Demystifying Forest Bonds

Assessing the suitability of bonds as a financing instrument to meet forest-based NDC targets

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Note: GP, global practice; CCSA, Cross-cutting solution area.

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Citation

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### Abbreviations

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<td>ABC</td>
<td>Low Carbon Agriculture Program</td>
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<td>APP</td>
<td>Area of Permanent Protection</td>
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<td>CAR</td>
<td>Environmental Rural Cadastre</td>
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<td>CBI</td>
<td>Climate Bond Initiative</td>
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<td>CCSA</td>
<td>Cross-cutting solution area</td>
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<td>CICERO</td>
<td>Center for International Climate and Environmental Research in Oslo</td>
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<tr>
<td>COP</td>
<td>Conference of the Parties</td>
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<td>CRA</td>
<td>Environmental Reserve Quota</td>
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<td>DRC</td>
<td>Democratic Republic of the Congo</td>
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<td>ESG</td>
<td>Environment, social and governance</td>
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<td>EU ETS</td>
<td>European Union Emissions Trading Scheme</td>
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<td>FSC</td>
<td>Forest Stewardship Council</td>
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<td>GAVI</td>
<td>Global Alliance for Vaccines and Immunization</td>
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<td>GBP</td>
<td>Green Bond Principles</td>
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<td>GHG</td>
<td>Greenhouse gas</td>
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<td>GP</td>
<td>Global practice</td>
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<td>ha</td>
<td>Hectare</td>
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<td>IBRD</td>
<td>International Bank for Reconstruction and Development</td>
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<td>IFC</td>
<td>International Finance Corporation</td>
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<td>INDC</td>
<td>Intended Nationally Determined Contributions</td>
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<td>IRR</td>
<td>Internal rate of return</td>
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<td>LCD</td>
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<td>Multilateral finance institution</td>
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<td>Million hectares</td>
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<td>NDC</td>
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<td>PLANAVEG</td>
<td>National Revegetation Plan of Brazil</td>
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<td>PRA</td>
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<td>PRONAF</td>
<td>National Program for the Strengthening of Family Farming</td>
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<td>REDD+</td>
<td>Reducing Emissions from Deforestation and Forest Degradation</td>
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<tr>
<td>SME</td>
<td>Small and medium-sized enterprise</td>
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<td>SPV</td>
<td>Special-purpose vehicle</td>
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<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
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<td>UNFF</td>
<td>United Nations Forum on Forests</td>
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<td>WBG</td>
<td>World Bank Group</td>
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Executive Summary

Forests have been receiving increased attention over the past few years, particularly through international climate change negotiations and efforts to develop a mechanism for reducing emissions from deforestation and forest degradation. In many forest-rich countries, the implementation of the recently declared COP21 INDC\(^1\) targets builds significantly on greenhouse gas (GHG) emission reductions and emission avoidance related to forests. Most of these countries will require considerable new investments in forestry that can be realized only through an increased level of financing over the next few years. Given the scale of the financing requirements, prevailing macroeconomic conditions, and fiscal constraints, it is unlikely that these countries will be able to fund these programs alone.

Financing mechanisms, especially those related to carbon finance, have not yet been able to deliver the resource flows necessary to sustain investments in the reforestation and restoration of degraded lands, forest management, and forest conservation at required levels. While there have been some promising examples for carbon-based forest finance on a pilot and/or project basis, these are largely reliant on single-donor and one-off contributions rather than larger-scale institutionalized financing mechanisms with steady income streams and cash flows. Forestry activities targeted by carbon finance may also not cover the entire range of forest sector interventions needed to meet NDC targets. Although COP21 made important advances for forest-based carbon finance, the overall resources available for global forest investments still fall far short of what is required to meet investment needs under NDC.

With the limitations of conventional financing through donor-led approaches, bonds – especially Green and Forest Bonds – have been increasingly viewed as a promising financing instrument to meet NDC-related investments in the forestry sector with advantageous financing terms. However, available data on the use of bonds to finance forest investments presents a sobering picture. Although the Green and Climate Bonds market has been growing exponentially in recent years, the share of agriculture and forestry investments supported by bonds is marginal and amounts to less than 3% of all such bonds.

This report presents a systematic assessment of the viability and comparative advantage of bonds as a financing instrument to meet forest-based NDC targets. The assessment considers the sectoral framework conditions of the forest sector and how these impact financing and investment decisions. Special reference is made to Brazil as a case study. However, the analysis is relevant for the broader global discussion on NDC financing for forest-based financing in other countries, as well as other sectors relevant to meeting NDC targets. The report seeks to address the subject from an issuer perspective, and mainly for public sector entities.

Forest country context

Many countries where the forest sector is important in meeting NDC commitments are characterized by their high political risks and low economic performance, resulting in low credit ratings and higher costs of public debt. These conditions not only make it more difficult to raise resources for public investments, they also indicate a less favorable environment for private investments as these prefer low risk and stable economic performance, especially investments in forestry that are long-term and commonly more sensitive.

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\(^1\) Intended Nationally Determined Contributions. The word “intended” was used because countries were communicating proposed climate actions ahead of the Paris Agreement being finalized. However, as countries formally join the Paris Agreement and look forward to implementing these climate actions, the “intended” is dropped and an INDC is converted into a Nationally Determined Contribution (NDC). (WRI 2015b)
Reliable long-term land and tree tenure arrangements are the most important among the criteria required by investors for making forest investments. Countries with lower development performance are confronted with a range of important and urgent public investment priorities – not least those related to energy, infrastructure, or education sectors. They must choose carefully which investments will yield the greatest development benefits, commonly measured in economic growth and shared prosperity.

Among the rich set of forestry countries, Brazil represents a particularly pertinent example for analyzing the use of bonds as a financing instrument for forest investments. Brazil’s GHG emission profile has historically been characterized by the prominence of Land Use and Land-use Change and Forestry (LULUCF), which are mainly emissions related to deforestation and forest degradation in the Amazon and the Cerrado biome. However, deforestation rates have been declining since 2004, and there has been a dramatic shift in the pattern of emissions. By 2010 LULUCF accounted for less than 20% of the total, down from close to two-thirds. To achieve this, Brazil has implemented important policy and governance reforms, especially targeting re- and afforestation with the objective of restoring degraded and deforested landscapes. Forest restoration is of particular importance for Brazil and is featured prominently in the NDCs, with an estimated cost between R$ 31 and R$ 52 billion (USD 9.5–16 billion) over the next 25 years.

As is the case for many other forest countries, Brazil also faces a challenging development framework, especially with respect to its macroeconomic performance. This poses significant hurdles for mobilizing public resources needed for investments to meet NDC targets. The country’s growth performance has continually declined since 2011, culminating in flat growth in 2014 and a contraction (i.e. negative growth) of 3.8% in 2015. A devaluation of the currency increased the cost of raising money on international markets, and rating agencies reduced Brazil’s long-term foreign-currency rating to BB with a negative outlook in 2016. Brazil’s cost of issuing debt on the capital market increased substantially. The government had to pay more than 16% interest to place its ten-year bonds in 2015. Since March 2016, yields have been returning to the level of 2013–14.

Bonds, Green Bonds, and Forest Bonds

A bond is a debt instrument under which the issuer owes the holder a certain amount on which the issuer pays interest. Investing in bonds is generally viewed as a lower-risk investment option compared with other types of investment, such as stocks. Bonds guarantee a fixed income stream through interest payments and the return of the principal payment at nominal value at maturity. The level of risk is dependent on two factors: (1) the type of bond in question; and (2) the issuing entity. From an investor’s viewpoint, corporate bonds typically yield higher returns than bonds issued by public entities because they are characterized by higher risks of defaulting on their financial obligations, whereas countries “can always raise taxes”. In contrast to this general rule, bonds issued by countries with unstable economies maybe characterized by a higher risk premium than for corporate bonds issued by financially solid private sector issuers. For example, in February, Moody’s (2016a, 2016c) rated the two Brazilian companies BRF and Fibria at Ba1, which was one step higher than the Brazilian government credit rating of Ba2 at the time.

The concept of the Green Bond was developed in 2007 as a response to increased investor demands for engagement in climate-related opportunities. The first entities to issue such a bond were the World Bank and the European Investment Bank (EIB). The World Bank has issued over USD 9 billion worth of such bonds through more than 125 transactions in 18 currencies (as of October 2016) since its first issuance in 2008. The majority of eligible projects are from the energy (38%) and transport (34%) sectors. Only 12% of the eligible projects fall into the category of agriculture, forestry, and ecosystem projects.
The underlying rationale for issuing Green Bonds is twofold: first, Green Bonds allow issuers to broaden the investor base by reaching those investors that may not invest in a plain vanilla bond from the same institution or corporation; second, Green Bonds can serve as a communication tool between issuer and investor, especially with the objective of promoting environmental performance of issuers, which may not be realized through plain vanilla bond issuances. From an investor perspective, the demand for Green Bonds is commonly rooted in the need to demonstrate commitment to environmentally responsible investments. Investors are increasingly focused on integrating environment, social and governance (ESG) factors into their investment portfolios, and Green Bonds can meet their environmental objectives. In this context, the need for independent certification of eligible proceeds use becomes evident.

Different criteria and approaches to ensure that bond proceeds are indeed resulting in positive “green” impacts have been established by financial groups, non-profit organizations, and corporate investment firms. These “green” impacts can be related to climate and carbon emission reductions, targeting climate adaptation benefits, waste reduction, or for sustainable forest management, reforestation and afforestation, to list just a few. The three most common standards for labeling Green Bonds are the Green Bond Principles (GBP), the Climate Bond Standards, and Green Bond Indices (key features are highlighted in Annex A). However, the realities of certification of Green Bond investments as being “green” may be more flexible and subject to interpretation than expected. CICERO (2016), for example, uses a dark green, medium green or light green classification in its independent reviews of Green Bond frameworks. These “Shades of Green” give investors a signal about the extent to which a project is contributing to building a low-carbon and climate-resilient society by 2050.

Green and Forest Bonds market analysis

The market for officially labeled Green Bonds is expanding rapidly and important milestones have been reached over the last three years. Until 2013 the Green Bonds market was comparatively small and dominated by multilateral development banks such as EIB or World Bank, which were the first institutions to issue Green Bonds. Since 2013, corporations have been starting to tap into the field of Green Bonds, and municipalities have also launched their first Green Bonds.

In contrast to the general strong demand for Green Bonds, the forestry sector continues to play a negligible role in this market. The volume of outstanding Green Bonds is USD 118 billion, with 2% being issued in the forestry sector. The most important sectors are the energy sector, with more than USD 50 billion (43%), and the buildings and industry sector, with USD 28.6 billion (24%). Bonds issued in the forestry and agriculture sector, however, make up only USD 2.5 billion (2.1%). The amount of Green Bond issuances has grown exponentially from USD 3.3 billion to over USD 80 billion in 2016 (CBI 2016b).

Bonds and Forest Investments: issues and approaches

Forest Bonds can be viewed as more encompassing than traditional timberland bonds that cover basic needs like new infrastructure, equipment, refinancing, or working capital, although they are not focused on environmental services for which payments have been elusive. At this point carbon finance is still an emerging player in Forest Bond issuances and market prices for carbon credits are still low. Investors are beginning to look at other assets that can be generated through forest-related investments (i.e. the role of forests in providing environmental services like regular quantities of high-quality water or reducing the likelihood of flooding), but the sale of future incomes from such forests is rare.
In comparison to Green Bonds that are characterized by high credit ratings, Forest Bonds have on average a lower credit rating. 43% of the outstanding bonds fall into the AAA credit ratings band, primarily due to large development banks. 14% of outstanding Green Bonds have no rating, possibly because the issuing entities are fairly small or new to the market. Most of the issued Forest Bonds have no credit rating at all, and none of the issuing entities has an AAA rating. The lack of a good credit rating can be a serious challenge for issuers. This applies especially to large-scale bonds that have to be attractive to institutional investors.

For a public institution, issuing a Forest Bond is likely to be less attractive than other Green Bonds as social returns on forest projects tend to be lower, less immediate and less visible compared with other green projects. One reason is that the economic returns on green energy and infrastructure investments – defined in terms of contribution to economic growth and shared prosperity – are commonly higher than investments in forests. As more people may be immediately affected by public investments in renewable energy, clean transport, health, and education, the provision of these services may always be preferred over investments in forestry that yield tangible returns only in the medium-to-long term.

Bonds related to the forest sector are regularly issued by large, frequently multinational, pulp and paper or wood product companies that use large areas of private industrial plantations to source raw materials. These companies have a good record of implementation based on a successful business model, and seldom advertise their issuances as “green” or “forest”, but simply as bonds designed to help a successful corporation cover general costs. Such issuers have issued bonds up to USD 600 million, with proceeds not used exclusively for forestry activities. Instead, proceeds are oriented towards general operations and refinancing debt with relatively short tenure averaging less than eight years. Another reason why forest companies do not always promote their corporate bonds as “green” is that labeling increases costs, while institutional investors expect the same returns on Forest Bonds as they obtain for other more traditional bonds.

Compared with Green Bonds or even plain vanilla bonds, additional costs can arise for bonds that are forest sector-specific. These include additional expenditures for defining green criteria, monitoring and maintaining the proceeds as green, and transparently communicating performance to investors over the lifetime of the bonds. The costs of contracting a second party opinion and preparing projects and reports are most notable. During their life cycle, Green Bonds create additional costs at several stages and through different agents. In contrast, the definition of a successful forest investment may be more difficult. Moreover, the possibility of forest investment efforts being offset by simultaneous deforestation in other regions of the country, for example when dislocating agricultural production, is omnipresent. Monitoring of the ongoing compliance may require a geographic information system, which is costly and not always available. Hence, it is particularly difficult to define criteria and monitoring, which is therefore costly for forestry projects.

Issuance options for a Forest Bond and the role of the World Bank

This report proposes several theoretical structures for issuing Forest Bonds, ranging from public sector models through an international financial institution (IFI) such as the World Bank, private sector structures, or issuances using a dedicated financing facility. The selection of the appropriate model depends on the type of revenues, the institutional arrangements, the delivery of funds, and the risk. The question of how revenues are generated to pay back the bond is crucial for investors and issuers alike. The funds to repay the bond do not necessarily have to come from forest activities directly, especially for public investments, but can be tax money, for example. A second important question is how financing is managed and by whom. Whether the financing is managed by the government, a corporation, or a special-purpose vehicle (SPV) will influence the delivery of activities and the associated risk. The kind of activities that are financed through the bond depend largely on the institutional arrangement, as governments can, for example, finance monitoring
systems while corporations are more likely to finance plantations. Finally, the risk and the risk premium depend mainly on the institutional arrangement because the default risk constitutes the primary risk in all models. The reliability of revenue flows is only a secondary risk, as these may be offset by other income sources such as taxes or revenues from other activities.

For the public sector, the most common models for bond-backed finance are tax-backed and revenue-backed government bonds. In the tax-backed model, the government issues a bond to raise capital and uses that to fund forest activities. These activities could range from public-sector-driven afforestation investments, supporting smallholder forest management and reforestation, improving governance in the forestry sector, to research and development. Furthermore, the government collects taxes, as usual, and uses these to repay the bond. This approach increases the country’s debt burden and depends on the credibility of the government’s policy framework in using the funds raised only for forest activities. The main difference between the tax- and revenue-backed models is that revenue-generating forest activities are funded and used to repay the bondholders. If these revenues fall short, however, the government will have to step in, using tax revenues as a back-up because the bond is still on its balance sheet. Therefore, the primary risk for the bondholders is still the government default risk. From the government’s perspective, this approach has the advantages of using less tax money, and that parties benefiting from the forest activity pay for it. Earmarking the forest-based revenues can help increase confidence that there are specific revenues of a known scale available to repay the bond.

The role of the World Bank in these issuance models may vary – from being the issuer of the bond when proceeds will be used in support of the green share of the broader investment portfolio, providing advice in the process of a bond issuance by a country, to providing in-depth technical assistance for more complex bond issuance and resource-flow arrangements. It is important to note that the World Bank cannot issue any kind of bond – plain vanilla or Green/Forest Bonds – on behalf of a country or for a specific pre-identified investment. The World Bank issues Green Bonds on the basis that it will match proceeds with certified green investments sometime after the overall investment operation has been identified and agreed between the Bank and the client. It therefore makes no difference for a client country if projects are financed through Green Bonds or plain vanilla bonds. Logically, the risk for the bondholders is reflected in the risk rating of the World Bank, and not of the project or the country in which the forest operation is being financed.

For a private sector company with a sustainable forestry portfolio, asset location, ownership and stability of related cash flows are the central considerations in the resource flow frameworks. The framework for a corporate Forest Bond is similar to a public revenue-backed Forest Bond, with the main difference being that, as a back-up, the corporate has to rely on revenues from other activities instead of tax payments. In this framework, the corporate issues a bond to raise investments, and uses these to fund revenue-generating forest activities, such as plantations. Moreover, the corporate collects the revenues from the forest activities and, since this bond is held on the balance sheet, the corporate will have to complement the revenue stream if necessary with income from other activities in order to repay the bondholders. Whether the revenues stem from forest activities or another source – maybe even from non-sustainable activities – does not affect the green label as long as the activities financed through the bond comply with the Green Bond Principles (GBP).

Similar to the public sector model, the role of the World Bank or other IFI in the context of private sector bond issuances can range between being the issuer of a Green Bond to raise resources to be matched with green private investments, to providing technical assistance in an issuing process, or providing a more complex support structure. The support that the Bank could offer through its private sector arm, the International Finance Corporation (IFC), includes, for example, client risk management, anchor investments,
and credit. To reduce the risk of an issuance for a client, the IFC can offer hedging instruments directly to clients who do not have full access to hedging products, such as interest rate or cross-currency swaps. The IFC could also commit to subscribing to an issuance ahead of the public offering, which can be communicated to prospective investors to send a positive signal. This aspect is critical as it is likely to result in an over-demand for a Green Bond, which can lead to basis point reductions. This price correction, however, is then not an attribute of the green investment; rather it is due to the IFC’s pre-issuance subscription.

A finance facility set up by public sector entities could include other donors and thereby take the global public good character of forests into account. In such a scenario, a separate legal entity would be created to issue the bond and manage the proceeds. The bond would fund any kind of forest activities. The revenues would be generated through commitments made by one or a group of governments and be used for paying back the bondholders. The risk would therefore still remain in the ability of the governments to service the debt. Similar finance approaches have been successfully implemented to finance vaccination programs such as the Global Alliance for Vaccines and Immunization (GAVI Alliance), which issued bonds based on legally binding grant payments from its sovereign sponsors. However, compared with a vaccination program, forest investments require a much longer investment horizon, and output and outcome are much harder to ascertain. It seems therefore unlikely that donors would be willing to commit pledges over such a long horizon to countries with low political stability.

Using bonds for forest financing to meet NDC targets

At this point, it is unlikely that Green Bonds will deliver on the prospect of meeting finance needs for forest-related investments that will have to occur under NDCs. While there is little doubt that the volume of Green Bond issuances will continue to increase for energy and infrastructure, the potential for bond-based forest sector financing is likely to be limited as a result of the current structure of the bond market and the attributes of Green Bond finance.

The specific needs of forestry investments do not align well with the financing characteristics of bonds, including Green Bonds. For example, the time between investment and revenue flow that is characteristic to forestry is regarded as a critical bottleneck. It is further magnified by the fact that average credit ratings for Forest Bonds are lower than for average Green Bonds. This results in higher coupon payments, which reflects the elevated degree of risk of forest investments. Although some bond-based financing structures, such as zero-coupon bonds, are theoretically suited to mitigating the forest investment-specific financing challenge, the market analysis did not provide any revealing insights to suggest that such structures are yet used at larger scale in forestry. A possible explanation for the very limited use of zero-coupon bonds is that they are, not only if used for a Green Bond, unconventional compared with other fixed-income products. Zero-coupon bonds constitute rather a niche product that does not align with most investors’ preferences (e.g. having a regular cash flow or just being a more standard product). Furthermore, it is likely that other forestry-specific attributes will remain a major disincentive for such financing. Lower investment volumes, investment scope, spatial and stakeholder heterogeneity, and the lack of secured and immediate income streams are secondary, but equally important, differences that hamper the forest sector from using bonds as a financing tool.

Regardless of whether an issuance is made with the objective of meeting forestry-related NDC investment needs, Forest Bonds must meet market expectations for returns. This is difficult when the issuing entity is not a well-financed corporation or public entity with a positive track record. It is unlikely that NDC activities would yield the 10% internal rate of return (IRR) target desired by many investors in forest plantations, or higher targets associated with natural forests, to compete with traditional investments (partly due to the
lack of competitive manufacturers with solid revenue streams). IRRs are positively impacted when forest investors can lease land or use public land through other forms of government agreements as land purchase costs represent significant cost factors. For example, the IRR for plantation investments in Brazil without land costs (i.e. existing landowners) ranged from 17% to 23%, and for investments including land costs from 9% to almost 12% (Cubbage et al. 2007).

The stigmatization of productive forest management as a driver of deforestation disadvantages bond investments due to perceived reputational risks for the investor. Governments have the option to employ complementary safeguards that mitigate these risks and stimulate the demand for forest products. Such complementary measures could range from facilitating a framework for transparent third-party certification, to increasing the demand for wood through green public procurement policies. Other sectors, especially agriculture, may provide additional models for stimulating demand for forest commodities, especially from smallholders.

Public investments in forestry should further strengthen the governance framework, especially addressing illegal logging, but also incentivizing smallholder approaches to re- and afforestation. In Brazil, existing support programs for rural producers (ABC, PRONAF, etc.) have had an uneven performance, with the availability of financial resources not being the limiting factor. Accordingly, there is a need to better understand the disincentives for investment in forest activities from the landowner’s viewpoint and, on that basis, occasion appropriate adjustments to incentive mechanisms. Investing in such reform efforts may eventually yield the multiplier effects for private sector investment that are necessary to meet NDC investment targets.

This analysis suggests that the potential for bonds-based forest finance to meet NDC targets is limited – particularly when characteristics specific to forest investments are matched with forest/country economic performance parameters. However, there is room for enhancing the incentive framework for this finance instrument through further innovations. For example, bond issuances related to carbon finance may be promising once critical issues such as carbon tenure and carbon pricing are resolved. Some recently piloted forest carbon-based financing models, such as Debt for Climate Swaps, Environmental Policy Performance Bonds, or Debt for Climate Policy Performance Swaps, are still small in scale and have not yet moved beyond the pilot stage. The underlying structures of these financing instruments and options for scaling-up have yet to be analyzed. Furthermore, guarantees provided by national development banks could mitigate some of the risk associated with forest investments, even though such efforts might again be in competition with other sectors and development priorities.

To achieve a true breakthrough in bond-based forest finance, it will be necessary to identify and design concrete and bankable solutions that integrate international support into bond structures to achieve both scale and efficiency. The ultimate aim of such bond structures would be to provide governments and the private sector with access to lower-cost capital than they currently get from capital markets. This, in turn, will enable them to expand credit volumes for forest investments that deliver against NDC targets. These structures would also aim to leverage international support commitments – resulting in more investments and greater GHG reductions per dollar granted. While there is potential for reducing deforestation and forest degradation (REDD+) and climate finance to play a leveraging role, there must be demonstrable improvements in achieving mitigation and other outcomes.

Finally, demand-side interventions may be even more promising as an indirect measure to stimulate investments in forestry than an a priori focus on the supply of finance. In this regard, stimulating the
demand for wood products as an indirect measure could trigger investments in the forestry sector, including reforestation and regeneration of degraded lands. For example, reforming public procurement favoring sustainably managed forest products, including the use of wood for energy, could increase the demand for wood and attract investors to the sector. Secured demand coupled with reliable price levels and, hence, revenue streams, could be an important factor in driving forest investments, especially for mitigating the investment risk resulting from a lack of immediate revenue streams after the initial investments. Not only could this motivate small investors, it might also facilitate the use of thus far little-used bond structures such as zero-coupon bonds.
1. Introduction

The Paris Agreement reached in December 2015 at the 21st Conference of the Parties (COP21) of the United Nations Framework Convention on Climate Change (UNFCCC) is regarded as setting a fundamentally new course in the global climate effort. More than 190 nations, whose joint greenhouse gas (GHG) emissions represent more than 98% of global GHG emissions (CAIT 2016), committed to “Intended Nationally Determined Contributions” (INDCs). Through these, countries determine their contributions to GHG reductions in the context of their national priorities, circumstances and capabilities, but within a global framework for “collective action toward a low-carbon, climate-resilient future” (WRI 2015b). In that sense, INDCs are seen as creating a feedback loop between national and international decision-making on climate change.

The Paris Agreement achieved a particular breakthrough for the forestry sector by acknowledging mitigation efforts from reducing deforestation and forest degradation (REDD+). While the Kyoto Protocol still excluded forest-sector-based emission reductions in developing countries, where emissions from deforestation often exceed those in other sectors, REDD+ is now permanently included in Article 5 of the Paris Agreement. Forest-based commitments under the INDCs of China, Brazil, Bolivia, and the Democratic Republic of the Congo (DRC) alone could achieve a reduction of 2.5% of the current total annual emissions globally over 15 years (WRI 2015a). This reveals the importance of acknowledging forest-based GHG emissions when talking about climate change.

The inclusion of REDD+ in the Paris Agreement is of particular importance since it serves as a political signal to mobilize urgently needed financial resources, especially because financing under REDD+ programs – although substantial – still falls significantly short of meeting actual needs. Before the Paris Agreement, REDD+ programs had already attracted an estimated USD 10 billion in international investments, largely from government sources from member countries (see Figure 1), but the governments of Norway, Germany and the UK have also agreed to commit another USD 5 billion for REDD+ over the next five years (Forest Trends 2014). In contrast, the funding required for sustainable forest management is projected to be between USD 70 billion and USD 160 billion per year globally (UNFF 2012). Other recent estimates suggest that the scale of financing required to halve deforestation will increase over the current decade, reaching USD 30 billion annually by 2020 (Eliasch 2008). Specific to Brazil, most recent estimates put the price tag of attaining the country’s NDC commitment at USD 10 to 16 billion (Instituto Escolhas 2015). For the forestry sector, the Paris Agreement only extended the current goal of mobilizing USD 100 billion a year by 2020 through 2025, with a new, higher goal to be set for the period after 2025 – for all NDC objectives.

Consequently, and as confirmed by a rapid assessment of INDC implementation needs post-Paris, countries continue to rank financing needs highest among the challenges identified. With the limitations of

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2 The word “intended” was used because countries were communicating proposed climate actions ahead of the Paris Agreement being finalized. However, as countries formally join the Paris Agreement and look forward to implementation of these climate actions – the “intended” is dropped and an INDC is converted into a Nationally Determined Contribution (NDC). (WRI 2015b)

3 The wide range of this estimate reflects the still prevailing uncertainties in Brazil as to what land restoration techniques will eventually be employed and their location.
conventional financing approaches, additional and new financing sources and instruments are needed to avoid the promising momentum of the NDC process grinding to a halt before ever reaching full speed. There is considerable hope that the Paris Agreement will attract new long-term investments, not only from other developed countries, but also from private sector actors. With the elimination of the strict differentiation between developed and developing countries that characterized earlier efforts of UNFCCC negotiations, it is also expected that countries mobilize and leverage their own resources to help meet NDC objectives under a common framework that commits all countries to apply their best efforts and economic capabilities.

**FIGURE 1: DEFORESTATION RATES AND REDD+ FINANCING COMMITMENTS (2009–14)**

In the broader context of global NDC implementation and finance, Brazil represents a particularly important country example. While the Brazil’s commitments put forward under the Paris Agreement would induce a 2% reduction of GHG emissions globally compared with 2005,⁴ its NDC targets build significantly on GHG emission reductions and emission avoidance in the land-use and land-use change sector. Commensurate with this situation, the country will require considerable new investments and financing over the coming years.⁵ Given its advanced development status compared with other economies, such as Sub-Saharan African countries, Brazil will also have to mobilize its own – and additional – financing, and will not

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⁴ Own calculations based on data from WRI.
⁵ It is estimated that achieving the target of 12 Mha of restored forests in Brazil’s NDC over 25 years alone will cost R$31–52 billion (USD 10–16 billion) (Instituto Escolhas 2016).
be able to rely exclusively on external financing to meet NDC targets in supporting and sustaining its ambitious forest-related NDC targets.

The option of financing NDC-related investments – especially those pertaining to land-use and forestry – through the issuance of Forest Bonds as a subset of Green Bonds has received particular interest. With the emergence of Green Bonds on international financing markets, expectations arose that those resources could not only play an important part in unlocking much needed resources to bridge the financing gaps identified for meeting climate investment needs, but that those financing options would be additional and in some way associated with preferential attributes vis-à-vis conventional market finance – not least cost advantages.

At first sight, however, available data on the use of Green or Climate Bonds to finance forest investments presents a sobering picture. Although the Green and Climate-aligned Bonds markets have been growing exponentially in recent years, reaching nearly USD 118 billion and USD 700 billion, respectively, by June 2016, the agriculture and forest sectors amounted to less than 3% of the Green Bond market (CBI 2016b).

Given this lackluster experience, there is a need to analyze the reasons for the low uptake of Green Bonds that are specific to the forest sector, as well as to calibrate the expectations in forest-specific Green Bonds as a new and additional financing source to meet the finance needs for forest-based investments under NDCs. Given the determination of Brazil and other forest countries in addressing the challenges of land-use change and implementing ambitious restoration and reforestation targets, there is a need to better understand what instruments, including financial market instruments, are promising and viable for buttressing the NDC implementation agenda and the development of national policies in key sectors. With this objective, Brazil’s Ministry of Environment requested the World Bank Group’s support in (i) exploring the potential of Green/Environmental Bonds for the forest sector; (ii) in reviewing whether and how this financing instrument could be put into practice as one possibility from a menu of diverse financing sources and mechanisms for forest and land restoration investments; and (iii) in comparing those experiences with those where Green Bonds were already successfully used to finance climate investments for mitigation and adaptation objectives in other climate-related sectors. Hence, this report seeks to address the subject from the issuer perspective, and mainly for public sector entities such as federal governments.

The objective of this report is to conduct a systematic assessment of the viability and comparative advantage of bonds as a financing tool to meet Brazil’s forest-based NDC targets. The assessment will consider the sectoral framework conditions of the forest sector and how these impact financing and investment decisions. While the report intends to address Brazil’s interest in exploring this financing option, the associated analysis is relevant for the broader global discussion on NDC financing – both for forest-based financing in other countries, but also regarding other sectors relevant to meeting NDC targets. The value-added of this assessment to the global NDC financing debate is that it will be embedded in the factual context of one of the most important forestry countries, and that comparisons may be made with other existing forest financing mechanisms.

The following questions reflect a set of issues raised in discussions with various stakeholders prior to this analysis. They serve as guidance to the analysis and discussion presented in this report.
1. **Terminology:** Green Bonds, Climate Bonds, Forest Bonds, Carbon-backed Bonds and other terminology refer to the same instrument in the minds of some, but are regarded as different to each other in the minds of others.
   - Are there differences between these terms or are they mere labels for the same instrument?
   - How do these bonds differ from regular bonds and what is the difference between Green and Forest Bonds?

2. **Experience:** The issuing of Green and similarly labelled Bonds is relatively recent.
   - What do we know of bonds that were tried for raising funds for green investments, especially as regards land use and forestry?
   - What were the key barriers to, or ingredients for, success?
   - What forms of securitization were applied?

3. **Demand and supply:** With the Green Bonds family being relatively new, the sub-category of Forest Bonds has not been widely explored.
   - What was the rationale/motivation for introducing Green Bonds to the financial market?
   - What risks do Forest Bonds entail that make them different from mainstream Green Bonds? And why do they make up only a very small fraction of the total Green Bond market?
   - Are there strategies that could be pursued to make Forest Bonds more attractive, especially given the increased need for forest financing to meet NDC targets?
   - How are future developments of this bond market segment currently anticipated by financial experts?

4. **Institutional aspects:** With Green Bonds originally being explored by multilateral finance institutions (MFIs), there may also be a particular role for these institutions with regard to Forest Bonds.
   - What are the possible ways in which resources that are raised through the issuance of Green and Forest Bonds can be channeled toward forest investments?
   - Are there specific roles for MFIs in the issuing of Green and Forest Bonds?
   - Does the investment type for which bond-raised resources are dedicated influence the underlying rationale for using bonds vis-à-vis other financing mechanisms and sources?

5. **Private sector:** While public bonds for public investments to meet NDC targets are the primary concern, particularly for forestry targets, it is widely acknowledged that complementary private sector investments will need to be raised.
   - Has the private sector utilized Green or Climate Bonds for forest investments?
   - Is it attractive for the private sector to issue bonds for investments in forestry? Under what circumstances?
   - Are private sector investments likely to meet some of the NDC targets?
   - What are the commonalities and differences between public and private sector forest investments?
   - Is the securitization of private sector Forest Bonds different from those issued by the public sector?
   - What role does the public sector play in mobilizing bond-based private sector investments in forestry to meet NDC targets?
To meet the objectives of this study and to respond to the questions outlined above, the remainder of this report is structured as follows.

- First, to contextualize the assessment of bonds as financing options for meeting NDC objectives, a brief summary of the global role of forests in the context of low-carbon development is provided. With Brazil serving as the country of analysis, the global summary is complemented by highlighting selected factoids of the broader Brazilian context relevant to the assessment of bonds, including brief summaries of the Brazilian economic and fiscal situation, investment environment, forestry sector, and the national NDC with emphasis on reforestation and forest restoration targets. Given the broad scope of these topics, this summary discussion will highlight only a few of the most pertinent forest-specific issues relevant to the subsequent analysis.

- Second, the underlying characteristics of bonds are presented, including a more detailed discussion of Green and Forest Bonds. While this part will mostly focus on bonds issued for public sector finance, key aspects of private sector bonds are also discussed.

- Third, an analysis of how bonds could be applied in the Brazilian context is conducted, building on a set of selected hypothetical scenarios. This analysis will highlight the principal roles and responsibilities of different actors and the associated advantages and disadvantages of each scenario.

- The report concludes with a discussion of the key findings of the analysis, broadly following the set of guiding questions outlined above. Recommendations regarding the use of bonds for forest-based climate finance will be elaborated, including the identification of topics for further analytical work. While the concluding discussion is focused on the specific case of Brazil, broader considerations for the global debate on NDC financing will also be included.
2. Contextualizing Forest Financing to Meet Forest-based Emission Reductions under NDCs

2.1 The global context

Forests are a priority for Low-Carbon Development (LCD) policies given their key role as both a major source of GHG emissions – carbon sinks – and in actively reducing emissions. According to the latest assessments of the Intergovernmental Panel on Climate Change (Smith et al. 2014), 12% of GHG emissions (from 2000 to 2009) come from forest and other land-use changes. The potential of forests to contribute to LCD can be broadly categorized as follows: (i) reducing emissions from forest degradation and deforestation (REDD+); (ii) enhancing the carbon sequestration potential of forests; and (iii) material substitution using wood instead of fossil-fuel-intensive materials, including biomass energy in lieu of fossil fuels. Global estimates for broad forest financing needs are rather scarce, show great variability, and their accuracy is questionable. The United Nations Forum on Forests (UNFF) estimates annual global finance needs for forestry and sustainable forest management at between USD 33 billion and around USD 70 billion (Castrén et al. 2014, UNFF 2006). In a more recent study from the UNFF Advisory Group on Finance Collaborative Partnership on Forests (2012), the global need for funding for sustainable forest management is estimated to be between USD 70 billion and USD 160 billion per year. The FAO expects annual financing needs to “range between USD 35 billion to meet the Bonn Challenge targets6 up to more than USD 300 billion for land degradation neutrality”7 (FAO 2015).

For some countries, the relative share of land-use change and forestry-related GHG emissions can reach over 80% of total national emissions. Ranking the top 20 countries according to their relative GHG emissions from land use, land-use change and forestry (LULUCF), eight countries are from Africa, seven from Latin America, and five from the Asia-Pacific region (see Figure 2). Measured in absolute terms, Latin America leads with eight countries, followed by seven from Africa, and four from the Asia-Pacific region. Indonesia, Brazil, and Nigeria are the top absolute emitters, but Canada with its large boreal forest areas also makes it into the top 20. While relative emissions from LULUCF are likely to fall as soon as industry- and transport-related emissions increase, absolute GHG emissions from LULUCF may develop differently.

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6 The Bonn Challenge is a global effort to restore 150 Mha of the world’s deforested and degraded land by 2020, and 350 Mha by 2030.

7 Land degradation neutrality is defined as a state whereby the amount of healthy and productive land resources necessary to support ecosystem services remains stable or increases within specified temporal and spatial scales.
Consequently, a majority of countries include actions in the forest sector in their NDCs. According to the latest available data provided by UNEP (2015), a total of 109 countries (counting the EU as one) made statements regarding their willingness to reduce emissions from deforestation and forest degradation, or to enhance forest carbon stocks. While the most commonly proposed activity is the protection of carbon stocks in standing forest ecosystems through avoided deforestation and degradation, many countries indeed aim for achieving an enrichment in forest-based carbon simultaneously through reforestation and forest regeneration. Figure 3 provides a global summary overview of national commitments. These commitments are made in the context of a range of institutional arrangements, such as UNFCCC, bilateral arrangements, the Carbon Fund, and international multi-stakeholder partnerships (UNEP 2015). The emission reduction contribution of LULUCF in NDCs is estimated as an approximate contribution of 1.6 GtCO₂ (of which 0.5 GtCO₂ comes from Annex I countries) from full implementation of unconditional NDCs, increasing to 1.9 GtCO₂ (range: -0.1–4.3) under full implementation of both unconditional and conditional NDCs. The forest-related mitigation potential under the NDCs will be less than this, as forestry comprises a subset of LULUCF activities described in the NDCs.

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8 This includes 94 developing countries according to a definition applied by UNEP. See UNEP (2015) for a full elaboration of its assessment methodology.
9 These numbers were published before all countries had submitted their NDCs. As of June 2017 updated data are unavailable.
10 See UNEP (2015) for a more differentiated analysis of the GHG emission reduction potential of forest-related actions committed under NDC.
However, the technical potential of forests to contribute to GHG emission reductions can differ significantly from the economic potential (UNEP 2015). Smith et al. (2014) present estimates of global mitigation potential at different cost levels, ranging from 0–1.5 GtCO₂e for costs < USD 20/tCO₂e, to mitigation potentials of 0.1–9.5 GtCO₂e for costs < USD 50/tCO₂e, and ranging from 0–13.8 GtCO₂e for costs < USD 100/tCO₂e. From a regional perspective, REDD+ is stated as the most cost-effective forestry option for Latin America and the Middle East and Africa regions, whereas forest management dominates the Asia region (Smith et al. 2014). Results are summarized in Table 1, which uses earlier findings from Nabuurs et al. (2007) to compare technical and economic potential of forest-based GHG emission mitigation.

Source: UNEP (2015)

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Technical mitigation potentials represent the full biophysical potential of a mitigation option and account for constraining factors such as land availability and suitability. Economic potential refers to mitigation that could be realized at a given carbon price over a specific period. Economic mitigation potentials tend to be context-specific and are likely to vary across spatial and temporal scales — for example, due to varying policy incentives and competition for resources across various mitigation options. Economic potentials are generally expected to be lower than the corresponding technical potentials (Smith et al. 2014).
### Table 1: Comparing the Technical and Economic Potential of Forest-Based GHG Emission Reductions Interventions by Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Reduced deforestation GtCO$_2$ in 2030</th>
<th>Reduced degradation and forest management GtCO$_2$ in 2030</th>
<th>Afforestation and reforestation GtCO$_2$ in 2030</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Economic$^1$ at carbon prices in USD/tCO$_2$</td>
<td>Economic$^1$ at carbon prices in USD/tCO$_2$</td>
<td>Economic$^1$ at carbon prices in USD/tCO$_2$</td>
</tr>
<tr>
<td></td>
<td>(A) (B) (C)</td>
<td>(A) (B) (C)</td>
<td>(A) (B) (C)</td>
</tr>
<tr>
<td>Africa</td>
<td>0.6 (0.2–0.8)</td>
<td>0.81 1.03 1.16</td>
<td>0.5 (0.2–0.9)</td>
</tr>
<tr>
<td>Latin America &amp; Caribbean</td>
<td>1.9 (1.2–2.5)</td>
<td>0.87 1.55 1.85</td>
<td>0.1 (0–0.2)</td>
</tr>
<tr>
<td>Asia-Pacific$^2$</td>
<td>1.0 (0.4–1.4)</td>
<td>0.42 0.62 0.84</td>
<td>0.3 (0.1–0.6)</td>
</tr>
<tr>
<td>Totals</td>
<td>3.5 (1.8–4.7)</td>
<td>2.10 3.20 3.85</td>
<td>1.7 (0.3–1.7)</td>
</tr>
</tbody>
</table>

Source: UNEP 2015, Nabuurs et al. (2007)

Notes: (A) USD 1–10/tCO$_2$; (B) USD 20–50/tCO$_2$; (C) USD 100/tCO$_2$

1 Economic potential from Nabuurs et al. (2007) indicates annual amount sequestered or emissions avoided, above business as usual, in 2030 for carbon prices USD 100/tCO$_2$ and less.

2 Asia-Pacific is the sum of the values for Non-Annex I East Asia, OECD Pacific, Other Asia, and Middle East.

A detailed contrasting of technical and economic potential forest-based GHG emission reductions reveals that in many cases the technical potential could not even be realized at carbon prices of USD 100/tCO$_2$e (see Table 1). For reduced deforestation, only Africa could meet its technical potential by 2030 at carbon prices of USD 20–50/tCO$_2$e, while the Asia-Pacific and Latin America regions would remain below their technical potential even at carbon prices of USD 100/tCO$_2$e.$^{12}$ In contrast, Asia-Pacific and Latin America can achieve their technical potential for reduced degradation and forest management at carbon prices of USD 1–10 USD/tCO$_2$e, while African countries would require carbon prices above USD 50/tCO$_2$e. For afforestation and reforestation, only Asia-Pacific can achieve its technical potential, but would require carbon prices at USD 100/tCO$_2$e, while Africa and Latin America fail to meet their technical potential by large margins even at USD 100/tCO$_2$e.

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$^{12}$ Compare within each category (Reduced deforestation, Reduced degradation and forest management, and Afforestation and reforestation) the necessary technical investment against the economic potential at the different carbon price levels (A, B, C).
The importance of the economic dimension of the mitigation potential of forests further underlines the relevance of the economic situation of countries that include the forest sector in their NDC for achieving these targets. Differentiating countries by both their economic performance (approximated by poverty prevalence\(^\text{13}\)) and their forest area as a share of total land area, a quadrant categorization results as depicted in Figure 4.\(^\text{14}\) Several countries with high relevance for reducing forest-based emissions display poverty rates of 50% and above, indicating a challenging economic context in which the economic and technical potential for forest-based GHG emission reductions may diverge significantly.

High poverty prevalence and low economic performance may cause governments to decide to converge toward investment choices yielding the highest returns for economic and social development, which can be aggravated by high opportunity costs of capital. Figure 5 shows that countries with lower GDP per capita and higher public debt tend to face higher capital costs for public investments.\(^\text{15}\)

\(^\text{13}\) The World Bank definition of people living on less than USD 3.10/day is applied here.

\(^\text{14}\) Four general categories can be delineated: (1) high poverty, low forest cover; (2) high poverty, high forest cover; (3) low poverty, high forest cover; (4) low poverty, low forest cover.

\(^\text{15}\) Measured in 10-year government bond yields.
Analyzing these aspects in more detail for countries with a high relevance for reducing forest-based emissions confirms that economic realities for reducing forest-based GHG are not promising. Taking a subset of the top-ranked 20 countries with respect to total GHG emissions from forest-based emissions shows that, on average, these countries have a poverty rate of 37%; GDP per capita of USD 7,400; an annual inflation rate of around 6%; a budget balance of -4.1%; and public debt of 39% of GDP (see Table 2). Approximated by government bond yields, these countries face opportunity costs of capital of about 12% at credit ratings averaging the medium-to-low B range. For some of the countries, such as DRC, there is no bond market at all and the government is raising funds entirely through other means. For example, tax revenues or tariffs and development assistance is covering a significant share of the public spending (see African Financial Markets 2016). Figure 6 and Figure 7 show that tropical forest countries tend to have unfavorable credit ratings and high political risks. For countries like Venezuela or Brazil, these parameters are even worse today than the maps below suggest.
It should be noted that the credit ratings have changed since 2011; however, the shift has not been sufficiently radical to affect the message that the map presents.
Under such financial framework conditions, the fiscal space for public investments in forestry is often limited. Without either significantly reducing the opportunity costs of capital or the realization of large international transfer payments to subsidize investments in the forest sector, there is likely to be a large gap between the technical and the economic potential for reducing forest-based GHG emissions. Depending on whether forest-related commitments under NDC are closer to the technical or economic potential, countries may find themselves more or less well-positioned to achieve their commitments. This need for low-cost financing options has given rise to the hope by some that Green or Forest Bonds might be able to deliver on lower-priced funds.
**TABLE 2: SUMMARY OF KEY FOREST AND ECONOMIC DATA FOR TOP 20 FOREST-BASED GHG EMISSION COUNTRIES**

<table>
<thead>
<tr>
<th>Country*</th>
<th>Total GHG emissions (MtCO₂/year)¹</th>
<th>Share of GHG emissions from LUCF (%)¹</th>
<th>Poverty rate (%)²</th>
<th>Forest area (% of total)²</th>
<th>GDP/capita USD²</th>
<th>Inflation (%)²</th>
<th>Budget balance (% of GDP)²</th>
<th>Public debt (% of GDP)³</th>
<th>Credit rating (S&amp;P/Moody’s)³</th>
<th>Bond yield (%)⁴</th>
<th>Risk premium (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>1,981</td>
<td>61.59</td>
<td>41.7</td>
<td>50.2</td>
<td>3,500</td>
<td>6.41</td>
<td>-2.53</td>
<td>27.0</td>
<td>BB+ / Baa3</td>
<td>7.06⁵</td>
<td>3.46</td>
</tr>
<tr>
<td>Brazil</td>
<td>1,823</td>
<td>44.46</td>
<td>9.1</td>
<td>59.1</td>
<td>3,124</td>
<td>5.72</td>
<td>-10.30</td>
<td>66.2</td>
<td>BB / Ba2</td>
<td>13.52</td>
<td>4.72</td>
</tr>
<tr>
<td>Canada</td>
<td>856</td>
<td>16.60</td>
<td>N/A</td>
<td>38.2</td>
<td>50,186</td>
<td>0.94</td>
<td>0.10</td>
<td>91.5</td>
<td>AAA / Aaa</td>
<td>1.52</td>
<td>0</td>
</tr>
<tr>
<td>Nigeria</td>
<td>475</td>
<td>37.52</td>
<td>76.5</td>
<td>7.7</td>
<td>3,203</td>
<td>8.48</td>
<td>-1.60</td>
<td>11.5</td>
<td>B+ / B1</td>
<td>15.0</td>
<td>7.07</td>
</tr>
<tr>
<td>Malaysia</td>
<td>433</td>
<td>33.51</td>
<td>2.7</td>
<td>67.6</td>
<td>11,307</td>
<td>2.11</td>
<td>-3.20</td>
<td>54.0</td>
<td>A- / A3</td>
<td>4.05</td>
<td>1.89</td>
</tr>
<tr>
<td>Argentina</td>
<td>405</td>
<td>16.55</td>
<td>3.6</td>
<td>9.9</td>
<td>5,232</td>
<td>8.78</td>
<td>-5.40</td>
<td>48.4</td>
<td>B- / B3</td>
<td>3.47⁶</td>
<td>10.21</td>
</tr>
<tr>
<td>Venezuela</td>
<td>397</td>
<td>28.44</td>
<td>14.9</td>
<td>52.9</td>
<td>12,265</td>
<td>40.64</td>
<td>-11.50</td>
<td>49.8</td>
<td>CCC / Caa3</td>
<td>9.25</td>
<td>15.69</td>
</tr>
<tr>
<td>DRC</td>
<td>202</td>
<td>81.98</td>
<td>90.7</td>
<td>67.3</td>
<td>438</td>
<td>1.63</td>
<td>-3.70</td>
<td>19.7</td>
<td>B- / B3</td>
<td>N/A</td>
<td>10.21</td>
</tr>
<tr>
<td>Angola</td>
<td>200</td>
<td>24.93</td>
<td>54.5</td>
<td>46.4</td>
<td>12,751</td>
<td>10.62</td>
<td>-2.20</td>
<td>31.0</td>
<td>B / B1</td>
<td>9.5⁷</td>
<td>7.07</td>
</tr>
<tr>
<td>Colombia</td>
<td>200</td>
<td>22.84</td>
<td>13.8</td>
<td>52.7</td>
<td>7,918</td>
<td>2.02</td>
<td>-2.40</td>
<td>38.0</td>
<td>BBB / Baa2</td>
<td>7.52</td>
<td>2.98</td>
</tr>
<tr>
<td>Cameroon</td>
<td>191</td>
<td>57.57</td>
<td>54.3</td>
<td>39.8</td>
<td>1,407</td>
<td>1.95</td>
<td>-6.40</td>
<td>19.9</td>
<td>B / B2</td>
<td>9.75⁸</td>
<td>8.64</td>
</tr>
<tr>
<td>Myanmar</td>
<td>185</td>
<td>46.44</td>
<td>N/A</td>
<td>44.5</td>
<td>1,204</td>
<td>5.52</td>
<td>-4.31</td>
<td>32.0</td>
<td>N/A</td>
<td>9.00</td>
<td>N/A</td>
</tr>
<tr>
<td>Tanzania</td>
<td>172</td>
<td>59.13</td>
<td>76.1</td>
<td>52.0</td>
<td>955</td>
<td>7.87</td>
<td>-5.10</td>
<td>39.9</td>
<td>N/A</td>
<td>16.9⁹</td>
<td>N/A</td>
</tr>
<tr>
<td>Peru</td>
<td>160</td>
<td>44.68</td>
<td>9.7</td>
<td>57.8</td>
<td>6,549</td>
<td>2.82</td>
<td>-2.10</td>
<td>23.0</td>
<td>BBB+ / A3</td>
<td>6.26</td>
<td>1.89</td>
</tr>
<tr>
<td>Ecuador</td>
<td>138</td>
<td>60.21</td>
<td>11.6</td>
<td>50.5</td>
<td>6,346</td>
<td>2.74</td>
<td>-4.00</td>
<td>33.1</td>
<td>B / B3</td>
<td>8.70</td>
<td>10.21</td>
</tr>
<tr>
<td>Bolivia</td>
<td>137</td>
<td>66.27</td>
<td>13.4</td>
<td>50.6</td>
<td>11,729</td>
<td>6.20</td>
<td>-2.54</td>
<td>39.7</td>
<td>BB / Ba3</td>
<td>6.25¹⁰ 5.66</td>
<td></td>
</tr>
<tr>
<td>Zambia</td>
<td>120</td>
<td>61.33</td>
<td>78.9</td>
<td>65.4</td>
<td>1,726</td>
<td>6.98</td>
<td>-8.10</td>
<td>31.0</td>
<td>B / B3</td>
<td>8.63¹¹ 10.21</td>
<td></td>
</tr>
<tr>
<td>Paraguay</td>
<td>111</td>
<td>66.79</td>
<td>6.3</td>
<td>38.6</td>
<td>4,713</td>
<td>2.68</td>
<td>-1.50</td>
<td>19.7</td>
<td>BB / Ba1</td>
<td>5.0¹²  3.92</td>
<td></td>
</tr>
<tr>
<td>Papua NG</td>
<td>100</td>
<td>86.32</td>
<td>80.7</td>
<td>74.1</td>
<td>2,268</td>
<td>4.96</td>
<td>-3.20</td>
<td>35.8</td>
<td>B+ / B2</td>
<td>10.81  8.64</td>
<td></td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>10</td>
<td>6.00</td>
<td>N/A</td>
<td>36.4</td>
<td>931</td>
<td>1.63</td>
<td>-2.40</td>
<td>77</td>
<td>N/A</td>
<td>62.93  N/A</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>415</td>
<td>46.2</td>
<td>36.6</td>
<td>48.1</td>
<td>7,388</td>
<td>6.54</td>
<td>-4.12</td>
<td>38.4</td>
<td>N/A</td>
<td>11.95  N/A</td>
<td></td>
</tr>
<tr>
<td>EU (28)</td>
<td>3,633</td>
<td>-6.71</td>
<td>N/A</td>
<td>38.01</td>
<td>85.2</td>
<td>AAA</td>
<td>1.41¹³</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


* These are the 20 countries according to total forest-based GHG emissions ranked according to their total GHG emissions. See also Figure 2.

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The World Bank | Demystifying Forest Bonds
2.2 The Brazilian context

2.2.1 The forest sector

With 60% of its land covered by forests and totaling 13% of the planet’s total forest area, Brazil has abundant forest resources, a forestry industry rated one of the top five globally due to growing exports (8% since 2003), and substantial private investment in the value chain. In addition, Brazil is the world’s largest charcoal producer; the fourth-largest pulp producer; the eighth-largest composite panel producer; and the ninth-largest paper producer (Mendes 2014). Forest production shows a great variation by region, with high log production in the south and low production volumes in the Amazon and Cerrado regions.

Brazil has 520 million hectares (Mha) of natural forest, of which 307 Mha are in federal (225 Mha) and state (82 Mha) public lands. Most public forest lands in the Amazon (39% or < 121 Mha) are managed by federal and state governments, with a similar amount (37% or 117 Mha) held by indigenous and non-indigenous communities. Less than 3% of Brazil’s Amazon is legally allocated for long-term forest production. In 2011, Brazil had over 1.3 Mha of Forest Stewardship Council (FSC)-certified forests, producing 596,000 m³ of logs annually. In 2012, total log production from all Amazonian natural forests was 13.5 million m³. This high volume is due in part to Brazil having high average commercial wood volumes for natural forests of 13–18 m³/ha in the Amazon (SBF 2015a).

The main access mechanism for such production is the concession model whereby the government of Brazil provides private enterprise with long-term rights and responsibilities to a fixed area of public forests. The administrative procedures to grant concessions have been slow in the past. In 2013, only 1.2 Mha of federal and state public lands (0.5% of all public lands) were actually allocated for forest concessions on the roughly 5 Mha currently designated for concessions (and the 33 Mha of undesignated lands which could be used as a productive forest estate). The maximum total area available for production forestry on federal lands could be as high as 38 Mha (SBF 2015a).[^17]

With an annual consumption of 24.5 million m³ of tropical hardwood from throughout the country, Brazil is the second-largest domestic log consumer in the world, and the world’s largest consumer of tropical lumber, with an annual volume of 14 million m³ (CONSUFOR 2010). Internal demand for tropical hardwoods is estimated to grow to 21 million m³ annually by 2020, and require 36 Mha of natural forest under sustainable management. Brazil exports around 1.5 million m³, thus making it the world’s third-largest tropical lumber exporter. In 2009, the natural forest management sector supported over 2,000 companies that provided jobs to over 200,000 people, and generated USD 2.5 billion in gross revenues from wood products (SBF 2015a).

Brazil has been able to reforest large expanses of land for the purposes of industrial production, primarily for pulp and paper. By 2015, it had established 7.8 Mha of planted forest, of which 37% was independently certified via the FSC system. While notable in absolute terms, this area barely represents 1.5% of the country’s total forest cover. Fiber production from these plantations is largely from large-scale industrial development in regions outside of the Amazon (Kanieski da Silva 2013).

Brazil has become the world’s leader in plantation forestry, with eucalyptus growth rates having quadrupled in the past 40 years to reach an average annual volume growth of 40 m³/ha. This has resulted in the plantation industry accounting for USD 69 billion of Brazil’s GDP (1.2%), 540,000 jobs, and USD 10.9 billion in exports (4.8% of the country’s total) in 2015 (IBÁ 2016). The main drivers behind these

[^17]: This excludes the 124 Mha for communities, 34 Mha of parks and reserves, and 28 Mha of state lands.
trends have been the low cost of large areas of land with suitable growing conditions for wood fiber, and strong technical innovation by both public and private sectors (SFB 2015a).

In addition to the infrastructure, human capacity and lack of capital issues discussed previously, obtaining capital for Brazil’s forestry sector, particularly in the Amazon, remains a challenge for several reasons:

- law enforcement is still weak and there remains a large supply of cheap illegal or informally sourced wood;
- the transaction costs for legal operations can be prohibitively high due to the low administrative capacity to regulate sustainable forest management;
- the government offers few incentives for sustainable forestry – most mills that process logs from natural forests are under-equipped or rely on antiquated machinery that cannot competitively manufacture wood products;
- the silvics of most native species are still poorly understood;\(^\text{18}\)
- land conflicts and lack of secure title.

2.2.2 Deforestation and NDC

Under its NDC, Brazil committed to reducing net GHG emissions by 37% below 2005 levels by 2025 (UNFCCC 2015). This marks the first time a major developing country has committed to an absolute reduction in emissions from a base year (WRI 2015a). However, compared with 2012 levels of GHG emissions, Brazil’s commitment represents a reduction of GHG by only 29%, not 37%. If Brazil achieves its NDC goal, global GHG emissions will have been reduced by 1.8% compared with 2005 levels.

Brazil's GHG emission profile has historically been characterized by the prominence of LULUCF as compared to Agriculture and Livestock, Energy, Industrial Processes and Waste Disposal. LULUCF emissions comprise mainly emissions related to deforestation and forest degradation in the Amazon region and the Cerrado biome – two huge carbon reservoirs. Deforestation rates have declined since 2004 and there has been a dramatic shift in the pattern of emissions (see Figures 8 and 9). By 2010, LULUCF accounted for less than 20% of the total, down from close to two-thirds.

\(^{18}\) “Silvics” is the term used for the characteristics that define the life history, growth, behavior and ecology of a tree species. It is often linked to – and used interchangeably with – the term “silviculture”, which strictly refers to the science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society, such as wildlife habitat, timber, water resources, restoration, and recreation on a sustainable basis. Silvics describes all aspects of a tree species life cycle, from germination to death, including the environmental and soil conditions that are suitable for its growth, and the insects and pathogens that can harm it.
The progress in limiting deforestation has made a major contribution to reducing Brazil’s GHG emissions over the past decade, and NDC commitments can be achieved only if forest- and land-use-based targets are realized. Limiting the deforestation of the Brazilian rain forest and protecting other sensitive biomes has been largely achieved through increasing the designation of protected areas and improving accountability and control. Without further advances in land-use change and forestry, Brazil will actually increase GHG emissions by 36% above 2005 levels by 2025 (Climate Action Tracker 2016). These numbers reveal the importance of the forestry sector in Brazil in achieving GHG reduction on a global scale. One of the core elements of Brazil’s NDC commitments represents the restoration of 12 Mha of forest and the elimination of illegal deforestation by 2030 (UNFCC 2015).

Despite the recent achievements, continuing public policy and public investment efforts addressing forest conservation and reforestation are of utmost importance for meeting NDC targets. The deforestation rate in the Amazon is still one of the highest in the world and Brazil remains one of the largest GHG emitters. Cattle ranching and soybean production for export accounted for around one-third of Brazil’s GHG emissions between 2000 and 2010 due to their impact on land use (Lenzen et al. 2013).

The Brazilian government established and amplified a variety of important laws and policies to address deforestation and restoration in Brazil, not least the Native Vegetation Protection Law, or Forest Code (Law 12.651/2012), as one of the cornerstones of these policies. The Forest Code aims to establish a trading system that provides the opportunity for landowners to “offset” their legal reserve debts\(^\text{19}\) by purchasing surpluses from other landowners. The compensation instrument is termed the Environmental Reserve Quota (CRA), a tradable legal title for landowners which could create a market for forested lands.

\(^{19}\) The difference between actual area with forest and forest area mandated by law.
adding monetary value to native vegetation and providing the opportunity for additional income streams for reforestation. Enforcing this law alone would deliver the intended 12 Mha of reforestation in Brazil (World Bank 2016b).

**Figure 9: Deforestation in the Legal Amazon 2000–14**

![Graph showing deforestation in the Legal Amazon 2000–14](image)

*Source: INPE (2015)*

Lack of compliance has prompted recent changes to the Forest Code (Brancalion et al. 2016). Further institutional tools were developed to ensure comprehensive and integrated management of the Forest Code, including implementation of an Environmental Rural Cadastre (CAR) and the Environmental Compliance Program (PRA). The CAR system provides georeferenced maps and images, enabling documentation of over 5 million rural properties in Brazil. This should allow all landowners to register their property and identify the precise limits of their Areas of Permanent Protection (APPs) and legal reserves. The PRA establishes criteria for the definition of areas in APPs and legal reserves that need to be recovered if landowners face a deficit of natural vegetation on their properties.

It is estimated that achieving the target of 12 Mha of restored forests in Brazil’s NDC over 25 years will cost R$ 31–52 billion (USD 9.5–16 billion; Instituto Escolhas 2015). Variation in this cost is due to the uncertainty over how and where this restoration will be implemented (e.g. depending on the relative share of reforestation versus natural regeneration, etc.). The National Revegetation Plan of Brazil (PLANAVEG 2013) proposes at least five restoration methods that affect the cost, extent, and quality of vegetation restoration. For example, it does not require that reforestation be limited to the use of native species. Regardless, the cost of reforestation under PLANAVEG will need to be borne by many of the private landowners who are currently not complying with the Forest Code, and who will therefore need access to finance in order to comply with their obligations.

Brazil has several credit programs that target the financing of reforestation or sustainable forestry activities at a subsidized price to facilitate the access to finance for landowners (for an overview of available programs see SFB 2013). The Low Carbon Agriculture Program (ABC) aims to reduce GHG
emissions from agriculture and livestock production activities, and to reduce deforestation and prevent land degradation. Producers from all over Brazil can apply for the subsidized credits. FNE Verde aims to promote the development of economic projects and activities that encourage the preservation, conservation, and restoration of the environment. It is part of Brazil’s Northeast Financing Constitutional Fund, and therefore only producers located in the North and Northeast of Brazil are eligible. The program FNO Biodiversidade is available only in the North region, and has credit lines that are exclusively intended for projects that regularize and recover legal reserve areas and APPs. The National Program for the Strengthening of Family Farming (PRONAF), initiated in 1995, features subsidized credit tailored to smallholder farmers, and explicitly includes the forest sector in its PRONAF Floresta module.

The Brazilian Development Bank, BNDES, offers further possibilities, and has been progressive in establishing loan programs for various activities in the forest sector with long tenures, attractive grace periods, and reasonable interest rates (e.g. BNDES Florestal and BNDES Fundo Clima). However, the government-funded loan programs have proven difficult to access, with terms considered less useful than originally intended. As a result, uptake has been lower than anticipated.
## Table 3: Financial Mechanisms for Funding Forestry Activities

<table>
<thead>
<tr>
<th>Type of Finance</th>
<th>Description</th>
<th>Payment Terms</th>
<th>Issues</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loan</td>
<td>Lines of credit provided by banks to individuals, companies or associations to finance reforestation, natural forest management, or sustainable agriculture</td>
<td>Paid back with interest</td>
<td>Onerous or difficult to access; poorly advertised; inappropriate terms</td>
<td>BNDES Climate Fund and ABC Loan Program</td>
</tr>
<tr>
<td>Bond</td>
<td>Debt instrument where investor loans money to an entity that borrows funds for a defined period with a defined rate of interest</td>
<td>Usually regular payments with interest</td>
<td>Virtually non-existent outside of standard issuances by large companies for corporate activities, or (more rarely) development banks that apply proceeds to forestry activities</td>
<td>Klabin or IFC Climate Bonds</td>
</tr>
<tr>
<td>Guarantee</td>
<td>Loss-coverage mechanism whereby one financial institution promises another that it will provide financing in the event that the lendee cannot pay</td>
<td>No payment necessary but risk reduction</td>
<td>Common in many sectors (including agriculture), but less so in natural forest management and reforestation</td>
<td>Diminishing guarantee whereby bank covers decreasing % of loan</td>
</tr>
<tr>
<td>Tax Incentive</td>
<td>Tax exemptions on certain inputs, services or capital related to natural forest management, restoration or sustainable agriculture; as well as outputs (i.e. timber products)</td>
<td>Reduction in tax burden</td>
<td>Useful and appropriate for large companies, but less so for smaller entities</td>
<td></td>
</tr>
<tr>
<td>Market Payment</td>
<td>Private market payment for product or service derived from productive activity</td>
<td>Cash input</td>
<td>Products must be of good quality, competitively priced, and available when needed</td>
<td>Lumber from natural forests, fiber from plantations, or agricultural crops</td>
</tr>
<tr>
<td>Grant</td>
<td>Funds provided by governments, non-profits, donors and, occasionally, private companies to implementers of activities</td>
<td>Non-refundable and no interest; no payback responsibility</td>
<td>Low amounts and low availability; “No such thing as a free lunch”</td>
<td>FIP funding to complement loans to improve or strengthen technical or political deficiencies to make loan payment more likely</td>
</tr>
<tr>
<td>Government Expenditures</td>
<td>Direct government payments to employees and contractors to provide services related to natural forest management, reforestation or sustainable agriculture</td>
<td>No payment necessary</td>
<td>Funds usually generated by tax collection (and some donors), which are limited and subject to political whims</td>
<td>PPPCDam, SFB Budget</td>
</tr>
</tbody>
</table>

*Source: Ministry of Finance, Brazil. Undated.*
2.2.3 Economic considerations

The profitability of forest operations in Brazil is estimated to be among the highest in the world. The IRR is the most common method of expressing the profitability of a forestry investment, and their average values serve as benchmarks to understand the basics of investing in the sector. Cubbage et al. (2007) find that without land costs (i.e. existing landowners), timber investment returns for exotic timber plantations in Latin America are generally much greater than those for the native plantations of loblolly pine (Pinus taeda) in the southern US.

Investment returns in forestry are generally among the highest worldwide, based on excellent growth rates and good prices for timber. Cubbage et al. (2007) find that Brazil has the highest growth rates and the highest timber prices for exotic species, but also the highest land costs. The IRR for Pinus taeda plantation investments without land costs in Brazil is estimated at 17%, while this value is 13% in Argentina, 9.5% in the US, and 16.9% in Chile (see Table 4). When land costs are included the IRR is reduced by around 10%. The land costs could be eliminated or at least substantially reduced through leasing schemes or logging concessions on public lands. These approaches could improve returns, but limit the possibility of using the land and its appreciation as collateral.

**Table 4: Comparison of IRR for tree plantation investments in Brazil and other countries**

<table>
<thead>
<tr>
<th></th>
<th>Without land costs</th>
<th>With land costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil, Pinus taeda</td>
<td>17%</td>
<td>8.8%</td>
</tr>
<tr>
<td>Brazil, Eucalyptus grandis</td>
<td>22.7%</td>
<td>11.7%</td>
</tr>
<tr>
<td>Brazil, Amazonia Pinus caribaea*</td>
<td>17.89%</td>
<td></td>
</tr>
<tr>
<td>Brazil, Amazonia Gmelina spp.*</td>
<td>27.53%</td>
<td></td>
</tr>
<tr>
<td>Brazil, Central Eucalyptus spp.*</td>
<td>20.16%</td>
<td></td>
</tr>
<tr>
<td>Brazil, Southern Pinus taeda*</td>
<td>15.57%</td>
<td></td>
</tr>
<tr>
<td>Uruguay, Pinus taeda</td>
<td>15.1%</td>
<td>10.2%</td>
</tr>
<tr>
<td>Argentina, Pinus taeda – Misiones</td>
<td>12.9%</td>
<td>9.9%</td>
</tr>
<tr>
<td>Chile, Pinus radiata</td>
<td>16.9%</td>
<td>10.8%</td>
</tr>
<tr>
<td>US South, Pinus taeda</td>
<td>9.5%</td>
<td>5.9%</td>
</tr>
</tbody>
</table>

*Source: Cubbage et al. (2007) and *Sedjo (2001)*

After years of economic slowdown and with an ongoing economic crisis, mobilizing public resources needed for investments to meet NDC targets represents a significant challenge for Brazil. Since 2011 the country’s growth performance has continually declined – from an average of 4.5% growth between 2006 and 2010, to 2.2% between 2011 and 2014, culminating in flat growth in 2014 and a contraction (i.e. negative growth) of 3.8% in 2015. Growth in the past decade was largely based on favorable external conditions, credit-fueled consumption, and an expanding labor force. As these drivers were exhausted, structural constraints on potential growth have become more relevant.

The large fiscal deficits have translated into rapidly rising public debts. General government gross debt rose from 57.2% of GDP at the end of 2014 to 64.5% in 2015, surpassing the level reached during the global financial crisis (61.2%). The level of gross debt is high for an emerging market country and is a cause

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20 For a detailed analysis of the current state of the economy in Brazil, see World Bank (2016c).
for concern given the rising trajectory and high interest costs. Net debt remains significantly lower, but has also increased from 33.1% of GDP in 2014 to 36.0% in 2015. Nonetheless, low foreign-currency exposure (5.5% of gross public debt as of January 2016), a decreasing share of fixed-rate domestic debt (36% of gross public debt), and a comparatively low share of foreign-held government debt (19% of gross public debt), limit rollover risks in the near term.\(^{21}\)

**TABLE 5: BRAZIL—SELECTED ECONOMIC INDICATORS**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual GDP growth, %</td>
<td>7.5</td>
<td>4.0</td>
<td>1.9</td>
<td>3.0</td>
<td>0.5</td>
<td>-3.8</td>
<td>-3.5</td>
</tr>
<tr>
<td>Annual Inflation</td>
<td>5.0</td>
<td>6.6</td>
<td>5.4</td>
<td>6.2</td>
<td>6.3</td>
<td>9.0</td>
<td>8.7</td>
</tr>
<tr>
<td>Foreign direct investments, % of GDP</td>
<td>4.0</td>
<td>3.9</td>
<td>3.5</td>
<td>2.8</td>
<td>3.9</td>
<td>4.1</td>
<td>4.3</td>
</tr>
<tr>
<td>Gross external debt, USD billion</td>
<td>352</td>
<td>404</td>
<td>441</td>
<td>484</td>
<td>557</td>
<td>543</td>
<td>559</td>
</tr>
<tr>
<td>General government revenue, % of GDP</td>
<td>37.4</td>
<td>37.9</td>
<td>37.9</td>
<td>37.9</td>
<td>36.5</td>
<td>37.1</td>
<td>36.0</td>
</tr>
<tr>
<td>General government expenditure, % of GDP</td>
<td>33.8</td>
<td>33.7</td>
<td>34.1</td>
<td>34.8</td>
<td>35.9</td>
<td>36.8</td>
<td>37.0</td>
</tr>
<tr>
<td>Interest payments on public debt, % of GDP</td>
<td>5.0</td>
<td>5.4</td>
<td>4.1</td>
<td>4.7</td>
<td>5.4</td>
<td>8.5</td>
<td>5.3</td>
</tr>
<tr>
<td>Fiscal balance, % of GDP</td>
<td>-1.4</td>
<td>-1.2</td>
<td>-0.4</td>
<td>-1.6</td>
<td>-4.7</td>
<td>-8.2</td>
<td>-6.3</td>
</tr>
<tr>
<td>General government gross debt, % of GDP</td>
<td>51.8</td>
<td>51.3</td>
<td>53.7</td>
<td>51.5</td>
<td>56.3</td>
<td>65.5</td>
<td>68.5</td>
</tr>
<tr>
<td>International bond issues (USD billion)</td>
<td>38</td>
<td>34</td>
<td>15</td>
<td>13</td>
<td>14</td>
<td>11</td>
<td>12</td>
</tr>
</tbody>
</table>

*Source: EIU (2016)*

**Because of these developments, the Brazilian real has been devalued, the cost of raising money has increased, and rating agencies have reduced Brazil’s long-term foreign-currency rating to BB with a negative outlook in 2016.** The new country rating is two steps below investment grade and puts Brazil on a par with countries like Bolivia, Paraguay, and Guatemala. The BRL lost almost 30% of its value in 2015.\(^{22}\) Similarly, Brazil’s cost of issuing debt on the capital market increased substantially. Under such circumstances, raising funds through bonds for public investments is challenging and costly, thus public investments are constrained. For example, the government had to pay more than 16% interest to place its ten-year bonds in 2015. Since March 2016, yields are returning to the level of 2013–14 – i.e. 11% (Investing.com, 2016).

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\(^{21}\) Rollover risk is commonly faced by countries when their debt is about to mature and needs to be rolled over into new debt. If the yields for the government bonds are rising, debt has to be refinanced at a higher rate, thus incurring more interest charges in the future.

\(^{22}\) The market and the BRL have shown signs of improvement since President Temer took office in August 2016 (Bloomberg 2016).
The economic crisis is also affecting the Brazilian forest sector; wood and paper production has been declining for the past two years after eight years of growth. Since most of the production is absorbed by domestic demand, economic contraction has a strong effect on these products. Cellulose, on the other hand, is mostly exported and therefore a devaluation of the BRL makes the production economically more attractive and resilient to domestic economic changes. The devaluation of the real by about 15% in 2015 has benefitted wood, pulp and paper exports and increased their profits. The costs in the forest sector are increasing faster than Brazil’s average rate of inflation. In 2015 alone, inflation in the planted tree sector was 12.8%, while national inflation was 10.7% (IBÁ 2016). Consequently, costs in the industry grew 2.1% – more than the average increase in costs and prices in the Brazilian economy (IBÁ 2016).

Source: Investing.com (2016)

Source: IBA (2016)
Brazil’s privately owned forest plantations are economically significant and constitute an important element for achieving Brazil’s NDC commitments; however, they require the establishment of a favorable public policy and investment framework. Although they represent only 1.5% of Brazil’s forest area, planted forests are an important driver of economic growth and employment. In 2015, the Brazilian planted tree industry was responsible for generating 0.9% of all domestic taxes collected; created 3.8 million jobs (direct, indirect and income-effect); and generated approximately 6.0% of the industrial GDP (IBÁ 2016). However, forestry production costs in Brazil have been increasing by more than the inflation rate over the last 14 years (IBÁ 2015) due to increasing wages, high inflation, and stagnant labor productivity.

Internal structural and natural constraints that impede the growth of forest-based economic development and conservation for which bond proceeds might be allocated include the following:

- Overall focus on exporting raw materials rather than value-added products reduces profitability;
- Inefficient clearance processes for international trade adds to costs;
- Poor infrastructure and transportation bottlenecks make access to remote areas costly and difficult;
- Limited access to finance (particularly for small companies) results in underfunded operations that cannot comply with additional requirements; and
- Skills shortages coupled with onerous labor regulations that create disincentives to hiring.

Bonds play an important role for raising funds for private sector investments. According to FEBRABAN (2016), the majority of bond issuances that qualify for Green Bonds over the past five years have been in the forest sector, although the issuance amounts of such bonds have oscillated greatly from year to year. High issuances in 2010 and 2014 contrast with no issuances in 2013 and 2015, and smaller issuance amounts in the remaining years.

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23 Around 92% of the 7.7 Mha plantations are Pinus or Eucalyptus plantations (IBÁ 2015), and 65% are located in the South and Southeast regions (IBÁ 2016).
While this shows that bonds are financing instruments actively used for private sector investments in forestry, the suitability of Green Bonds for forest sector investments by the public sector is still in open to question. To better understand and gauge the use of bonds, the next section recaps key definitions and costs and benefits associated with the issuance of Green Bonds. This is followed by a discussion of scenarios with reference to the previous country analysis and international context, especially with a view to the resulting macroeconomic constraints due to credit rating and investment security.

24 All Brazilian corporate bond issuances since 2010 have been analyzed, highlighting emissions from forestry, renewable energy, railway transport, and waste treatment and sanitation sector issuances that would fit Green Bond criteria.
3. Bonds, Green Bonds, and Forest Bonds

A bond is a debt instrument under which the issuer owes the holder a certain amount (the principal), based on which the issuer pays interest. The maturity date of a bond is the date on which the issuer pays back the principal to the bond holder. Interest is usually payable at fixed intervals. The bond is often traded on the secondary market, meaning that the ownership of the instrument can be transferred and turned into a liquid asset on the secondary market. The most common types of bond include sovereign municipal bonds and corporate bonds. By purchasing debt via a bond, an investor becomes a creditor to the corporation or a public entity. For corporate bonds, the investor has a greater claim on the assets than equity shareholders. In the case of bankruptcy, bondholders are paid before shareholders, but do not participate in profit-sharing (FED San Francisco 2005).

The key characteristics of bonds are summarized below.

**Standard senior bonds**
- Standard senior unsecured issuances where proceeds are designated to fund green projects/activities (e.g. World Bank Green Bonds).
- Similar to a loan (bond issuers must repay the capital they borrowed plus interest).
- Raises money in the market at fixed or variable cost (benchmark rate plus a spread).
- Repays interest (annually or semi-annually, depending on the characteristic of the issuance).\(^{25}\)
- Repays the principal all at once at maturity (bullet type repayment).

**Securitization bonds**
- Securitization of a bond is the process whereby certain types of asset are pooled such that they can be repackaged into interest-bearing securities.
- A financial institution (“the originator”) identifies the assets it wants to securitize and pools them into the reference portfolio. It then sells the assets to a special-purpose vehicle (SPV). For legal purposes, the SPV is a separate entity from the financial institution, but the SPV exists only to purchase the financial institution’s assets. By selling the assets to the SPV, the issuer receives cash and removes the assets from its balance sheet, providing the issuer with greater financial flexibility. The SPV issues bonds to finance the purchase of the assets; these bonds can be traded in the marketplace and are referred to as securitized products.
- A collateralized bond refers to a debt instrument where the first source of repayment is cash flow from the collateral.

**Project bonds**
- Project bonds are linked to a specific project and its output and are directly exposed to the project risk. These projects generally have long tenures and have received an investment-grade rating (although this is not a necessary condition).
- A typical issuance would be from a project-operating company with a long-term off-take contract, with the debt amortizing fully by the term of the contract. The issue would be rated by rating agencies, which provide specific guidelines for projects to achieve investment-grade ratings (i.e., minimum debt service coverage ratios, minimum requirements for commercial framework, etc.).
- The project bond market is highly suitable for many projects, either as the sole financing source or in combination with bank loans for larger projects. Common characteristics are as follows: large projects

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\(^{25}\) Zero-bond coupons are an exception. They do not pay interest but are sold at a substantial discount on the face amount that is paid back on maturity.
(total capital in excess of USD 450 million); operating projects; long-term contracted cash flows from creditworthy off-takers; fixed-price off-take agreements; highly rated project participants.

Revenue bonds
- Revenue bonds are backed by the revenues generated from the financed project, which are held on the balance sheet.
- General examples include toll revenues from a road project or revenues from a public transportation system. In the forest sector, national parks could be financed through revenues from park entrance fees, for example.
- The direct link between revenues generated from the project and repayments alleviates political difficulties associated with using general tax or company money to repay a project that benefits only a sub-population.

### Table 6: Differentiation between on- and off-balance-sheet bonds and feasibility for reforestation investments

<table>
<thead>
<tr>
<th></th>
<th><strong>On balance sheet</strong></th>
<th><strong>Off balance sheet</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Revenues pass through the financial accounts of the issuer before paying back the bondholder.</td>
<td>Revenues are held off balance sheet in a separate legal entity which then issues the bond.</td>
</tr>
<tr>
<td><strong>Link between revenues and bond repayment</strong></td>
<td>Weak link, which gives the issuing institution flexibility over how to pay back the bond (earmarking can limit the leeway).</td>
<td>Strong link, since only revenues generated from the bond’s investment are used to repay the bondholders.</td>
</tr>
<tr>
<td><strong>Features</strong></td>
<td>The repayment is associated with the broad revenue portfolio of the issuing entity, not a specific revenue stream. This translates into lower risks for the investor.</td>
<td>This approach allows the institution’s debt burden to be reduced and some of the risk to be distributed to the bondholder.</td>
</tr>
<tr>
<td><strong>Risk profile</strong></td>
<td>Primarily defined by the risk profile of the issuer.</td>
<td>Directly related to the underlying revenue-generation mechanism (see Table 9).</td>
</tr>
<tr>
<td><strong>Public sector</strong></td>
<td>Bondholders are repaid from the broad revenues generated by the country’s portfolio. Risk is a function of government credit rating. <em>Example</em>: Bond funds forest monitoring system.</td>
<td>Bondholders are repaid through revenues generated from the financed project. Risk depends on the ability to generate sufficient income, e.g. concession fees, timber sales, etc. <em>Example</em>: Bond funds forest plantation and is repaid through logging concessions for this plantation.</td>
</tr>
<tr>
<td><strong>Private sector</strong></td>
<td>Bondholders may be repaid through revenues generated from the financed project or other company activities. Risk is reflected in the company’s credit rating. <em>Example</em>: A pulp and paper company expands plantations and repays bondholders with revenues from existing pulp and paper sales.</td>
<td>Bondholders are repaid exclusively through revenues generated from the financed project, e.g. a forest products processing machinery. Risk depends on the ability to generate revenues. <em>Example</em>: A forest products company finances new machinery and repays bondholders with revenues from enhanced products sales.</td>
</tr>
<tr>
<td><strong>Remark</strong></td>
<td>Suitable for investments in re-/afforestation activities during the gap until revenues can be bridged through the broader revenue portfolio of the issuer.</td>
<td>Not suitable for re-/afforestation, even when fast-growing species and short rotations are anticipated, as investment-revenue gap does not match bond characteristics if no alternative revenue streams exist.</td>
</tr>
</tbody>
</table>
3.1 Green Bonds

The concept of the Green Bond was developed in 2007 by the Skandinaviska Enskilda Banken AB and the World Bank as a response to increased investor demands for engagement in climate-related opportunities. The first entities to issue such a bond were the World Bank and the European Investment Bank (EIB). The World Bank has issued over USD 9 billion worth of such bonds through more than 125 transactions in 18 currencies (as of October 2016) since its first issuance in 2008. The clear majority of eligible projects are from the energy (38%) and transport (34%) sectors. Only 12% of the eligible projects fall into the category of agriculture, forestry, and ecosystem projects (World Bank 2015b). From a market originally dominated by international development banks (e.g. World Bank, EIB, etc.), the Green Bond market has attracted a variety of new issuers, among them corporates and municipal issuers.

The trend of increasing World Bank issuances of Green Bonds is reverting, and issuances have been declining since June 2014 (see Figure 13). Development banks in general have little to gain from issuing a second-party verified Green Bond since financing social and environmentally friendly projects is their raison d’être. World Bank bonds finance only World Bank projects, which are expected to comply with the organization’s rigorous environmental and social safeguards in any event. Current evidence does not suggest a price advantage for Green Bonds (see section 3.4) and therefore the additional selection, monitoring and reporting costs prevail. The future rationale for issuing Green Bonds depends on the development of the Green Bond market. The market could continue to grow if environmental, social and governance factors (ESG factors) gain further popularity and Green Bond standards are developed further. Such a development would increase the demand for Green Bonds and is likely to result in a price advantage of Green Bonds over plain vanilla bonds, giving issuers an incentive to tap further into the market. If the market is approaching a point of saturation – for example, because ESG factors are sufficiently addressed, or because Green Bonds are too complex, the market price might remain virtually equal to plain vanilla bonds. Finally, in the event of other, more attractive, instruments to address ESG factors emerging, or if “green washing” becomes a pressing issue, the demand for Green Bonds could plummet.
3.1.1 Definition and rationale for issuing Green Bonds

A Green Bond differs from a plain vanilla bond in terms of the activities it finances and the restrictions imposed on its use. The issuer must ensure that the proceeds are invested in green projects, ideally confirmed by an independent certification. The Green Bond Principles (GBP) and the Climate Bond Initiative (CBI) have established requirements that need to be met by Green Bonds, although these are voluntary. In theory, Green Bond proceeds could be used for a wide variety of environmental projects, but in practice they have been used largely for similar projects such as Climate Bonds. In some cases, proceeds have gone to areas regarded as environmental but not necessarily related to climate change, such as organic farming (CBI 2016b).

The labeling of a bond as “Green” – or something similar such as a Blue Bond, Climate Bond, or Forest Bond – was initially a value judgement by the issuer. In the early days of Green Bond issuance, this judgement was made by dedicated environmental specialists at the World Bank or other development banks. What had to be confirmed or certified was that the proceeds raised through the issuance of Green Bonds were used for the intended purpose. As discussed, independent of using Green Bond proceeds to finance project implementation, all World Bank projects are subject to the same rigorous social and environmental safeguards review and approval process to ensure that projects meet client countries’ development priorities. Hence, a Green Bond may be issued when there is a sufficiently strong pipeline of eligible projects that will be selected from the Bank’s portfolio. These will meet all requirements of the GBP, whereas the investor will not know ex ante the composition of the bond by sectors – unless it is a themed bond (e.g. a water sector bond, see also Figure 14).

Source: World Bank (2016a)

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26 There are no binding rules to determine when a bond can be advertised as “Green”. 
The World Bank has not yet issued a Forest Bond per se, but it does finance forest-related activities in certain countries with the proceeds generated from Green Bond issuance. Forestry projects financed from Green Bond proceeds tend to address reforestation – for example, through investment operations in China, Mexico, and Uruguay.

The underlying rationale for issuing Green Bonds is twofold: first, Green Bonds allow issuers to reach different investors looking for a responsible and low-risk rated (i.e. AAA-rated) fixed-income product; second, Green Bonds can help promote investors’ environmental credentials by demonstrating their commitment to environmentally responsible investments. Investors are increasingly focused on integrating ESG factors into their investment portfolios, and Green Bonds can help them meet their environmental objectives (CBI 2016c). With an increasing number and diversity of Green Bond issuers, the need for independent certification of eligible proceeds becomes evident. Independent groups have already emerged to provide such second opinions, such as the Center for International Climate and Environmental Research in Oslo (CICERO).

3.1.2 Green certification approaches

Different criteria and approaches to ensuring that bond proceeds are indeed resulting in positive “green” impacts have been established by financial groups, non-profit organizations, and corporate investment firms. These “green” impacts can be climate- and carbon-emission-related, target climate adaptation benefits or waste reduction, or be for sustainable forest management, reforestation and afforestation, to list just a few aims. The three most common standards used to label Green Bonds are the GBP, Climate Bond Standards, or Green Bond Indices (key features are highlighted in Annex A). The
criteria are mostly similar but vary in terms of the requirement for an independent third-party certification to monitor the performance of the Green Bond.27

**BOX 1: THE DIFFERENCE BETWEEN “SECOND OPINION” AND “THIRD-PARTY” VERIFICATION IN GREEN BOND ISSUANCE PROCESSES**

- **Second opinion**: this type of verification generally declares if a bond’s intended use of proceeds and its intended governance framework comply with the GBP. This verification method lacks a standard form or process.

- **Third-party verification**: this is recognized as the more rigorous form of assessment by the GBP. Verification is against a declared set of industry-specific criteria, which assess whether the projects being funded are green. It is also conducted by audit professionals in line with standards such as the International Standard on Assurance Engagements 3000 for the verification of GHG emissions.

*Source: Standard & Poor’s (2016)*

**Independent certification enhances the credibility of Green Bonds as a new product, accentuates marketing efforts, and provides regular assurance regarding performance as proceeds are deployed.** According to Bloomberg (2016), as of mid-2016 some 80% of Green Bonds have used a second opinion or third-party certification (GFSG 2016). A second opinion is a valuable improvement on issuer disclosure since it provides additional assurance to investors regarding the validity of the issuer’s claims. Yet reviews may lack independence as the second opinion providers can be involved in the development of the issuance’s Green Bond framework. A third-party certification is more independent than the second-party review as it has to adhere to international assurance standards (see Box 1 above for more details). The development of robust sector-specific certification criteria is time-consuming and resource-intensive. The limited availability of certification criteria in different sectors has curtailed the use of standards in the early stages of the market and the CBI is, as of October 2016, still working on land-use certification criteria (CBI 2016d). However, increased availability of sector-specific criteria is reducing this barrier (GFSG 2016). 

Table 7 provides examples of how second opinion and third-party verifiers are integrated into the issuance process. All these actions are necessary only for a Green Bond issuance and are not required for a plain vanilla bond issuance. They therefore constitute an additional step or “transaction cost” for Green Bond issuance.

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27 Only the CBI requires third-party certification. A second-party opinion reviews environmental criteria which the issuer will use to select projects for funding. This approach does not address whether the bond has been managed as intended. Third-party opinions provide the highest level of confidence that the bond issuer uses robust processes to track proceeds management and report on outcomes.
**TABLE 7: RESPONSIBILITIES OF SECOND-PARTY REVIEWERS DURING THE GREEN BOND LIFE CYCLE**

<table>
<thead>
<tr>
<th>Entity</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-issuance</strong></td>
<td></td>
</tr>
<tr>
<td>First-party (issuer)</td>
<td>Development of a framework to identify green projects. Disclosure of how proceeds will be managed and allocated based on the definition of green eligible assets</td>
</tr>
<tr>
<td>Second opinion</td>
<td>Review of the framework ranging from verification of the adherence to the GBP to provision of a new Green Bond framework</td>
</tr>
<tr>
<td>Third-party certification</td>
<td>Confirms that the planned Green Bond use of proceeds adheres to the Green Bond Standard and relevant asset-specific standards, such as FSC certification</td>
</tr>
<tr>
<td><strong>Post-issuance</strong></td>
<td></td>
</tr>
<tr>
<td>First-party report</td>
<td>Disclosure of proceeds allocation and project performance</td>
</tr>
<tr>
<td>Second opinion</td>
<td>Review of the adherence of proceeds to eligible green projects and reporting of key green indicators</td>
</tr>
<tr>
<td>Third-party certification</td>
<td>Auditing firm provides additional assurance for the allocation of the proceeds to eligible green projects and types of projects</td>
</tr>
</tbody>
</table>

*Source: CBI (2016c)*

**Specific to Forest Bonds, a common approach to ensuring that proceeds from Forest Bonds are invested in eligible forest investments is to require certification through the independent, third-party certification systems.** CICERO, for example, uses the certification by the FSC to ensure that investments comply with internationally accepted criteria for sustainable forest management.\(^{28}\) The FSC utilizes independent, accredited certifiers to verify that an operation meets FSC sustainable forest management standards. Given the fixed-cost characteristics of forest management certification, it is usually more feasible for larger companies as the costs can be between USD 0.06 and USD 36 per certified ha, depending on the size of forest area (Potts et al. 2010).\(^{29}\) The majority of bonds that have had a positive climate impact on the forestry sector come from companies with FSC-certified forests and a chain of custody certification. Certification is especially important in the forest sector and, as Cranford et al. (2011) put it, “the most important attribute for any Forest Bond is that its environmental credibility must be assured” (p. 13).

**But the realities of certification of Green Bond investments as being “green” may be more flexible and subject to interpretation than expected.** For example, CICERO (2016) grades its independent reviews of Green Bond frameworks as dark green, medium green or light green (or brown). These “Shades of Green” indicate to investors how much a project is contributing to building a low-carbon and climate-resilient society by 2050. The grading builds on a broad qualitative assessment of each project and reflects the climatic and environmental ambitions of the bond as well as the robustness of the associated governance structure. It is hard to determine how green these bonds are, especially for on-balance-sheet bonds, because they are backed by the issuers’ general balance sheet or tax revenues. This general balance sheet can have mostly non-green activities. Such Green Bonds might be perceived as general finance instruments for investments that would have happened in any case.

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\(^{28}\) The FSC has established global principles and criteria for responsible forest and plantation management including issues such as: maintaining water quality, preventing the loss of natural forests, prohibiting the use of highly hazardous chemicals, and reducing the impacts of logging.

\(^{29}\) FSC management was contacted as part of the research conducted for this project but has not indicated whether it has engaged specifically in the certification of Forest Bond Issuances.
**Figure 15: Definition of Green Investment Categories of Green Bonds (CICERO 2016)**

- **Dark green**: Projects and solutions that realize the long-term vision of a low-carbon and climate-resilient future today. This will typically entail zero-emission solutions and governance structures that integrate environmental concerns into all activities. Examples include renewable energy projects such as solar or wind.

- **Medium green**: Projects and solutions that represent steps towards the long-term vision, but are not quite there yet. Examples include sustainable buildings with good (but not excellent) energy efficiency ratings.

- **Light green**: Projects and solutions that are environmentally friendly but are not a part of the long-term vision. Examples include energy efficiency improvements in fossil-based industry that result in short-term reductions of GHG emissions, and diesel-fueled buses.

- **Brown**: Projects that are in opposition to the long-term vision of a low-carbon and climate-resilient future.

**Source**: CICERO 2016

### 3.1.3 Market statistics of Green Bonds

The market for officially labeled Green Bonds is expanding rapidly and important milestones have been reached in the last three years (see Figure 15). Until 2013 the Green Bond market was comparatively small and dominated by multilateral development banks such as the EIB or World Bank, which were the first institutions to issue a Green Bond. Since 2013 corporations and municipalities have been starting to tap into the field of Green Bonds. Initiatives such as the CBI and the GBP have helped to develop the market further by setting standards and providing guidelines for both issuer and investors. Large banks launched green indexes in 2014 designed to track the global Green Bond market. In 2015 the first Green Bond was issued in South America by the Brazilian food company BRF, and in 2016 Moody’s launched a service to assess the “greenness” of investments. The first sovereign Green Bond was issued in 2016 by Poland. Although experience with such products remains limited, it is interesting to note that this first sovereign bond included support to some forest-relevant activities, such as sustainable land-use and national park management, while explicitly excluding others, such as support to wood-based biomass energy. This first sovereign Green Bond had a slightly higher price than plain vanilla bonds.³⁰

³⁰ For further information on this first sovereign Green Bond see: [https://www.ft.com/content/28c137e9-bde9-3c0e-bc27-bf0d084bbe0e](https://www.ft.com/content/28c137e9-bde9-3c0e-bc27-bf0d084bbe0e)  
In contrast to the general strong demand for Green Bonds, the forestry sector is playing a negligible role in this market. The volume of outstanding Green Bonds is USD 118 billion, with around 2% being issued...
in the forestry sector. The most important sectors are energy, with more than USD 50 billion (43%), and the building and industry sector, with USD 28.6 billion (24%). Bonds issued in the forestry and agriculture sector, however, amount to only USD 2.5 billion (2.1%). The number of Green Bond issuances increased by 92% between 2015 and 2016 alone, reaching almost USD 81 billion in 2016 (CBI 2016b). As discussed in section 2, the estimated amount Brazil needs in order to finance its NDCs is probably USD 9.5–16 billion. This points to a fourfold finance gap, even if all of the current Forest Bonds were issued for investments targeting Brazil.

**Labeled Green Bonds have on average a shorter tenure than unlabeled climate-aligned Bonds.** According to the CBI, this is due to the dominance of large state-backed entities in the rail sector within the climate-aligned universe where investment horizons are long (CBI 2016b). Within the World Bank, the average of Green Bonds is three years shorter than for plain vanilla bonds issued in USD. The relatively short tenure maturity of Green Bonds could, on one hand, point towards the risk-averseness of investors. On the other hand, the majority of Green Bonds fund renewable energy investments, which have a fairly short investment horizon. Short tenures for Green Bonds could be problematic for investments that pay off only after several years, like forest investments.

**Compared with Green Bonds that are characterized by high credit ratings, Forest Bonds have on average a lower credit rating.** 43% of the bonds outstanding fall into the AAA credit ratings band, primarily due to large development banks. 14% of outstanding Green Bonds have no rating, possibly because the issuing entities are small or new to the market. In the forest sector, most of the issued Green Bonds have no credit rating at all and none of the issuing entities has an AAA rating. The lack of a good credit rating can be a serious challenge for issuers. This applies especially for large-scale bonds that have to be attractive for institutional investors.

**FIGURE 18: CREDIT RATING FOR ALL GREEN BONDS COMPARED WITH GREEN BONDS IN THE FOREST SECTOR (LEFT) AND TENURE FOR GREEN BONDS COMPARED WITH CLIMATE-ALIGNED BONDS (RIGHT)**

*Source: CBI (2016b)*
3.2 Forest Bonds

Thus far, Forest Bonds have been rare and the supply of suitable projects for them appears to be small. A Forest Bond is defined more by the forest-friendly activities it delivers and less by the revenues it uses to repay the bond (Cranford et al. 2011). Such bonds allow issuers to:

- reforest degraded lands;
- facilitate the transition from livelihoods based on forest conversion or degradation to more sustainable systems that protect forests;
- develop capacity and infrastructure for public sector agencies;
- manage and preserve natural forests;
- process sustainably harvested forest products (both timber and non-timber from natural or plantation operations) for sale into local and international markets.

In light of this, suitable projects could include:

- reforestation of degraded lands;
- support to harvester cooperatives for non-timber forest products;
- capital investments to strengthen a national or sub-national forest agency;
- development and implementation of national monitoring and tracking systems;
- timber production from natural forest concessions;
- payment for environmental services;
- agroforestry systems that combine trees with crops (IFC 2007).

Most issuers of bonds that invest in forestry and agriculture (88%) label and promote their offerings as Green Bonds (CBI 2015). For forestry, the reasons for this could be that while the green labeling increases the positive visibility of the project, an explicit forest labeling could achieve the opposite as the public perception of productive forestry projects (e.g. logging and plantations) is often negative. This attests to the importance of the green label, without which such bonds might not prove sufficiently attractive to investors. Forest investments are sometimes judged unfavourably when rating their environmental sustainability and social attributes, especially where the productive use of forests is involved. Uncertain land tenure, potential violations of indigenous people’s rights, or the perceived destruction of forests because of timber harvesting are just a few examples of the reputational challenges faced by the sector. Even third-party sustainable management certification may not be sufficient to change these views. Investors tend to prefer a perceived clear cause–effect impact relationship, as is the case with renewable energy or green infrastructure projects when seeking to demonstrate their corporate and social responsibility by investing in Green Bonds. In that way, Forest Bonds stand in contrast to other Green Bond issuances that are frequently oversubscribed, indicating superiority regarding market demand for non-Forest Bonds. The factors that lead to this difference for Forest Bonds, and what interventions could possibly – if at all – address this development, need to be analyzed.

A key obstacle to generating investor interest in Forest Bonds is the lack of a direct revenue stream. Infrastructure-based Green Bonds (e.g. energy) can easily generate direct revenue streams, such as tariff incomes for energy consumption that guarantee a steady and almost immediate income stream. It is harder to establish such a direct income stream for forestry-based Green Bonds. This is important for both on- and off-balance-sheet investment structures, as it either contributes to an enhanced income base for

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31 In this report Forest Bonds refer to Green Bonds funding primarily forest-related activities.
on-balance-sheet investments or represents the sole income stream and justification for an off-balance-sheet investment. This observation is supported by CBI (2016b), which states that the lack of an obvious revenue stream of public forestry investments is a key barrier, and is likely the reason for the low demand. The public good character of forests is difficult to translate into direct financial revenue streams and constitutes the core challenge to acquiring private finance.

Even if there is a direct revenue stream, it is subject to many uncertainties, such as site heterogeneity, management objectives, long production periods, demand volatilities and natural disasters. The conventional way to address this is to have a fast-growing monoculture plantation that produces a certain mass product (i.e. fiber for pulp and paper or energy). However, even here production is perennial, implying that no significant revenues will accrue in the first seven years (or more). Alternatively, risks can be addressed with a wide management portfolio – i.e. multi-age and multi-species forests, where managers can flexibly react to changing market demands, but which are also more resilient to calamities. However, here the disadvantage is much longer production periods (40 years and more for high-value timber species). In other words, the most critical aspect of forestry is the time lapse between investment and revenue generation. Investments in forestry have long tenures, requiring significant capital expenditures before revenues are realized. To investors, long-term investments in a country with a low credit rating are unappealing as the risk of default on commitments remains for a longer period of time. There are other, more short-term, investment options. Likewise, the probability of natural disasters such as wildfires, pests and diseases increases with longer time horizons.

From the perspective of the public institution issuer, Forest Bonds are likely to be less attractive than other Green Bonds, as social returns on forest projects tend to be lower and less tangible when compared with other green projects. One reason is that the social returns on green energy and infrastructure investments are higher than investments in forests. As highlighted in a World Bank Policy Research Paper (World Bank 2000), high social returns on infrastructure are a function of the shortage of the infrastructure in question. While the paper concludes that its results apply to electricity investments in the poorest countries and road infrastructure investments in middle-income countries, shortages for green infrastructure investments exist across all country income groups. Therefore, social returns on these investments are large. More importantly, even where this shortage is only a perceived shortage by select stakeholders, the nature of democratic governments and short political cycles may impact the prioritization towards satisfying critical voter demands rather than following a different, possibly more balanced, prioritization process for public investments. In that vein, as more people may be immediately affected by public investments in renewable energy, clean transport, health, and education, the provision of these services will usually be preferred over investments in forestry that may yield “tangible” returns only in the medium-to-long term.

Corporations in the forest sector that issue bonds are typically large, multinational pulp and paper companies that already have a good credit rating, a solid implementation record, and a diversified business portfolio. The companies seldom advertise their issuances as “green” or “forest”, but simply as bonds designed to help a successful corporation obtain capital to expand its business. These bonds enjoy a greater flexibility in the use of their proceeds than Green Bonds, and are not systematically different from other corporate bonds. This may suggest, however, that the quantity and value of Forest Bond issuances is underreported since there are, for example, pulp and paper companies that are not

32 Generating large revenue streams typically takes at least seven years for high-yield pulp and paper plantations. High-quality timber production is characterized by rotation periods of 40–100 years, and even longer in temperate climates.
necessarily registering or promoting their bonds as Forest Bonds. The predominant issuance of corporate Forest Bonds is mostly relevant for investments in plantations, forest concessions, and their operation. The associated processing and manufacturing could increase the value added and revenues from forest products. In Brazil bonds are, however, not commonly issued by companies within the agriculture and forestry sector, and out of all companies in the agriculture, forestry and farming sectors, fewer than 10% have issued bonds (CBI 2016b). Governments can only seek to provide an enabling environment to incentivize corporate Forest Bond issuance, but not appoint these issuances.

One reason why forest companies do not always promote their corporate bonds as green is that labeling increases the costs, while institutional investors expect the same returns on Forest Bonds as they obtain from other, more traditional, bonds. According to GFSG (2016), certification costs can range between USD 10,000 and USD100,000 per issuance. These costs must be mobilized before the bond issuance and, although comparatively small as a total amount, mobilizing this before capital is available could represent a burden at this initial stage of the issuance. Furthermore, Green (and Forest) Bond issuers must meet market expectations for returns, which is a difficult task when the issuing entity is not a large, well-financed corporation (or municipality) with a track-record of positive results. In such cases, the labeling of “Green” or “Forest” may raise additional questions about the financial viability and payback period. In Brazil and other South American countries, large companies with some forest-related projects can issue such long-term corporate bonds based on their overall financial strength. Brazil’s BRF, one of the world’s largest food companies, for example, became Brazil’s first corporation to issue a Green Bond in 2015, and parts of the proceeds are designated for forest-related projects. But for those large companies, the issuance is backed by the overall credit rating and indirectly secured through a portfolio of diversified revenue streams (Sustainalytics 2015).

Smaller companies that cannot rely on a diverse business portfolio with a range of income streams will find bonds less attractive as a financing instrument given the need for annual interest payments, relatively short tenures, and certification/labeling costs. For smaller companies, bonds may be feasible only if the investment can realize immediate and direct revenue streams to pay annual interest and the repayment of the bond principal after a short tenure. In the forestry sector, this is realistic only in the processing industry, where bond resources could be used for financing equipment or infrastructure that leads to efficiency gains or additional product lines. However, for reforestation investments, bond characteristics like annual interest rates and short tenures are a disadvantage due to the characteristic time lapse between the investment and the generated revenue stream – even when fast-growing and high-yield plantations are involved. Typically, smaller companies cannot use a balance sheet of a diverse revenue portfolio to finance the bond, but would ultimately have to rely, at least partially, on the revenue stream that is generated by the bond-based investment. In such a situation, a zero-coupon bond would be a logical approach to accessing the capital market, as these essentially allow for a very long grace period and reduced stress on issuers with limited cash flow. However, zero-coupons are unconventional compared with other fixed-income products, and that zero-coupon bonds tend to be rather a niche product. As such they do not align with most investors’ preferences (e.g. having a regular cash flow or just being a more standard product) – probably even more so if, like forestry, the sector is not “mainstream”.

Impact and institutional buyers are the main investors targeted by the issuance of a Forest Bond (Cranford et al. 2011). While impact investors are willing to accept an upper-medium-to-high investment-grade credit rating, institutional investors are looking for AAA ratings. Impact investors are often willing to compromise on their preferred investment characteristics (rating, liquidity or return) in exchange for the assurance that the investment provides environmental benefits. Institutional investors, on the other hand, act on behalf of large groups and therefore have the fiduciary duty to select secure investments.
They are therefore constrained to select bonds with a high investment-grade credit rating and assured high liquidity — characteristics not commonly associated with Forest Bonds.

A review of existing Forest Bonds revealed that neither project bonds nor bonds relying on REDD+ are yet a reality in the forest sector. In our dataset, we found only one small pilot project in Chile (SIF Chile, USD 13 million that would count as a forest project bond, and none that relied completely or partially on REDD+ payments as a revenue source (see Annex B). This has not changed since Cranford et al. (2011) observed that a project bond in the forest sector “has not yet been issued” (p. 26). It therefore appears that project bonds in the forest sector are only a theoretical concept for now.

A recently issued Forest-Carbon Bond may change this and serve as an interesting pilot for issuing bonds related to the carbon-performance of the associated investments. The investors of the bond that was issued by the IFC in October 2016 were offered the option to receive either “cash or carbon” — i.e. choose a regular monetary payment flow or a repayment in the form of carbon credits that the investor can then use against their own carbon mitigation commitments, or trade and sell in the (carbon) market. It remains to be seen how many investors opted for the carbon credit as repayment; what share of these used the carbon credit to comply with enforced or voluntary mitigation commitments; and, if traded on the market, what prices could be realized. Given that dominant carbon trading schemes such as the EU Emissions Trading Scheme (ETS) do not yet accept forest-based carbon credits for trading, it also remains to be analyzed if and how these credits would be sold. Another possible issue with such a scheme revolves around the question of the property rights of carbon and whether “double counting” is permitted. Even though private companies may own land and trees, national governments may prefer to count carbon credits from private investments against their national commitments. It is not yet clear whether such credits can be privately sold and included in national commitments at the same time — i.e. if the government can benefit from the mitigation actions of the private sector.

In summary, the review of bonds issued in the forest sector further revealed the following characteristics (for details see Annex B).

1. Since 2013, the number of forest-related bonds has increased but remains at a low level; 12 out of 20 Forest Bonds have been issued since 2013.
2. Most of these bonds finance operations in countries with large forestry sectors (i.e. the US, Sweden and Brazil).33
3. The issuance volume depends mainly on the company size and its experience in the forestry sector.
4. Two Brazilian corporations are among the companies with the highest issued volume of forest-related bonds (BRF and Fibria). These bonds are all high-yield forest plantations of species with well-known characteristics.
5. Most bonds are issued in USD, yet currencies other than USD are also used.
6. The tenure varies between three and 20 years, with an average tenure length of eight years.
7. The majority of forest sector bonds are issued by private companies, and the approaches employed are rarely transferable to a public sector bond issuance.

33 Results are based on research on forest-related bonds specifically conducted for this study. See Annex B for details.
3.3 Benefits and costs of a Green Bond issuance

While the above discussion already indicates that an institutionalized lower-yield advantage is not the primary motive for the issuance of Green Bonds, the explicit and implicit benefits and costs of Green Bonds need to be analyzed further. This section aims to clarify which costs and benefits issuers may expect from issuing a Green Bond versus a plain vanilla bond.

3.3.1 Benefits of Green Bonds

As one of the first issuers of Green Bonds, the World Bank explicitly stated that the broadening of the investor base and the promotion of environmental credentials were the primary motives. Accordingly, no advantages with respect to lower yields were expected or explicitly targeted. Current ex post analyses do not suggest that Green Bonds receive a financial benefit per se, but that there is a slight interest rate advantage over plain vanilla bonds on the secondary market due to demand and supply mismatches (Standard & Poor’s 2016). The main challenge in analyzing the financial benefit is that information on the relevant primary market trades is not publicly available.

This price advantage is not institutionalized but rather results from the demand and supply situation for the specific bond issuance on the secondary market. In other words, the price advantage of a Green Bond is not determined ex ante, but is a result of the issuing process and is fully visible only after it is complete. Therefore, issuers can attempt to design the issuance in such a way that demand from investors is high and likely to exceed the bond supply. The effective demand and supply situation and resulting price advantage remain uncertain. A price advantage is not guaranteed and could be higher or lower for a number of reasons – but ultimately it remains a function of a supply shortage, if any.

Barclays (2015) finds that investors (i.e. bondholders) are paying a 16.7 basis point (0.167%) premium to acquire Green Bonds on the secondary market. The model differentiates between the spread of Green Bonds and comparable issues controlling for credit rating, currency, spread duration, etc. It argues that this premium is partly attributable to opportunistic pricing based on strong demand from environmentally focused funds. However, it should be noted that this analysis refers only to prices achieved through trading on the secondary market, not on the primary market, and hence the issuer does not benefit from this strong demand. Barclays’ results are confirmed by a yield curve analysis conducted by Bloomberg Blog, which illustrates that green IBRD (International Bank for Reconstruction and Development) bonds trade on the secondary market at lower yields than plain vanilla IBRD bonds over time. If there is really a premium in the secondary market, it could indicate that the original pricing was too low, and it could be a question of market development (Barclays 2015). However, whether such an analysis is meaningful is open to question, and caution should be applied when drawing conclusions for primary bond market prices. There is little trading for Green Bonds since investors tend to hold the bonds for long periods –to comply with ESG requirements, for example. Hence, pricing indications become theoretical prices that are not trading prices. If a bond tightens in the secondary market this does not necessarily mean the original price the issuer paid was too high –i.e. that Green Bonds are cheaper from an issuer’s perspective.

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34 A premium in this context means that bondholders accept a lower interest rate for the periodical interest payments than they would accept for a comparable plain vanilla bond. The motivation is possibly the positive association made with investing in a Green Bond.

35 A yield curve displays the interest rate or yield of bonds with differing maturity dates. A lower yield curve is advantageous for the issuer as their interest payments will be lower.
Even if this yield advantage were indicative of the actual cost savings for issuers, the cumulative benefit would decrease with increasing coupon prices. For example, for a 12% baseline coupon the saving effect would be only 1.4% of the total interest payments. Using a stylized numerical example to illustrate cost savings, and assuming that an investment volume of 100 million were to be financed through bond issuance, the total financial advantage gained through a Green Bond issuance accumulated over 15 years would be roughly USD 2.5 million, or 1.4% of the total interest payment. This seems to be a rather small amount compared with the overall investment burden, and might be insignificant when additional costs for the issuance of the Green Bond are included. To put this into perspective, underwriting fees typically range from 15 to 35 basis points depending on the size of the offering, the term, and other complexities.

While it is acknowledged that some analyses suggest a financial advantage of Green Bonds in secondary markets, this comparison can be challenging as the parameters that influence secondary market prices are complex. This reduces the reliability of such conclusions. Comparing one-on-one World Bank issuances of Green Bonds and plain vanilla bonds with very similar characteristics (same currency, year of issuance and tenure) reveals that Green Bonds are not systematically sold under better conditions than the plain vanilla counterpart. Price advantages, price equalities and price disadvantages for Green Bonds can be found for the different matches. Broadening the analysis and comparing Green Bonds versus their mainstream counterparts across issuing entities shows an indicative price disadvantage for the issuer of Green Bonds. A comparison of supranational Green Bonds shows a yield of at least a 15 basis point higher than their supranational plain vanilla counterparts, while having a similar average maturity (Schroders 2015).

It is generally very challenging to make a valid comparison between Green Bonds and plain vanilla bonds because a bond issuance price is derived from many factors which are difficult to determine in advance. Factors that influence the price and are relatively easy to account for are issuance size, tenure and credit rating. However, some of the previous results do account for the different credit ratings and should hence be treated with some caution. Other factors are known but harder to account for. For example, corporate and public bond issuances will likely contain different characteristics. The timing of the issuance is of vital importance as credit market conditions change or alternative investment opportunities emerge and vanish. Factors that are very tricky, if not impossible, to account for are investor relations; marketing efforts associated with Green Bond issuance; or complementary measures, such as IFC’s offer to choose between a cash or carbon-credit coupon for their Forest Bond. These factors can enhance the attractiveness of a Green Bond but are highly case-specific.

Currently, examples can be found of Green Bonds trading both above and below the yield curve of their plain vanilla counterparts. The consensus is that they largely trade in line with conventional bonds (Standard & Poor’s 2016). Elders and Mammadov (2016) confirm this statement, asserting that labeling a bond as green “has helped issuers attract new investors. Yet, these bonds have failed to offer a clear yield advantage for issuers and suffer from added verification costs.” Anecdotal evidence from market insiders indicates that a 2–3 basis point tightening could be achieved with European Green Bond issuance (Standard & Poor’s 2016). But no such tightening has yet been experienced in the US market, where the level of understanding and demand for environmentally driven issuance currently lags behind Europe (Standard & Poor’s 2016).

This confirms the earlier finding that the reason for the premium paid in the secondary market for Green Bonds is likely the result of a demand and supply mismatch leading to an undersupply of the bond in
question. The reasons for this are manifold. Many of the Green Bonds that have been issued in the past have been oversubscribed (Schroders 2015; The Economist 2014; see Annex B). In the case of Forest Bonds it is not clear whether the actual demand is strong enough to lead to oversubscription, as the analysis of existing Forest Bonds found only three examples of Bonds with reported oversubscription (see Annex B). In the general green-labeled bonds market, there are currently not enough bonds available to meet investor demand, and this is driving up the price on the secondary market, whereas on the primary market, investors might not be willing to pay such a premium.

Possible explanations for the oversubscription for Green Bonds are as follows.

− Green Bonds attract a greater diversity of investors seeking environmental impact, thus increasing demand.

− Green Bonds might be perceived as inherently less risky (or volatile) than comparable unlabeled Green Bonds, leading to higher risk-adjusted returns (Barclays 2015).

− Some investors are obligated to invest a certain share of their capital in environmentally friendly activities.

− Green Bonds provide additional value (public good) by delivering verifiable environmental benefits.

Investors’ strong interest in buying Green Bonds often results in a broader investor base, which is advantageous for issuers, but governments might not be able to expand their already broad investor base. Many sources report that Green Bonds attract investors who would not usually invest in a plain vanilla bond of the same issuer (Morgan Stanley 2016; World Bank 2015b; CBI 2015). Issuers benefit from strong investor demand in several ways. Most importantly, it means they can attract new kinds of investor, diversifying the pool of individuals and institutions with an interest in their projects. It is also an attractive feature from an issuer’s perspective that most Green Bond investors are “buy-and-hold investors” (CAIA 2015). The broader interest in Green Bonds enables issuers to be selective and sell only to certain investors, like those who are signatories to the GBP or to the Global Investor Statement on Climate Change (Environmental Finance 2016). Moreover, issuers can try to increase the size of their offering, demand a longer payback period, or seek better pricing through artificially low issuance volumes (whether this is actually achieved is another question) (Citiscope 2016). However, the possibility of broadening the investor base is probably more attractive for less-well-known issuers than for larger bond issuances such as governments. Sovereign bonds issued by governments are probably among the most well-known financial products in the market, and the scope to draw the attention of new investors to this bond by the addition of a green label seems very limited. In addition, the market analysis for existing Forest Bonds undertaken for this report has shown oversubscription to be less prevalent in the forest sector than in other sectors.

Both investors and issuers can benefit from using Green Bonds as they can help to boost their reputation or simply enable them to comply with self-imposed corporate social responsibilities (Environmental Finance 2015a). Both governments and investors can improve their international reputation by using Green Bonds to finance climate mitigation and economic development efforts across borders. Quality-labeled Green Bonds have generally received favorable press coverage – especially if the bond is the first for a given jurisdiction (Environmental Finance 2015a). Many pension funds and other institutional

36 A bond is oversubscribed when the issuance price is too low or demand by investors is higher than expected. When a new bond issue is oversubscribed, the issuer can adjust the price or offer more securities to reflect the higher-than-anticipated demand.
investors are now mandated to include responsible and sustainable investments in their portfolios. Ethical reasons play a role, and managers are seeking strategies to address the risk that climate change imposes on other fund assets (Bloomberg Blog 2015).

Underwriters face a trade-off between a growing reputation for a broader investor base and the cost of familiarizing themselves with Green Bond particularities. Green Bonds offer an opportunity to grow the underwriter’s reputation as a high-value service provider that can attract a variety of investors. Large buyers’ networks and access to high-demand offerings are indicators of quality for underwriters. Given the growing number of responsible investors looking to buy quality Green Bonds, underwriters have a great deal to gain if they acquire expertise in this new and growing area of debt financing (Environmental Finance 2015a). This comes at the additional cost of understanding the eligibility criteria of this new and not standardized financial product, which increases the opportunity cost for the underwriter. Furthermore, the placement process may be hampered by the longer tenure and the need to retain additional services, like the second opinion (FEBRABAN 2015).

The complexity of achieving a price advantage through the issuance of a Green Bond is exemplified by a recent issuance of a Sustainability/Green Bond by a Turkish bank with dedicated investments in direct and indirect climate change mitigation, climate change adaptation, and sustainable infrastructure (IFC 2016). The issuance, which was accompanied by the World Bank’s private sector arm, the IFC, and realized in May 2016, started with an initial price considered to be 450 basis points, but resulted in a final price of 387.5 basis points, or 62.5 basis points lower than the initial offering (due to a significant demand, 13 times oversubscription, and associated triple-price revision). However, while about a third of this gain (20 basis points) is attributed to the green nature of the bond (IFC 2016), the remaining basis point gains should be attributed to other factors such as the implementation of the pre-issuance roadshow and the advisory support provided by the IFC.

3.3.2 Costs of Green Bonds

An assessment of the costs of Green Bonds shows that issuance and ongoing costs are at first usually greater than those of plain vanilla bonds, but are difficult to quantify. The costs include additional expenditures for defining the green criteria, monitoring and maintaining the proceeds as green, and transparently communicating performance to investors over the lifetime of the bonds. The costs of contracting a second-party opinion and preparing projects and reports for them are among the clearest cost factors. During their life cycle, Green Bonds create additional costs at several stages and through different agents. Figure 19 illustrates when additional costs may occur.

Both issuance and ongoing costs for a Forest Bond might be even higher than for “regular” green projects. Comparing, for example, a solar energy project and a reforestation project can help illustrate this point. For a solar plant the final output is easy to determine and verify. The day the solar plant produces energy and feeds it into the system, the goal of producing renewable energy has been achieved and tracking is straightforward. In contrast, the definition of a successful reforestation project is more difficult. How tall would the trees have to grow, or what would be the stocking rate per ha for an area to be considered reforested? Does an exotic species plantation count as reforestation under NDC? Moreover, the possibility that reforestation efforts are offset by simultaneous deforestation in other regions of the country – to relocate agricultural production, for example – is omnipresent. Wherever reforestation and land restoration are undertaken on scale, monitoring the ongoing compliance often requires detailed satellite image interpretation which is costly and not always available. Overall, defining criteria and monitoring are particularly difficult and thereby costly for forestry projects. Table 8 contrasts the costs and benefits of a Green Bond issuance.
FIGURE 19: ADDITIONAL COSTS FROM ISSUING A GREEN BOND

Table 8: Cost and Benefit Comparison for Issuers of Green Bonds Compared with a Plain Vanilla Bond

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Costs</th>
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</thead>
<tbody>
<tr>
<td>- Current higher demand than supply of Green Bonds can lead to oversubscription and potential to increase issuance size.</td>
<td>- Opportunity cost for the staff to familiarize with the concept of Green Bonds.</td>
</tr>
<tr>
<td>- Larger investor base.</td>
<td>- Cost of elaborating an adequate set of criteria to select eligible projects.</td>
</tr>
<tr>
<td>- Reputational benefits (e.g. marketing can highlight issuer’s green credentials and support for green investment).</td>
<td>- Ongoing transaction costs from administrative, certification, reporting, verification, and monitoring requirements.</td>
</tr>
<tr>
<td>- Articulation and enhanced credibility of an issuer’s sustainability strategy.</td>
<td>- Reputational risk if a bond’s green credentials are challenged.</td>
</tr>
<tr>
<td>- Access to “economies of scale” as majority of issuance costs are in setting up the processes.</td>
<td>- External verification.</td>
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<tr>
<td></td>
<td>- Less financial flexibility in the use of the proceeds.</td>
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</table>

3.4 Risks

Investing in bonds is generally viewed as a lower risk compared with other types of investment, such as stocks. Bonds guarantee a fixed income stream through interest payments and the return of the principal payment at nominal value at maturity. The level of the risks is dependent on two factors: (1) the issuing entity – i.e. the default risk; and (2) whether it is an on-balance or an off-balance-sheet bond, where commercial and market risk are relevant. Corporate bonds typically yield higher returns than bonds issued by public entities because they are characterized by higher risks of defaulting on their financial obligations, whereas countries “can always raise taxes”. In contrast to this general rule, bonds issued by countries with unstable economies may be characterized by a higher risk premium compared with corporate bonds issued by financially solid private sector issuers. In February 2016, Moody’s (2016a, 2016c), for example,
rated the two Brazilian companies BRF and Fibria at Ba1, which was one grade higher than the Brazilian government credit rating of Ba2 at the time.

**TABLE 9: RISKS ASSOCIATED WITH FOREST BONDS**

<table>
<thead>
<tr>
<th>General definition</th>
<th>Forest Bond specific risks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commercial risk</strong></td>
<td>- Natural hazard risk is the risk of commercial failure of an enterprise due to natural events (e.g. fires or diseases).</td>
</tr>
<tr>
<td></td>
<td>- Political risk is the risk of commercial failure due to action by the government where a forest investment is made. This can include expropriation of assets, cancellation of concessions, etc.</td>
</tr>
<tr>
<td><strong>Market risk</strong></td>
<td>- Ecosystem market risk is the risk that either the demand or price in markets for ecosystem goods and services (e.g. certified timber) will be lower than expected.</td>
</tr>
<tr>
<td></td>
<td>- Regulatory risk is the risk that governments will not implement the appropriate legislation to establish or support direct and indirect markets for forest-based ecosystem goods and services.</td>
</tr>
<tr>
<td><strong>Default risk</strong></td>
<td>- Not specific for a Forest Bond.</td>
</tr>
</tbody>
</table>

*Source: Cranford et al. (2011)*

The default risk is the primary risk for on-balance Green and Forest Bonds that bondholders assume; commercial and market risks, on the other hand, are relevant mainly to off-balance or project bonds. There is no difference regarding risk for an investor between “normal” public sector bonds (on the balance sheet) and Green and Forest Bonds. Furthermore, the default risk is independent of the investment’s characteristics as it depends only on the ability and willingness of the issuing entity to repay the bond. The ability to repay the bond is affected by the market and commercial risk, yet investors will most likely look at the overall credit-worthiness of the originator when making the investment decision. For project bonds (off the balance sheet) commercial and market risk are the primary risks, yet, as discussed previously, forest project bonds have thus far rarely been issued.

For an “off-balance-sheet bond” (e.g. a project bond) investors could anticipate commercial risk and demand insurance or guarantees against these risks. Forestry is an unfamiliar sector for many investors and therefore the perceived risk profile is high, as is the desire to insure against these risks. Insurance can

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37 It appears unlikely that investors would demand such a hedge for an “on-balance-sheet bond” since the overall solvency of the issuing entity is decisive.
cap large losses, increase overall financial certainty, and improve credit terms and thereby access to finance. Around 30% of all issued insurance is to attract investments to enterprises in new territories that may be perceived as high-risk-bearing (Pardus 2016). The typical risk coverage for forest companies includes events like fires, windstorms, or snow. Issues such as industrial action, malicious damage, and civil commotion can be covered, but pests, diseases and theft are typically not. In Brazil, 40% of the insured risk must stay in the local market and has to be covered by a Brazilian company (and not sold on the international reinsurance market; Pardus 2016).

The insurance of traditional risks (i.e. fire, floods, etc.) to projects financed through Forest Bond proceeds is not a necessary condition since the risk is reflected in the Bond’s price. Few forestry projects actually use insurance. Rather than purchase insurance per se, issuers can apply large discounts to the projected benefits or earnings of the project (Reddy, personal communication). For example, a project could claim only half of the projected revenue - the other 50% could be an upside gain if realized but not utilized in the pricing. The insurance costs will ultimately be reflected in the bond price and the question of whether to insure or not becomes a zero-sum game.

**Box 2: MIGA insurances in practice**

In 2013, the Multilateral Investment Guarantee Agency (MIGA) backed a World Bank and Santander Bank loan for the State of Sao Paulo for a transportation project. With MIGA’s credit enhancement, the cost of the commercial loan was lower and the tenure longer than Sao Paulo could have achieved on its own. World Bank Group (WBG) involvement allowed Banco Santander to book the risk of the transaction as World Bank/MIGA exposure rather than Sao Paulo or Brazil exposure, and helped preserve lines of credit for other operations in Brazil. MIGA, on the other hand, had an easier insurance process since the project had already gone through the World Bank due-diligence process, such as safeguard reviews (MIGA 2014).

In Nicaragua, MIGA backed an investment of USD 48.8 million in support of the Bamboo Plantation for up to 15 years against expropriation, war and civil disturbance. MIGA’s backing enabled the company to more than triple the original investment in Nicaragua and move forward with other international expansions. The possibility for MIGA to insure such Forest Bonds has existed only since late 2010. Before that, MIGA had insured equity investments and loans for timber and reforestation projects. MIGA is suited to insuring Forest Bonds because it has the financial scope to insure large amounts and for long periods of up to 15–20 years, matching the long-term nature of forest investments (EcoPlanet Bamboo 2015).

The MIGA of the World Bank Group can provide political risk insurance and credit enhancements, and can thereby offer insurance that other companies are not able to provide. MIGA can help investors by insuring eligible projects against losses relating to currency inconvertibility and transfer restriction, expropriation, war, terrorism, and civil disturbance, breach of contract and non-honoring of financial obligations. Moreover, MIGA can offer insurance with up to 15–20 years’ maturity, matching the long-term nature of forest investments. The guarantee volume can be up to USD 600 million for any single investment project with the option to use reinsurances for leveraging it up to the tenfold sum (Global Canopy Programme 2014). MIGA’s political leverage with host countries and a strong capital position provide it with an implied AA credit rating. The price for MIGA’s guarantee premiums is based on a calculation of both country and project risk. Fees average approximately 1% of the insured amount per year, but can be significantly lower or higher. An issuance of USD 10 billion would incur an annual fee of USD 100 million (MIGA 2016).
## Table 10: Challenges and Solutions Associated with Green Bonds

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Solution</th>
<th>Applies to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provision of a financially attractive product</td>
<td>No/hardly any price advantage</td>
<td>All issuers, especially those with lower credit rating</td>
</tr>
<tr>
<td></td>
<td>Complementary measure to increase attractiveness</td>
<td></td>
</tr>
<tr>
<td>Labeling costs for Green Bonds</td>
<td>Experience reduces transaction costs</td>
<td>All issuers, especially those with little or no experience</td>
</tr>
<tr>
<td>Lack of secure revenues and income streams</td>
<td>Mixture of different revenue sources, use on-balance-sheet structure (e.g., taxes, income from other activities) or a commitment-backed off-balance-sheet bond (such as the Global Alliance for Vaccines and Immunization (GAVI))</td>
<td>All issuers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off-balance-sheet bonds</td>
</tr>
<tr>
<td>Long gaps between investment and revenue</td>
<td>Rely on a mix of revenue sources or use on-balance-sheet structure</td>
<td>All issuers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off-balance-sheet bonds</td>
</tr>
<tr>
<td>Issuing bonds increases debt burden</td>
<td>Options to issue Green Bonds off balance sheet</td>
<td>All issuers</td>
</tr>
<tr>
<td>Low credit ratings for many forest countries</td>
<td>Guarantees from donors and/or MIGA</td>
<td>Public</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On-balance-sheet bonds</td>
</tr>
<tr>
<td>Political insecurities (e.g., land tenure challenges or violation of indigenous people’s rights)</td>
<td>Guarantees from donors and/or MIGA</td>
<td>All issuers, especially relevant for the public sector</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On- and off-balance-sheet bonds</td>
</tr>
<tr>
<td>Reallocation of proceeds to non-green projects</td>
<td>Earmarking and ring-fencing</td>
<td>On-balance-sheet bonds, especially relevant for the public sector</td>
</tr>
<tr>
<td>Stigmatization of forest project</td>
<td>Certification of sustainable forest use through FSC and/or voluntary impact monitoring</td>
<td>All issuers</td>
</tr>
<tr>
<td>Table 11: Typology of Green Bond Products and their Characteristics</td>
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<td></td>
</tr>
<tr>
<td><strong>Relevant for:</strong></td>
<td><strong>Revenue source</strong></td>
<td><strong>Risk</strong></td>
</tr>
<tr>
<td>On-balance-sheet bond (repaid from other income sources)</td>
<td>Public sector (e.g. federal governments, municipalities)</td>
<td>Non-forest (e.g. taxes, income from other company activities)</td>
</tr>
<tr>
<td></td>
<td>Private sector (e.g. multinationals)</td>
<td></td>
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<tr>
<td></td>
<td>Development banks (e.g. WBG, ADB, KfW)</td>
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<td></td>
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<tr>
<td>On-balance-sheet bond (revenue-backed bond)</td>
<td>Public sector (e.g. federal governments, municipalities)</td>
<td>Revenues are largely forest-based, but could be mixed</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td>Development banks (e.g. WBG, ADB, KfW)</td>
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</tr>
<tr>
<td>Debt-based off-balance-sheet bond (e.g. loans to landholders)</td>
<td>Public sector (e.g. federal governments, municipalities)</td>
<td>Forest-based, or at least forest-neutral, revenues</td>
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<td></td>
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<tr>
<td></td>
<td>Development banks (e.g. WBG, ADB, KfW)</td>
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<tr>
<td>Equity-based off-balance-sheet bond (e.g. backed by carbon credits or timber revenues)</td>
<td>Public sector (e.g. federal governments, municipalities)</td>
<td>Exclusively forest-based revenues</td>
</tr>
<tr>
<td></td>
<td>Private sector (e.g. multinationals)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Development banks (e.g. WBG, ADB, KfW)</td>
<td></td>
</tr>
<tr>
<td>Commitment backed off-balance-sheet bond (e.g. forest finance facility adopting the GAVI model)</td>
<td>Public sector (e.g. federal governments, municipalities)</td>
<td>Non-forest-based revenues</td>
</tr>
<tr>
<td></td>
<td>Development banks (e.g. WBG, ADB, KfW)</td>
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</tbody>
</table>
4. Use of Bonds to Finance Forest Sector Investments under NDC: Options and Limitations

Bonds are only one of several instruments available to public or private investors to realize investments in forestry. Taking account of the characteristics of bonds that were analyzed in section 3, investors undergo a selection process to identify the optimal financing instrument specific to their needs. Although different in its nuances, such a selection process as outlined in Figure 20 is largely analogous for public or private investors and the steps taken are also relatively independent of the targeted type of forest investments, such as conservation, productive forest management, or downstream processing.

**Figure 20: Decision Tree for Policymakers on Whether to Explore Using a Forest Bond**

1) Is there a (urgent) need for large-scale investment in forests?  
2) Are there sufficient resources available to finance that large-scale intervention?  
3) Is there currently capacity to absorb large-scale finance and make that intervention?  
4) Is there a reasonable expectation for mechanisms to be in place soon for paying back the bond?

*Source: Adapted from Cranford et al. (2011)*
Following the suggested selection criteria illustrates possible bottlenecks for using bonds for forest investments:

**Step 1: Is there an urgent need for large-scale intervention?**

**Public:** As discussed above, the public prioritization process for competing investments is a political process that is influenced by certain factors, such as immediate impact on economic growth and shared prosperity, which entails how many people are impacted by those investments and in what time span. Compared with other green investments, such as renewable energy, clean transport, or green housing, investments in forestry may be regarded as lower-tier development priorities, hence they will often have lower priority.

**Private:** A private investor would probably not even initiate this identification process if there were not already a conclusion — and decision — that an investment is needed and that funds needed to be raised.

**Step 2: Are there sufficient resources available to finance that large-scale intervention?**

**Public:** For public investments, resource availability is a complex question and, *inter alia*, again related to the competing investment priorities that were addressed in the first step. Governments rarely issue themed bonds but rather opt for general budget support. Similarly, financial commitments on bond issuances are met through the collection of taxes and other fees and revenue sources.

**Private:** When going through a process to identify suitable financing options, a private sector player has already concluded that additional resources are needed; hence the question of whether sufficient resources are needed is superfluous.

**Step 3: Is there currently capacity to absorb large-scale finance and to implement that intervention?**

**Public:** From an institutional perspective, for the specific case of NDC commitments, there must be a reality check to determine whether those commitments are indeed realistic — i.e. the associated expenditures. Institutional capacity is limited in many World Bank client countries. Disbursements at scale will not occur as the policy and implementation framework is not in place. However, whether such a criterion is explicitly evaluated or implicitly included in the public investment prioritization process of a country is beyond this analysis — i.e. further political economy analyses are required.

**Private:** For a private sector actor, the capacity of resource implementation is much simpler to address. Depending on the technical and financial size and nature of the anticipated investment, either existing capacity is sufficient or capacity needs to be increased — through hiring new staff, investing in technical capacity, or both.

**Step 4: Is there a reasonable expectation for mechanisms to be in place soon for repaying the bond?**

**Public:** For the public sector, this issue is related to the question of how much impact the investment would create for economic growth. It is therefore indirectly addressed in the first step of the financial instrument selection. The reasonable demonstration as to how associated revenue streams and employment would be created through a proposed forest investment — with impacts on tax and other revenues — is thus one of the most critical determinants for bond-based finance.

**Private:** Given that steps 1–3 are of less relevance for private sector actors, the structure of the anticipated revenue stream is the most important determinant of whether bonds should be used as a financing instrument. For plantation investments, the time lapse between the investment and the
revenue stream is critical. Only large-scale players that can cross-subsidize bond issuance can manage this forest-specific feature and provide adequate confidence to investors for making a bond issuance realistic. Bonds would be more feasible for wood-processing industries, such as pulp and paper – as soon as the investment is realized, revenue can be generated through the sale of wood products.

Looking at public and private sector investments combined, the reasonable expectation for mechanisms to be in place for paying back the bonds emerges as the most critical parameter for determining the suitability of bonds to finance forest investments. Taking account of the risk-related challenges associated with this criterion, as discussed in the previous section, this structural analysis explains why the share of Forest Bonds is currently limited. Only if this decisive bottleneck can be successfully addressed will the propensity to select bonds as a financing instrument for forest investments increase.

Another argument that favors the use of plain vanilla over Forest Bonds is that making forest investments through general budget allocations allows for a more flexible project selection than would be the case for a Green or Forest Bond. Commitments that have been made at the date of issuance of such a specific bond have to be met. It could, for example, become more feasible to intensify reforestation efforts in one specific region of the country and less so in other states, and thereby shift the focus of the investments in a way that is not congruent with the original bond strategy. In the event of tax income being too low, governments have the option to issue plain vanilla government bonds to address financing gaps. Only if there is a need – and reliable potential – for broadening the investor base would a Green or Forest Bond become a noteworthy option. The decision tree can help policymakers decide whether a bond is a desirable option at all.

Once a bond issuance is selected as the most suitable financing instrument, the financing structure and resource mobilization flows need to be designed. A bond can have various structures that will be determined by the generation of revenues, the institutional arrangements, the delivery of funds, and the risk. The question of how revenues are generated to repay the bond is crucial for investors and issuers alike. The funds for repaying the bond do not necessarily have to come from forest activities and could be, for example, tax revenue. A second important question is how finances are managed, and by whom. Depending whether the finance is managed by the government, a corporation, or an SPV, will influence the delivery of activities and the associated risk. The kind of activities that are financed through the bond depend largely on the institutional arrangement. Governments can, for example, finance monitoring systems while corporations are more likely to finance plantations. Finally, the risk and the risk premium depend mainly on the institutional arrangement because the default risk is the primary risk in all models and the reliability of revenue flows is only a secondary risk, as they can be offset by other income sources, such as taxes or revenues from other activities. Figure 21 presents a framework that summarizes these key features.
In the following sections, several bond-financing models will be used to exhibit different options of how bond issuance could be operationalized in support of forest investments. For this purpose, we first discuss the resource flow and risks of different bond frameworks, before elaborating in a second step the potential scenarios of the World Bank’s role to support the bond issuance. These stylized implementation arrangement models were differentiated between public and private sector investments with the aim of further contributing to understanding the practicalities of bond-based forest investments.

### 4.1 Public sector models

Public investments aim to benefit the economy at large. Hence, policymakers will allocate tax revenues according to the government’s priorities. Public investments can be in support of policy changes, governance enforcement, and other provision of public goods. They are not necessarily a physical entity from which a stream of revenues is directly generated. In that vein, public sector investment decisions should be theoretically targeted towards those yielding the highest social returns. On the other hand, public sector decisions may also be motivated by a political economy framework – e.g. favoring voter-positive outcomes that deviate from a socially optimal investment with the highest welfare gains.

Governments are in a privileged situation in that they can issue a bond that is backed solely by tax payments to fund forest activities, such as conservation measures, which do not provide an immediate financial return. Such an approach would follow the conventional example of bond issuances and would allow the government to tap into a new pool of investors who are looking for green investment opportunities. In this framework (Figure 22), the government issues a bond to (1) raise finance, and (2) fund forest activities. These could range from public afforestation investments, to support to smallholder forest activities, conservation measures, improving sector governance, to research and development. Furthermore, the government (3) collects taxes as is customary, and (4) uses tax revenues to repay the bond. This modality increases the country’s debt burden. Its success depends on the government’s credibility to use the funds for the forest activities it has advertised. A key feature of such a bond is that it is held on the balance sheet of the issuing government. As such, the primary risk to the bondholder is the creditworthiness of the government – i.e. its ability to collect, and willingness to use taxes to pay back the bond. In other words, investors will look at the default risk of the country as indicated by the country’s credit rating and not any specific, ring-fenced forest activity.
Using revenues generated from forest activities as a revenue source is very similar to a tax-backed bond in terms of risks and the general framework. In other sectors, governments have already issued similar revenue-backed bonds – e.g. to raise funds for toll roads. The main difference between this and the previous framework is that (2) revenue-generating forest activities are funded, and (3a) used to repay the bondholders. If these revenues fall short, however, the government will have to (3b) step in using tax revenues as a back-up because the bond is still on its balance sheet (see Figure 23). Therefore, the primary risk for the bondholders is still the government default risk. From the government’s perspective, this approach has the advantages of potentially using less tax money, and that parties benefiting from the forest activity pay for it. Earmarking the forest-based revenues can help increase confidence that there are specific revenues of a known scale available to pay back the bond.
Considering the frameworks examined, the role of the World Bank or other IFIs in supporting the issuance of a Green Bond can take a variety of forms. For this analysis, four stylized scenarios are selected. At this point, how revenues are generated and what kind of activities are financed are not relevant for the scenarios. Rather we are looking in detail into the institutional arrangement and the roles of the World Bank, governments or national development banks. The government’s economic performance and credit rating will determine the bond coupon. Any immediate cash return on these public sector investments is important only for the government’s internal selection process among investment alternatives, if at all. As stated previously, from an economic perspective, it would be expected that governments aim at investments with the highest social return on capital, but this may also be driven by the political motives defined by the political economy framework of the sector (see section 3.2).

A misunderstanding that frequently arises in global forest financing discussions is that the World Bank cannot issue any kind of bond on behalf of a country – either plain vanilla, Green, or Forest Bond. In fact, the World Bank issues Green Bonds on the basis that it matches proceeds with certified green investments. For a client country it makes no difference if projects are financed through Green Bonds or plain vanilla bonds as the conditions are the same (see section 3.4. above for further detail). The risk for the bondholders in this scenario would be the risk of the World Bank and not of the project or the country in which the forest activities are executed. Such a situation is depicted in Scenario 1 in Figure 24.

**Figure 24: Stylized public sector Green Bond-based forest financing models**

![Figure 24](image)

Source: Own elaboration

Similar to the first scenario, the World Bank can also advise a country issuing Green or Forest Bonds (Scenario 2). In this scenario, the government would issue a Forest Bond to fund forest activities and use tax revenues (or revenues it generates from forest activities) to repay bondholders. The World Bank – or other financial institutions – can provide advisory services regarding the specificities of the bond issuance process by relying on its own experience and other client countries’ experience in the issuance of Green Bonds. This model applies to IBRD countries that are perceived as sufficiently mature to issue their own
bonds since the risk of default is the main credit risk. The resources raised would then be invested in forest sector activities supporting the delivery of NDC objectives, which do not necessarily generate revenues.

In Scenarios 3 and 4, a national development bank, such as BNDES, would act as the issuing entity, with the government providing the enabling framework for Green or Forest Bond issuance. Again, as in Scenario 2, the World Bank or other financial institutions could provide advisory services. The important aspect in this scenario is that the government creates a supportive enabling environment for Green Bond issuance, which could address, for example, aspects of certification or other features specific to Green Bond issuances. The government could also enhance the investment framework for green investments so that the pool of investments that are eligible for certification would be increased and deliver against the Green Bond targets. The selection of feasible projects likely requires commensurate technical expertise within the respective local development bank. The World Bank could provide support to the selection process through technical assistance, such as establishing selection criteria. The main risk would be the default of the national development bank, which is linked to the government’s capacity and willingness to provide support, if needed. However, in the case of Brazil, federal government-owned banks have even lower credit ratings than those in the private sector due to the currently prevailing weaknesses in their operating environment (Fitch 2016).

Scenario 4 deviates from Scenario 3 insofar as it employs a different model for use of the bond-based resources. Instead of a direct interaction between the national development bank and the forest investment, the resources will be provided to one or several intermediaries. These could be regional development banks or other decentralized financial institutions, but also existing forest financing funds dedicated to providing financial resources for sustainable forestry to small landholders, for example, through subsidized credit lines. Such financial arrangements are especially important when NDC objectives require investments by many small landowners, either for re- and afforestation or the sustainable management of existing forests.

This approach is especially appealing where it provides capital to structurally disadvantaged regions that are targeted for NDC reforestation activities. Outgrower schemes are a nuanced model when active forest product value chains are associated with such investments. For Brazil, such intermediary programs could include among others ABC, FNE verde, or Bolsa Floresta. On a global scale, there is an increasing number of examples of financial incentive schemes for re- and afforestation and sustainable forest management targeting small land holders (Kapp 1999, Kraienhorst 1999, Mes and Tarazona 1999, Souter and Kapp 1999). Again, the risk that bondholders will consider is the default of the issuing national development bank and not the intermediary or the small landowners.

4.2 Private sector models

For a private sector company with a sustainable forestry portfolio, asset location, ownership and stability of related cash flows are the central considerations in the resource flow frameworks. The

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38 Outgrower schemes are binding arrangements through which a company (e.g. a pulp and paper producer) ensures its supply of forest products by individual or groups of farmers.
financial viability of sustainable natural growth forestry in Brazil exists in many places, but the failure of governments to restrict illegal logging, and to clarify and enforce land rights as well as the country’s infrastructure gap have detrimental effects on sustainable forestry investments. Lack of enforcement and the influx of illegally harvested timber into markets erodes the competitive position of legally, and most often more expansively produced timber. Likewise, disputes over land rights can be costly and take many years to be resolved, if ever.

The framework for a corporate Forest Bond is similar to that of a public revenue-backed Forest Bond. The main difference is that, as a back-up, the corporation has to rely on revenues from its operations instead of tax payments. In this framework (see Figure 25), the corporation issues a bond to (1) raise investments, and (2) use these to fund revenue-generating forest activities such as plantations. Moreover, (3a) the corporation collects the revenues from the forest activities and, since this bond is held on the balance sheet, the corporation will have to (3b) complement the revenue stream if necessary with income from other activities, in order to (4) repay the bondholders. Whether the revenues stem from forest activities or source, or even from non-sustainable activities, does not affect the green label as long as the activities financed through the bond comply with the GBP.

**Figure 25: Framework for a corporate revenue-backed Forest Bond**

The primary risk associated with a bond issuance by a private corporation differs from that associated with public sector bonds. While it is also the credit rating of the company that determines the coupon of the bond, this credit rating links the bond and the targeted investment more directly, especially the smaller and more homogeneous the private sector company (e.g. for companies focusing only on plantation management). In those cases, the generated financial (cash-flow) revenues from the investment and other activities of the company can play a vital role in attracting investors. It is likely that
in most contexts, the so-called “sovereign ceiling” applies, 39 which means that no firm is more creditworthy than its government, and hence the costs for a corporate to issue a Forest Bond are at least as high as for a government (Durbin and Ng 2005).

A Green Project Bond would represent an alternative to avoid the issuer’s default risk, by separating the project risk from the corporate risk. If a corporation decides to finance a forest project through a project bond, it would first (1) set up an SPV to keep the bond off the balance sheet and separate eligible assets from the other assets and liabilities of the project company. Investors would (2) purchase the bond from the SPV, which (3) uses these funds to finance forest activities, that will (4) generate revenues that can (5) be used to repay the bondholder. Within this framework, investors are directly exposed to commercial and market risk as the default risk of the project is intertwined with these two risks. The risks include fluctuations, regulatory risk, natural hazard risk and political risk, to name just a few.

**Figure 26: Framework for a Corporate Forest Project Bond**

![Diagram](source: Own elaboration)

A cost-reduction strategy in these corporate frameworks is to pool natural forest management with plantation forestry to create a blended portfolio of assets to mitigate some of the commercial and market risks. While natural forest management offers high returns at high risks, plantations offer a high degree of consistency and predictable cash flows. From a commercial standpoint, these assets are less risky, and are generally more attractive for lenders than the management of natural forests. Different cash flows within the portfolio could flow to different tranches of the structure of a project bond. More predictable revenues, such as those from plantations, would be assigned to the senior note, while less certain revenues such as natural growth would flow into junior notes.

The scenarios for private sector Forest Bond issuance and the roles of the World Bank and other financial institutions are similar to the public sector and build on the previously presented resource flows. In the simplest scenario, the IFC, as the World Bank’s private sector arm, would issue Green Bonds

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39 As discussed previously, Brazil has seen instances where the “sovereign ceiling” did not apply; however, this could easily change in the future.
(based on criteria as defined in the Green Bonds issuance) and make the raised resources available to private companies investing in green projects, which in turn would use the generated revenues to repay the IFC. The primary risk for bondholders would be the default of the IFC. As for the public model, the financial terms of the transaction would be no different than for other IFC transactions and, very likely, without any price advantage despite the IFC’s AAA credit rating. In Scenario 2, the IFC could act as an advisory service provider to a company that aims at issuing Green Bonds on the financial market. The risk premium would depend on the corporate or project credit rating.

**Scenario 3** represents a mix of the public and private sector approach, as a national development bank issues the bond and uses the resources raised in support of private sector forest investments, such as small and medium-sized enterprises (SMEs) specializing in forestry. In contrast to larger forestry companies that can issue bonds on their own, SMEs and community groups need an intermediary financial institution to make use of these financing instruments. The IFC could provide advisory services to both the SME and the issuing entity. In this scenario, the default risk would apply to the national development bank and not to the corporation. Supporting forestry SMEs is likely the most effective way to promote pro-poor growth in the forestry sector. Private companies focusing mainly on wood processing could also support smallholders through outgrower schemes and, depending on the size of the company, could set up such a model through bonds without the help of an intermediary. By taking a proactive stance on ownership rights, local sustainable trade networks and payments for environmental services revenue, such a facility would help develop the potential market for loan providers by enhancing their knowledge of borrower assets.
The advisory service that the IFC and probably other development bank private sector entities could provide can be categorized as client risk management, anchor investments, and credit enhancement (see Figure 28). To reduce the risk of an issuance for a client, the IFC can offer hedging instruments directly to clients who do not have full access to hedging products, such as interest rate or cross-currency swaps. The IFC could also commit to subscribing to an issuance ahead of the public offering, which can be communicated to prospective investors in order to send a positive signal. This aspect is critical as it is likely to result in an over-subscription for the Green Bond, which, as discussed before, can lead to basis point reductions. This price correction, however, is then not an attribute of the green investment, but is due to the IFC’s pre-issuance subscription. Moreover, the IFC can provide a partial credit guarantee to improve the credit rating of an issuance for wider investor access and longer-term financing. Similar to the pre-issuance subscription, this move will motivate investors and could lead to over-subscription and basis points reductions that are not at all a result of the green nature of the bond issuance. This demonstrates that the analysis which suggests an average 16.7 basis points advantage for Green Bonds (see section 3.3) may even be too optimistic, as some of this advantage must be attributed to factors other than the green nature of the bond issuance.

**Figure 28: IFC Support Areas for Bonds Issuances by Private Entities**

1. **Client Risk Management Products**
   - **Product:** Managing Risk in FX and Rates through:
     - Interest Rate Swaps
     - Cross Currency Swaps
   - **What:** Hedges for bonds into fixed or floating rate, into local currency
   - **How:** IFC provides hedging instruments directly to clients who do not have full access to hedging products.

2. **Anchor Investment**
   - **Product:** Investment in:
     - Plain Vanilla Bonds
     - Green Bonds
     - Asset Backed / Structured Debt, etc.
   - **What:** Direct financing via purchase of a substantial portion of an issuance.
   - **How:** IFC commits to subscribe to an issuance ahead of the public offering, which can be communicated to prospective investors to send a positive signal.

3. **Credit Enhancement**
   - **Product:** Guarantee on:
     - Bonds
     - Asset Backed / Structured Debt
   - **What:** Partial guarantee of an issuance to improve the risk profile of the instrument.
   - **How:** IFC provides a partial credit guarantee to improve the credit rating of an issuance for wider investor access and longer term financing.

*Source: IFC (2016)*

### 4.3 Special financing mechanisms

The World Bank successfully used a commitment-backed method to raise funds for the GAVI vaccination program (GAVI 2016). The unique feature of this approach was to issue the bond against future donor pledges for the program. Thereby funds became available immediately, before the donors actually contributed their share. The future financial pledges are used to pay the bond’s yield and, eventually, redeem it. From the donor’s perspective, this approach did not constitute an additional liability in their current budget as its obligation is phased over time.

Following the example of the GAVI alliance, a commitment-backed Forest Bond could be used to raise funds on the capital market. The bond would be 1) issued by an independent and off-balance-sheet forest finance facility to 2) fund forest activities. 3) Revenues would be generated through commitments made by one or a group of donors and 4) used to pay back the bondholders. Since the revenue generation is
decoupled from the underlying forest investment, the financial means raised through this type of bond could be delivered to forest activities that do not have a financial return but that likely feature large social returns on a global level. The primary risk to bondholders will reside in the ability and willingness of countries that have backed the bond to honor their commitment – i.e. the default risk of the committed countries. The World Bank could serve in this framework as an advisor due to its experience with the GAVI alliance, and as a convener while also acting as a donor to the facility. Likewise, the governments of the targeted countries could make commitments to the facility.

**Figure 29: Framework for a forest finance facility**

While appealing in theory, a duplication of the GAVI approach for the forestry sector is unlikely for now: monitoring and attribution of results is more challenging and direct effects are not immediate. For vaccinations, cause–effect relationships are very clear. The resources raised through the bond pay the vaccine and other related expenses. The result is the immunization of a certain number of people against a disease. For forestry, the relationship is less clear as it involves multiple steps with significant transaction costs and the evaluation of success would be significantly more complex.

As has been shown, Green Bonds do not decrease the funding costs for issuers of a Forest Bond; however, price advantages could be attained through securitization. Securitization provides capital market investors with two key benefits (IFC 2007):

- **Structural preference:** The collection of assets included in a securitization have either performed well on a historical basis or are believed likely to do so in the future, so the default risk is low.

- **Legal preference:** While a conventional investor claim is subject to the bankruptcy procedures of the jurisdiction in question in the event of a default, an asset-backed investor will already have legal control of the assets securing their claim. Creating this legal preference – isolating the asset from any other claim – is the key to securitization, and requires the establishment of an SPV to hold the assets.

**However, Green or Forest Bonds do not offer any particular advantage in the process of securitization.** It might be even more difficult to create an attractive diversified portfolio with strictly green assets. From
an investor’s perspective, having a claim over a diversified portfolio is a significantly lower risk than a claim over an individual asset. In other words, investors are not interested in “putting all their eggs in one basket”. The diversification, for example, of a portfolio based exclusively on forestry projects in the Amazon would be very low, and thereby the risk and required interest rate would be expected to be high.

**Securitization works well with collections of relatively homogeneous but illiquid assets.** Once pooled and repackaged, incoming cash flow and other economic benefits from a pool can be sold as securities. The most common example of this is the pooling and repackaging of repayments on mortgages and car loans. The question of whether securitization could help to overcome the finance gap for the NDC needs to be answered. However, this would be a separate analysis that goes beyond the scope of this report.

**Table 12: Summary of the presented scenarios**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Potential activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public sector</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1. WBG issues a bond on behalf of a government</td>
<td><em>Not possible</em></td>
<td><em>Not possible</em></td>
<td><em>Not possible</em></td>
</tr>
<tr>
<td>2. Government issues bond and is advised by WBG</td>
<td>- Use of WBG’s experience and instruments &lt;br&gt; - Quality assurance &lt;br&gt; - Can finance activities that do not generate revenues</td>
<td>- Costs to contract WBG expertise &lt;br&gt; - Obligation to use proceeds as agreed</td>
<td>Afforestation, forest management, reforestation, improving forest governance, subsidized credit lines, research and development, etc.</td>
</tr>
<tr>
<td>3. National development bank issues bond and is advised by WBG</td>
<td>- Use of WBG’s experience and instruments &lt;br&gt; - Quality assurance</td>
<td>- Costs to contract WBG expertise &lt;br&gt; - Additional technical expertise within national development bank required &lt;br&gt; - National development bank credit rating is decisive</td>
<td>See above</td>
</tr>
<tr>
<td>4: National development bank issues bond to finance financial intermediary and is advised by WBG</td>
<td>- Use of WBG’s experience and instruments &lt;br&gt; - Quality assurance &lt;br&gt; - Provide finance to SME landowners &lt;br&gt; - (In Brazil) built on existing loan programs</td>
<td>- Costs to contract WBG expertise &lt;br&gt; - Additional technical expertise within national development bank required &lt;br&gt; - Large number of small loans might make due diligence criteria complex and costly</td>
<td>SME forestry</td>
</tr>
<tr>
<td>Scenario</td>
<td>Advantages</td>
<td>Disadvantages</td>
<td>Potential activities</td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
<td>--------------</td>
<td>---------------------</td>
</tr>
<tr>
<td><strong>Private sector</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1. IFC issues bond for private forest company | − Use of IFC experience and instruments  
− Quality assurance | − Same conditions as IFC loans | Forest plantations, natural forest management |
| 2. Company issues bond and is advised by IFC | − Use of IFC experience and instruments  
− Quality assurance | − Intensive due diligence to create an attractive portfolio  
− Exposure to national economic performance requires sufficient security over the portfolio assets  
− Large-scale plantations are most profitable but not very feasible in the Amazon | Forest plantations, natural forest management |
| 3. National development Bank issues bond and IFC advises the bank and SME | − Use of IFC experience and instruments  
− Quality assurance  
− Small-scale forestry is a very effective mechanism to eliminate poverty | − Same conditions as IFC loans  
− Large number of small loans might make due diligence criteria complex and costly | Forest plantations, natural forest management, subsidized credit lines |
| **Special financing facility** | | | |
| 1. Bonds are issued against future donor pledges | − No additional liability in donors’ budget  
− Commitments can be phased over time  
− Credit rating might be high (depending on donor rating) | − High coordination cost  
− Pledges for countries for low credit rating are less likely  
− Cause–effect relationships are not very clear and potentially unattractive for donors | Afforestation, forest management, reforestation, improving forest governance, subsidized credit lines, research and development, etc. |
5. Conclusions

The expectation that the significant financing needs for land restoration and reforestation under NDCs may be met by Green, or more specifically Forest Bonds is unlikely to be fulfilled. This report has exposed important limitations, but also misconceptions, associated with bonds as a forest financing tool, resulting in an overall sobering picture. Although the Green, Climate, and Forest Bonds market has grown exponentially in recent years, the agriculture and forest sectors amount to less than 3% of all Green Bonds. While there is no doubt that the volume of Green Bonds will continue to grow, the potential for bonds-based forest sector financing are likely to be limited due to the current structure of the bond market and the attributes of Green Bonds financing. Even for general Green Bonds, it is not yet clear whether the financial benefits resulting from the current over-demand can eventually off-set transaction costs entailed in Green Bonds issuances, such as second opinion and financial flow monitoring. A broader or more diversified investor base and a better marketing potential appear to be the most tangible advantages of a Green Bond over a plain vanilla bond.

Sectors such as renewable energy, green transport, or sustainable housing appear better suited for employing Green Bonds as a financing tool. In contrast, the specific needs of forestry investments do not align well with the attributes and financing requisites of bonds, including Green Bonds. This mismatch relates predominantly to the underlying forest financing challenge of facing a significant time lapse between the initial investments and the resulting income stream, which is emblematic of forest investments. As discussed, the tenure of a Green Bond is, on average, shorter than for an unlabeled Green Bond (or average bond more generally). Furthermore, most bonds require annual or semi-annual coupon payments directly after issuance. This demands a near immediate income stream, combined with the need to repay the principal at a shorter maturity. Considering the lengthy time lapse between investment and eventual revenue streams, this is especially challenging for forest sector investments.

Although some bond-based financing structures, such as zero-coupon bonds, are theoretically suited to mitigating the forest-investment-specific financing challenges, the report’s market analysis did not suggest that such structures are employed in the forest sector. Moreover, it is likely that other attributes specific to forestry continue to form a major disincentive for motivating such finance. For example, the time lapse impediment of forest investments is further magnified by the fact that average credit ratings for Forest Bonds tend to be lower than for average Green Bonds, resulting in higher coupons payments that reflect the risk profile of forest investments. Compared with other sectors, the lower investment volumes, investment scope, spatial and stakeholder heterogeneity, and the lack of secured and immediate income streams are secondary but equally important differences that disadvantage the forest sector. This may explain why, so far, most of the innovative bond issuances in the Green Bond market, such as zero-coupon bonds, were undertaken by international finance institutions, especially the World Bank. However, as discussed in the analysis, here the bond issuance is not related to a specific investment, but serves to finance a resource pool of the IFI’s green investments. Even here, many of the issuances had an exploratory character and were relatively small in volume, and the suitability for further mainstreaming and scaling remains to be seen.

The objective disadvantage of forest financing attributes for using bonds as a financing instrument is further increased by the investors’ subjective preferences for other sectors. Land tenure challenges, possible interference with indigenous people’s rights, or the perceived destruction of forests due to timber extraction are just a few examples of the sector’s reputational challenges. Consequently, forest investments are often unfavorably judged as regards their green, climate, or sustainability attributes,
especially when logging and other productive uses of forests are involved. Even third-party sustainable management certification may be insufficient to allay these concerns.

From an environmental impact point of view, a secondary effect of the observed investor preferences could be that due to a rather “soft” interpretation of “greenness”, Green Bonds will become increasingly mainstream, with their incremental environmental impact uncertain. This concern is further amplified by the current lack of transparent and widely accepted global standards, as well as the absence of clearly defined environmental impact benchmarking for regulating the certification of green investments in the matching process with the resources raised by a Green Bond. What kind of effect this situation has on financing bond-based forest investments remains unclear.

The broader global discussion on deforestation is still commonly (although casually) associated with timber extraction and the productive use of forests. This preconception makes it doubtful that productive forest management – i.e. the sustainable extraction of timber and other wood and non-wood products – would necessarily benefit from an elevated regulatory framework, better benchmarking of green impacts, or independent third-party sustainability certification. With the dominant concern of global forest loss and an unfavorable political economy around the productive use of forests, the opportunities associated with such uses to meet low-carbon growth objectives and to provide value chains for incentivizing investments into re- and afforestation remain either largely unnoticed or are perceived as having too many risks and challenges.

Although the disadvantages of using bonds for forest finance apply to public and private sector investments alike, the constraints on public sector financing are of primary concern when discussing financing needs under NDCs. The principal reason is that NDC commitments are public commitments and are not directly linked to private sector interests. Although it is widely acknowledged that a combination of public and private sector investments is needed to meet NDC targets, it is the public sector’s primary responsibility to provide an enabling framework of policies that incentivize private sector investments, including the facilitation of the use of bonds as a possible financing instrument for such investments.

Forest Bonds must meet market expectations for returns regardless of whether issuances are made with the objective to meet forestry-related NDC investment needs or not. Some of the NDC activities, for example improved forest-monitoring systems, are unlikely to yield returns that are sufficiently high to compete with other green investments (e.g. renewable energies). For forest plantations the returns can be boosted through land leasing or using public lands because land costs are a considerable cost factor that can hereby be avoided. However, this limits the potential of using the land and its appreciation as collateral. In 2010, the IRR for plantation investments in Brazil without land costs (i.e. existing landowners) ranged from 17% to 23%, and for investments including land costs, the return ranged between 9% and 12% (Cubbage et al. 2007).

In contrast to the demand on the public sector for taking the lead role in these investments, the uneven economic performance of most forest countries and the competition for scarce public finances by other sectors and development priorities create an additional constraint on the governments of forest-rich countries. As the analysis demonstrated, many forest-rich countries are confronted with unfavorable credit ratings resulting in high bond coupons and high costs of public investments. This fiscal constraint, coupled with a high demand for basic infrastructure related to energy, transport and housing, provides for conditions where a government integrates green investments more easily into countries’ broader development agenda and economic growth strategy, hence favoring these sectors over forestry. As green infrastructure investments generate co-benefits, including many environmental benefits and the delivery
against low-carbon development objectives as well as NDC targets, public perceptions of such prioritization outcomes will likely be favorable.

Many forest-rich developing countries also experience significant institutional constraints that stand in the way of efficiently disbursing public funds for NDC-linked forest programs – even if the constraints regarding instruments and perception were absent. This situation further elicits decision-makers to allocate public funds to sectors where there is an investment gap but elevated institutional capacity, together with the promise of higher political returns such as conceivably would be the case for infrastructure.

Reflecting on these constraints in the context of forest-related NDC targets, governments would have to prioritize those forest sector investments that yield high economic returns and stimulate a high degree of private investment. Most likely, those would not be direct investments in forestry activities, such as re- and afforestation. The focus would be on investments that indirectly impact the forestry sector, especially those that have the potential for creating multiplier effects in terms of crowding-in additional financing. Independent of whether resulting financing is mobilized from abroad as foreign direct investments or originates domestically, such measures could also have a positive impact on the use of bonds for forest financing as investors might respond to more favorable investment conditions.

Countries can choose from multiple options for stimulating increased investments in the forestry sector, especially bonds-based forest finance, which can be clustered into five broad groups: (i) improving forest sector governance; (ii) enhancing the regulatory framework determining the use of bonds for forest investments; (iii) enhancing the financial incentives for investments into forestry; (iv) stimulating demand for forest products, especially wood and timber; and (v) providing incentives to smallholders for forest investments, especially as regards re- and afforestation. It is unlikely that addressing only one of these topics will yield the expected results. Contingent on country conditions, only a mix of policy interventions from these groups would stimulate NDC-related forest investments, while also creating the desired co-benefits for economic development. As many analyses have pointed out in the past, forest governance and tenure reforms would need to be given highest priority, especially for incentivizing private sector investments. However, while governance reforms are a necessary condition, they are not sufficient, as only the rigorous enforcement of such governance frameworks will have the desired effects.

To scale up private sector forest investments, one challenge identified by the analysis in need of immediate attention is that bonds-based forest finance to date suits only the financial capacities of larger companies and institutional investors. In contrast, and contingent on prevailing forest and land tenure regimes, the private sector can comprise a rather heterogeneous group of actors ranging from large-scale forest companies to community-based forest enterprises, to smallholder investors. Each of these actors responds to different, though related, incentive frameworks. Given that the broad financing terms for Green and Forest Bonds are not very different from general bond issuances, further innovation is needed to make bonds-based finance suitable for the wide range of medium- and small-scale stakeholders and potential investors.

As investors seem to disfavor investing in bonds that support investments in productive forest management due to a perceived reputational risk, one option for governments to stimulate investments in forestry may be through complementary measures that target a mitigation of these risks and stimulate the demand for forest products. Those complementary measures could range from facilitating a framework for transparent third-party certification to increasing the demand for wood through public procurement policies. Other sectors, especially agriculture, may provide additional models
for stimulating demand for forest commodities, especially from smallholders. Secure demand coupled with reliable price levels and, hence, revenue streams could be important for driving forest investments, especially for mitigating the investment risk resulting from the lack of immediate revenue streams after the initial investments. This could not only motivate smallholder investors, but may also facilitate the use of innovative bonds structures, such as zero-coupon bonds, that have not been utilized to date.

Even though the country context that determines the suitability of bonds as a financing instrument for forest investments may vary, several implications for the country case of Brazil can be identified. First, the current economic environment makes it difficult for Brazil to increase public debt. Second, pressing investment needs in sectors other than forestry reduce the importance of issuing Green and Forest Bonds for forest financing to meet NDC financing needs. In this situation, public sector investments should target leveraging private sector investments by enhancing the overall incentive framework for such investments. Potential activities could range from targeting illegal logging that undercuts prices of legally and sustainably produced timber, to incentivizing smallholder approaches to re- and afforestation. Investing in targeted research to buttress such reform efforts may yield the multiplier effects for private sector investments that are needed to meet NDC investment targets.

The following themes, while not particularly costly, do need to be researched or supported to further the Forest Bonds agenda in Brazil.

- Innovative approaches to securitizing bonds based on standing timber volumes from natural forest concessions, purchase agreements with international development banks for carbon; “Performance-based Payments” for reduced-impact logging or reduced deforestation; and aggregation models of small operators via associations which scale up less-traditional assets.
- Production and processing of lesser-known timber species and non-timber forest products to increase revenues and efficiency of operations.
- Incentives for project-specific bonds based on productive activities with reliable revenue streams, flexible tenures, variable rates, and less traditional sources of revenue.
- Incentive programs based on reduced costs to producers (rather than subsidies) to promote long-term investment in forest-friendly sectors rather than in activities with a shorter payback period and negative environmental impacts.
- Incentives to high-quality underwriters with strong credit-worthiness to achieve high bond ratings.
- Local agencies to offer second opinions on the use of proceeds and general allocation process by Forest Bonds to reduce costs (but linked to international agencies to ensure global credibility).

Further recommendations aiming to improve the overall environment with a view to accomplishing the country’s NDC targets may be found in the World Bank report “Brazil’s INDC Restoration and Reforestation Target” (World Bank 2016a).

Current constraints notwithstanding, there are promising areas for enhancing the incentive framework for this finance instrument through further innovation. For example, bond issuances related to carbon finance may be promising, although aspects such as carbon tenure and carbon pricing remain critical issues. Some recently tested forest carbon-based financing models, such as Debt for Climate Swaps, Environmental Policy Performance Bonds, or Debt for Climate Policy Performance Swaps, are still small in scale and have not yet moved beyond the pilot stage. The underlying structures of these financing
instruments, and the options for scaling-up, are yet to be analyzed. In addition, guarantees provided by national development banks could serve to mitigate some of the risk associated with forest investments. However, such guarantees are also employed in other green and climate finance models, with the risk of triggering competition with other sectors and other development priorities.

From an investor’s perspective, unenhanced bonds will not provide a solution, as they are simply a vehicle for capital in search of stable and secure returns, while offering no advantages to issuing governments in terms of the financing cost. Hence, attention must be paid to the role that the government and international donors can play in improving the risk–return profile of the bond structures. For bonds to increase the flows of finance to forest restoration and protection, they must be at least as attractive to investors as Green Bonds of other, competing sectors. Given their fiduciary responsibility, the majority of institutional bond investors will require some form of enhancement for investments with sub-commercial returns, taking into account the risks associated with a developing country setting. This means that the financing structure must incorporate public grant funding and cater sufficiently to risks.

A true breakthrough in bond-based forest finance, will depend on the identification and successful design of concrete and bankable solutions that integrate international support into bond structures to achieve both scale and efficiency. The ultimate aim of such bond structures would be to provide governments and the private sector with access to lower-cost capital than they currently obtain from capital markets. This in turn will enable the expansion of credit for forest investments that deliver against NDC targets, while leveraging available international support such as through REDD+, climate finance or development assistance – achieving more investment and greater GHG reductions per dollar granted. An analysis of how this might be achieved is the focus of a complementary report on this topic.
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### Annex A  Comparison of Approaches to Defining Green Bonds

<table>
<thead>
<tr>
<th>Establishing institutions</th>
<th>Green Bond Principles*</th>
<th>Climate Bond standards (CBI)</th>
<th>Green Bond indices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group of large financial institutions.</td>
<td>The CBI, an international investor-focused not-for-profit organization.</td>
<td>Each index is run by a bank or credit rating agency.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristics of the criteria</th>
<th>GBP explicitly do not attempt to provide a definition of what constitutes “green”. Instead, they are designed to provide issuers with guidance on the key components involved:</th>
<th>A standard that issuers can have their Green Bond certified to. The standards define what is considered “green” and the technology specifications for certain types of climate-related projects. Standards for agriculture/forestry projects are currently being developed.</th>
<th>Each index has different requirements for eligible Green Bonds. For example, Barclays/MSCI excludes large-scale hydro projects and corporate energy efficiency projects, despite these being labeled green by some issuers and considered green by some investors. There are a growing number of Green Bond indices launched by investment banks or credit rating agencies including: Barclays/MSCI, Standard &amp; Poor’s/Dow Jones, Bank of America and Merrill Lynch.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of proceeds: define and disclose criteria for what is considered “green” and funded through the bond.</td>
<td>Use of proceeds: define and disclose criteria for what is considered “green” and funded through the bond.</td>
<td>Use of proceeds: define and disclose criteria for what is considered “green” and funded through the bond.</td>
<td></td>
</tr>
<tr>
<td>Project evaluation and selection: define process to apply “green” criteria to select specific activities.</td>
<td>Project evaluation and selection: define process to apply “green” criteria to select specific activities.</td>
<td>Project evaluation and selection: define process to apply “green” criteria to select specific activities.</td>
<td></td>
</tr>
<tr>
<td>Management of proceeds: define processes and controls to ensure funds are used only for specified “green” activities.</td>
<td>Management of proceeds: define processes and controls to ensure funds are used only for specified “green” activities.</td>
<td>Management of proceeds: define processes and controls to ensure funds are used only for specified “green” activities.</td>
<td></td>
</tr>
<tr>
<td>Reporting: evaluation against both environmental and financing criteria.</td>
<td>Reporting: evaluation against both environmental and financing criteria.</td>
<td>Reporting: evaluation against both environmental and financing criteria.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voluntary?</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third-party verification?</td>
<td>Recommended</td>
<td>Yes</td>
<td>Varies by index</td>
</tr>
</tbody>
</table>

* Source: KPMG 2015

* The Green Bond issuance process includes early screening to identify potential environmental or social impacts and designing actions to mitigate impacts. The project’s progress, outcomes and impacts are monitored by the government and the World Bank throughout the implementation phase.
# Annex B  List of Forest-related Bond Issuances

<table>
<thead>
<tr>
<th>No.</th>
<th>Year</th>
<th>Company</th>
<th>Core business</th>
<th>Country</th>
<th>Volume (local currency, million)</th>
<th>Volume (USD million)</th>
<th>Use</th>
<th>Tenure (years)</th>
<th>Coupon rate</th>
<th>Nature of rate</th>
<th>Credit rating</th>
<th>Bond purchasers</th>
<th>Climate-aligned bond</th>
<th>Guarantee</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2014</td>
<td>Sveaskog AB</td>
<td>Forestry, saw-logs, pulpwod, biofuel</td>
<td>Sweden</td>
<td>SEK 300 SEK 700</td>
<td>36.8 85.9</td>
<td>General business</td>
<td>5</td>
<td>STIBOR +1.20%</td>
<td>Floating annual</td>
<td>A-</td>
<td>Institutional investors</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2014</td>
<td>Svenska Cellulosa AB</td>
<td>Hygiene and forest products</td>
<td>Sweden</td>
<td>SEK 1,000 SEK 500</td>
<td>122.7 61.4</td>
<td>Forestry and energy</td>
<td>5</td>
<td>STIBOR +0.68%</td>
<td>Floating annual</td>
<td>Baa1/ A-</td>
<td>Oversubscribed (by 50%); 30 investors</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2015</td>
<td>Sumitomo Forestry</td>
<td>Housing and wood products</td>
<td>Japan</td>
<td>JPY 20,000</td>
<td>182.2</td>
<td>General business</td>
<td>3</td>
<td>Zero-coupon</td>
<td>Annual</td>
<td>A/a-1</td>
<td>Unknown</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>2014</td>
<td>Estover Energy</td>
<td>Sustainable energy</td>
<td>UK</td>
<td>GBP 48.5</td>
<td>68.5</td>
<td>Forestry &amp; energy</td>
<td>12</td>
<td>Unknown</td>
<td>Limited audience due to a lack of rating</td>
<td>-</td>
<td>Infrastructure</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>2015</td>
<td>Millar West. Forest Products</td>
<td>Lumber and pulp</td>
<td>Canada</td>
<td>USD 210</td>
<td>210</td>
<td>Forestry</td>
<td>6</td>
<td>8.50%</td>
<td>Annual</td>
<td>Caa1</td>
<td>Unknown</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>2015</td>
<td>BRF S.A.</td>
<td>Food</td>
<td>Brazil</td>
<td>EUR 500</td>
<td>570</td>
<td>Energy, forestry, manufacturing, general</td>
<td>7</td>
<td>2.75%</td>
<td>Annual</td>
<td>Ba1</td>
<td>Sustainability-oriented investors</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>2014</td>
<td>Klabin</td>
<td>Paper</td>
<td>Brazil</td>
<td>USD 500</td>
<td>500</td>
<td>General</td>
<td>10</td>
<td>5.25%</td>
<td>Semi-annual</td>
<td>BBB-</td>
<td>Unknown</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>2014</td>
<td>Fibria</td>
<td>Pulp and paper</td>
<td>Brazil</td>
<td>USD 600</td>
<td>600</td>
<td>General</td>
<td>10</td>
<td>5.25%</td>
<td>Annual</td>
<td>Ba1/ BBB-</td>
<td>Unknown</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>2015</td>
<td>Fibria</td>
<td>Pulp and paper</td>
<td>Brazil</td>
<td>BRL 675</td>
<td>186</td>
<td>Forestry and manufacturing</td>
<td>6</td>
<td>14.11%4</td>
<td>Annual</td>
<td>Ba1/ BBB-</td>
<td>Unknown</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2000</td>
<td>Sociedad Inversora Forestal (SIF)</td>
<td>Forestry</td>
<td>Chile</td>
<td>USD 13</td>
<td>13</td>
<td>Production forestry</td>
<td>10</td>
<td>8%</td>
<td>Annual</td>
<td>AA-</td>
<td>Unknown</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>2015</td>
<td>State of Hawaii</td>
<td>Public</td>
<td>US</td>
<td>USD 35</td>
<td>35</td>
<td>Habitat preservation</td>
<td>?</td>
<td>2–3.5%</td>
<td>Annual</td>
<td>Aa2</td>
<td>Unknown</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>2012</td>
<td>Tornator</td>
<td>Forestry</td>
<td>Finland</td>
<td>EUR 250</td>
<td>285</td>
<td>General Business</td>
<td>7</td>
<td>3.125%</td>
<td>Annual</td>
<td>Not rated</td>
<td>Unknown</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>2014</td>
<td>Altri</td>
<td>Pulp, paper and forests</td>
<td>Portugal</td>
<td>USD 140</td>
<td>140</td>
<td>Forestry</td>
<td>6</td>
<td>3%</td>
<td>Annual</td>
<td>Not rated</td>
<td>Unknown</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>2007</td>
<td>Celulose Beira Industria</td>
<td>Paper pulp, energy</td>
<td>Portugal</td>
<td>EUR 300 EUR 75 EUR 80</td>
<td>342 85.5 91.2</td>
<td>Forestry</td>
<td>5</td>
<td>3.75%</td>
<td>Annual</td>
<td>Not rated</td>
<td>Unknown</td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>

1. Use of funds for general business or specific projects related to the company’s core business.
3. Climate-aligned bond: Bonds that are aligned with climate change goals or meet certain environmental criteria.
4. Guarantee: Y indicates a guarantee by the government, whereas - indicates no guarantee.

Note: The table includes detailed information on various forest-related bond issuances across different countries and years, with columns for company, core business, country, volume, use, tenure, coupon rate, nature of rate, credit rating, bond purchasers, and climate-aligned bond, along with a guarantee indicator.
| No | Year | Company | Core business | Country       | Volume (local currency, million) | Volume (USD million) | Use         | Tenure (years) | Coupon rate | Nature of rate | Credit rating | Bond purchasers | Climate-aligned bond | Guarantee |
|----|------|---------|---------------|---------------|------------------|---------------------|-------------|---------------|--------------|-------------|----------------|---------------|-------------------|---------------------|-----------|
| 15 | 2008 | Forestal Oriental SA | Forestry | Uruguay | USD 35  | 35 | Forestry | 10 | 7% | Annual | A | Unknown | Y |  
| 20 | 2008 2010 | Tamil Nadu Newsprint & Papers Ltd | Paper | India | INR 1,000  INR 500 | 14.6  7.3 | Forestry | 7 5 | 11% 8.75% | Annual | A | Unknown | Y |  
| 17 | 2011 | Planting Empowerment | Social Forestry | Panama | USD 1 | 1 | Forestry | 8 | Zero-coupon\(^3\) | Lump sum | Not rated | Unknown | - | - |
| 18 | 2011 | EcoPlanet Bamboo Group | Non-timber Bamboo | Nicaragua | USD 12 | 12 | Forestry | 15 | 9-11.4%\(^4\) | Annual | Not rated | Unknown | - | MIGA |
| 19 | 2014 | Martha’s Vineyard Land Bank | Public | US | USD 35  | 35 | Habitat Preservation | 5-20 | 3%, 4% and 5% | Annual | AA | Unknown | Y | BAM Insurance |
| 20 | 2013 2014 | Massachusetts Public | US | | 100 million USD | 100 | Habitat Preservation, Energy, Water | 20 | 3.75% - 5.00% | Annual | AA+/Aa1 | 30% oversubscription institutional investors | 300% oversubscription retail investors | - | - |
| 22 | 1996 | Precious Woods | Forestry | Brazil | USD 71.2\(^7\) | 71.2 | Forestry | - | Stocks | - | Not rated | Unknown | - | |
| 24 | 2006 | TimberStar | Forestry | US | USD 800  | 800 | Forestry | - | Asset-backed securities | - | Aa1 | Unknown | - | - |
| 25 | 2006 | Phaunos Timber Fund | Forestry | US, Brazil, Uru, Chi, E.Africa | USD 278  | 278 | Forestry | - | Timber investment fund | - | Not rated | Unknown | - | - |
| 26 | 2006 | Lignum fund | Forestry | Chile | USD 34  | 34 | Forestry | - | Timber investment fund | - | Not rated | Unknown | - | - |

Notes: 1 Exchange rate as of March 2016. 2 Coupon rate is based on the original local currency. 3 According to CBI. 4 99% of CDI (Interbank Deposit rate) currently at 14.25%. 5 8% annual interest rate paid at the end of the eight-year period. 6 Based on the information that a 15-year investment will increase by 380–500% over 15 years depending on the amount invested. 7 Total company assets at 31 December 2015.
### Summary of Review'd Bonds and Financial Instruments

<table>
<thead>
<tr>
<th>Company</th>
<th>Bond details</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sveaskog AB</td>
<td>Finance general operations, but more than 90% of revenues are derived from operations that have a clearly positive environmental impact (First pure-play Green Bond).</td>
<td>Sveaskog (2014); Handelsbanken Research (2015)</td>
</tr>
<tr>
<td>Svenska Cellulosa AB</td>
<td>Europe’s largest private forest owner. Fiber from own forest accounts for 50% of the group’s total wood supply.</td>
<td>Svenska (2014); CBI (2014a); SCA (2015)</td>
</tr>
<tr>
<td>Sumitomo Forestry</td>
<td>To pay back first series of unsecured corporate bonds, invest in wood construction material and other businesses.</td>
<td>CBI (2015); Reuters (2015a)</td>
</tr>
<tr>
<td>Estover Energy</td>
<td>Speyside Biomass Power project where biomass used will be by-products from the local forest industry.</td>
<td>Environmental Finance (2015a)</td>
</tr>
<tr>
<td>BRF S.A.</td>
<td>Financed green projects such as energy efficiency, renewable energy, sustainable forests (development of eucalyptus plantations), GHG reduction, water management, packaging, raw material use reduction and waste management.</td>
<td>Deutsche Bank (2015); Sustainalytics (2015); Moody’s (2016a)</td>
</tr>
<tr>
<td>Klabin</td>
<td>Proceeds used to finance general company activities.</td>
<td>Klabin (2014), Standard &amp; Poor’s (2016)</td>
</tr>
<tr>
<td>Fibria</td>
<td>Portion of funds raised used to cover early redemptions of the Bond “Fibria 2021” (with 6.75% interest rate).</td>
<td>Fibria (2016); Moody’s (2016b)</td>
</tr>
<tr>
<td>Fibria</td>
<td>Financing of activities en Matto Gross de Sul: agribusiness, procurement of goods (inputs) and services (contractors) for upstream forestry, and capital expenditure for Horizon 2 new pulp production line.</td>
<td>Fibria (2016); Moody’s (2016a)</td>
</tr>
<tr>
<td>Sociedad Inversora Forestal (SIF)</td>
<td>Acquired 4,600 ha of standing forests and planted 3,100 ha of new forests. In November 2002, SIF issued a ten-year USD 13 million bond backed by the cash flows from these forestry assets.</td>
<td>IFC (2004); Pollak (2010)</td>
</tr>
<tr>
<td>State of Hawaii</td>
<td>Acquisition of the land to preserve natural habitat, recreational, research and educational values, and open space.</td>
<td>Environmental Finance (2015b); State of Hawaii (2016)</td>
</tr>
<tr>
<td>Tornator</td>
<td>Proceeds used for refinancing existing debt.</td>
<td>Tornator (2012)</td>
</tr>
<tr>
<td>Altri</td>
<td>Not further specified.</td>
<td>CBI (2016a)</td>
</tr>
<tr>
<td>Celulose Beira Ind.</td>
<td>Not further specified.</td>
<td>CBI (2016a)</td>
</tr>
<tr>
<td>Forestal Oriental SA</td>
<td>To generate long-term investment instruments compatible with long-term forestry activities.</td>
<td>CBI (2016a)</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>Not further specified.</td>
<td>CBI (2016a)</td>
</tr>
<tr>
<td>Planting Empowerment</td>
<td>Expand the number of ha under Planting Empowerment management from 20 (22,000 trees) to 120 ha (132,000). Previous offerings have successfully raised nearly USD 150,000 from over 50 investors.</td>
<td>Planting Empowerment (2012)</td>
</tr>
<tr>
<td>Company</td>
<td>Bond details</td>
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<td>---------------------------------</td>
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<tr>
<td>EcoPlanet Bamboo Group</td>
<td>Financing Bamboo plantations in Nicaragua; in 2012, became first carbon offset project to receive political risk insurance ($27 million) from MIGA</td>
<td>EcoPlanet Bamboo (2011); Sustainable Business (2011)</td>
</tr>
<tr>
<td>Martha’s Vineyard Land Bank</td>
<td>Acquisition of 190-acre property with unique aesthetic, agricultural, wildlife and recreational features. Bond issued against pledged revenues from Land Bank; &gt; 15 tranches with varying terms.</td>
<td>CBI (2014b)</td>
</tr>
<tr>
<td>State of Massachusetts</td>
<td>First US Municipal Green Bond issued in 2013; USD 669 million, tax-exempt, fixed-rate General Obligation Bond including USD 100 million Green Bonds with same credit rating as General Obligation Bonds. In 2014, a USD 350 million bond was issued to finance clean water, energy efficiency in state buildings, land acquisition, open space protection, environmental remediation, river revitalization and preservation, and habitat restoration.</td>
<td>Timbers (2015); Environmental Finance (2014b); WSJ Blog (2014)</td>
</tr>
</tbody>
</table>

### Other forest investment products

<table>
<thead>
<tr>
<th>Company</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Precious Woods</td>
<td>Had been operating in Amazonas State since 1996 running sustainable forestry on 506,699 ha on private and concessions. In 2008, the lack of legal and institutional frameworks in Pará State forced Precious Woods to give up its forestry operation. Land tenure, taxes and logging concession issues are still problem for Amazon operations.</td>
<td>Precious Woods (2015)</td>
</tr>
<tr>
<td>MagForestry (Eucalyptus Fibre Congo)</td>
<td>Eucalyptus Fibre Congo has exclusive concession agreement with government of the Republic of Congo which expires in 2076. The plantation concession covers 68,000 ha. MagForestry owns a wood chip plant to produce 2,000 tons of eucalyptus chips per day.</td>
<td>MagIndustries (2016); IFC (2007)</td>
</tr>
<tr>
<td>TimberStar</td>
<td>900,000 acres of timberlands located in Louisiana, Texas and Arkansas. In February 2008, iStar Financial sold the timberland to investor-clients of the Hancock Timber Resource Group for USD 1.7 billion, including the assumption of debt.</td>
<td>Moody's (2006)</td>
</tr>
<tr>
<td>Phaunos Timber Fund</td>
<td>Had investments in four different regions of the world. No single country represents &gt;40% of gross assets of the company and no continent &gt;60%.</td>
<td>Phaunos Timber (2016)</td>
</tr>
<tr>
<td>Lignum fund</td>
<td>Forestry fund with 20,000 ha of standing radiata pine trees and planting up to 30,000 ha of radiata pine and eucalyptus globulus under long-term land-use right agreements with small and medium landowners and farmers in Chile.</td>
<td>IFC (2004)</td>
</tr>
</tbody>
</table>