

UNDERSTANDING FOREST BONDS

A GUIDE TO RAISING UP-FRONT FINANCE FOR TROPICAL FORESTS

Produced by



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Global Canopy Programme

The Global Canopy Programme (GCP) is a small and dynamic tropical forest think tank based in Oxford, acting through our global networks of experts in science, policy, business, finance and forest communities. We gather their tropical forest intelligence to spark insight, convene research and design projects that can help leverage future large-scale systemic change, demonstrating the value of forests as natural capital and communicating it to the world.

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More on forest bonds

For those readers that are interested to learn more, particularly key steps to making a forest bond work, we recommend reading the report on *Unlocking Forest Bonds: A High-Level Workshop on Innovative Finance for Tropical Forests*. That report presents a more in-depth, technical view of the specific challenges and concerns of using bonds in the context of forest finance. Both *Understanding* and *Unlocking Forest Bonds*, as well as links to other relevant materials, can be found at:

www.globalcanopy.org/projects/understanding-forest-bonds

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FOREWORD

As the world navigates through an unprecedented financial crisis, the opportunity to transition to a fairer and greener economy is emerging. But to achieve that transition, what is misvalued needs to be properly valued, and we need to be more open to business as *un-usual*. It is starkly obvious that the costs of degrading natural capital, such as forests, are undervalued and unrepresented in the price of goods profitably made from ecosystem conversion. The new green economy should recognise the full value of forests, including all of its ecosystem services worth trillions of dollars, and push business to act more sustainably in relation to this vital natural capital.

A transition to a forest-friendly economy could cost upwards of tens of billions of dollars annually and is unlikely to be achieved without public sector leveraging of private sector finance. That is precisely where forest bonds can help. As part of a broad financial approach, forest bonds would tap into global capital markets to deliver up-front finance at the scale and with the urgency required to maintain forests and their ecosystem services before they are lost.

Predicating this intervention solely on a forest carbon market, which is yet to exist at the necessary scale, has so far stalled private sector interest in forest bonds. This could be overcome by taking a broader Proactive Investment in Natural Capital (PINC) approach to these bonds. PINC is a complementary approach to REDD+ that draws on sources of revenue beyond carbon markets. A PINC forest bond could be paid back, for example, by green commodity revenue streams, with carbon viewed not as the primary revenue stream, but as a potential future upside.

Such an approach is particularly useful to help finance more sustainable agriculture. Agribusiness is the fastest growing cause of deforestation globally. To save forests, we need to stop degradation at the forest frontier, move agricultural production onto restored land and increase agricultural efficiency. A bond with a PINC approach could be key to financing that transition.

Understanding Forest Bonds is the Global Canopy Programme's contribution to demystifying forest bonds and bridging the communication gap between policy-makers and the investment community. Different contexts call for different bonds, which this publication addresses. Whichever type is used, however, to be successful, the benefits to forests and forest communities must be absolutely ensured and the bond must be carefully designed

to ensure fair and equitable sharing of risks and rewards among all stakeholders.

As the Rio+20 Earth Summit approaches, defining a 'roadmap to a green economy' will be essential. Forest bonds should be on that map. They offer a giant opportunity to help finance a significant part of the transition to a new economy, where natural capital is valued alongside human and financial capital, and is not simply plundered at will.



Andrew W. Mitchell
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Global Canopy Programme

EXECUTIVE SUMMARY

Why do we need to frontload forest finance?

Every year around 13 million hectares of forest around the world are cleared (FAO, 2010) for purposes such as crop cultivation, pastures, logging and mining. Although the rate of loss has declined in some countries in recent years, the global deforestation rate is still “alarmingly high” and it remains particularly high in the world’s main tropical forest regions (FAO, 2010). As forests are degraded, so are the ecosystem services they provide to humanity. These services are valued in the order of USD trillions per year (TEEB, 2009) for their role in underpinning livelihoods and supporting climate, food, energy and water security across the globe.

Conserving forests for the benefit of both current and future generations requires significant up-front investment. It requires investment:

- 1 To plan, including undertaking consultations and developing policies;
- 2 To strengthen institutions, such as land tenure and forest governance; and
- 3 To monitor, report and verify that forest conservation has actually taken place.

All the while, incentives that drive deforestation must decline and sustainable livelihoods must become more accessible and prosperous for current and future generations.

It is estimated that to do all of this and halve the rate of deforestation by 2020, investment in the conservation and sustainable use of forests will have to increase from less than USD 10 billion *total* that has been pledged now, to approximately USD 30 billion *annually* by 2020 (Commission on Climate and Tropical Forests, 2010). A number of mechanisms exist to generate the needed funding, such as increasing the market share of forest-friendly agricultural products, implementing green fiscal reform, and increasing the use of ecosystem service markets (see Parker and Cranford, 2010), but it will take time to implement these mechanisms at the scale needed. Forest bonds offer an opportunity to raise the needed large-scale finance for forests, and to raise it now.

What is a forest bond?

Public or private institutions that need to raise large-

scale, up-front finance often do so by selling bonds in to the global bond markets worth nearly USD 100 trillion. A bond is a tradable financial security representing a promise that the organisation that sold it will pay whomever holds the security a pre-specified interest payment at defined intervals over the bond’s lifetime, and also pay the full face value of the bond upon maturity. The amount raised by selling the bond will be the amount investors are willing to pay based on the interest and face value payments that are being promised. Essentially, selling a bond is a way to borrow large amounts of finance from the global financial markets.

Bonds are a familiar financing mechanism in sectors such as water, energy, development and even health. Climate bonds have seen increasing use in recent years to finance investments in climate change mitigation and adaptation, and in some cases forest projects have been included in the portfolio of investments underlying climate bonds. Considering the nature of the financing needs described above, however, bonds specifically dedicated to forest investment, i.e. *forest bonds*, could also be a key component of a strategy to sustain the world’s forests.

Who would invest in a forest bond?

Two particular types of investors have been identified that may be interested in a forest bond. The first type is impact investors who, when comparing a forest bond to a normal corporate or government bond, are willing to take a slightly lower return on investment and compromise on other financial qualities of the bond as long as the environmental and social benefits are absolutely assured. The second type of investor is institutional investors, who control the majority of funds invested in global bond markets. These investors would not compromise on the financial aspects of the bond, but would be very attracted to a forest bond if it could be structured to suit their needs.

How would a forest bond work?

As with any bond, in return for borrowing money from global bond markets, the issuer must pay back a pre-specified amount of interest plus the face value of the bond once it has reached maturity. To do so, the issuer must generate revenues. As noted above, there are many mechanisms that can be used to generate revenues for forest

finance. In general these revenues can be forest-based (e.g. price premiums on sustainable timber) or non-forest based [e.g. official development assistance (ODA)], depending on the forest investment needs. The choice between these two types of revenue will have important implications for the type of activity that can be supported: ranging from capacity building activities and land tenure reform to investments in forest-friendly enterprises and projects that generate ecosystem service credits.

The finance raised from selling a bond and the revenue generated to pay it back can either be held on the financial accounts of the issuing institution (on balance sheet) or in a legally independent entity (off balance sheet). Combined with the choice of revenue generating mechanism, the choice of institutional arrangements has important implications for the risk to both the bond investor and the bond issuer. Generally if the bond is on balance sheet, the bondholder will be concerned with the risk of the bond issuer making repayments, while the issuer will be taking on risks associated with revenue generation. If the bond is off balance sheet, the bondholder will be directly exposed to the risks associated with revenue streams. In either case, measures will be required to mitigate some of the risks that are present in order to make a forest bond viable.

Where would forest bonds work?

The type of forest bond that could work in a given country depends on the financial stability, level of political risk and current (and likely future) shape of forest policy in that country. Before purchasing a bond, potential bondholders would analyse these characteristics and the specific structure of the bond to determine which characteristics directly present a risk if they invest in the bond. Policy-makers must also consider these characteristics—particularly the shape of forest policy—to determine which type of bond would be useful for their country to issue or support.

Although no type of forest bond is off limits to any particular tropical forest region, an initial evaluation indicates which type of bond could be most useful and/or successful in each of the world's three major tropical forest regions. A forest bond issued by a forest nation or backed by commitments from one or more forest nations could be successful in Latin America, particularly the Amazon region. In contrast, Africa would likely get the most use

out of a bond issued by a relevant multilateral development bank or backed by commitments from donor countries. Finally, in Eastern and Southern Asia, an off-balance-sheet forest bond backed by forest-based revenues currently seems the most viable option.

INTRODUCTION

The challenge

Tropical forests cover about 15% of the world's land surface (FAO, 2010) and provide a multitude of ecosystem services from local to global scales. At the global level, through their interactions with the atmosphere, tropical forests are fundamental to the cycling of water and heat around the planet. They also absorb vast quantities of carbon from the atmosphere, helping to reduce the build-up of greenhouse gases, whilst returning oxygen to the atmosphere in the process. Regionally, they filter and regulate the flow of water in river basins. At more local scales, forests provide a resource base upon which the livelihoods of over a billion of the world's poor depend (The World Bank, 2004). In many ways, we can consider tropical forests to be *ecological infrastructure* that provides a suite of ecosystem services underpinning livelihoods and climate, food, energy and water security. The value of this ecological infrastructure is in the order of USD trillions annually (TEEB, 2009).

In spite of these immense societal benefits, the global rate of deforestation is still “alarmingly high” according to the United Nations Food and Agricultural Organization (FAO, 2010). It is estimated that around 13 million hectares of forest are cleared every year (FAO, 2010) for uses such as agriculture, pasture, logging and mining. Although forest conversion can bring economic prosperity, it also brings increasing costs in the form of lost ecosystem services (Braat & ten Brink, 2008). Comparing those costs and benefits, it is unlikely that deforestation at its current rate will bring improvements to human wellbeing that are sustained for future generations to enjoy. As such, many tropical forest countries are seeking to undertake a new forest-friendly mode of development.

A role for forest bonds

The transformation from business-as-usual to more sustainable ecosystem management requires a broad strategy of policy and institutional reform along with capacity building and on-the-ground implementation. Amongst other actions, this will require a significant scaling up of funding in the immediate future. As an indication of the scale of finance needed, a recent study estimated that the funds needed to halve the current rate of deforestation will have to increase from less than USD 10 billion total that has been pledged now, to approximately USD 30 billion annually by 2020 (Commission on Climate and Tropical Forests, 2010). Although estimates of the financing needed vary, there is increasing consensus that the public sector alone does not have the means to raise these funds and therefore engagement with the private sector is imperative.

Bonds started receiving more attention from the environmental community after the successful issuance of bonds to fund immunisation and vaccination in less developed countries (IFFIm, 2011). Since bonds have historically been used to raise the finance needed to construct physical infrastructure and finance many other actions in a country's development process, it is not surprising they are now being used to finance green and climate-friendly development. Since 2008, development banks and other financial institutions have increasingly used *green bonds* or *climate bonds* to raise money for their investments in renewable energy and water infrastructure. The World Bank, for example, has issued over USD 2 billion in such bonds to finance its climate-change-related investments (World Bank, 2011) and green bond issuances totalled around USD 3.5 billion in 2010 alone (Wood & Grace, 2011).

Whilst green and climate bonds have been used to finance a portfolio of projects that can include forest-related investments (e.g. World Bank Green Bonds), a forest bond has not yet been issued that would specifically finance the ecological infrastructure of tropical forests and related forest-friendly development. Several proposals have, however, been put forward for the creation of a forest bond (see e.g. The Prince's Rainforests Project, 2009). Further, a bamboo bond has recently been issued that follows one potential structure a forest bond might take^[1] and the first forest bond is expected to be issued soon^[2].

What is a bond?

Bonds are a way of borrowing finance from private capital markets. As with other debt-based mechanisms, bond issuers must repay the capital they borrowed plus interest (see **Figure 2** in **Framework** section). A public or private institution can sell (i.e. *issue*) a bond, and it represents a promise that over the bond's lifetime the organisation that sold it (the *issuer*) will pay back a pre-specified amount. Repayment usually includes an interest payment (i.e. *coupon payment*) that occurs every 6 or 12 months, plus full repayment of the initial value of the bond (called the *principal*) at the end of the bond's life (upon its *maturity*). Since bonds are tradable, the interest payments and principal repayment will be given to whomever owns the bond (known as the *bondholder*) at the time that payment is due.

The terms of a bond are defined mainly by the cash flows the borrower plans to use to pay back the bond (the bond's *collateral*), and the level of confidence that the issuer will have the ability and willingness to collect those cash flows and use them to pay back the bond. The terms relevant to potential bondholders include:

- **Return:** The value of coupon and principal payments
- **Credit Rating:** Indicates the level of confidence that the bond will be repaid; a risk measure
- **Maturity:** The number of years until the principal is paid back
- **Liquidity:** The ability to trade the bond in a secondary market
- **Covenants:** Any specific requirements the issuer must adhere to

These terms are made clear when the bond is issued, so the bondholder has a reasonable expectation of the timing and scale of the return on their investment in the bond. Bonds are therefore often referred to as a fixed-income investment, and because they provide relatively predictable long-term returns, they are a key component of any diversified investment portfolio. That is also why the global bond market is three times larger than the global equity market, which on average provides higher returns to investors, but offers more volatile returns and hence more risky investments.

Frontloading forest finance

When considering using bonds to finance the conservation and sustainable use of tropical forests, policy-makers might consider the potential benefits and liabilities of doing so. The main benefits are that bonds engage the private sector to frontload and lock-in large-scale financing. Doing so, however, creates a future liability to pay back the investors from whom finance was initially raised. As such, before attempting to create a forest bond, policy-makers and potential forest bond issuers should ask the vital question: is there a strong case to frontload finance and create that liability?

This question has both political and institutional dimensions. First, from a political perspective, policy inaction on deforestation will result in continued emissions of harmful greenhouse gases, further loss of biodiversity, and a reduction in the provision of other vital ecosystem services. All of these changes will continue to degrade the livelihoods of those living in and around forests, as well as those that live far beyond them. Many of the mechanisms to generate revenue that can be used to finance forests will take time to implement at the scale needed (Parker et al., 2009; Parker and Cranford, 2010), and forest bonds could offer a bridging mechanism whilst these other sources of finance are scaled up (The Prince's Rainforests Project, 2009).

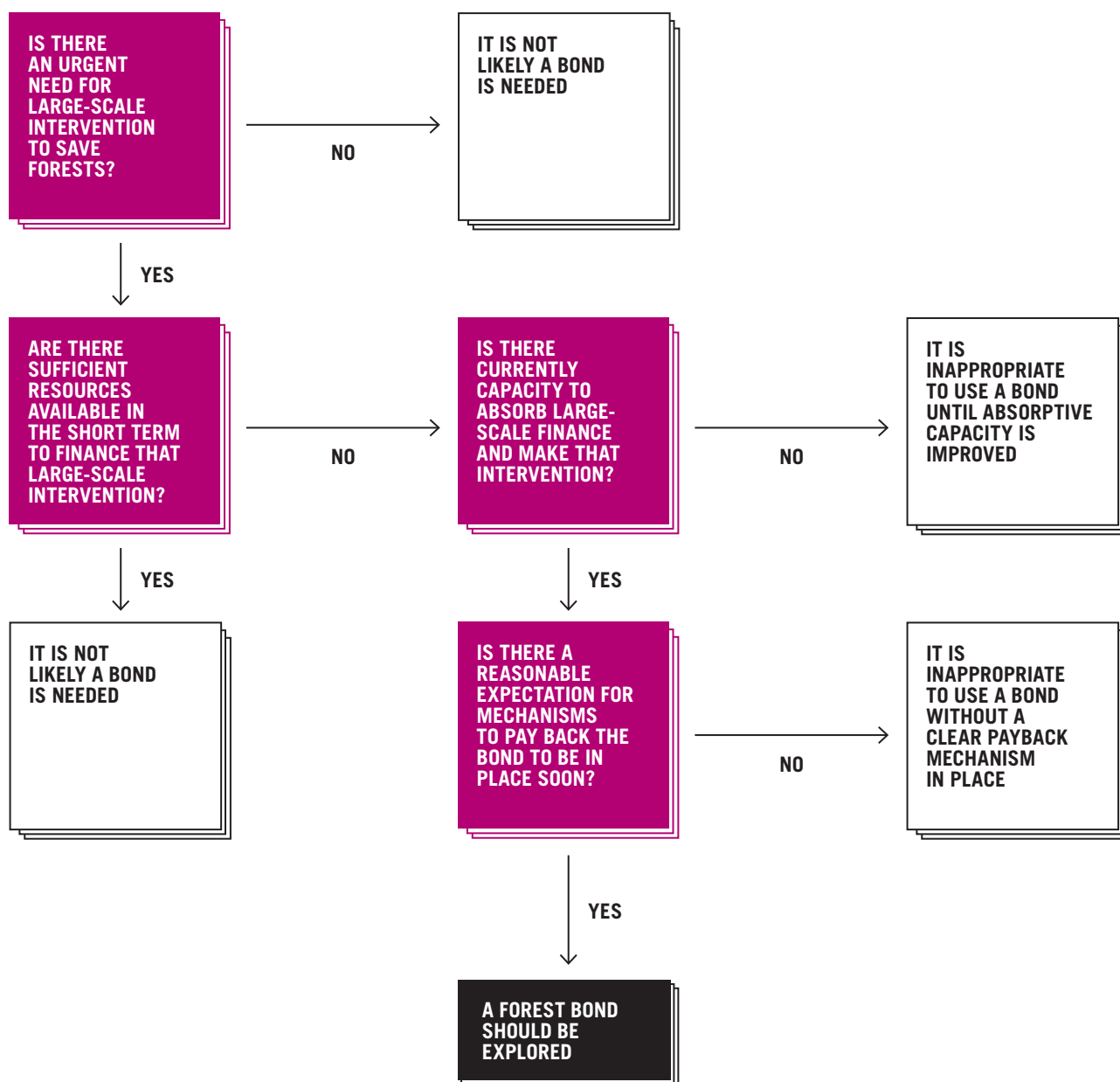
Second, from an institutional perspective, forest-owning nations vary in their ability to absorb finance effectively at scale. Large amounts of frontloaded finance are only useful if the recipient has the capacity to use it effectively in the short term. A related concern will be the type of mechanism that the issuer will use to pay back bondholders as well as the choice of how the mechanism will be managed. This will be important in defining the types of actions that can be carried out on the ground. These issues are discussed in more detail in the **Generation** and **Delivery** sections.

The decision process that a policymaker might go through before exploring whether to issue, or support the issue of, a forest bond is shown in **Figure 1**.



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Figure 1: Decision tree for policy-makers on whether or not to explore using a forest bond



WHO WOULD INVEST?

Research on forest bonds (e.g. Forum for the Future and EnviroMarket, 2007; Forum for the Future, 2009; Prince's Rainforests Project, 2009; Flensburg, 2010; Cranford et al., 2011) has identified two specific groups of potential forest bond investors and their preferences for the five terms of a bond outlined above. By understanding those preferences and each group's motivation for investing in forest bonds, policy-makers can be more targeted and thus more effective in their design and use of forest bonds.

Impact investors

Impact investing is an investment strategy where investors proactively seek investments with positive social and/or environmental benefits in addition to financial returns. There are over a hundred active impact investment funds (GIIN, 2011) underpinning a market that could grow to more than USD 500 billion by 2020 (Monitor Institute, 2009). Impact investors (and some socially responsible investors) are often willing to compromise on their preferred investment characteristics in exchange for assurance that the investment provides broader environmental or social benefits.

Currently, most impact investing has been implemented in community health, energy, or microfinance projects, but there is strong potential to extend impact investing into forest and other natural capital projects. A brief survey of private investors' preferences for green bonds (see Cranford et al., 2011) showed that impact investors would prefer a forest bond if it had an upper-medium to high *investment grade credit rating* (i.e. a credit rating of A3/A- or better), a return comparable to other bonds with a similar level of risk, and high liquidity (Table 1). Impact investors would be willing to compromise on these three requirements, however, if the environmental benefits of the investment were significant and assured.

Impact investors would make good early investors in forest bonds when the market is not yet well known, is smaller (and therefore has lower liquidity) and is perceived as being riskier. This is particularly true for forest bonds that are more difficult for investors to evaluate, such as forest-backed bonds.

Table 1. Comparing impact and institutional investors' preferred characteristics of a forest bond.

IMPACT INVESTORS	PREFERENCE	COMPROMISE?
Return	Better returns than government bond	Yes
Credit Rating	≥ A–	Yes
Maturity	≤ 10 years	No
Liquidity	High	Yes
Environmental Benefits	Assured	No
INSTITUTIONAL INVESTORS	PREFERENCE	COMPROMISE?
Return	Better or similar returns to government bonds	No
Credit Rating	AAA or close to	No
Maturity	≤ 10 years	No
Liquidity	High	No
Environmental Benefits	Assured	No

Institutional investors

Institutional investors manage the largest proportion of private sector finance globally—roughly US\$70 trillion (The City UK, 2010). These investors act on behalf of large groups of people (e.g. managing pension funds and insurance funds) and therefore have a responsibility (called *fiduciary duty*) to ensure the highest standard of care is taken to meet the investment needs of their clients, who are relying on the investment returns for their retirement or to pay insurance claims.

Institutional investors are therefore often more constrained in how they can invest and a forest bond would have to meet their requirements to be attractive.

A forest bond would only attract institutional investors if it had a high investment grade credit rating (i.e. AAA or close to) and assured high liquidity (see **Table 1**). Despite these constraints, however, institutional investors are increasingly interested in green bonds to improve the long-term performance of their portfolio (Flensburg, 2010) because they recognise that:

- Environmental risk increases the uncertainty of future investment performance;
- Investments may be exposed to future constraints in natural resources; and
- Environmental regulation is beginning to impact investment performance.

Institutional investors are likely to become increasingly interested in forest bonds as the market grows (improving liquidity) and risks are better known and managed.

Credibility of forest bonds

The most important attribute for any forest bond is that its environmental credibility must be assured. The environmental (and potentially social) outcomes of a forest bond are the motivation for it in the first place. Investors will prefer a forest bond, or other green or climate bond, to a non-green bond with the same financial characteristics if and only if the environmental benefits of the forest bond are assured. No investors—nor any other stakeholders in a forest bond—are willing to compromise on that.

Environmental credibility of a forest bond will be influenced by how finance is managed and delivered, which can vary depending on bond structure, particularly the institutional arrangements. To support the growth and legitimacy of a forest bonds market, standardised criteria to judge credibility are needed to generate confidence and allow comparability between different bonds. Development of standards for climate bonds is already underway, and a similar initiative to devise standards specific to forests bonds is being developed. For more information on that process see www.climatebonds.net/proposals/standards.

FRAMEWORK

Underlying the basic outline of a forest bond described so far are multiple ways in which a forest bond can be structured. **Figure 2** presents a framework to assess the various structures a forest bond can have^[3] and is comprised of four basic modules:

Generation: How is revenue generated to pay back bond investors?

Institutional Arrangements: How is finance managed and by whom?

Delivery: How is finance delivered to support forest activities?

Risk: What are the primary risks of the bond and who holds those risks?

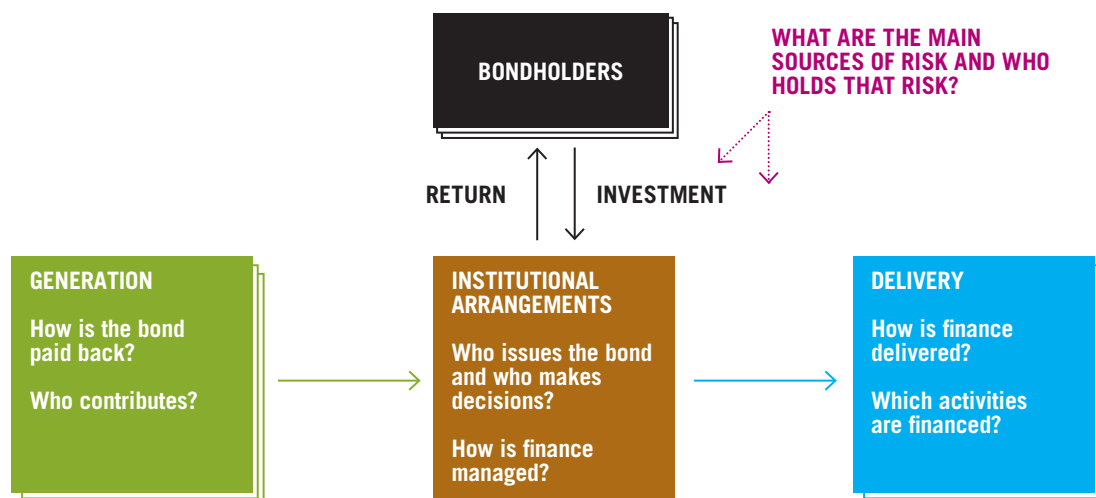
These modules represent individual components of a forest bond and when combined they describe the forest bond mechanism as a whole. It is important to note two things. First, bondholders do not define the structure of the bond and would sit outside of these four modules.

Bondholders would provide the issuing institution with up-front finance, which that institution would then deliver to forest-based activities in the short term. In the medium to long term, bondholders would be repaid through the revenue generation mechanism.

Second, the bond structure is primarily defined by the first two modules of the framework: Generation and Institutional Arrangements. The delivery mechanisms used and risks associated with the bond are heavily influenced by the choices made in terms of generation and institutional arrangements.

For each of these components there are one or two key characteristics that can vary, and this will have important implications for the overall bond structure. For example, in generating revenue the choice of generation mechanism affects *who will contribute*, whereas in delivering finance the choice of mechanism impacts *which types of activity* will be financed. The following sections will explore these four modules in detail, focusing on the key options for each module.

Figure 2. Framework for understanding a forest bond. Boxes represent actors and solid arrows represent flows of finance.



GENERATION

The issue of how to generate revenues is often the first question when considering any forest finance strategy. Whilst forest bonds are at times presented alongside revenue generation mechanisms, it is important to note that a bond does not itself generate revenue. Bonds are a way of raising finance from private capital markets, and as with other debt-based mechanisms, bond issuers must repay the capital they borrowed plus interest. As such, a forest bond creates a net liability on the balance sheet of a bond issuer and a key question is how revenue will be generated in the medium to long term to repay the bondholder.

There are many mechanisms through which revenue can be generated to pay back a forest bond (see Parker and Cranford, 2010), but for better understanding we discuss here the two broad categories of revenue generation mechanisms separately. There are mechanisms that generate revenues from the underlying forest asset, which we call here **forest-based revenues**, and those that generate revenues from some other source, which we call **non-forest-based revenues** (see Table 2). Forest bonds could easily use a blend of revenue generation mechanisms within each category and, although it would be more complex, could also be structured to use a blend of mechanisms across these two categories.

Forest-based revenues

Revenue can be generated from the underlying forest investment through **direct markets** for forest biodiversity and ecosystem services (e.g. forest carbon markets) or **indirect markets** where the value of forest biodiversity and ecosystem services is linked to other types of markets (e.g. forest-friendly agriculture).

Forest-based revenues are politically attractive because they incorporate the value of forest biodiversity and ecosystem services into normal economic activities. Direct market mechanisms place the burden of payment (or in this case, repayment of the bond) either on actors that have to mitigate their direct, negative impacts on the environment (e.g. mining companies could use biodiversity offsets) or on actors that are not paying the full value of the natural resources they directly use (e.g. bottling companies could pay for watershed protection). Indirect market mechanisms, in contrast, place the burden of payment on the consumer. Whilst indirect mechanisms may be less politically palatable in developed or non-forest countries where high

consumption occurs, such mechanisms can help create a more equitable distribution of the burden of repayment among forest and non-forest countries, or more accurately, among nations with relatively high and relatively low levels of consumption that negatively impacts forests.

Non-forest-based revenues

The second option is for revenues to be generated through mechanisms not related to forests, either from **other markets** not specifically linked to forest biodiversity or ecosystem services (e.g. aviation levy) or from **non-market** mechanisms (e.g. ODA).

Generally speaking, non-forest-based revenues are less politically attractive because they generate revenue either from consumers or firms that are not directly impacting forests (e.g. through an aviation or maritime levy) or from general citizens or individuals (e.g. through general budget allocation). They do, however, have benefits. First, they can be used to redistribute the burden of payment if the mechanism involves an international financial transfer such as a debt-for-nature swap^[4] or auctioning of carbon emission allowances in a non-forest country. Second, while direct and indirect markets for biodiversity and ecosystem services are still growing and maturing, non-forest-based revenues provide a larger and potentially more stable revenue base to draw from in the short and medium term.

Table 2. Mechanisms that could be used to pay back a forest bond (based on Parker and Cranford, 2010).

REVENUE	MECHANISM	MECHANISM EXAMPLES
Forest-based	Direct Markets	Forest carbon market Biodiversity offsets Watershed payments
	Indirect Markets	Certified timber Green commodities User fees (e.g. ecotourism)
Non-forest-based	Other Markets	Aviation or maritime levy Financial transaction tax Levy on insurance premiums
	Non-market	General budget allocation ODA Debt-for-nature swaps

INSTITUTIONAL ARRANGEMENTS

The second issue to address in relation to a forest bond is what the institutional arrangements will be. For a forest bond, this means first understanding which organisation is trying to use a bond to finance forest investment (e.g. a government, multilateral development bank, private bank, etc.). Second, this means understanding how both the finance raised by issuing the bond and particularly how the revenue generated to repay the bondholder will be managed. The link between revenue generation and bond payback can either be weak, but allow flexibility in paying the bond back, if it is **on balance sheet**, or it can be strong and legally binding if the bond is **off balance sheet**.

On balance sheet

When revenues to pay back a bond are held *on balance sheet*, they pass through the financial accounts of the issuing institution before paying back bondholders. This means that the link between revenue generation and bond payback is weak, giving the issuing institution flexibility over how to pay back the bond. Payback can either be based on a specific (or set of) generation mechanism(s) or on general budgetary revenues. In the case where repayment is backed by a specific mechanism, the revenues can be *earmarked* to pay back the bond. Earmarking, however, is a political decision and there is therefore a risk that the revenues could be re-appropriated for other spending needs in the future.

Because the bond is on balance sheet, if either the revenue generation mechanism or earmarking procedure fails, bondholders have recourse to claim repayment from other sources from which the issuer receives revenue. Since this places the burden of debt squarely on the issuing institution, the risk profile of an on-balance-sheet forest bond would primarily be defined by the risk profile of the issuer.

Off balance sheet

The alternative arrangement is that revenues are held *off balance sheet* in a separate legal entity called a special purpose entity (SPE), which then becomes the bond issuer. Under this structure a stronger link is maintained between the revenue generation mechanism and bond payback, since the revenue raised to pay back the bond essentially side-steps the financial accounts of the organisation that

wants to use a bond (called the *originator*) and so moves more directly from the revenue generation mechanism to the bondholder. This type of bond is referred to as an asset-backed security (ABS) and is used when originating institutions want to distribute some or most of the risk of the underlying revenue generating mechanism to other institutions such as the bondholders themselves. It is also used when these institutions do not want to hold the debt of the bond on their accounts, thus allowing the originator to maintain low debt levels and the ability to borrow finance for different activities in other sectors.

Because the revenues used to pay back an off-balance-sheet bond are kept legally separate from the originator (i.e. are *ring-fenced*), the risk-return profile is directly related to the underlying revenue generation mechanism. For example, under the immunisation bond (see IFFIm, 2011), which uses future ODA commitments to repay bondholders, the return is based on the commitments from donor countries and the risk is defined by the ability and willingness of those countries to honour their commitments.

DELIVERY

The third consideration for the structure of a forest bond is how finance will be delivered to the organisations and communities that carry out forest-friendly activities. As discussed above, the choice of delivery mechanism is strongly influenced by the choice of revenue generation mechanism and the type of institutional arrangement being used.

As with revenue generation mechanisms a mix of delivery mechanisms will probably be used in a forest bond. For purposes of understanding, however, delivery mechanisms can be viewed as falling into two classes, those that are expected to generate a direct **financial return** and those that will have little or **no financial return**.

Financial return

Where revenue generation depends on the underlying forest asset (see **Forest-Based Revenues** in the **Generation** section) the delivery mechanism will often align with the need to generate some financial return on forest investment. Examples of delivery mechanisms in this “closed-loop” system include normal or *concessional* lending to forest-friendly enterprises or households, direct investment (i.e. taking an equity stake) in those enterprises, or creating performance-based payments/incentives at the local level (e.g. through a forest carbon market) assuming the bond issuer would receive performance-based payments from another party at the national or international level (e.g. through REDD or biodiversity payments).

No financial return

Where revenue generation is independent of the underlying investment (see **Non-Forest-Based Revenues** in the **Generation** section) there will be much more flexibility in how finance can be delivered. These bonds could use any of the mechanisms outlined above in addition to other mechanisms that generate no financial return, such as grants or non-financial incentives. In one or two cases (as will be described in later sections on different bond structures), generation mechanisms that depend on forest-based revenues can also use delivery mechanisms with no financial return. Activities that have no financial return, such as capacity building and technology transfer, are vital to the overall efforts to sustain the world’s forests. For some countries or regions, being able to fund those types of

efforts will be a more immediate need and so it is important to understand which types of forest bonds could include delivery mechanisms to support such activities.

RISK

The final consideration for the structure of a forest bond is risk; specifically what the primary risks associated with the bond are and who faces those risks. Risk is heavily defined by the generation mechanisms and institutional arrangements of a forest bond and risk mitigation will be included in any bond structure (see opposite).

Before investing, potential investors in forest bonds will consider all of the risks normally relevant to bonds. Under certain forest bond structures they will also consider the risks relevant to forest-level investments (see e.g. Gaines and Grayson, 2009), many of which are similar for investments in any asset class (e.g. currency risk if investing from abroad). There is, however, a set of risks that are either specific to or particularly relevant for forest bonds that potential bondholders will focus on.

Commercial risk

Commercial risk is the risk of failure of the underlying asset to produce the goods or services expected (e.g. not producing as many ecosystem service credits as expected). In the case of forest bonds, commercial risk is only relevant for bonds backed by forest-based revenues, but to whom this type of risk falls is dependent on the institutional arrangements of the bond. There are two types of commercial risk that are particularly important for bonds paid back with forest-based revenues.

First, **natural hazard risk** is the risk of commercial failure of an enterprise due to natural events. In the case of forests, such events could include forest fires, disease, drought and weather. Most potential investors in forest bonds do not have much experience in the forest sector, so are not familiar with these risks and measures to mitigate such risks are needed.

Second, **political risk** is the risk of commercial failure due to action (or inaction) by the government where a forest investment is made. That can include expropriation of assets, cancellation of forest concessions, or non-enforcement of forest law. Political risk is a primary constraint on foreign direct investment in all sectors (MIGA, 2010) and is often cited as the greatest concern among potential investors in REDD+ projects in developing countries (Clinton Foundation, 2008 as cited in Forum for the Future, 2010). Thus, political risk would be a primary concern for bonds dependent on forest-based revenues.

Market risk

Market risk arises when the prevailing economic environment causes an investment to generate less revenue than expected. There are two specific market risks related to forest investments generally and therefore to forest bonds.

The first, **ecosystem market risk**, is the risk that either the demand or price in markets for ecosystem goods and services (e.g. certified timber and carbon credits respectively) will be lower than expected.

Ecosystem market risk is inherently linked to the second type of risk: the **regulatory risk** that governments will not implement the appropriate legislation to establish or support direct and indirect markets for forest-based ecosystem goods and services. As with commercial risk, market risk is only relevant for bonds dependent on forest-based revenues, but to whom it falls depends on the institutional arrangements of the bond.

Default risk

Default risk is the risk that institutions responsible for paying back a forest bond will fail to meet their obligation. Default risk is not specific to forest bonds, but is important to highlight because it depends on which organisation is responsible for paying back the bond, which in turn is a function of the revenue generation mechanism and institutional arrangements of the forest bond structure. For example, if a bond is repaid by developed country ODA commitments, the default risk is defined by those developed country governments and their willingness and ability to honour those commitments. For almost every forest bond structure, bondholders will hold default risk.

Risk mitigation

The financial sector has various strategies to mitigate risk, four of which are commonly discussed for forest bonds, particularly in relation to commercial and market risks associated with forest-based revenue generation mechanisms. Two of these strategies, insurance and guarantees, provide compensation in the case of commercial failure. The other two strategies, portfolio diversification and investment tranching, mitigate various risks through the structure of the bond.

Insurance could be purchased to cover a range of risks, and is the most likely method of mitigating natural hazard risk, as seen in the emergence of specialised forest insurance products provided by private-sector insurers (Gaines and Grayson, 2009). A guarantee is a type of insurance used to mitigate risks that are difficult to quantify and in the context of forest bonds might be used to mitigate political risk. Guarantees are more likely to be provided by the public sector through a sovereign or supranational guarantee agency. For example, in mid-2011 the US Government's private-sector development finance institution (the Overseas Private Investment Corporation) agreed to provide what is believed to be the first guarantee against political risk for a REDD project (Terra Global Capital, 2011).

Portfolio diversification can be implemented by ensuring that any cash flows backing a forest bond come from sources that range across geography and/or market sectors. This mitigates risk because underperformance of investment in one place can be offset by overperformance elsewhere. A tranche structure would divide a forest bond into different segments, each with a different risk-return profile. The *senior tranche* would be paid before the more *junior tranches*, and thus be exposed to less risk, but in return for taking lower risk would receive a lower return. In contrast, *junior tranches* would accept first loss if there were any problem with repaying the bond, and so accept more risk, but also expect a higher return assuming all runs smoothly. Both diversification and tranching are crucial to mitigate multiple risks, particularly those associated with nascent ecosystem markets.

The financial sector also has various strategies to deal with the risk of default by issuing institutions, and failure to pay by backing institutions, including mono-line insurance and credit-default swaps. The risk of default, however, is the primary risk that bondholders take on when purchasing a bond of any type, and forest bonds would be no different. Further discussion of mitigation of commercial, market and default risk is included in the section on **Forest Bond Structures**.



FOREST BOND STRUCTURES

Using the framework outlined above, the following section presents six basic structures that a forest bond can take. Whilst a forest bond would not be limited to these six structures (i.e. hybrids could be developed), examining these structures allows us to understand the way in which forest bonds can be used to finance the conservation and sustainable use of tropical forests.

As discussed previously, the structure of a forest bond is defined primarily by two key factors: whether the bond is repaid through forest-based or non-forest-based revenues; and whether finance is kept on or off the balance sheet of the institute using the finance raised (i.e. the strength of the link between pledged revenues and bond payback). Within a matrix of these two variables, **Figure 3** presents the six basic structures of a forest bond with a brief description of each.

The following pages will discuss each of the structures based on the framework outlined in the previous pages. The

discussion of each structure includes a diagram similar to that presented in the Framework section above (**Figure 2**) where boxes represent actors and solid arrows represent flows of finance. Each discussion also includes a summary of the key characteristics of each bond structure as they pertain to the four components of that framework.

Figure 3. The matrix of forest bonds based on the types of revenues used to payback the bond and whether the bond is held on or off the balance sheet of the organisation that developed it.

	ON BALANCE SHEET	OFF BALANCE SHEET
NON-FOREST-BASED	<p>GOVERNMENT FOREST BOND (TAX-BACKED) A sovereign bond that specifically raises finance for forests.</p> <p>CORPORATE FOREST BOND Similar to green bonds issued by multilateral development banks.</p>	<p>COMMITMENT-BACKED FOREST BOND Uses a forest finance facility and adapts the model of immunisation bonds.</p>
FOREST-BASED	<p>GOVERNMENT FOREST BOND (REVENUE-BACKED) Like bonds issued by sub-national governments to construct infrastructure.</p>	<p>FOREST-BACKED BONDS (DEBT-BASED) Adapts the model of a microfinance-backed security, but with forest-friendly loans.</p> <p>FOREST-BACKED BONDS (EQUITY-BASED) An asset-backed security backed by revenues such as forest carbon, certified timber, etc.</p>

GOVERNMENT FOREST BOND (TAX-BACKED)

GENERATION	INSTITUTIONAL ARRANGEMENTS	DELIVERY	RISK
Non-forest-based revenues.	On balance sheet; issued by government.	Can finance activities without financial return.	Bondholder faces risk of default by government. Issuing government faces risk in terms of its ability to raise taxes to pay back the bond.

The most basic form of forest bond would be a government-issued bond repaid by tax revenues. There are historical examples of governments issuing themed bonds that are backed by general tax revenues, specifically war bonds. The aim of a forest-themed bond is to tap into a new class of investors that may not normally purchase bonds from the given issuer, but are more interested in financing specific social or environmental initiatives. A national government or sub-national government of a forest or non-forest country could issue this style of bond. Having a smaller tax base, sub-national governments may be more likely to issue a government bond backed by revenues [see **Government Forest Bond (Revenue-Backed)**].

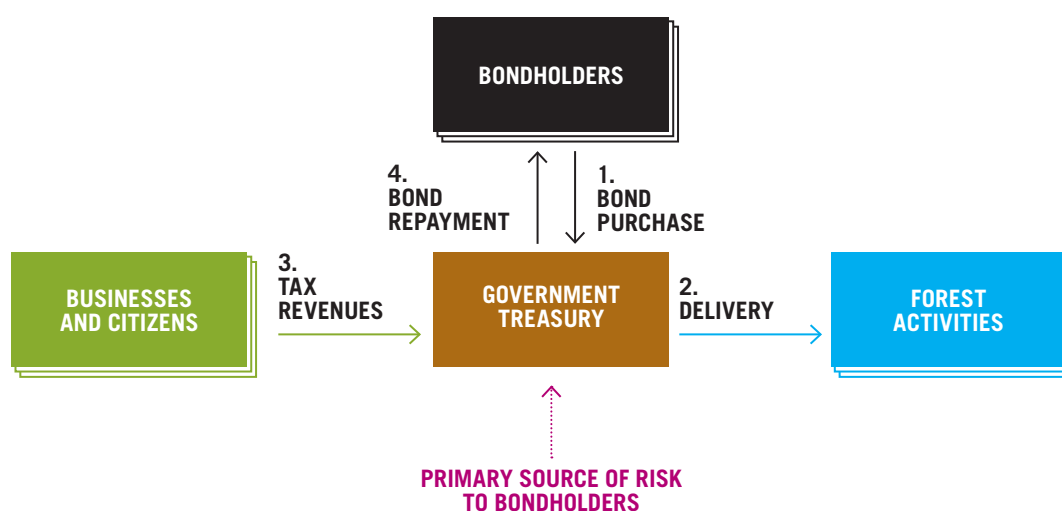
As shown in **Figure 4**, a tax-backed government forest bond follows a simple structure. The government issues a bond to raise finance (1), uses that finance to fund forest activities (2), collects taxes as normal (3) and uses tax revenues to pay back the bond (4). A key feature of a government bond is that it is held on the balance sheet of the issuing government. As such, the primary risk to the bondholder is the ability and willingness of the issuing government to raise and use taxes to pay back the bond. Investors would be most attracted to a tax-backed government forest bond issued by a country with an investment grade credit rating or higher (i.e.

minimum rating of BBB-) and they may even require credit enhancement for those with a low investment grade credit rating (i.e. above, but close to BBB-).

There are two major concerns with a tax-backed government forest bond. First, from the issuing government's perspective they will be taking on more debt. To satisfy both the potential bondholders who are deciding whether to invest in the bond and politicians who are deciding whether debt should be issued, an issuing government would need to show clearly that they would be in a strong financial position to repay the bond, which would mean showing that sufficient taxes can be raised from businesses and citizens. Second, governments can change and finance raised by the bond can be reallocated to finance activities in non-forest sectors, so credibility in accounting for how finance is delivered will be crucial.

There are also two major benefits to a tax-backed government forest bond. First, since it is essentially a typical government bond it would be fairly easy for investors to compare it to other government bonds and therefore evaluate as a potential investment. This would make the bond more attractive to many types of investors. Second, because the bond would not depend on forest-based revenues to repay bondholders, the bond could fund forest activities with no financial return.

Figure 4. Structure of a tax-backed government forest bond.



GOVERNMENT FOREST BOND (REVENUE-BACKED)

GENERATION	INSTITUTIONAL ARRANGEMENTS	DELIVERY	RISK
Revenues are largely forest-based, but could be mixed.	On balance sheet with earmarked revenues; issued by government.	Can finance activities without financial return.	Bondholder faces risk of default by government. Issuing government faces ecosystem market and natural hazard risk (not regulatory or political risk).

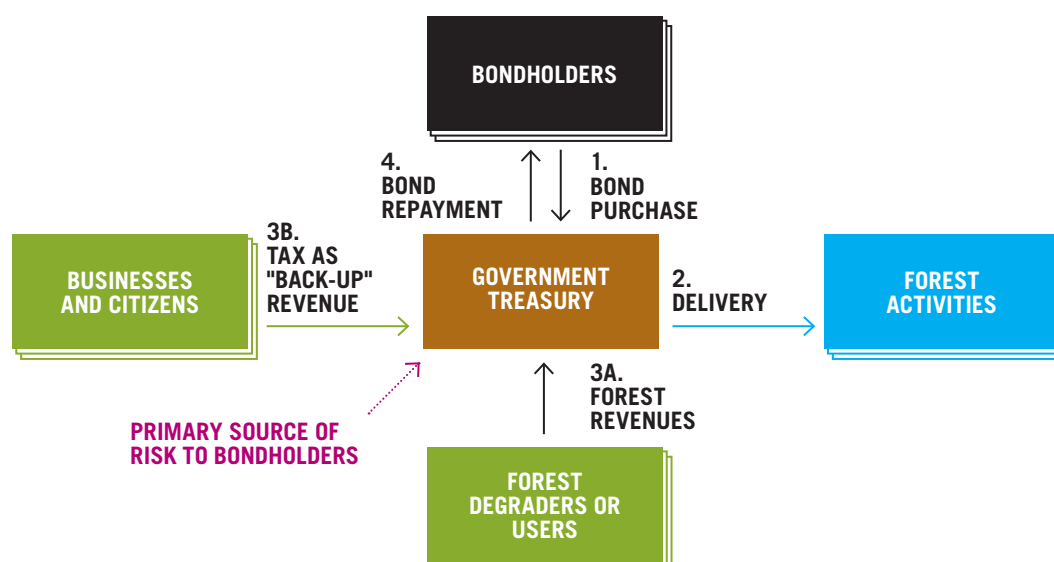
A government forest bond can also be repaid using forest-based revenues. There are many examples of governments issuing revenue-backed bonds in other sectors, particularly at the state or municipal level to raise finance for infrastructure projects such as railways and toll roads. While municipal, state and federal governments could all issue a bond of this type, sub-national governments would probably favour this type of bond over a tax-backed bond due to their relatively smaller tax base.

As illustrated in **Figure 5**, a revenue-backed government forest bond is similar in many ways to a tax-backed forest bond. The main difference is that the revenues used to pay back the bond are primarily generated from policies the government implements to generate forest-based revenues (**3a**). Although the bond is on balance sheet, the government can earmark these forest-based revenues, thereby giving bondholders and policy-makers some confidence that there are specific revenues of a known scale available to pay back the bond. The link between those revenues and the bond payoff, however, is still dependent on political decisions in annual budget allocations, leaving the possibility that in future years the government could reallocate the generated revenues to another cause.

Since the bond is held on balance sheet, if forest-based revenues fail to materialise, the bond will still need to be paid back from other revenues, such as general taxes (**3b**). With tax revenues as the “back-up” option for paying back this type of forest bond, from the bondholder’s perspective, a revenue-backed government forest bond would have a similar risk profile to a tax-backed bond.

From the issuing government’s perspective a revenue bond would alleviate the political difficulty associated with a tax-backed bond, namely that local businesses or citizens not associated with forest degradation would pay back the bond. Instead, the government could institute policies, or use policies already in place, to generate revenues from forest-degrading or forest-using actors (e.g. through stumpage fees, biodiversity offsetting, or user fees), thus following the more politically palatable polluter (or user) pays principal. Further, because the government has the power to institute revenue-raising policies, the funds raised through the bond would not have to be invested in forest activities with a financial return.

Figure 5. Structure of a revenue-backed government forest bond.



CORPORATE FOREST BOND

GENERATION	INSTITUTIONAL ARRANGEMENTS	DELIVERY	RISK
Mixed.	On balance sheet; likely to be issued by multilateral development bank.	Would finance activities with at least a small financial return.	Bondholder faces risk of default by issuer. Issuer faces either default or commercial and market risks.

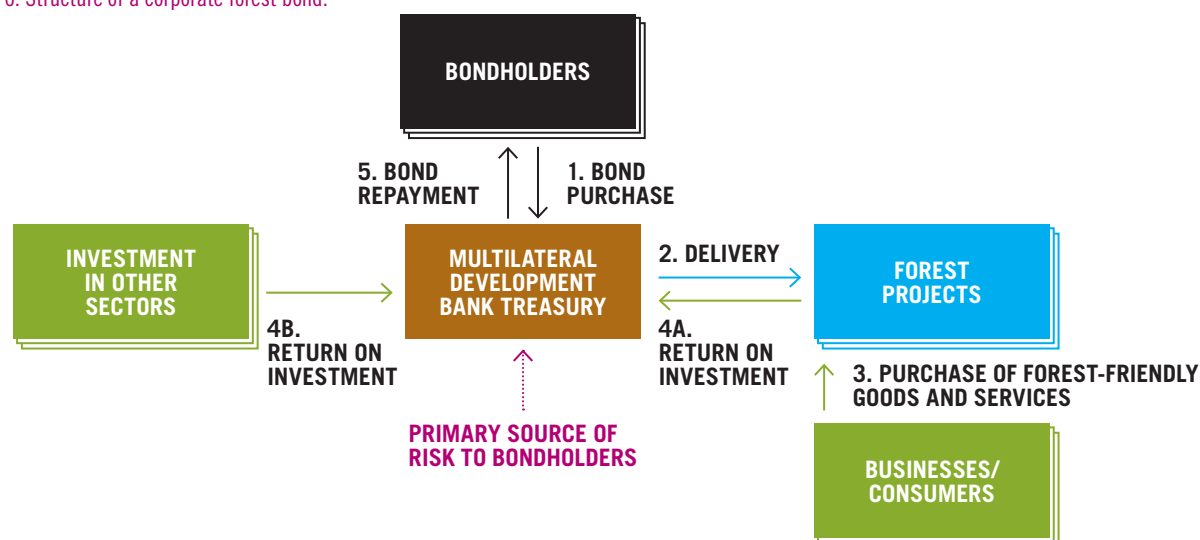
A bank would issue a corporate forest bond to finance its investment in a portfolio of forest projects. As indicated in **Figure 6**, the issuer would raise finance through a bond (1) and invest that in forest projects (2). Those projects would generate at least some revenue through direct and indirect markets for forest ecosystem services, such as the sale of forest carbon credits or sustainable agricultural commodities (3). The bond issuer would then receive a portion of those revenues (4a) but would also receive revenues from investments in other sectors (4b). Revenue streams from all the issuer's investments in every sector would flow into its treasury, the treasury in turn would pay back the bond from its total available resources (5). So as with all forest bonds, a corporate forest bond can be defined as a forest bond not by how it is paid back, but because the money it raises is delivered to forest-friendly activities.

Like a government forest bond, a corporate forest bond is on balance sheet so the primary risk to bondholders is default by the issuer. Unlike a government forest bond, however, the issuer does not have the power to implement policies that support forest-based revenue generation. If returns on investment in forest-friendly activities are lower than expected, the issuer will have to depend more on returns from investments in other sectors to pay back the bond. Due to the perceived nascent nature of direct and indirect markets for forest ecosystem services, private

banks are unlikely to want to take on the direct risk of paying back a forest bond with revenues from other investments and would probably prefer to issue a forest-backed bond (described later) rather than a corporate forest bond.

Consequently, a corporate forest bond might be most appropriate for a multilateral development bank (MDB), which has both the remit to support sustainable development objectives through concessional investments and the political leverage to promote policies that support forest-based revenues within the countries they invest in. Repayment of the MDB's forest investments could be concessional and based on non-forest-based revenues while the relevant policies to support forest-based revenues were being implemented. A MDB would thus most likely deliver finance through (concessional) lending following the model of World Bank Green Bonds (World Bank, 2011) or through an equity-like arrangement similar to, for example, Emissions Reduction Purchase Agreements (ERPAs) used by the World Bank in its carbon funds (see www.wbcarbonfinance.org for more information). Whatever the delivery mechanism, an issuing MDB would still need to take risk mitigation measures, by for example investing in a diverse portfolio of projects varying by country and revenue source.

Figure 6. Structure of a corporate forest bond.



COMMITMENT-BACKED FOREST BOND

GENERATION	INSTITUTIONAL ARRANGEMENTS	DELIVERY	RISK
Non-forest-based revenues.	Off balance sheet; sponsored by public or civil sector.	Would finance activities with no financial return.	Bondholder faces risk of default by backing governments. Backing governments face risk in generating revenues.

Commitment-backed forest bonds have received significant attention in forest policy discussions that cite the immunisation bonds issued by the International Finance Facility for Immunisation (IFFIm) as a successful model^[5] (IFFIm, 2011). Following that model, and as indicated in **Figure 7**, a commitment-backed forest bond would be issued by an SPE—called a *forest finance facility*—to raise finance (1) that is used to fund forest activities (2). Revenues would be generated through commitments made by one or a group of governments (3) and used to pay back the bondholders (4).

An ODA-backed bond is the most frequently discussed option for a commitment-backed forest bond (see The Prince's Rainforests Project, 2009), but the repayment mechanism for this type of forest bond could be any of the other market or non-market mechanisms outlined in **Table 2**. Since the revenue generation is decoupled from the underlying forest investment, the finance raised through this type of bond could be delivered to forest activities that do not have a financial return.

A commitment-backed bond is held off balance sheet, so the primary risk to bondholders will reside in the ability and willingness of countries that have backed the bond to honour their commitments (i.e. default risk). Learning from the IFFIm there are three main requirements for a commitment-backed bond to be low risk (FitchRatings,

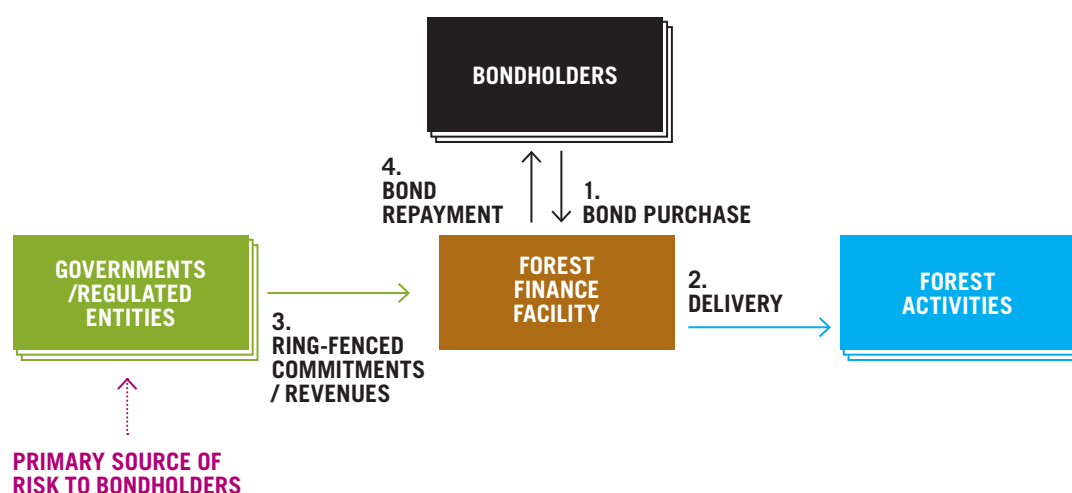
2010; Standard and Poor's, 2009):

- A politically compelling mandate and strong commitment from backing countries;
- Strong credit ratings of backing countries; and
- Conservative financial management within the finance facility.

A growing body of evidence coupled with a high degree of political support has led to a politically compelling mandate for forests and it is assumed that any forest finance facility would be conservative in its financial management of a forest bond. The greatest concern, therefore, for potential investors in a commitment-backed forest bond will be the risk associated with the countries backing it. The majority of countries funding forest conservation either through bilateral or multilateral channels have high investment grade credit ratings, so an ODA-backed bond would be considered low-risk.

There is also potential for developing countries to fund investment by making commitments from their general budget, but due to their generally lower credit ratings, increased risk mitigation would likely be needed.

Figure 7. Structure of a commitment-backed forest bond.



FOREST-BACKED BOND (EQUITY-BASED)

GENERATION	INSTITUTIONAL ARRANGEMENTS	DELIVERY	RISK
Exclusively forest-based revenues.	Off balance sheet, sponsored by private sector.	Would finance activities with financial return.	Bondholder faces commercial and market risks.

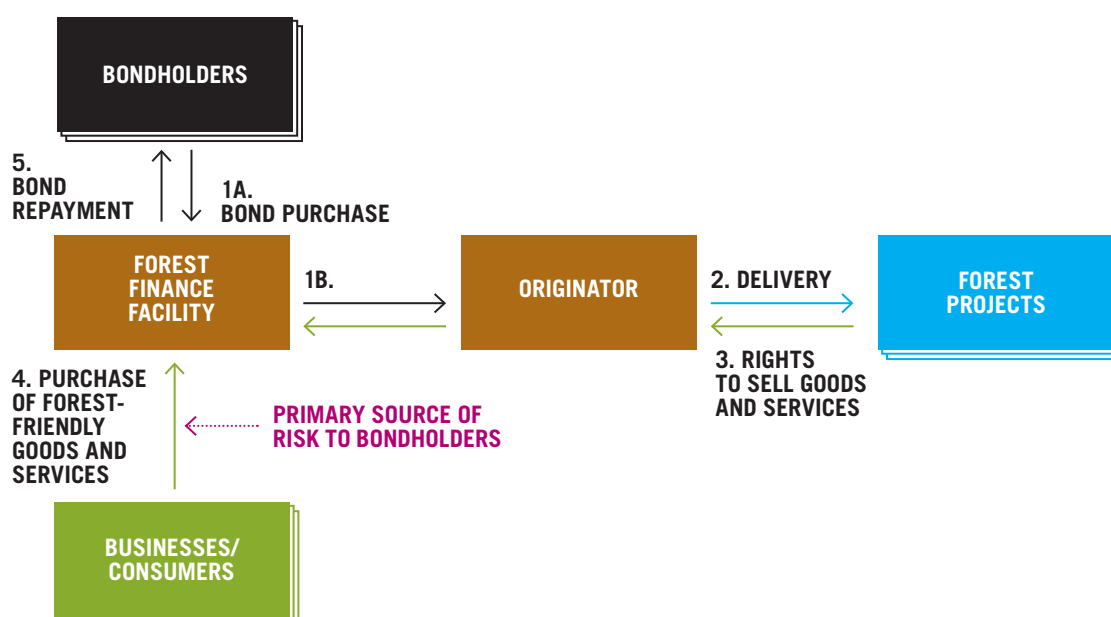
An equity-based forest-backed bond was the first type of forest bond structure to be envisioned (see Forum for the Future and EnviroMarket, 2007; Lambe, 2007). Whilst a forest-backed bond has not yet been issued, this model is currently being developed by several organisations^[6] and examples in related sectors are emerging^[7]. A forest-backed bond is the most likely structure that a private financial institution would choose to use.

As illustrated in **Figure 8**, the bond would be issued by a forest finance facility (1a). The originator would then receive those funds (1b) and use them to invest in forest activities through an equity investment or performance-based payments (2). In return, the rights to some or all of the ecosystem goods and/or services would be passed back to the forest finance facility (3). The facility would generate revenues by selling those goods and services into regional or global markets (4) and those revenues would be used to pay back the bond (5). For example, in return for investing in activities that produce carbon credits, the forest finance facility would receive the rights to (some of) those credits, and would generate revenue by selling them in carbon

markets.

As the only sources of revenue from such a bond are those from ecosystem goods and services, strong financial management will be a key function of the facility to manage market risks such as commodity price fluctuations, particularly as forest-friendly goods and services still have relatively small market share. Further, without proper measures, a forest-backed bond directly exposes bondholders to the commercial risks of forest investment. The bond structure would need to adopt strategies to mitigate risks the bondholder faces and distribute risks to those best able to deal with them. Among these risks, regulatory and political risk of the countries the bond is used to invest in will be a key concern for investors considering an equity-based forest-backed bond.

Figure 8. Structure of an equity-based forest-backed bond.



FOREST-BACKED BOND (DEBT-BASED)

GENERATION	INSTITUTIONAL ARRANGEMENTS	DELIVERY	RISK
Non-forest-based revenues.	Off balance sheet; sponsored by public or civil sector.	Would finance activities with no financial return.	Bondholder faces risk of default by backing governments. Backing governments face risk in generating revenues.

A debt-based forest-backed bond would build on the growing body of experience with microfinance-backed securities—often referred to as a *microfinance-backed security* (MFBS) or *microcredit-backed security* (MCBS). The first security backed by loans to microfinance institutions (MFIs) was issued in 2004 (BlueOrchard, 2006) and 2006 saw issuance of two securities that directly pooled microfinance loans (e.g. securitisations by ProCredit Bulgaria and BRAC; see Hüttenrauch and Schneider, 2009).

As shown in **Figure 9**, the institutional arrangements of debt-based forest-backed bonds are very similar to that of equity-based bonds, but the generation and delivery mechanisms are different. Finance is delivered through loans to households or small- and medium-sized enterprises (SMEs) that want to undertake forest-friendly activities (2). The institutions implementing these activities would maintain the rights to the forest-friendly goods (e.g. certified timber) and/or ecosystem services (e.g. forest carbon credits) they produced and generate revenues from selling them into local, regional, or potentially global markets (3). Sales of those goods and services would be used to repay the loan (4) and those loan repayments would

be used to pay back the bond (5).

As with the previous structure, a debt-based forest-backed bond directly exposes bondholders to the underlying investment risk. In the case of a debt-based bond, however, the risk to bondholders is institutional in nature and would be the risk that borrowers default on their loan repayments. As such, the commercial and market risks would fall mainly to borrowers who would need to ensure that their investment generates sufficient revenue to repay any loans they have received. Innovation may therefore be needed in the bond structure to ensure that the forest-level borrowers do not have a disproportionate amount of risk placed on them. That is particularly true where the borrowers are rural communities or low-income households. Further care should also be taken to ensure that these borrowers have support to manage the risks that they do face.

Figure 9. Structure of a debt-based forest-backed bond.

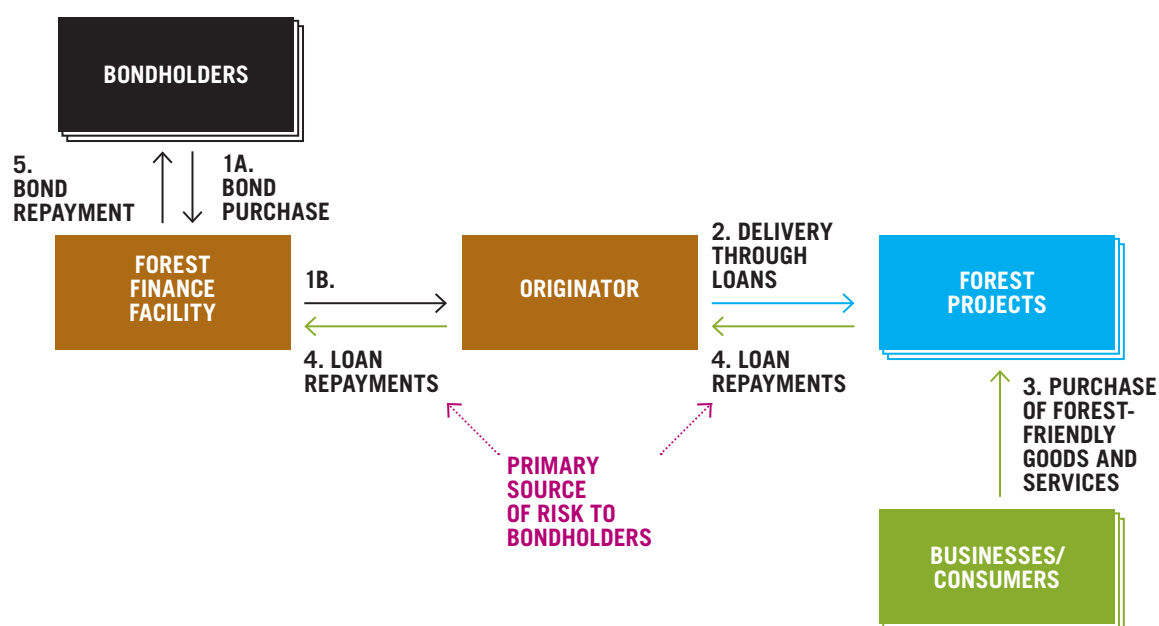




Photo by Sushant Jadhav, Creative Commons on Flickr



ADDING PERSPECTIVE

Policy perspective

Forest-owning countries^[8] have vastly different developmental, political and institutional contexts, and therefore have different capacities to implement forest policy reform. Within international climate change negotiations, recognition of these different contexts has led to the development of what has been called a phased approach to REDD (Meridian Institute, 2009). Under the phased approach, countries will progress from capacity-building activities toward national approaches that deliver emissions reductions through forest activities in a measurable, reportable and verifiable way.

While the phased approach has been developed in the context of an emissions reduction framework under the United Nations Framework Convention on Climate Change (UNFCCC), conceptually it can also apply to other activities to conserve and sustainably use tropical forests, including certified timber production and green commodities. As under the development of REDD, **Phase 1** would be the planning phase and include strategy development, capacity building and demonstration activities. **Phase 2** would include implementation of policies addressing deforestation and degradation, and processes for monitoring, reporting and verifying improvements in forest management would be established. **Phase 3** is when the ability to deliver measurable and environmentally sustainable ecosystem goods and services at the national or sub-national level would be fully established and rewarded.

For each phase, different bond mechanisms will be more appropriate to use than others (see **Table 3**). In **Phase 1**, a commitment-backed or tax-backed government forest bond could be used, as they do not depend on forest-based revenues to pay back bondholders. Furthermore, since the issue of capacity building is often framed as an international responsibility (e.g. for REDD under the UNFCCC), a commitment-backed bond that generates revenue from donor countries (as suggested in e.g. Prince's Rainforest Project, 2009) might be the most appropriate structure to use. **Phase 2** activities would begin to generate some forest-based revenues, but more importantly they would pave the way for the generation of significant forest-based revenues in the future. As such, a government or corporate forest bond could be used to support these activities. A bond that depends wholly on forest-based revenues could only be used to finance **Phase**

3 activities. A forest-backed bond (equity- or debt-based) would therefore only be an appropriate choice for countries implementing the final phase, although other bonds backed by forest-based revenues (i.e. corporate or government) could also be used to finance this phase.

With good financial planning, a sequential issuance of different types of forest bond could be used to build an end-to-end forest financing strategy. For example, a forest-owning nation could finance capacity-building activities using revenue raised from a forest bond backed by ODA commitments from donor countries. After several years that country could issue its own government forest bond, for example, a 5-10 year tax-backed forest bond to finance Phase 2 activities. After several more years the country would hopefully be entering Phase 3 and have mechanisms in place to reward measurable and verifiable forest conservation and sustainable use. At this time, it could issue a revenue-backed forest bond. Critically, if the timing is set up appropriately, the capital from the second government issued forest bond could be used to pay back part of the first.

Following such a strategy, the tropical forest country would only maintain the additional debt on its accounts for a few years. While that debt is on its accounts, however, it provides a clear incentive to ensure that policies are in place in good time to support a revenue-backed government forest bond with direct and indirect markets for forest biodiversity and ecosystem services.

Investment perspective

Each of the bond structures discussed in the previous section will present different risks to bondholders. The risk associated with a **government forest bond** (tax- or revenue-backed) will primarily be determined by the riskiness of the issuing forest nation. Sovereign credit ratings provide a direct measure of the financial stability of a country and as a result are a good indicator of the level of risk associated with a government forest bond depending on which country issues it (see **Figure 10**). Generally speaking, countries with an investment grade credit rating (i.e. BBB- or above) have the best potential to issue a sovereign forest bond. The 12 tropical forest countries^[9] that fall into this category, listed from highest to lowest credit rating, are: Australia, China, Taiwan, Chile, Malaysia, Thailand, Mexico, Brazil, Colombia, India,

Table 3. The phases of implementing policies to reward the provision of ecosystem services, and the forest bond structures that could be used to finance each phase.

	PHASE 1	PHASE 2	PHASE 3
AIMS Bond type	STRATEGY DESIGN	IMPLEMENTATION	PERFORMANCE
Commitment- backed			
Government (tax)			
Government (revenue)			
Corporate			
Forest-backed (debt)			
Forest-backed (equity)			

Panama and Peru.

A **commitment-backed bond** is off balance sheet, and the risk will therefore be dependent on the type of mechanism that will be used to repay the forest bond. In the case of an ODA-backed bond, the associated risk can be estimated from donor countries' sovereign credit ratings. Most donor countries have a high investment grade credit rating and recognise the politically compelling issue of tropical forest conservation. Assuming that conservative fiscal management was employed by the forest finance facility, a bond backed by ODA should have a sufficiently high credit rating to interest investors. Bonds that are backed by other financial mechanisms such as auctioning of emissions allowances in the EU, or an aviation or maritime levy, would be assessed based on the performance of those mechanisms and the surety of the regulation supporting them. For bonds backed by commitments from tropical forest countries, the list of most likely backers will be limited to the same 12 with the greatest potential to issue a government forest bond.

The risk associated with **forest-backed bonds** and **corporate bonds** that are dependent on forest-based

revenues would be less influenced by sovereign credit rating and more influenced by the political risk of the tropical forest country in which those revenues were generated. Political risk is not the only risk associated with tropical forest investment, but is consistently noted as the risk of greatest concern for potential investors, and so provides the primary filter to understand where it may be feasible to use forest-backed and corporate forest bonds (**Figure 11**).

Political risk is most clearly important for forest-backed bonds. For an equity-based forest-backed bond, if this risk is not mitigated, potential bondholders will be directly exposed to the level of political risk the project-level forest investments face. For a debt-based forest-backed bond, the borrowers would face some of the political risk, and so the bondholders indirectly face this risk through higher risk of default on forest-friendly loans. As such a forest-backed bond is most likely to be successful to finance forest activities in countries with low political risk.

With a corporate forest bond, bondholders would only be exposed to the risk of the balance sheet of the issuing institution. As such the risk that bondholders will face would probably be low, since institutions that would issue a corporate bond (e.g. international finance institutions and private investment banks) would have a high credit rating. Nevertheless, political and other risks still have an impact on where this type of bond structure could be useful, because the issuing institution would be taking on those risks. As with a forest-backed bond, therefore, a corporate forest bond would most likely be issued in countries with low political risk unless significant risk mitigation was included in the bond structuring.

CREDIT RATINGS OF FOREST COUNTRIES

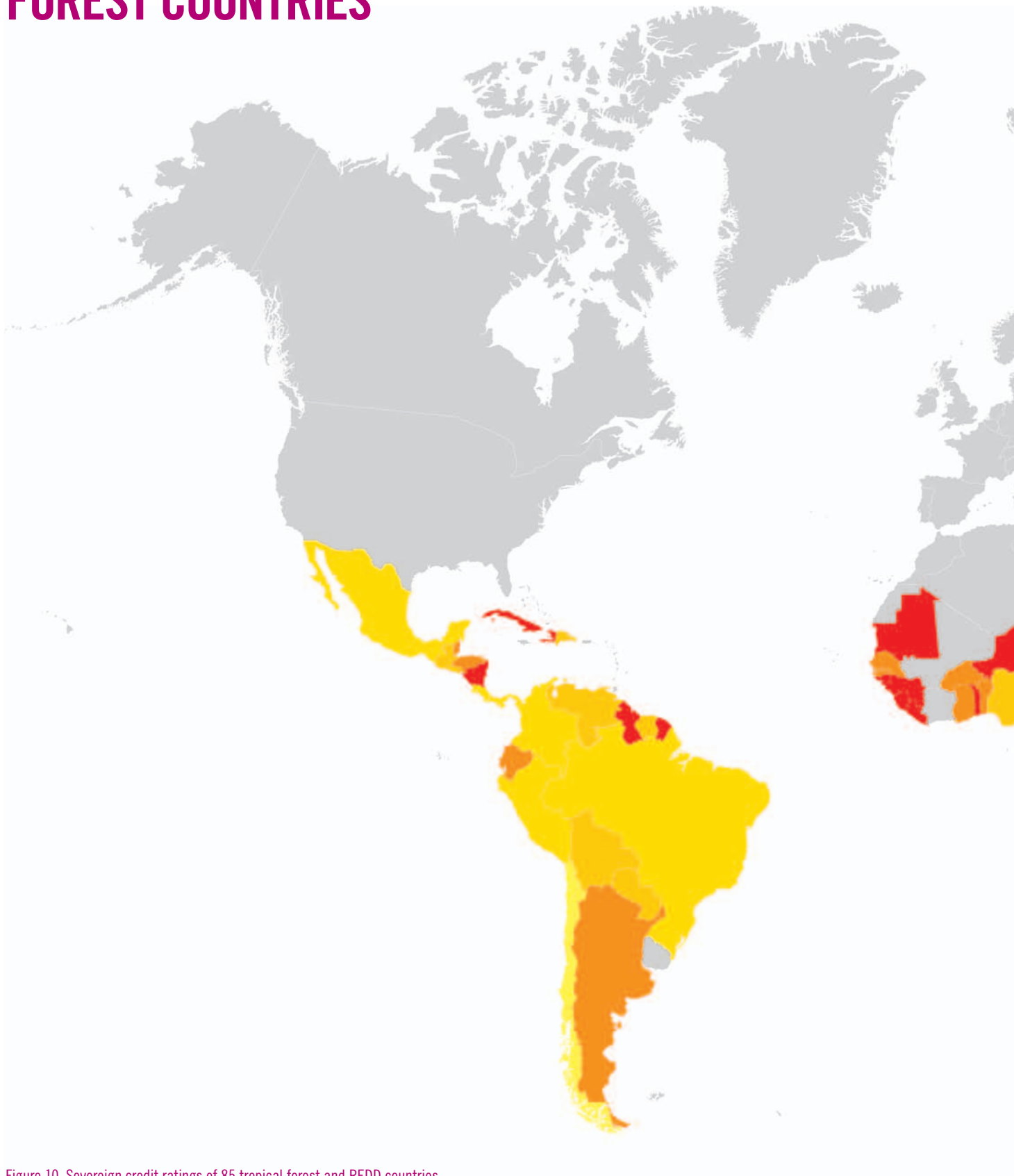
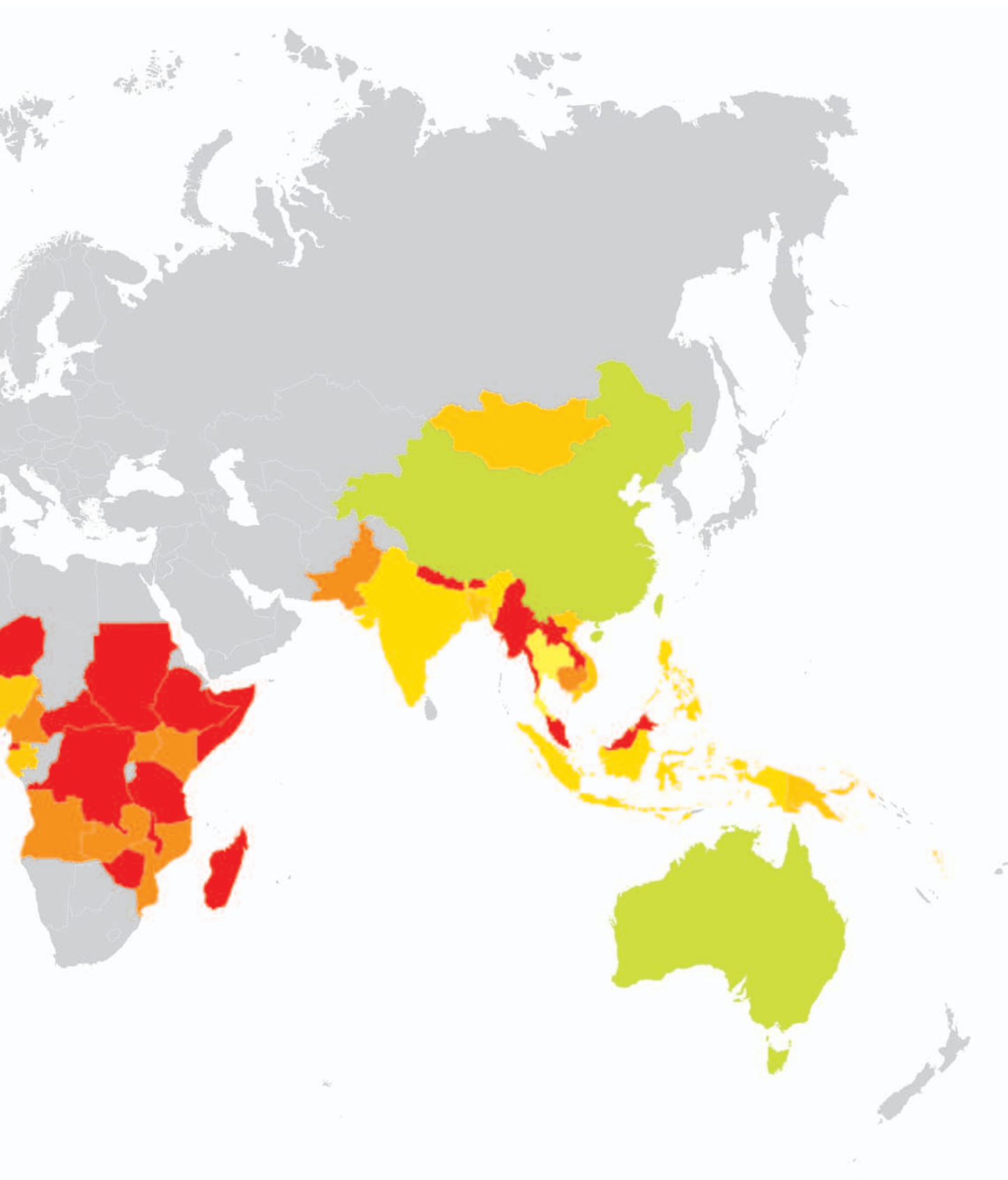


Figure 10. Sovereign credit ratings of 85 tropical forest and REDD countries, based on Standard and Poor's (S&P) ratings in June 2011. Countries with investment grade credit ratings are categorised as High (S&P rating AAA to AA-), Upper Medium (A+ to A-) and Lower Medium (BBB+ to BBB-). Countries without investment grade credit ratings are categorised as Speculative (BB+ to BB-), Highly Speculative (B+ to B-) or Not Rated.



POLITICAL RISK OF FOREST COUNTRIES

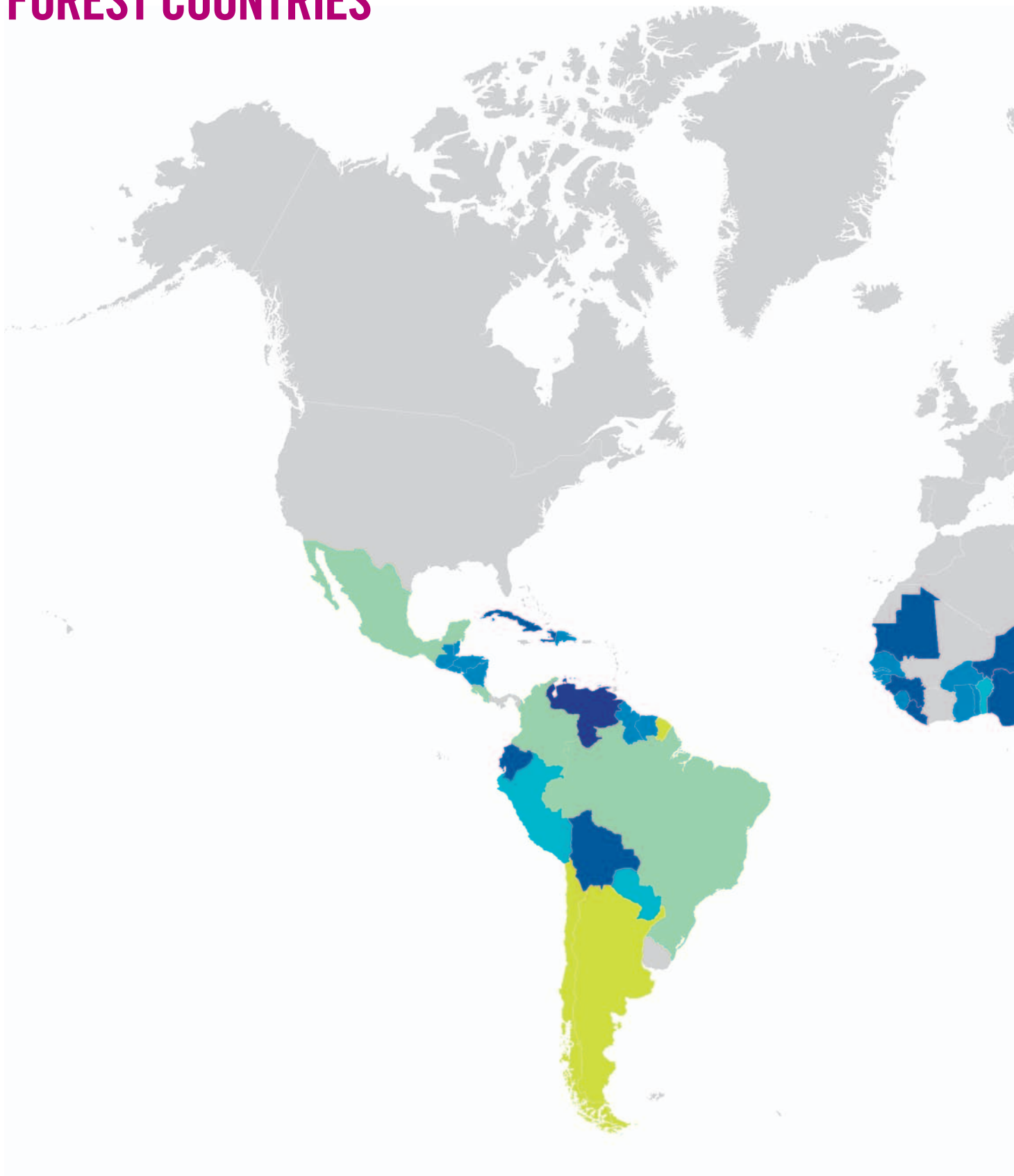
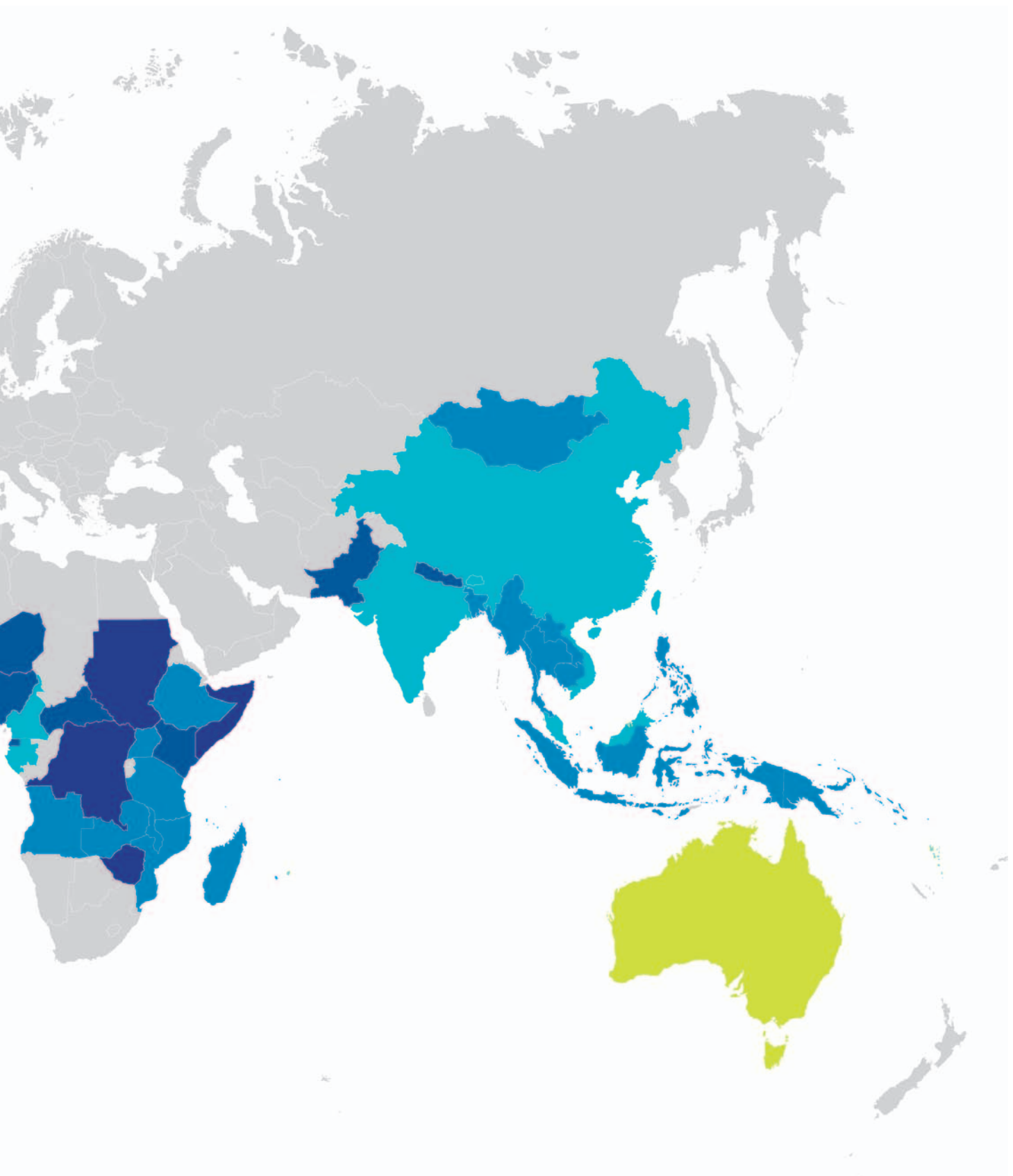


Figure 11. Political risk ratings of 85 tropical forest and REDD countries, based on Aon's political risk map 2010. Countries are categorised following Aon's categorisation.





WHICH FOREST BONDS WHERE?

Building on the information presented about forest bond structures, and overlaying the policy and investor perspectives, a picture emerges of which forest bonds might work in different tropical forest regions.

Latin America

Of the 12 tropical forest countries with an investment grade credit rating, six are in Latin America: Chile, Mexico, Brazil, Colombia, Panama and Peru. Latin America is therefore a region in which government bonds backed by individual countries could be particularly useful. All of these countries also have a strong or rapidly growing economy, which means that not only are they more able to pay back a bond, but are also facing increasing threats to their forests from increasing levels of growth and consumption.

There is also potential to develop a regional bond in South America, in which for example, Brazil, Colombia and Peru could work together to issue forest bonds that support conservation and sustainable use of the majority of the area of Amazonia and protect the Amazon's major headwaters. The credit rating of these countries is sufficient and their economies are growing at such a pace that they would not necessarily need to depend on donor country support. Extending beyond the Amazon and across South America, Chile would be a potentially welcome addition to such a facility from an investor's perspective.

The Latin American countries in this list also have relatively high levels of participation in markets for ecosystem goods, such as certified timber or sustainable agricultural commodities. Those with low political risk—Brazil, Chile, Colombia and Mexico—are therefore prime candidates to be the focus of a bond backed by forest-based revenues that is issued by either the government or a private institution. Perhaps the most obvious country in which to develop a forest-backed bond is Brazil, which has arguably the best capacity for monitoring, reporting and verification (MRV) of emissions reductions and has already established a reference level for GHG emissions from tropical forests.

Africa

The majority of African nations have a lower than investment grade credit rating (or are unrated) and also have a high level of political risk. Many African countries

are also either only in Phase 1 or have not yet begun their national REDD strategy and have little access to markets for ecosystem goods and services. As such, an ODA-backed bond following the model of the IFFIm would be the most viable option from the investor perspective and most useful from a policy perspective to fund a broad strategy of forest governance improvement across the region.

That said, there are some notable private-sector forest investments already taking place in some African nations (e.g. Wildlife Works Carbon, the first Verified Carbon Standard REDD project in the world) and a few other African nations stand out as having low political risk (e.g. Gabon). It is feasible, therefore, that a forest-backed or corporate forest bond could be used to invest in a portfolio of carefully selected projects in the region. With a remit to support (sustainable) development through the private sector, the International Finance Corporation (IFC) is a strong candidate to issue a corporate forest bond to finance African forest investments. If ecological infrastructure could be considered within its remit, the African Finance Corporation (AFC) may be even better situated to issue a corporate forest bond that invests in well-selected private investments in forests across the continent.

Eastern and Southern Asia

Eastern and Southern Asia have a greater diversity of sovereign credit rating than either Africa or Latin America and similarly a much greater diversity of political risk than Africa. The diversity of risk across Asia's tropical forest countries means that a regional forest-backed bond could be developed that uses portfolio diversification to mitigate risk and a tranching structure to sell different levels of risk and return to different types of potential bondholders.

In the short term, any forest-backed bond in this region may have to focus on markets for forest-friendly goods rather than the sale of ecosystem services directly. Conversion of tropical forests, and broader land degradation in this region are dominated by market-based activities, such as timber, palm oil, and rice cultivation across forests, peatland and other ecosystems. From a policy and investor perspective, rather than a forest-specific bond, a broader natural capital or green growth bond that includes forests at its core may be more viable (and potentially more useful) to tackle the direct and indirect drivers of forest loss and land degradation in the region.

MAKING FOREST BONDS WORK

Although bonds are commonly used in many sectors, there are still barriers to their use in the forest sector. Overcoming these barriers was the focus of *Unlocking Forest Bonds*, a workshop held by WWF's Forest and Climate Initiative, the Global Canopy Programme and the Climate Bonds Initiative. The workshop brought together a group of international experts in forest policy and finance to explore how to make a forest bond work. A summary of the workshop results is presented in **Table 4** (the full report can be found at www.globalcanopy.org/projects/understanding-forest-bonds)

A key issue raised during the workshop is the need to improve understanding of what forest bonds can be and increase the level of dialogue and engagement between investors, policy-makers and forest-level stakeholders. All sides use different language to describe their needs and expectations of forest finance, and without clear understanding of how forest bonds work and what they are intended to do, suspicion and mistrust can easily build up. Bridges of communication must be forged and confidence building must take place between these communities before we can realise the full potential of forest finance mechanisms such as bonds to sustain forests and enhance human livelihoods.

Understanding Forest Bonds is part of that process. To truly secure the world's natural capital, much of which is forests or located near forests, financing needs to increase from the USD tens of billions per year to USD hundreds of billions a year. To reach that scale we cannot argue about which mechanism is best; we need all mechanisms. And whilst those mechanisms are being put in place, bonds can be used to frontload finance and start acting to save the world's forests now.

Table 4. Key findings from the *Unlocking Forest Bonds* report. The full report and other relevant documents can be found at www.globalcanopy.org/projects/understanding-forest-bonds.

ATTRACTING INVESTORS	To attract the biggest investors, forest bonds will need to be simple, transparent, comparable and liquid, and must hold an investment grade credit rating	The first forest bonds, however, should target investors with a socially responsible investment mandate who may be willing to compromise on those characteristics.	Adopting a tranche (i.e. segmented) structure would enable forest bonds to attract multiple types of investors at the same time.
CREATING A BOND	Policy-makers and financiers should consider not just carbon revenues, but a mix of cash flows to back a forest bond.	A forest bond can fund multiple initiatives inside and outside the forest to both increase forest resilience and reduce the pressures on them.	Public policy can create a price signal to stimulate early investment in forest preservation.
DEALING WITH RISK	Political risk is the dominant concern for potential investors; forest bonds will require some degree of political risk insurance (PRI).	The external policy environment must also be supportive. Risk mitigation measures like PRI will not make a bad deal good; it will only make a good deal better.	
FOREST COUNTRY POTENTIAL	The burdens and benefits of forest preservation must be appropriately balanced among all stakeholders for forest bonds to be deemed legitimate.	It's worth looking to sub-national experiences in forest countries for lessons on how to strike this balance.	With appropriate technical support, sub-national governments could actually be early issuers of forest bonds.
DONOR COUNTRY SUPPORT	Increasing demand for ecosystem goods and services would secure the cash flows that pay back investments in forest conservation and sustainable use.	Reducing financing costs would help stimulate forest friendly investments.	Donor countries can become more directly involved in the structuring and issuing of a bond by for example underwriting the bond directly.
DIALOGUE AND ENGAGEMENT	More dialogue between the public and private sectors is needed to understand what each expects, and is willing to do, to support public-private partnerships.	Dialogue needs to expand to other public-sector actors including treasury departments and finance ministries that are familiar with private-sector engagement.	

GLOSSARY OF TERMS

- **Asset-backed Security**
A financial security that is backed by a future flow of revenues that are held legally separate from the originating institution.
- **Bond**
A debt-based financial instrument that a government or private institution can sell into private capital markets to raise up-front finance.
- **Bondholder**
A public or private sector entity that purchases a bond.
- **Collateral**
The assets used to secure a loan. In the case of forests bonds, refers to what is promised to pay the bond back.
- **Concessional Lending**
The lending of money at a cheaper interest rate (sometimes zero) and at times longer maturity than typical lending in normal credit markets. Multilateral development banks typically carry out concessional lending to support developing countries.
- **Coupon Payment**
A detachable portion of a bond that is given up in return for a payment of interest (*versus principal*).
- **Climate Bond**
A bond issued to finance investment in climate change mitigation and adaptation.
- **Credit Default Swap (CDS)**
Credit default swaps (CDSs) are a form of insurance on a loan or bond. The purchaser of a CDS pays the seller a pre-agreed amount at regular intervals. If certain conditions are met, usually that the borrower or bond issuer defaults, then the CDS seller will compensate the CDS purchaser for their loss and in return will receive the rights to the defaulted loan or bond.
- **Credit Enhancement**
Credit enhancement describes the process of a bond issuer implementing risk mitigation measures so that the bond they issue receives a higher credit rating.
- **Debt-for-nature Swap**
When a portion of a developing country's foreign debt is forgiven in exchange for that country making local investments in environmental conservation.
- **Diversification**
A risk-management practice that involves investing in a group of projects that are heterogeneous by geography, sector, and/or type of expected revenues.
- **Ecological Infrastructure**
Ecosystems and landscapes that provide ecosystem services to humanity.
- **Ecosystem Service Credits**
A tradable certificate or permit either 1) representing the right to use or emit a specified amount of an ecosystem service, or 2) recognising the provision of an ecosystem service.
- **Equity Stake**
The portion of ownership of an asset that is based on an equity investment
- **Equity Investment**
An investment that results in the investor owning a portion of the underlying asset (company, land, etc.). Equity investments receive the lowest priority regarding returns arising from the asset. Generally equity investments are realised when the share of equity owned is sold on, although equity dividends may also be received.
- **Fiduciary Duty**
Responsibility of managers of institutional investment funds (such as pension funds and insurance funds) to act in the best interest of the fund beneficiaries.
- **Fixed-income Investment**
An investment with the terms of the return on that investment outlined from the outset.
- **Forest Bond**
A bond that is issued to solely finance investments that support the conservation and sustainable use of forests.
- **Forest Finance Facility**
A special legal entity that would manage finance raised through *off-balance-sheet* forest bonds and the revenues generated to pay them back. A type of *special purpose* entity.
- **Green Bond**
A bond issued to finance investments with an environmental focus; often used as a synonym for climate bonds.
- **Guarantees**
Insurance for risks that are difficult to quantify.
- **Impact Investing**
An investing practice whereby investors are willing to compromise on their preferred financial qualities of an investment (e.g. expected return, risk) as long as positive social or environmental benefits of that investment are assured.

- **Institutional Investors**
A non-bank person or organisation that trades in very large volumes; often synonymous with pension and insurance funds.
- **Investment Grade Credit Rating**
A credit rating of Baa3/BBB- or greater. Bonds with lower credit ratings are considered speculative investments.
- **Issuer**
The organisation that sells a bond to raise finance.
- **Insurance**
A contract whereby an individual or organisation receives financial compensation if the terms of the insurance contract are met; usually those terms are an unlikely negative event such as a forest fire destroying a plantation.
- **Liquidity**
The degree or ease to which a financial asset can be bought or sold without affecting that asset's price.
- **Maturity**
The age at which a bond expires and the principal value must be repaid.
- **Microfinance- or Microcredit-backed Security (MFBS, MCBS)**
An asset-backed security that is backed by repayment on microfinance/microcredit loans.
- **Monoline Insurance**
A type of credit enhancement where an insurer will guarantee that if a bond defaults the insurer will pay back the bondholders.
- **Off-balance-sheet Bond**
A bond where the finance raised and the revenues generated to pay back the bond are not held on the financial accounts of the originator. Instead those financial flows are ring-fenced and held off-balance-sheet in a special purpose entity (SPE).
- **On-balance-sheet Bond**
A bond where the finance raised and the revenues generated to pay back the bond are held on the financial accounts of the bond issuer.
- **Originator**
The organisation that structures an asset-backed security and is responsible for determining what the finance raised by that security is invested in.
- **Principal**
The face value of a bond that is promised to be paid the bond issuer on maturity of the bond (*versus coupon*).
- **REDD and REDD+**
REDD stands for Reducing Emissions from Deforestation and forest Degradation and refers to the reduction of greenhouse gas emissions through the reduction of forest loss. REDD+ incorporates three additional activities, the conservation, sustainable management, and enhancement of forest carbon stocks, all of which help to mitigate climate change.
- **Ring-fencing**
When a company or set of cash flows is made legally separate from the parent company.
- **Socially Responsible Investing**
Investments in organisations or assets that are believed to have a positive benefit for society; often involves screening out socially negative investments such as alcohol or arms production.
- **Special Purpose Entity (SPE)**
A legal entity whose operations are limited to dealing with specific assets, such as future cash flows.
- **Tranche (incl. Senior and Junior Tranches)**
A “slice” of an investment deal or structured finance where payments/returns are prioritised. That is, the senior tranche receives returns in preference to junior tranches, meaning the senior tranche is taking less risk, and so receives a smaller return than more junior tranches.

END NOTES

- 1 In mid-2011, EcoPlanet Bamboo (a subsidiary of the US-based EcoPlanet Group) issued what is believed to be the world's first asset-backed bamboo bond in mid-2011. More information at <http://www.ecoplanetbamboo.net/news/asset-backed-bamboo-bond>
- 2 A multilateral finance institution seems poised to issue the first "rainforest bond", which is being structured by Bank of America Merrill Lynch. Reported in Carbon Finance (4 May 2011) and Environmental Finance (6 May 2011) with the article "Rainforest bond aiming to monetise REDD credits" (subscription required).
- 3 The framework is based on Parker et al. 2009 and Parker and Cranford, 2010
- 4 An arrangement where a portion of a developing country's foreign debt is written off by the lender in exchange for the developing country making local investments in environmental conservation.
- 5 The International Finance Facility for Immunisation (IFFIm) is a special purpose entity that was established in 2006 to finance the delivery of vaccines in developing countries through the work of the Global Alliance for Vaccines and Immunisation (GAVI Alliance). The IFFIm, which has issued over USD 3 billion in bonds to date, is financed solely through future ODA commitments from donor countries.
- 6 E.g. A forest bond is being explored by Canopy Capital as a source of finance for ecosystem services provided by the Iwokrama reserve in Guyana (see www.canopycapital.co.uk)
- 7 E.g. The bamboo ABS issued by EcoPlanet (EcoPlanet, 2011)
- 8 We define "forest-owning nations" as the 80 countries traditionally considered "tropical forest countries" plus 5 REDD countries not in that original 80. REDD countries are defined as those participating in the Forest Carbon Partnership Facility (<http://www.forestcarbonpartnership.org/fcpnode/203>) or UN-REDD Programme (<http://www.un-redd.org/AboutUNREDDProgramme/tabid/583/Default.aspx>).
- 9 Singapore also falls into this category, but has very little rainforest and is unlikely to issue a forest bond.

REFERENCES

- AON, 2010, *2010 Political Risk Map*, Aon, Chicago.
- LAMBE, G. 2007, *The New Eco-Warriors: Can markets succeed where tree-huggers failed?*, The Banker, London, UK.
- BRAAT, L. & TEN BRINK, P. (EDS.) 2008, *The Cost of Policy Inaction: The case of not meeting the 2010 biodiversity target*, a study for the European Commission, DG Environment, ENV.G.1/ETU/2007/0044.
- CITY UK, 2010, *Fund Management 2010, Financial Markets Series*, The City UK, London, UK.
- CITY UK, 2011, *Bond Markets 2011, Financial Markets Series*, The City UK, London, UK.
- CLINTON FOUNDATION, 2008, *Increasing Investment in Tropical Forestry*, New York.
- COMMISSION ON CLIMATE AND TROPICAL FORESTS, 2010, *Protecting the Climate Forests: Why reducing tropical deforestation is in America's vital national interest*, Washington DC.
- CRANFORD, M., HENDERSON, I. R., MITCHELL, A. W., KIDNEY, S. & KANAK, D. P. 2011, *Unlocking Forest Bond: A HighLevel Workshop on Innovative Finance for Tropical Forests*, Workshop Report. WWF Forest & Climate Initiative, Global Canopy Programme & Climate Bonds Initiative.
- BLUEORCHARD, 2006, *BlueOrchard Microfinance Securities I Fact Sheet*, BlueOrchard, Geneva.
- ECOPLANET, 2011, *Asset Backed Bamboo Bond*. Online at: <http://www.ecoplanetbamboo.net/news/asset-backed-bamboo-bond>
- FOOD AND AGRICULTURE ORGANIZATION (FAO), 2010, *Key Findings, Global Forest Resources Assessment 2010*, United Nations Food and Agriculture Organization, Rome.
- FITCHRATINGS, 2010, *The International Finance Facility for Immunisation (IFFIm): Full Rating Report*, FitchRatings, New York.
- FLENSBORG, C. 2010, *The Green Bond and Climate Bond Outlook: An introduction to a change of stakeholder demand*, presentation at Environmental Finance Webinar in October 2010
- FORUM FOR THE FUTURE, 2009, *Forest Investment Review*, Forum for the Future, London, UK.
- FORUM FOR THE FUTURE & ENVIROMARKET, 2007, *Forest-backed Bonds Proof of Concept Study*, International Finance Corporation, Washington DC.

- GAINES, A. & GRAYSON, J. 2009, *Chapter Four: The potential of risk mitigation mechanisms to facilitate private sector investment in REDD projects*, in *Forest Investment Review*, Forum for the Future, London, UK.
- Global Impact Investing Network, 2011, *ImpactBase*. Online at: [<http://www.impactbase.org/>] Accessed 18 September 2011.
- HÜTTENRAUCH & SCHNEIDER, 2009, *Securitisation: A Funding Alternative for Microfinance Institutions*, Chapter 17 in Matthäus-Maier, I. & Von Pischke, J. D. (eds.), *New Partnerships for Innovation in Microfinance*, Springer and KfW.
- INTERNATIONAL FINANCE FACILITY FOR IMMUNISATION, 2011, *Bonds*. Online at: <http://www.iffim.org/bonds/>] Accessed 18 September 2011.
- MERIDIAN INSTITUTE, 2009, *Reducing Emissions from Deforestation and Forest Degradation (REDD): An Options Assessment Report*, Meridian Institute, Washington DC.
- Multilateral Investment Guarantee Agency (MIGA), 2010, *World Investment and Political Risk*, MIGA, World Bank Group, Washington DC.
- PARKER, C., CRANFORD, M. 2010, *The Little Biodiversity Finance Book*, Global Canopy Programme, Oxford, UK.
- PARKER, C., BROWN, J., PICKERING, J. 2009, *The Little Climate Finance Book*, Oxford, UK.
- PRINCE'S RAINFORESTS PROJECT, 2009, *An Emergency Package for Tropical Forests*, Prince's Rainforests Project, London, UK
- STANDARD AND POOR'S, 2010, *International Finance Facility for Immunisation*, Global Credit Portal Ratings Direct, New York.
- STANDARD AND POORS, 2011, *Sovereigns Ratings List*. Online at: [<http://www.standardandpoors.com/ratings/en/us/>]. Accessed 18 August 2011.
- TEEB, 2009, *TEEB Climate Issues Update*
- TERRA GLOBAL CAPITAL, 2011, *Terra Global Capital Signs Groundbreaking OPIC REDD Insurance Contract*, 30 June 2011. Press release online at: <http://terraglobalcapital.com/News.htm>
- WORLD BANK, 2004, *Sustaining Forests: A Development Strategy*, World Bank, Washington DC.
- WORLD BANK, 2011, *Green Bond Fact Sheet*, Treasury, World Bank, Washington DC.
- WOOD, D. & GRACE, K. 2011, *A Brief Note on the*

Global Green Bond Market, Initiative for Responsible Investment, Harvard University, Cambridge, Massachusetts.

