment and Development – marked the first time high level government officials from around the world linked forestry to the expected changes in climate. Forestry was perceived as part of the problem but also part of the solution. 25 years later, the effects of climate change is more evident than in 1992, and the role of reforestation and avoided deforestation in combating these effects has become clearer. This is a great improvement for timberland investments.

Timberland investments have, through plantation establishment and management, a positive impact on the environment and climate. This goes for the global climate where the reduction in Greenhouse Gases is constantly pursued as well as on local levels where forests have a positive effect on the environment and people's daily life.

Greenhouse gas emissions as a manageable factor

Greenhouse gas ("GHG") emissions are identified as the most important cause of the climate changes recorded in recent years, where the most significant effects are increased global temperature and changes in rainfall patterns. GHG's are made up of a number of different compounds, but in relation to forestry, carbon dioxide ("CO₂") is by far the most important and manageable factor.

Through photosynthesis, carbon is captured from the atmosphere and stored in trees as they grow. Carbon is held in the tree's biomass itself, both above ground in stems, branches and foliage, and below ground in the root systems. In addition to this, carbon is also stored in the soil because of the changing ecosystem characteristics that occur when an area is forested. As a forest or plantation grows older and matures, the capture of carbon slows down. However, the storage of captured carbon in mature forests and older plantations is significant and contributes positively to the global carbon balance.

Carbon credits

The focus on CO₂ and forestry have had a significant upside to some forest investments as forest owners have gone through the process of verifying and selling carbon credits based on the carbon captured and stored in their greenfield operations. IWC has followed the development of carbon markets over the years in both voluntary and regulated markets, and likewise assessed investment opportunities. So far, several forest investments have carbon as one of the many return drivers, while some of the opportunities have emerged with carbon as the main driver.

Impact on microclimate

Forests have a significant and often highly appreciated influence on local or micro climatic conditions. A forested area will experience lower average temperatures during the day and warmer nights in the summer. Forests will also slow down surface water movements, so that streams will carry water for longer periods and experience fewer overflow situations. Wildlife will benefit from forest cover, and biodiversity will increase while noise and dust issues will diminish.

One of many factors influencing the growth potential for trees on a specific site is rainfall. Roughly speaking, more rain is better, and rain distributed over most of the year rather than seasonally is preferred. At the same time, forestry is often carried out on lands considered marginal for other more lucrative uses such as agriculture. As a result, declining precipitation in an area could have a two-fold outcome. Lands could become less attractive for forestry due to lower expected rainfall. At the

same time, agricultural land could become too marginal for agriculture and thereby mature into forestry. This is especially the case in Australia, where it is expected that some current agricultural land will become less desirable for farmland due to diminishing rain and changes in seasonality, thereby becoming an opportunity for timberland.

IWC analyzing climate change effects

IWC is continuously analyzing the effects of climate change in the main timberland investment regions. By 2016, elaborate studies have been done covering major tree planting regions of Australia and Brazil. Both studies show that the targeted regions were to experience slight changes in expected rainfall. It also showed that variation in both regions had a much more substantial influence on growing conditions than expected climate change. For one of the target areas in southeastern South Australia and southwestern Victoria overlapping with the southernmost part of the Murray-Darling catchment area, the expected decline in precipitation based on a study by the Australian Bureau of Meteorology, over the next 30 years were between two and five percent.

Studies in core regions of Brazil showed that despite a couple of years with severe draught in parts of Brazil, the expected rainfall changes in core plantation regions were positive. The Intergovernmental Panel on Climate Change ("IPCC") overall concludes that the southwestern part of Brazil is likely to receive more rain and experience higher temperatures as a result of changing climatic conditions. While the northeastern part of the country will experience unchanged or slightly lower precipitation along with higher temperatures. Available soil moisture is expected to be lower in the northeast due to this combination, while it will be unchanged towards the southwest.

Practical climate change management

Based on studies on climate change in core timberland regions and the outlook for future rainfall patterns, IWC has developed a questionnaire that managers are asked to respond to. The questionnaire seeks information on selecting, monitoring, analyzing, and acting on climate change and variation. Further, it requires the manager to relate to genotype and site selection as a result of information on climate change as well as the manager's consideration on establishment and management practices. The main idea behind the questionnaire is to engage in open dialogue with managers on the effects of climate change, variations in their region, and ways to manage them.

Climate change is an opportunity as well as a threat to timberland investments. IWC is well positioned to take advantage of such opportunities. But more importantly, IWC already manages the threats of changing weather patterns and diminishing rains via extensive due diligence on new opportunities and a close dialogue with existing managers. Along with the climate change agenda, the increased focus on renewable energy sources will have significant influence on forestry worldwide. IWC understands and continues to interpret the future demands for biomass for energy and the direct impact on biomass for other wood products, such as sawn timber. In core timberland investment areas, IWC continues to analyze the potential changes and adjusts investment strategies accordingly.

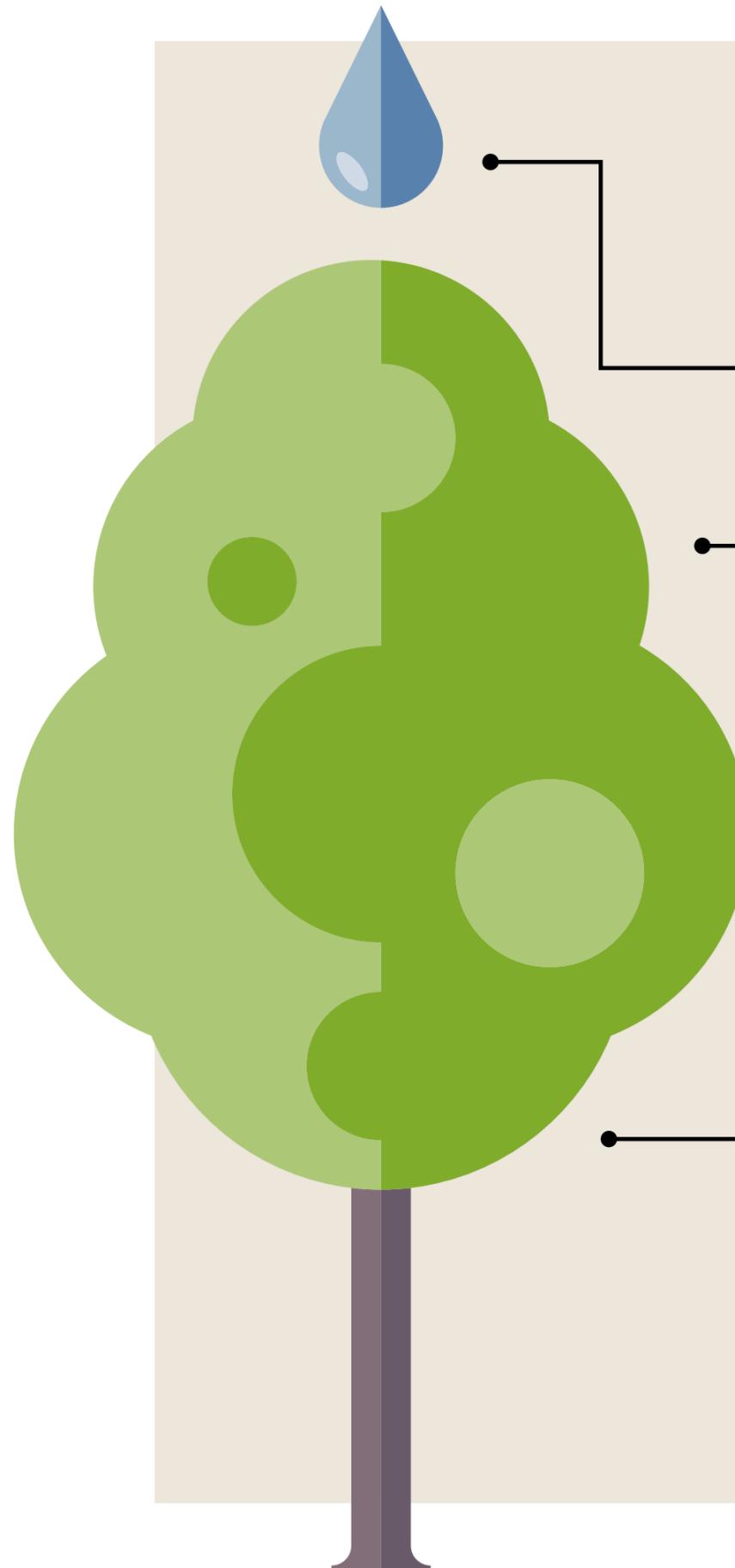
SIGNIFICANT CONTRIBUTIONS TO CLIMATE

A large tree can transpire as much as **378.5 liters** of water into the air per day.

A single 30-meter tall mature tree can absorb as much as **22.7 kg** of carbon dioxide in a year, which over its life time is approximately the same amount as would be produced by an average car driven **41,500 km**.



One tree can produce enough oxygen in a year to support **two people**.



Kolofon

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