Economics of forest and forest carbon projects

Translating lessons learned into national REDD+ implementation

UNEP RISØ CENTRE
ENERGY, CLIMATE AND SUSTAINABLE DEVELOPMENT

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January, 2013

This report can be downloaded from www.uneprisoe.org

ISBN: 978-87-92706-66-9

Grapic design: Kowsky / www.kowsky.dk

Acknowledgements

This publication draws on lessons learned by project activities in the forest sector in Latin America, Africa and Asia. We are thankful for the support of the project developers and their partner institutions and individuals. Their support was fundamental in preparing this publication. The study and the printing of the report was funded by the UN-REDD Programme.

We would like to express our special thanks to Vera Franken for her valuable contributions to the financial analysis conducted in the different case studies presented in this report and also for her contributions to the theory content included in the chapters four and five of the present study.

We would also like to thank our colleagues at the UNEP Risø Centre, especially Sudhir Sharma and Xianli Zhu (URC) for their valuable input and comments and Mette Annelie Rasmussen for her irreplaceable support during the layout process.

Furthermore, the publication benefitted greatly from comments and suggestions by Ravi Prabhu and Niklas Hagelberg of the UN-REDD Programme and James Verner and Françoise d'Estais of UNEP.

We want to thank Ejti Stih for providing us her beautiful paintings for the layout of this publication.

Finally, we thank Miriam Hinostroza for her valuable support and thoughts throughout the publication process.

Contents

Foreword

The financial implications of implementing a new forest management paradigm have not been well understood and have often been underestimated. Resource needs for e.g., stakeholder consultation, capacity building and addressing the political economy are seldom fully accounted for in the resource needs estimates put forward in connection to REDD+. This report investigates the economics of implementing forest and REDD+ projects through eight case studies from Africa, Latin America and Asia, analyzing real forest and REDD+ investments.

The report is part of efforts to share financial experiences and lessons learned with policymakers, project developers and stakeholders, with the objective to inform forest project and strategy development. It presents experiences and advice on the risks, costs and revenues of forest projects, thereby informing not only the development of future REDD+ initiatives but also the testing of advanced market commitments as a finance option for sustainable forest management.

The findings in the report underline the fact that only through sound and transparent financial information will forest projects and national forest initiatives become interesting for private financial institutions and comparable with other investment opportunities. It is therefore important to include robust analysis of the operations business case and its financial attractiveness to commercial investors, early in the design process.

Sylvie Lemmet
Director
UNEP, Division of Technology,
Industry and Economics (DTIE)

As for the economics of forest and forest carbon projects, it appears that REDD+ payments alone, especially at current prices, will not deliver the revenues that cover all expenses of transparent and long-term mitigation of forest carbon emissions. Instead the findings underline the importance of building up forest operations which effectively manages risk and delivers several revenue streams.

These findings are aligned with the advocacy efforts of UNEP and the UN-REDD Programme on multiple benefits and the combination of various funding and revenue streams. Only through this wider approach can our management and utilization of forest resources be ensured to deliver long-term benefits to national development, local livelihoods and climate change adaptation and mitigation efforts.

A transformation towards a low carbon green economy is also likely to present new market opportunities. While building on the traditional forest revenue streams (trade in timber and non-timber forest products) the emerging trade opportunities should also be included in the business model. As the demand for traditional forest goods is increasing and a green economy creates demands for new services, goods and solutions, it is foreseeable that with the right enabling conditions from the public sector, much more private sector investment will be directed towards forests in order to capitalize on a green economy.

Ibrahim Thiaw
Director
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Policy Implementation (DEPI)

Abbreviations

A/R	Afforestation/Reforestation
CSR	Corporate Social Responsibility / Corporate Sustainability and Responsibility
ERPA	Emission Reduction Purchase Agreement
FAO	Food and Agriculture Organization of the United Nations
GEF	Global Environment Facility
GHG	Green House Gas
HAP	Afforestation with Hazelnut Plantation in Western Georgia
HCPF	Holistic Conservation Programme for Forests
IFM	Improved Forest Management
IRR	Internal Rate of Return
JI	Joint Implementation
MPRP	Merang Pilot REDD+ Project
MRV	Monitoring, Reporting and Verification
NGO	Non-Governmental Organization
NPV	Net Present Value
ODA	Official Donor Assistance
OTC	Over-The-Counter
PDD	Project Design Document
PES	Payments for Environmental Services
PIN	Project Idea Note
REDD+	Reducing Emissions from Deforestation and forest Degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries
VCS	Verified Carbon Standard
UNFCCC	United Nations Framework Convention on Climate Change
UNEP	United Nations Environment Programme
UN-REDD	The United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
URC	UNEP Risø Centre

Executive summary

Addressing the degradation and loss of tropical forests is one of the central elements in the debate over climate change mitigation. Despite the progress made by the United Nations Framework Convention on Climate Change (UNFCCC), historically only afforesta-tion/ reforestation activities were recognized as part of the Clean Development Mechanism. However, since 2005, negotiations on REDD+ have made important progress. Since the Bali Action Plan, REDD+ has gained significant momentum as a financial mechanism to compensate countries for reducing their emissions from deforestation and forest degradation.

This report, "Economics of forest and forest carbon projects - Translating lessons learned into national REDD+ implementation", draws on lessons learned from the analysis of eight forest carbon projects. The aim of the report is to advise policymakers and project developers on how to structure their REDD+ national strategies, especially those related to attracting private and/or public investments.

Access to financing remains the fundamental challenge to implementing forest carbon projects. The case-study projects that were selected for this report include private and publicly funded projects from Africa, Asia and Latin America. This study evaluates the institutional roles, frameworks, agreements, and investment criteria which enables project implementation, in order to identify the prerequisites for attracting investors. The findings of the report contribute to building knowledge about costs related to forest project life cycles and the necessary institutional setup for the shaping of future national REDD+ strategies.

KEY CONCLUSIONS

1. Experience shows that public-private partnerships offer the most successful means to attracting investment and achieving sound project management. Public investment, typically from a bi- or multilateral fund, facilitates the attraction of private investments. In this type of arrangement the investment risk is reduced because it is shared between public and private investors.

2. National REDD+ programmes, instead of individual projects, offer the greatest potential to scale up investment in REDD+. By taking into account factors related to risks, costs and revenues, national REDD+ strategies would facilitate a positive environment for sustainable forest investment and thereby help close the REDD+ financing gap. On the other hand, national REDD+ strategies could empower the financial, technical and regulatory frameworks that can facilitate and accelerate incentives to secure the funds needed for the implementation of REDD+ programmes at sub-national level.

3. To date revenues from carbon credits have been a secondary source of income for forest carbon projects. This is due to the volatility and immature state of the carbon markets. Therefore it is necessary to substantially increase the existing demand for REDD+ credits, which can only be achieved through an increase in the greenhouse gas-reduction ambitions of Parties to the UNFCCC and by securing a global agreement in which REDD+ reductions will be recognized as a compensation mechanism.

4. Financial analysis shows that forest carbon projects still do not represent attractive investment options for the private sector when compared to standard carbon projects. This is due to the large upfront investments that are required. The long periods before real returns and often modest rates of return also reduce attractiveness. Calculation and estimation of investment criteria is generally more complex for forest carbon projects than for standard projects. Evidence from the analysis of the case studies suggests that project developers need support to structure their financial proposals to secure finance. It is therefore necessary to develop international guidance on how costs and benefits can be quantified. This will make it faster and easier to evaluate the cost-benefit ratio of REDD+ investments and has the potential to spark more investments in REDD+.

5. Financial risk is a major barrier to scaling up from forest carbon projects to REDD+ national strategies. Most of the case study projects were financed through grants, as many are conducted on a pilot basis. This is mainly due to the high financial risk associated with the projects, which increases the preference of governmen-

tal and non-governmental organizations to give grants rather than loans. Moreover, it reflects the reluctance of the private sector to engage in large investments because of the high risk perception. Therefore, one of the essential means for forest carbon projects to become financially attractive is to reduce the risk-adjusted discount rate. This will improve the financial indicators of a given project, increase the likelihood of a positive Net Present Value and shorten the period until real returns are experienced. Project developers, governments, donors and other stakeholders can make use of a number of risk-reducing tools to minimize the issue of risk.

6. Local community involvement, and the distribution of benefits at local level helps to secure a project's long-term sustainability. Most of the case projects were designed through a transparent process which included participatory workshops and policy consultations in order to guarantee the involvement and commitment of all the local stakeholders. Experience shows that it is also important to establish a solid and participatory mechanism to redistribute project income to local stakeholders and communities involved in forest carbon projects or programmes. Part of the financial resources generated by forest carbon projects are, in most cases, allocated as payments for environmental services to the participating communities. This turns into concrete and direct benefits including access to clean water, healthcare, information, productive activities and other welfare improvements for some of the most marginalized and vulnerable populations in the world, who are dependent on the forest for their survival.

1. Background

1.1 INTRODUCTION

The significance of REDD+ in climate change mitigation is increasingly recognized both in policy, private sector and science communities. In order to realize this potential it is essential to address the question of how to effectively attract transformative private-sector and public-sector investments in implementing REDD+ mitigation activities. By transformative we mean promoting a "step-change" in the way forests are managed, from more consumptive uses of ecosystem services (including carbon, i.e. higher carbon) to lower negative impact patterns with the creation of alternative livelihoods, jobs and enterprises. While afforestation and reforestation (A/R) projects are eligible for generating carbon credits under the CDM, only the voluntary carbon market is currently available to transact a wide range of REDD+ projects (including avoided deforestation and forest degradation, forest conservation, sustainable forest management and A/R).

Reducing GHG emissions from deforestation and forest degradation and enhancing sequestration by forests have been identified by both the Eliasch (2008) and Stern (2006) reports as two of the most cost-effective tools at our disposal to stabilize GHG concentrations in the atmosphere, while maintaining and enhancing the economic, social and environmental contributions of forests to our economies.

The international community has made significant progress towards an international REDD+ framework over the last few years. If open questions such as how to finance REDD+ activities can be resolved, an agreement could be within reach. Lessons learned from the financing of current and past forest projects will be crucial in this process. In order to identify and build knowledge about costs connected to forest project life cycles and how the private sector can best contribute to future REDD+ and related project financing, it would be important to have a clear picture of how forestry projects and activities, including REDD+, have been financially managed so far. Also, carbon finance and especially the CDM have, over the last five years, evolved into an innovative financial market through which the flow of financial resources from developed countries to developing countries has helped to reduce GHG emissions. However, there has been limited progress with CDM projects in the forest sector. It is therefore crucial that existing lessons are made available to inform and help develop REDD+ activities and forest investments in developing countries, especially where forests could provide a high potential contribution to mitigation and national development aspirations.

Against this background, this technical report sets out to provide policymakers, financial sector stakeholders and project developers with an informational entry point to the development of transformative national REDD+ strategies and their implementation. The report builds on a number of case studies distributed between the African, Latin American and Asian continents. These case studies represent both private and public funded projects.

The technical report's main objective is to draw lessons related to the risks, costs and revenues faced by project activities from the forest sector (CDM, A/R, REDD+, IFM, conservation, PES). The emphasis of the report is on analyzing real-world forest investments, including those in REDD+, drawing on experiences from forest carbon projects. Especially, it aims to identify and build knowledge about cost connected to forest project life cycles and on how the private sector can best contribute to future REDD+ and related project financing based on existing efforts on the ground. This is especially pertinent in the light of REDD+ as a future financing mechanism under the possible UNFCCC post-2012 Agreement.

However, before turning to the analysis of financial costs and GHG emission reductions of forest carbon projects, this chapter introduces the evolvement of REDD+ in the international negotiations, examines the existing funding opportunities for forest carbon projects and provides an overview of existing forest carbon projects. This publication looks at the challenges – both financial and institutional – that accompany the proposed scale-up of forest carbon projects.

1.2 OVERVIEW OF THIS REPORT

This report is organized as follows:

Chapter 1 describes the theory behind the shaping of a REDD+ framework. It introduces the development and current state of the international climate negotiations on REDD+ as a future mitigation mechanism. This section also contains an overview of the possibilities for financing forest carbon projects.

Chapter 2 describes the methodology used in the study and presents the eight forest carbon projects selected as case studies for the report.

Chapter 3 discusses the projects' institutional set-ups and stakeholder involvements, including how stakeholders have contributed to the development of the projects in their different phases. It also aspires to explain how the project developer identified investors and how, if any, stakeholder consultations were incorporated in the project phases.

Chapter 4 is concerned with the financial aspect of forest carbon projects. It aims at illustrating the key financial issues for investors and project managers, using theory and providing empirical examples from the case study projects. It furthermore tries to uncover why a financing shortage exists.

Chapter 5 analyzes the role that risk plays in getting finance for forest carbon projects. Risk is a prominent factor in why the private sector is reluctant to invest in REDD+ initiatives. This chapter tries to address this problem by presenting tools and actions to reduce risk.

Chapter 6 reports on the potential sustainable development contributions of the case projects. A portion of the financial resources generated by forest projects will, in most cases, be paid for environmental services to the participating communities in the project area and hence have concrete side-benefits in terms of welfare improvements in addition to the generated carbon benefits.

Chapter 7 presents the main lessons learned and provides suggestions on how to move forward in order to enable REDD+ initiatives. Governments from developing and developed countries play a crucial role in the success of REDD+ efforts to combat deforestation. This chapter's key message is to scale up REDD+ initiatives from individual projects to national programmes to increase visibility, funds and actual positive impacts in the form of deforestation reductions and local community benefits.

1.3 FRAMING REDD+

1.3.1 The story of the negotiations in the UNFCCC

The international community already made a few steps towards what is now called REDD+ when it mentioned the protection and enhancement of sinks, sustainable forest management and afforestation/reforestation in the Kyoto Protocol in 1997 (UNFCCC, 1998). However, the Marrakesh Accords, adopted at COP7 in 2001, allowed only afforestation/reforestation projects to be eligible under the CDM (UNFCCC, 2001). This was a significant setback for REDD+ activities, as it meant that only afforestation/reforestation projects could generate carbon credits that industrialized countries could buy to meet a part of their targets under the Kyoto Protocol. REDD+ projects were therefore limited to the voluntary carbon market, which was (and still is) considerably smaller than the compliance market.

REDD+ came back to the UNFCCC negotiations in 2005, when a group of countries lead by Papua New Guinea and Costa Rica proposed to include it in the agenda at COP11. In fact, the concept they introduced was limited to reducing emissions from deforestation, so it was "RED" rather than REDD+ (UNFCCC, 2005).

Negotiations quickly gathered momentum and two years later, COP13 agreed on the Bali Action Plan, which served as a basis for REDD+ negotiations in the subsequent years. In the plan, the parties to the UNFCCC called for "policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries" (UNFCCC, 2007a). In order to reflect this

broadened scope of potential activities, parties started using the term REDD+. This scope was reinforced in the subsequent years of negotiations. In a separate decision the COP also encouraged countries to explore a range of actions, including demonstration activities, to address the drivers of deforestation relevant to their national circumstances (UNFCCC, 2007b).

In the phase leading to COP15 in Copenhagen in 2009, REDD+ negotiations advanced well. Consequently, despite stopping short of reaching an agreement, the Copenhagen Accord recognized the crucial role of REDD+ (UNFCCC, 2009), which was underlined by a pledge from developed countries of US$3.5 billion for immediate steps towards REDD+. In addition, parties issued a draft text addressing REDD+ relevant issues such as the scope and principles guiding REDD+ and how to monitor, report and verify (MRV) on REDD+. The draft also proposed a phased approach to REDD+: countries would start with "readiness" activities, e.g. develop national REDD+ strategies while strengthening their capacity to MRV on REDD+. Then they would gradually move towards a performance-based mechanism where compensation is paid for quantified emission reductions (UNFCCC, 2010a).

However, Copenhagen left several issues unresolved, such as whether a market mechanism should be used to finance REDD+ activities (potentially using elements of the CDM as an orientation), or whether a fund-based approach would be more preferable.

COP16 2010 in Cancun, once again, did not lead to an agreement on a comprehensive international REDD+ framework. However, COP16 Decision 1/CP.16 (UNFCCC, 2010b) does include a chapter on REDD+. To a large extent, this chapter reflects and refines the Copenhagen draft, e.g. confirming that REDD+ should be implemented in phases. It also requested that REDD+ strategies and reference levels should be primarily developed at a national level.

Negotiations continued at COP17 in Durban, resulting in a decision on the reporting of safeguards in terms of emission reference levels and MRV (UNFCCC, 2011). However, although progress was made on the technical aspects of how to measure emission reductions from forestry activities, it is still up to individual governments on how they report on these safeguards. Furthermore, the major issue on defining a financial mechanism was postponed until 2012. In the absence of any complete decision on long-term finance, forest carbon markets are still faced with a large amount of uncertainty and the EU has also announced that it will not consider the inclusion of REDD+ into the ETS before 2020 (European Commission 2011).

1.3.2 Moving REDD+ from the sub-national to the national level

One of the most contentious topics in the negotiations has been on the question of the right scale of REDD+ initiatives. Should they best be incentivized at the sub-national scale, at the national scale or maybe both?

In recent years, many REDD+ initiatives have been developed on the sub-national scale and registered in the voluntary carbon market (Calmel et al., 2010). The sub-national scale functions similarly to the approach developed under the CDM: successful REDD+ projects or programmes are directly rewarded with international carbon credits. Proponents of this approach argue that many private sector investors like the tangible results and limited scope of projects (Angelsen et al., 2008a), so attracting REDD+ investment could be easier that way. This argument receives a lot of attention given the significant REDD+ financing gap that will need to be closed as quickly as possible.

Nonetheless many of the negotiating countries propose to incentivize activities at the national level. This means that countries would develop national reference levels for emissions from their forests as well as national MRV systems. In case of a successful reduction of country-wide emissions, it would be the respective government, not local actors, which would be rewarded with international carbon credits. The government could then opt to use a part of the corresponding revenues in order to incentivize stakeholders at the project level. Proponents of this approach argue that within a country-wide system, it is easier to detect and account for "leakage" of emissions caused by a particular activity within that system. The national approach could also help generate

country ownership and facilitate the development of integrated nation-wide REDD+ strategies that correspond with countries' other sustainable development policies (Angelsen et al., 2008b). Correspondingly, COP16 requested countries to develop national forest reference emission levels. However, as an interim measure, sub-national forest reference emission levels could also be developed if appropriate (UNFCCC, 2010b).

In 2007, a third option was proposed which has since received a lot of support (UNFCCC, 2007c). This option, called a nested approach, aims at combining the two approaches: both national and sub-national REDD+ initiatives could account for and receive international carbon credits. The key characteristic of this proposal is its flexibility. Countries can develop REDD+ initiatives at either of the two levels when they are ready to start doing so. For example, a given country might not yet have its national REDD+ strategy and infrastructure in place. In such a case, under a nested approach, sub-national initiatives could be implemented and rewarded while the country develops its national infrastructure in parallel. Countries would be obliged to eventually move to a fully operational national level, but sub-national initiatives could continue even after this move had taken place. Any credits issued to a successful sub-national initiative would then be deducted from the credits the government received for country-wide emission reductions. Consequently, sub-national and national emission reference levels would need to be coherent (Pedroni et al., 2010). The advantage of this approach might be the possibility to take REDD+ action immediately and attract private sector investment while at the same time creating ownership by national governments.

Whichever approach will ultimately be followed, REDD+ activities at the project level will be important, not only because of expected synergies between the work at the different levels, but also because deforestation will often need to be addressed locally. The real-world success factors and challenges of REDD+ projects can therefore play an important role in informing the development of national strategies, thereby ultimately increasing their effectiveness. The functioning of national strategies, in turn, can be tested at the project level.

Within that context, the financing of REDD+ projects will be a key element. What are the right conditions to attract project financing? What are the risks, costs and revenues linked to project development? By taking these and other factors into account, national REDD+ strategies could facilitate a positive environment for sustainable forest investment and thereby help close the REDD+ financing gap.

1.4 OVERVIEW OF EXISTING FOREST CARBON PROJECTS

Currently, more than 50 developing countries and economies are in transition to participate in programmes such as the United Nations Collaborative Programme on REDD (UN-REDD) or REDD readiness programmes under the World Bank's Forest Carbon Partnership Facility (FCPF) to improve their ability to implement REDD+ activities. Several databases keep track of projects related to forest carbon. Overall, approximately 300 different forest carbon projects are registered. The main share of the projects are located in Latin America, which contributed more than half of the credits that were contracted for in 2010 (Diaz et al. 2011), almost all of which came from projects in Peru and Brazil. Looking at the demand side, European buyers are the largest source, purchasing credits from Latin America, Asia and Africa. The credits generated in Africa remain relatively limited in terms of global supply. Besides, international trade indicates that buyers are inclined to buy credits locally (Diaz et al., 2011).

The Forest Carbon Portal lists 244 forest carbon projects under "Operational projects", including afforestation, reforestation, REDD+, Improved Forest Management, agriculture land management, re-vegetation with grass/scrubs, wetland and peat land management. "Operational projects" refer to projects that have completed a transaction of carbon credits or have been validated under offset standards. The FAO administered Agriculture Forestry and Other Land Use Mitigation Project Database, which aims to gather information about all mitigation activities currently ongoing within the forestry and agriculture sector (FAO, 2011), have 177 projects listed under forestry and accordingly in sub groups re-

ferring to REDD+, afforestation and reforestation. The CDM Pipeline, Analyses and Database run by the UNEP Risoe Centre is a database containing all CDM and JI projects sent for validation/determination (UNEP Risoe Centre, 2012). It has seven afforestation projects and 32 reforestation projects registered under CDM. So far, tCERs have only been issued to two CDM reforestation projects. In a stock-take from the state of the forest carbon market 2010 Diaz et al. (2011) identified 241 operating A/R projects and 40 REDD+ projects. The 40 REDD+ projects were shown to have contributed as much as 33 per cent of the transacted credits in the voluntary OTC offset market, and this has only grown in reason years. In 2010, REDD+ projects represented 67 per cent of the tCO_2e available on the OTC market, or 19.5 $MtCO_2e$ out of a total of 29.0 $MtCO_2e$ (Diaz et al., 2011), compared to 2009 where REDD+ represented 44.5per cent or 9.0 tCO_2e out of a total of 20.3 $MtCO_2e$. This shows an increase in the amount of tCO_2e transacted and offered on the market, but also constitutes a drawback for A/R projects, compared to IFM and REDD+ (Hamilton et al. 2010).

The number of projects identified by Hamilton et al. (2010) is very similar to the number of projects registered in the two databases by FAO (2011) and Ecosystem Marketplace (2011). The magnitude of transacted credits which the REDD+ projects are responsible for as mentioned by Hamilton et al (2010) and Diaz et al. (2011) are interesting when compared to a statement by Olander and Ebeling (2011). Olander and Ebeling (2011) said that most investors look for projects that have the capacity of offering 10,000 – 20,000 tonnes of CO_2e reduction per year, meaning that many projects have difficulties in meeting the demands of investors if they are covering less than a few thousand hectares, which is especially the case for A/R projects that are using slow-growing tree species. This could indicate that there are huge benefits to be found for projects offering 10,000 – 20,000 tonnes of CO_2e reduction per year. Still, experiences and lessons learned are limited as many of these projects are still in the early stages.

1.4.1 Financing forest carbon projects

Financing of REDD+ is a major concern for developing countries. In its preamble, decision 2/CP 13 states that "sustainable reduction in emissions from deforestation and forest degradation in developing countries requires stable and predictable availability of resources" (FCCC/CP/2007/6/Add.1). Funding for forest carbon projects in developing countries flows mainly from three sources: public funds, private investments and a mixture of public and private funds.

Public funds

Eliasch (2008) identified three main activities for which public funds should be available:

- demonstration activities
- up-front investments in major programmes
- kick-starting early action and test crediting mechanisms

Public financing will need to be made available when countries have limited access to financing up-front investments, for example if a country has risk profiles impeding private sector investments. Public funding, whether it is donated or lent, should be made available with the aim of establishing institutions and implementing a number of activities to attract private sector investments to enable countries' access to international carbon markets in the medium term (2020 and beyond). A number of commitments for public funding have already been made by donors and dedicated fund streams for reducing forest emissions are also being created.

The magnitude of public funds creates a substantial need for effective coordination, where the design and governance of funds should build on equal participation by developed and developing nations' official representatives. It should also consider the views of indigenous and forest communities. A coordinated approach is already taken by a number of donor countries, who are pooling funds within multilateral mechanisms. Both the UN and the World Bank play vital roles in the overall coordination and should work closely together to ensure harmonized and coordinated support. For example, the UN-REDD Programme works closely with the Forest Carbon Partnership Facility (FCPF) and the Forest Investment Program (FIP) in order to streamline support to national REDD+ strategies in addition to its collaboration with the UN Forum on Forests (UNFF), the Global Envi-

BOX 1 | Public funding for reducing forest emissions

United Kingdom

The International Climate Fund (ICF), a UK initiative, is an across-departmental fund established by the UK 2010 Comprehensive Spending Review which amounts to almost £800 million. It is planned that the International Climate Fund will account for 7.5 per cent of UK Official Development Assistance (ODA) by the end of the Spending Review period (2014-15). One of the main objectives is to support sustainable forest management and the right financial incentives to avoid deforestation. Additionally, the UK allocated £50 million to the Congo Basin Forest Fund (CBFF) and £15 million to the Forest Carbon Partnership Facility (FCPF) (Climate Funds Update, 2011).

Norway

Norway's International Climate and Forest Initiative, amounting to up to £330 million a year, is targeted towards efforts to reduce greenhouse gas emissions from deforestation in developing countries. The financial contributions aim to assist to the development of the REDD agenda through research and the demonstration of possible solutions for REDD +. As part of the funding, Norway contributes to the UN-REDD programme and several funds and facilities hosted by the World Bank, African Development Bank and others. Much of this support is channeled through Norad, the Norwegian ODA (MoE Norway, 2011).

Australia

Australia's $200 million International Forest Carbon Initiative is administered by the Australian Department of Climate Change and AusAID. The initiative is working to build capacity and provide momentum to support inclusion of REDD+ in a post-2012 global climate change agreement. The initiative is collaborating with the World Bank, Centre for International Forestry Research (CIFOR) and others.

Germany

The funds from the German International Climate Initiative (ICI) primarily flow into bilateral projects. The initiative provides financial support to international projects supporting climate change mitigation, adaptation and biodiversity projects with climate relevance. It aims to ensure that such investments will trigger private investments of a greater magnitude. In 2011, 28 REDD+ projects were financed for a total amount of €63 million.

ronment Facility (GEF), the UN Framework Convention on Climate Change (UNFCCC) and the International Tropical Timber Organization (ITTO). A number of the multilateral arrangements are described in Box 2.

In spite of large coordination tasks of the bilateral and multilateral funds undertaken by the UN and the World Bank, a country-led approach is essential. As noted by Eliasch (2008), the mechanisms should still allow recipient countries to select their delivery partners, such as regional development banks, NGOs, bilateral implementing agencies or private-sector organizations.

Private investment

Private finance of forest carbon projects is still in the early stages. Nevertheless, as a complement to purchasing and trading forest carbon credits, private sector investors may prefer to invest through other financial mechanisms including loans, bonds and leverage of finance from the insurance industry.

If engagement is sufficiently attractive and the risks can be effectively mitigated or avoided, the private sector would be more likely to invest in REDD+. O'Sullivan et al. (2010) outline the risks (see Table 1) as being close to those which governments face when implementing

BOX 2 | Multilateral funding for reducing forest emissions

The Climate Investment Funds

The Climate Investment Funds (CIF) are a unique pair of financing instruments designed to pilot what can be achieved to initiate transformational change towards low-carbon and climate-resilient development through scaled-up financing channeled through the Multilateral Development Banks (MDBs). Donor countries have pledged over US$6 billion to the CIF.

The Strategic Climate Fund (SCF) is one of the two funds of the CIF. It serves as an overarching framework to support three targeted programmes with dedicated funding to pilot new approaches with potential for scaled-up, transformational action aimed at a specific climate change challenge or sectorial response. One of these targeted programmes is the Forest Investment Program (FIP), approved in May 2009. FIP aims to support developing countries' efforts to reduce emissions from deforestation and forest degradation by providing scaled-up financing for readiness reforms and public and private investments. It will finance programmatic efforts to address the underlying causes of deforestation and forest degradation and to overcome barriers that have hindered past efforts to do so.

UN-REDD

The UN-REDD Programme is the United Nations collaborative initiative on Reducing Emissions from Deforestation and forest Degradation (REDD) in developing countries. The Programme was launched in 2008 and builds on the convening role and technical expertise of the Food and Agriculture Organization of the United Nations (FAO), the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP). The UN-REDD Programme supports nationally-led REDD+ processes and promotes the informed and meaningful involvement of all stakeholders, including Indigenous Peoples and other forest-dependent communities, in national and international REDD+ implementation.

The Programme supports national REDD+ readiness efforts in 46 partner countries, spanning Africa, Asia-Pacific and Latin America, in two ways: (i) direct support to the design and implementation of UN-REDD National Programmes; and (ii) complementary support to national REDD+ action through common approaches, analyses, methodologies, tools, data and best practices developed through the UN-REDD Global Programme. By July 2012, total funding for these two streams of support to countries totaled US$117.6 million (UN-REDD, 2012).

Global Environment Facility (GEF)

Since its inception in 1991, the Global Environment Facility (GEF) has financed over 300 projects and programmes focusing on forest conservation and management in developing countries. The total GEF allocation to forest initiatives during this period amounts to more than US$1.6 billion, leveraging US$5 billion from other sources. Since 2007, the GEF has increasingly provided resources for pilot projects focusing on REDD+, with a focus on fostering cross-sectorial cooperation. Pooling investments from different GEF focal areas has proven a valuable tool for harmonizing interventions and maximizing co-benefits from REDD+. For its fifth replenishment cycle (2010-2014), the GEF has further strengthened its commitment to REDD+ financing (GEF, 2011).

Forest Carbon Partnership Facility

The Forest Carbon Partnership Facility (FCPF), which became operational in June 2008, is a global partnership focused on REDD+. The FCPF assists tropical and subtropical forest countries develop systems and policies for REDD+ and provides them with performance-based payments for emission reductions. Thirty-seven REDD countries (14 in Africa, 15 in Latin America and the Caribbean and eight in Asia and the Pacific) have been selected in the partnership. The FCPF cooperates closely with other initiatives, in particular the UN-REDD Programme and the FIP.

TABLE 1 | Private sector risk and mitigation options for REDD+ investments

Risk to private Sector	Risk assessment	Risk mitigation
International REDD+ policy risk: An international REDD+ mechanism does not enter into force.	Are there investors that commit in the absence of an international legal framework? Does investment depend on the generation and delivery of compliance grade REDD+ credits?	Contractual arrangements which define the obligations of the parties in the absence of an international REDD+ mechanism. Definition of REDD+ proxies that could serve as a substitute of REDD+ credits (for government buyers).
REDD+ eligibility risk: Eligibility to participate in a REDD+ mechanism.	Evaluate the respective REDD+ countries' status in meeting eligibility criteria. Continuously monitor relevant eligibility criteria. Evaluate the various REDD+ countries institutional capacity.	Ensure that capacity and funding for achieving and maintaining eligibility is in place. Check there is sufficient funding in the national REDD+ implementation to maintain eligibility. Establish warning systems if a country is likely to lose eligibility. Obtain a guarantee from the World Bank or developed country governments.
Government implementation risk: Failure to implement national REDD+ policies and measures.	Appraise policies and institutions including history and performance. Assess governance and capacity risks.	Design of REDD+ mechanism. Guarantees and insurance.
Market risk: Low price in REDD+ credits.	Develop a carbon strategy factoring different prices and timing in purchasing and selling REDD+ credits.	Negotiate appropriate price structures that reduce exposure to price volatility.

Source: O'Sullivan et al. (2010)

REDD+ policies, such as government liability if the country fails to perform; institutional requirements and obligations; and ownership, issuance, and distribution of credits. Therefore, O'Sullivan et al. (2010) propose that solutions to managing risk from the public and private perspective can be devised along the same lines.

A mixture of public funds and private investment

Considering the risks related to investments in REDD+ faced by private investors, their current unwillingness to bear the costs of, for example, non-delivery of emission reductions from a forest programme, is understandable. One option to accommodate this is to use public funding in the short term to act as a guarantor, bringing down the cost of liabilities for the private sector, until the market grows large enough to cover such costs itself (Eliasch, 2008). Such an initiative, combining private and public funding, will also contribute to ensure a price signal which reflects the credibility of potential forest project countries. One of the efforts, which contributes to the public-private finance schemes of forest carbon projects is the FCPF (see Box 2), which assists tropical and subtropical forest countries develop the systems and policies for REDD+.

Villagers living around protected area. Holistic conservation Programme for Forests in Madagascar. Site of Andapa. Photo: WWF-Canon/M. Harvey

2. Methodology

This report is designed to provide information on the risks, costs and revenues faced by carbon projects from the forest sector (CDM, A/R, REDD, IFM, conservation, PES), in addition to useful lessons on stakeholder involvement, institutional organization and potential sustainable development benefits. The analysis is primarily based on data collected from forest carbon project developers and covers private, public and a combination of private-public financed projects.

The aim was to encounter projects that are outstanding in the field of forest carbon as innovative business models that can assist in highlighting the opportunities of attracting finance through a REDD+ framework to a wide range of developing forest regions. Based on this, project-level data were collected through questionnaires answered by project representatives. As a first stage, more than 50 projects were identified and contacted with the purpose of informing project developers about the objective of the technical report and inviting interested projects to participate. The criterion for participating projects was outlined as follows.

- The project and its business partners should be willing to provide the requested information.
- The projects should have private, public or business sector involvement.
- The project should be a forest carbon project, i.e. REDD+, afforestation/reforestation (A/R), CDM activity, improved forest management (IFM), conservation of forest areas or payment for ecosystem services (PES) or alike.
- The projects should indicate social and other local sustainable development impacts, i.e. capacity building, locally-sourced labour etc.

Projects which responded positively to the invitation of participating in the report were invited to send a letter of motivation. After receiving the cover letter, interested project developers were sent a brief questionnaire requesting very basic information. The basic questionnaire treated the following subjects: whether the project was financed by private or public funding; stakeholder involvement and engagement and activities and technologies applied by the project.

Based on a review of the basic questionnaire, eight projects from an equitable regional distribution were selected as case studies. The selected forest carbon projects all represent distinct examples of mitigation activities with different standards and methodologies. The project developers of selected projects were then provided with an in-depth survey, which included questions regarding:

- Basic project information
- GHG calculations, methodology and standards
- Finance
- Institutional and financial agreements
- Main barriers for the project
- Sustainable development impacts

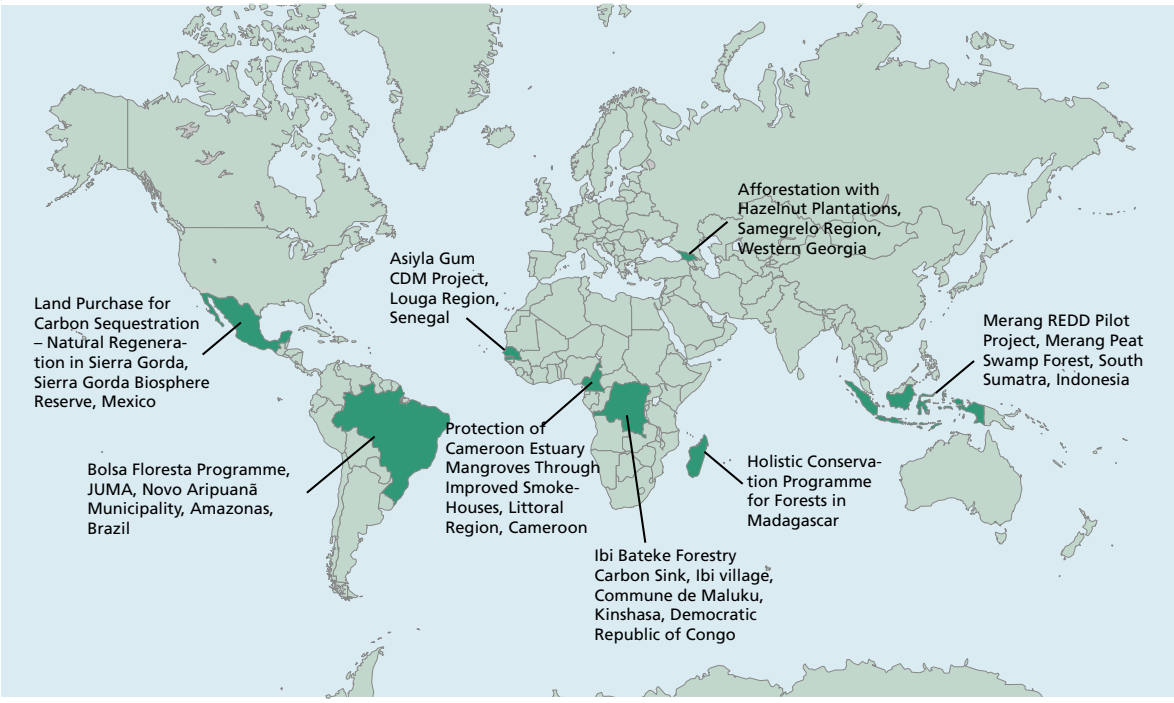
The in-depth surveys were followed up by interviews with project developers and their business partners. If needed, the project developers provided additional information, i.e. PDDs, PINs, available reports etc. Additional data sources are referenced throughout the report where appropriate.

The financial data is presented in the report in an aggregated manner or anonymously to prevent attribution to individual respondents. In cases where data is presented that identifies specific organizations, all information has been confirmed and approved by the concerned project or was made publicly available.

2.1 INTRODUCTION TO SELECTED CASE STUDIES

The following section presents a brief description of the eight selected case studies, summarizing the design, objectives and strategies of each project. These projects have in different ways resulted in climate change mitigation along with valuable community and biodiversity benefits. The following chapters will explore the financial and institutional structures of each project and present lessons learned which can contribute to the implementation of REDD+ strategies and activities, as well as to raise visibility of forest carbon projects as an investment opportunity. Additional project details are outlined in Annex 1.

FIG. 1 | Overview of the geographical locations of the eight forest carbon projects selected for the study



Case Project 1: Asiyla Gum A/R CDM Project (Senegal)

Case Project 1 is a reforestation on degraded lands project. The objective of project activity is the plantation of gum trees (Acacia senegal) on more than 20,000 hectares of degraded land in the Sahelian zone of Senegal. The project aims to increase the Arabic gum production in Senegal as well as promote ecosystem rehabilitation through reforestation efforts. Its implementation is also expected to create stable employment opportunities for rural communities as well as offering opportunities to grow food crops on the acacia plantations and provide grazing areas for livestock (CASCADe, 2011). All seedlings used for reforestation are derived from local production in nurseries managed by project staff and operated by local residents. The project is expected to contribute to the export of Arabic gum, which has been identified as a strategic area of economic development by the Senegalese government.

The project activities started in 2005 with a plantation on 5,500 hectares during the pilot phase and the project is already operational (CASCADe, 2010). During its second phase, the remaining 14,500 hectares will be planted up until 2023 and the project is expected to sequester 715.895 tCO_2e in total over a 30 year crediting period (PDD(1), 2010).

Case Project 2: Ibi Batéké Forestry Carbon Sink (Democratic Republic of Congo)

The Ibi Batéké Forestry Carbon Sink is an A/R CDM project aimed at converting 4,220 hectares of degraded savannah land into forest plantations for sustainable fuelwood supply and agricultural crops, mainly cassava. The project is located on the Batéké plateau in the Democratic Republic of Congo and is implemented by NOVACEL, a private company founded and managed by natives of the region. It offers an opportunity to reduce degradation and deforestation while alleviating poverty through local employment enhancement and

community development activities. Afforestation with acacia, eucalyptus and pine trees and subsequent CO_2 sequestration allows the project to generate carbon credits of both CDM and VCS standard. ERPAs have been signed with the World Bank's BioCarbon Fund for the purchase of 500,000 CERs to be generated by 2017 as well as with the French company Orbeo and Danone (PDD(2), 2010). Upfront project financing has been facilitated through investment granted by Suez and Umicore (at a very low interest rate of 0.5 per cent), securing long-term loans. Carbon credits have provided benefits to the communities through the construction of a school providing education to local children and a free health centre (Chenost & Mushiete, June 2011). The project is considered an integral part of a local sustainable development strategy in the Democratic Republic of Congo (Topa, 2009).

Case Project 3: Protection of Cameroon estuary mangroves through improved smoke houses (Cameroon)

The project is aimed at promoting sustainable utilization, management and conservation of the Cameroon mangrove ecosystems as fisheries support systems and buffers against climate change impacts. These objectives are to be achieved through the use of energy efficient fish-smoking houses in the Douala-Edea mangrove forest within the Cameroon Estuary (PDD(3), 2010).

Fish smoking and fish processing activities are one of the main drivers for degradation and loss of mangroves in the region. The project consists of significantly improving traditional smoke houses, thereby helping local communities to smoke fish in a more efficient way. As the smoke houses are mainly fuelled by mangrove wood, the improved technology also reduces the pressure on the unmanaged mangrove wood resources by indirectly reducing deforestation and degradation of the Douala-Edea mangrove forest. The project will be implemented in nine villages located near the mangrove area before 2014 (PDD(3), 2010). A single improved smoke house system will save between 18.71 and 34.16 tonnes of CO_2e per year. The whole project activity is expected to sequestrate the emissions of 90,234 tonnes of CO_2e during the 10 years crediting period (2010-2020) under the CDM (CASCADe, 2010).

Case Project 4: The Holistic Conservation Programme for Forests (HCPF) (Madagascar)

The Holistic Conservation Programme for Forests (HCPF) is a REDD+ pilot project initiated in 2008 that is contributing to the development of the national REDD+ strategy for Madagascar (BasicQuestionnaire(4), 2011). Its main goals include:

- Improving knowledge on effective and verifiable measure of the impact of field activities and strategies to reduce GHG emissions.
- Increasing the living conditions of local communities through management transfer and the development of sustainable agricultural practices.
- Fully integrating biodiversity conservation in Madagascar.

The project, which covers an area of more than 500,000 hectares, is fully financed by the French Foundation GoodPlanet, with Air France as the sole sponsor, and is implemented in the field by WWF Madagascar (BasicQuestionnaire(4), 2011). It has been funded as a grant scheme to avoid any risks related to non-delivery of carbon credits. The project developers are therefore not currently considering selling any potential carbon credits generated from the activities. Instead, the project is oriented towards testing research options and developing a forest carbon methodology for Malagasy forests.

Case Project 5: Afforestation with hazelnut plantations in Western Georgia (HAP) (Georgia)

The objective of the project is to sequester carbon and halt ongoing degradation of abandoned tea plantations in the poor rural Samegrelo region near the Black Sea coast, Georgia, through sustainable forest plantation with hazelnut production (PDD(5), 2011).

The region where the project is implemented has excellent economic potential, however investment is currently hampered by political instability and armed conflict risks. After the collapse of the Soviet Union, the Samegrelo region – formerly an important producer of fruit, nuts and wine – was left with a lack of capacity, deteriorating infrastructure and uncertain land tenure issues. This led to land abandonment, slash and burn clearing for grazing and small-scale crop cultivation, deforestation and

illegal waste dumping, which altogether made financing for agricultural projects particularly difficult. Carbon finance offers new opportunities, merging the need for start-up capital with climate mitigation and ecosystem protection. By creating a permanent forest cover on previously abandoned lands, it stops ongoing degradation, replenishing soil and vegetative stocks. Furthermore, the project offers significant environmental and economic prospects, including much needed sustainable and long-term income opportunities for local communities (BasicQuestionnaire(5), 2011).

The project, which is managed by Agrigeorgia LLC, has a total eligible planting area of 2401 hectares plus an additional 250 hectares of nature conservation. The total avoided/sequestered CO_2 will amount to 550,272 tCO_2e over an accounting period of 50 years beginning in 2009 (TÜV SÜD Industrie Service GmbH, 2011).

Case Project 6: Merang Pilot REDD+ Project (MPRP) (Indonesia)

The Merang REDD Pilot Project (MRPP) aims at identifying opportunities to reduce greenhouse gas emissions and protect biodiversity through avoided deforestation and degradation in South Sumatra, Indonesia. Furthermore, the project seeks to provide pathways for implementation of forest carbon management measures in a pilot area, the Merang Peat Swamp/Dome area, and to contribute to the sustainable management of natural resources in Indonesia. The project zone, which covers an area of 24,000 hectares, comprises the largest remaining peat swamp forest in South Sumatra, contributing to large below-ground carbon storage in the peat. However, the forest is currently under great pressure from illegal logging, forest fires and the conversion of peat swamp into intensive palm oil, pulp and paper plantations.

The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) has committed to financing the project as a grant scheme (€1,445,250) for the period of 2008-2011. A second component (MRPP II) focusing on applying and implementing knowledge management began in 2009 through another budget (€625,000) from BMU (Merang REDD Pilot Projects. Status Report and Annual Work Plan III, 2011). The carbon sequestration will be running over a period of 25 years and could potentially save about 400,000 tonnes of CO_2e/year. The project's replicability is very high due to the multi-level cooperation ranging from government agencies to NGOs and single communities (Steinmann et al.).

Case Project 7: Juma Sustainable Development Reserve Project (Brazil)

The Juma Sustainable Development Reserve Project aims at addressing deforestation in the south-eastern part of Amazonas State, Brazil, an area which is currently under great pressure from land use conversion. Its implementation is part of a wide strategy planned and initiated in 2003 by the current government of Amazonas State to halt deforestation and promote sustainable development in Amazonas State, based on the valuation of the environmental services provided by its standing forests (Viana et al., 2008).

The project is being implemented by Amazonas Sustainable Foundation (FAS) with financial support from the Amazonas State Government, Bradesco Bank, Coca Cola Brazil and Marriot International. Additionally, Case Project 7 is receiving financial support from the Amazon Fund. This fund is administered by FAS through the Bolsa Floresta Programme (Viana et al., 2012). A Payment for Environmental Services programme, Bolsa Floresta, which was set up by the Amazonas State Government and financed through a partnership with Marriott International, provides financial compensation to traditional communities for undertaking measures to protect existing forests (Chenost et al., 2010). The accounting period of the project will run from 2006-2050, and seeks to prevent deforestation of 329,483 hectares of tropical forests, corresponding to an avoided emission of 189,767,027 tonnes of CO_2. The project has been validated under the Climate, Community and Biodiversity Alliance (CCBA) Certification issued by TÜV-SÜD, with the award of a Gold Quality Standard (BasicQuestionnaire(7), 2011). All carbon credits generated by the project's REDD+ component belong to FAS and are sold to Marriott Hotel customers wishing to offset the carbon emissions related to their stay, for US$1 per night (Chenost et al., 2010).

Case Project 8: Carbon Sequestration in Communities of Extreme Poverty in the Sierra Gorda of Mexico (Mexico)

The Sierra Gorda Biosphere Reserve (SGBR) is a reforestation and REDD+ project aimed at sequestering carbon in local ecosystems and avoiding future deforestation and biodiversity loss while promoting sustainable development at a community level. The reserve, which was created in 1997, covers an area of 383,567 hectares and is located in the north of Queretaro State, Mexico. The project is managed by the NGO Bosque Sustentable A.C together with Grupo Ecológico Sierra Gorda IAP, which has been developing initiatives and projects for carbon reforestation and the promotion of sustainable development in the Sierra Gorda area since 1987 (Sierra Gorda Ecological Group). The sustainability of the project is ensured through payment for ecosystem services schemes established by CONAFOR (the National Forestry Commission), with funding from the World Bank Development Marketplace and Fundación Gonzalo Río (In-depthSurvey(8), 2011). The purpose of the project is to reforest areas that were deforested prior to 1990 due to agriculture and livestock expansion (PDD(8), 2010) as well as to provide alternative income activities to landowners and landholders living in extreme poverty. The project represents a living model of community-based conservation management where residents, who own 97 per cent of the territory (27 per cent ejidal, 70 per cent small landholders), have received training and actively participated in activities for restoration, recycling and productive development for the last 25 years (Sierra Gorda Ecological Group).

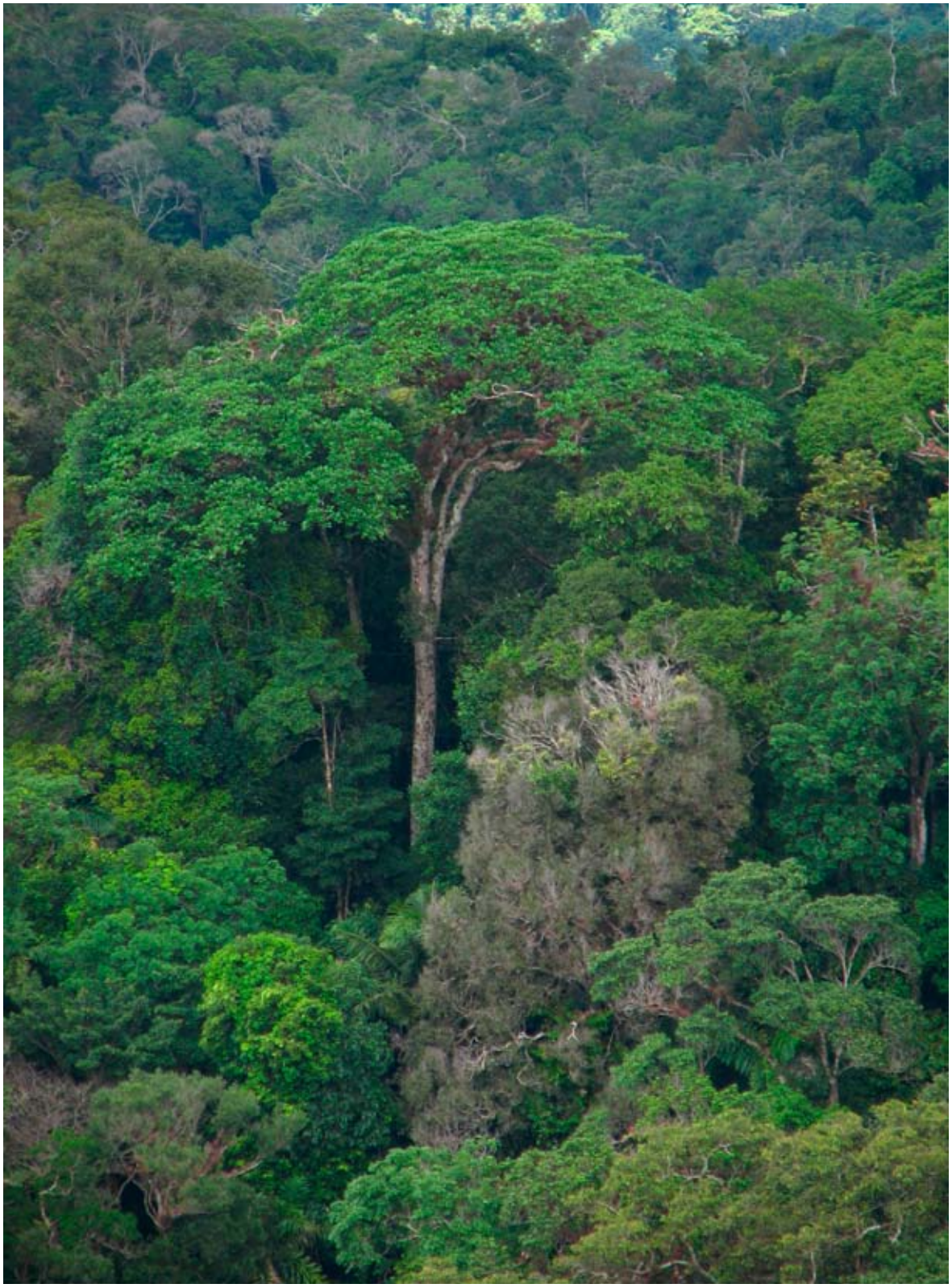


Photo credit: Winrock

3. The institutional arrangements

The design of forest carbon projects depends on the particular economic and legal systems in which the project operates, e.g. national policy priorities, existing institutions and availability of resources. National institutions are as varied as the circumstances and capabilities of the countries in which they exist, and how the project developers and owners decide to elaborate their strategies and the development of supporting implementation frameworks are matters of choice and sovereignty. This chapter aims to evaluate the stakeholders involved in the forest carbon projects, what their roles are and how they participate and contribute. It also aspires to explain how the project developer identified investors, and how, if any, stakeholder consultations are incorporated in the project phases. Whereas the decisions on the optimal approach and institutional framework needed to implement forest carbon projects should be left with each project, aspects concerning the involvement of institutions and stakeholders and the interaction between these merit some consideration which can be valuable for future planning processes of forest carbon projects.

3.1 STAKEHOLDERS INVOLVED

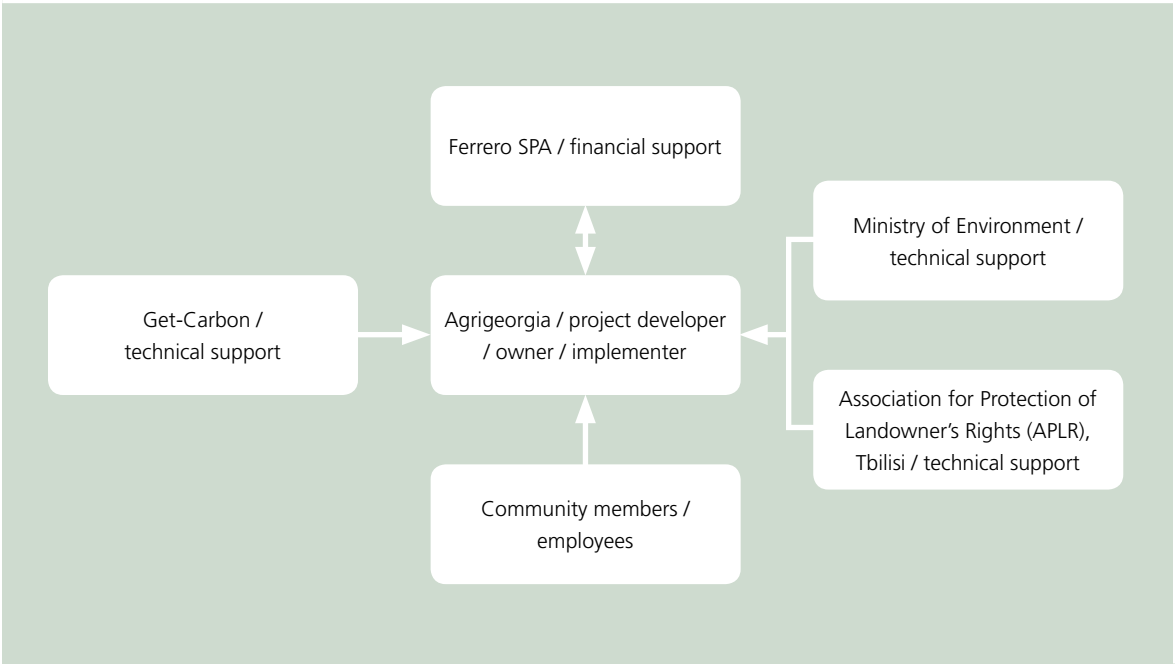
Several stakeholders are involved to varying degrees in the case projects. Traditionally, a number of stakeholders are involved in the development, implementation and management of a project, but stakeholders providing technical, financial and legal support also take up significant responsibilities in the performance of the forest carbon projects and their implementation. Identification of buyers of the carbon credits, the clients, is critical to most of the projects, like the involvement and commitment of local communities in the project areas. The main categories of stakeholders involved in carbon projects were characterized in a guidebook by Chenost et al. (2010) and can be divided broadly into the following groups of stakeholders: project developers, project financers, technical support, clients, local communities and other stakeholders.

The project developer may be the project owner or a project management support organization representing the project owner. Usually, it is the project developer who owns, leases or holds a title to a concession to the project area lands. The project developer may be a local authority or national government, a private company, an NGO or another association. Often, it is the project developer who is being responsible for operational project activities. Besides the project developer, most projects require technical support. This includes stakeholders who are technical operators executing the project; or consultants and technical experts assisting the project developers on technical aspects, for example related to forestry, legal or carbon related issues, or social and environmental aspects. The involvement of technical support may also include the drafting of project documents, methodology or monitoring.

The case projects included in this report illustrate very different approaches to the involvement of stakeholders, and the number of involved stakeholders varies between the projects. For example Case Project 5 is fully financed and owned by one private company, which implemented the project from its inception with support from a private consultancy company. The private company purchased the land (the project area) directly from the Georgian Government, and is the owner of the timber and other resources within the project area, so the project involves a limited number of stakeholders. The institutional framework for Case Project 5 is showed in Figure 2. Similarly, Case Project 2 is designed and implemented by a local private company founded, owned and headed by a native family of the project region and the project involves relatively few categories of stakeholders.

In contrast, other case projects include a larger number of stakeholders which are involved in the process. This is the situation in Case Project 6, which is implemented by the Ministry of Forestry, Indonesia, but is also part of the German Federal Government's Climate Initiative. The Ministry has assigned two local agencies to conduct the project, one of them in cooperation with Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH Indonesia. The proposal for the project was prepared by the Indonesian Forests and Climate Change Programme (FORCLIME) with the PIN financed by EU. FORCLIME is financed by the Federal Ministry for Economic Cooperation and Development (BMZ), Germany.

FIG. 2 | Case Project 5 – Afforestation with hazelnut plantations in Western Georgia



The institutional framework for Case Project 6 is illustrated in Figure 3.

The institutional framework is hence expanded with more involvement of both national and international stakeholders in comparison to those projects which involve mainly the project owners and selected stakeholders providing technical assistance. The framework becomes more complicated with the involvement of more stakeholders and transaction costs are likely to increase. However, the visibility of the project at an international level may also be easier to obtain with involvement of larger and international stakeholders and the opportunity to attract investors and carbon credit buyers may increase with visibility.

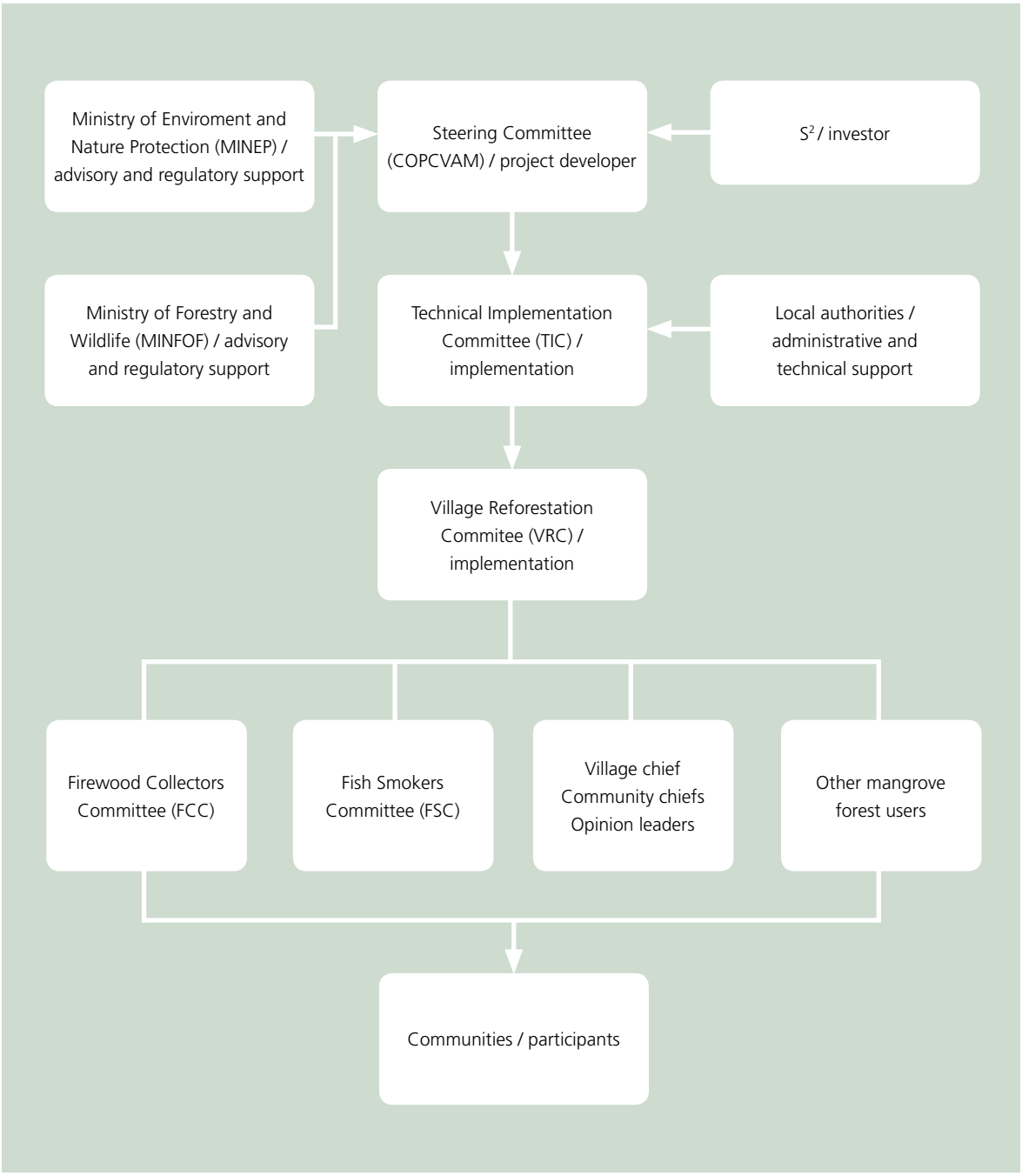
This is well illustrated in Case Project 8, where a complex network of governmental agencies, national and international foundations and financial bodies, social networks, universities and research institutions, non-governmental organizations and local communities constitute the institutions involved in the project. The project is one of several components in a large conservation programme involving local communities. The conservation programme is funded from different sources and promotes shared responsibilities between a NGOs and the state.

From reviewing the institutional frameworks of the case project, it shows that, besides the variety in the number of stakeholders involved, there are several means to implement the projects. While most of the projects are implemented by the project developer or local authorities, Case Project 3 is implemented through a Village Reforestation Committee which collaborates with community participants through local chiefs and committees. The institutional framework in Case Project 3 is illustrated in Figure 4. It shows that participants from local communities are directly involved in the project and public participation has formed an integral part of project planning.

FIG. 3 | Case Project 6 – Merang REDD Pilot Project

Another situation is showed in Case Project 4, where WWF-MWIOPO is the implementing partner but collaborates closely with seven regions of Madagascar in all activities implemented in their respective regions, including the creation of new protected areas and transfers of natural resources management and reforestation plans at the regional level. There is no contract per se between the project owner and the involved stakeholders. The project owners are building capacity in the local stakeholders and facilitating the interactions between them, the involved administrative entities and the forest service.

FIG. 4 | Case Project 3 – Protection of Cameroon estuary mangroves through improved smoke houses



Besides the stakeholders who are directly involved in the case projects, a number of external actors such as public authorities contribute to the framework in which the projects operate. This could be policies on collaborative forest management agreements or environmental policies. The external actors provide links to policies and processes that may affect the impact and efficiency of the projects. The stakeholders may include local environmental officers managing impact assessments or district agricultural officers managing adjacent lands.

The national and local governments have provided support to most of the case projects. For example Case Project 7 was supported by several entities within the Amazonas State Government during the process of creating the project and efforts were undertaken to consult all of the relevant legal institutions in the project area. This resulted in, among other things, a system for monitoring avoided emissions and a strengthened legislation for monitoring. For Case Project 4 the Ministry of Environment, Forest and Tourism, and Madagascar National Parks supervise the creation of new protected areas and transfers of natural resources management at the national level, as well as the REDD+ national strategy. It is also the ministry who ensures the law is implemented.

Also significant for many of the projects is the number of universities and institutions that are involved through providing technical support, e.g. for developing methodologies, land-use modeling, carbon assessment software and the provision of high resolution satellite images. In Case Project 4, institutions are using data from the project to study, for example, the development of the REDD+ mechanisms and payments for environmental services.

3.2 THE EXTENT OF INVOLVEMENT AND ROLE OF LOCAL COMMUNITIES

The involvement of communities in the forest carbon case projects can help improve efficiency by lowering the cost of forest carbon sequestration and storage. Typically, labor and administrative costs paid to communities are lower in comparison to what is paid to forest departments governing forests for similar kinds of work efforts (Somanathan et al., 2009). Besides, costs of monitoring forest carbon activities also have considerable potential to be reduced by involving local communities (Skutsch et al., 2009).

Generally, for the projects reviewed in this technical report, communities are involved both directly through employment opportunities and indirectly through community development activities. For example in Case Project 4, the local communities in the project areas are highly involved in the creation of new protected areas, transfers of natural resources management, restoration of forest landscape restoration, reforestation for fuel wood and alternative sustainable agricultural practices. The communities develop conventions for regulating the management of and access to resources themselves, which are hereafter validated by the local authorities. Whatever action or activities they decide to undertake must conform to the development plans of those administrative entities. As involved local stakeholders evolve in the forestry sector, they have to collaborate closely with the forest service by following the guidelines for ensuring sustainable use of resources. Specifically, under the transfer of management of natural resources, local communities sign a written contract with the forest service and the local administrative authorities for the sustainable management of their resources. The forest service helps local communities on the technical aspects essentially but their main role is to make sure that the management plans are well implemented. In other projects, such as Case Project 5, local communities are mainly involved as beneficiaries who live outside the project area and are exclusively involved through employment in the project area.

For Case Project 6 , there are no communities based within the project area but the communities close to the area are actively engaged through employment opportunities as forest rangers. The project has a community development component which is assigned to promote and enhance the active participation of local village communities in protecting and starting to rehabilitate and restore the degraded Merang peat swamp forests and their village surroundings. With this aim, community groups are established as Community Forest Rangers. By the end of 2010, the project had established

14 community forest groups with 15-20 forest rangers each. The Community Forest Rangers have been trained and actively participate in various project activities, such as fire patrols for prevention and initial suppressions during dry season, illegal logging monitoring from their command post, seedling collection from native species in the forest, nursery and plantation activities for rehabilitations and many other project activities such as surveys, carbon counting studies, etc. Case Project 6 has also introduced micro finance, savings and loan schemes to provide project participants with access to financial services in their villages.

For Case Project 7, local communities are involved in the project in several ways. Participants from communities are, among others, involved through the project's Deliberative Council. The Deliberative Council is in charge of deliberating on the running of the protected area and has the right to speak and vote on foreseen activities. Fifty per cent of the Deliberative Council consists of community stakeholders who live in the protected area, and the other 50 per cent consists of representatives from institutions involved in the project. Among other duties, the Deliberative Council approves the budget for the project and approves and follows up on the management plan and on reported actions that may have significant impacts inside and around the area. Nonetheless, local communities are mainly involved as participants and beneficiaries through the Bolsa Floresta Programme, where households or communities commit to zero deforestation in primary forest areas. In addition, there are also beneficiaries who live outside the project area and are not participants as such, but are involved through employment in the project area.

In Case Project 2, local communities participate in the project both directly through employment and indirectly through community development activities, where the latter involves the construction and management of a health center and a primary school.

The community participants in Case Project 1 are directly contracted for gum exploitation and organized into an Economic Interest Group or other associations. The community participants are in charge of planting and manual weeding and will be allowed to pasture animals and use the land for inter-cropping. The participants will resell the produced gum to Asiyla Gum SARL on a contract basis. Alternatively, the project lands are maintained and exploited by project employees who are allowed to cultivate production within the area of the Asiyla plantation and graze their animals. In both cases the reforestation activity will be the project's responsibility. A community membership organization for participants is subsidized by Asiyla by an annual amount representing up to 10 per cent of the associated annual carbon credits sales. In addition, two credit unions in two of the rural communities hosting the project will be established. The credit unions collect savings, create value and surrender credit to finance local economic initiatives, thus stimulating individual initiative and collective membership.

3.3 STAKEHOLDER CONSULTATION PROCESSES

Many of the case projects are designed through a transparent process involving participatory workshops and political consultations in order to guarantee the involvement and commitment of all the local stakeholders. Community representatives are interviewed to gain an understanding of the involved stakeholders and their perspectives on social, economic and environmental contexts for the projects. Additionally, most of the projects have an office located within the project areas with a project field coordinator. From here information is exchanged with communities and other stakeholders. Besides a greater transparency for involved participants (communities have easy access to information), such measures also have the potential to lower transaction costs and ensure efficiency with decisions rooted in the local specificities and conditions.

For example, for Case Project 7, a number of workshops were held during the project creation process with the objective of defining and discussing project investment priorities. During the workshops participants were also invited to present their priorities and vote for the most important ones. Being part of the Bolsa Floresta Programme, the Juma project operates according to several rules defined under the Bolsa Floresta

Programme. These rules were created subsequent to wide stakeholder discussions and consultations across the various stakeholder levels involved in the project, including community workshops, meetings and conferences (Viana 2008). For example, to avoid migration to the project area a rule was made during the consultation processes that a household must reside for at least two years in the project area to be eligible to receive any allowances. Another regulation refers to riverine populations who collect trees that float downstream, and stipulates that collected trees have to have roots to legalize this activity (Viana, 2010). A number of other management rules for the project have been developed through workshops with the project council members as participants. Also, Case Project 6 applied a stakeholder participatory approach for planning its annual work plan and stakeholder participation from all levels was arranged from the start of the project. Case Project 6 has also entered much strategic collaboration with locally active organizations by signing Memorandums of Understanding.

Another approach to stakeholder involvement is taken by the project owner in Case Project 5, who has carried out a stakeholder survey in order to provide additional information on land use and its history. The survey included stakeholders in several villages located in the immediate proximity of the four plantations in the region where the project activity is being carried out. In addition, a number of consultation meetings were held to discuss, through a series of questions, the project activities and potential negative impacts of the project activity on socio-economic, welfare or cultural aspects in the region. Appropriate information on proposed project activities was disseminated in the local language prior to the meetings. The participants in these meetings included stakeholders from communities, project employees, contractors, the forest authority, local associations and national NGOs. For example, the Biological Farming Association, ELKANA, which has know-how in land-use change practices and trends in the project area, participated in a stakeholder meeting discussing ways to improve tree nursery and plantation management practices. The high level of stakeholder involvement was fairly easy once local communities and authorities, through the stakeholder consultation meetings, understood the potential for growth and development based on carbon credits. Based on the information exchange, stakeholders became extremely supportive.

3.4 ESTABLISHING A RELATIONSHIP: THE PROJECTS, THEIR CLIENTS, INVESTORS AND OTHER PARTNERS

An important turning point for a forest carbon project is the capacity to secure funding. Besides the development of business plans containing descriptions of a project's profitability and risk profile, which will be analyzed by potential investors, the projects need to establish the initial contact with investors. Therefore the case projects participating in this technical report were asked to specify how the initial contact was established with investors. In addition, the case projects identified investors which were buyers of potential carbon credits, timber and forest products, etc. The project financiers included both individual financing schemes through a single investor and financing schemes involving groups of several investors. Additional project financing was shown to be provided through bank loans, public funds in the form of subsidies or grants, or private sources such as donations.

One example is Case Project 7, where a large hotel chain, who will purchase REDD credits to offset its carbon emissions, financed the preparation of the programme. Contact with Marriott International was established through personal relations. The hotel chain is also involved in divulgating and inviting its guests to donate funds via their web page to offset the carbon footprint created by staying at the hotels. The donation is tax deductible for U.S. taxpayers. The funding, which was used to establish the implementing body and to set up the programme comes from the Amazonas State Government, a bank and the national branch of a large international company. Also, Case Project 7 was approached by a state agency to make the state government's 2000-vehicle fleet carbon neutral. The contract has not yet been settled but is moving forward.

Case Project 8 has benefitted from being part of an already well-known conservation programme which

has helped to establish contact with financial partners. The buyers of the carbon credits gained through project activities are national Mexican and international companies from the UK, Spain, the Netherlands, USA, Switzerland and Mexico. The clients provide funds to the project operators to compensate for their emissions. The Netherlands National IUCN Committee has been a long-time partner (funding land purchases for conservation-nature reserves) and the project operators are acting as a "bridge" between clients and the local land/forest owners and have signed agreements with local land/forest owners. The first contract was developed for a large hotel chain in Mexico.

For Case Project 5, the project owner decided to finance the project after realizing the attractiveness of carbon sequestration activity. The demonstration of the attractiveness of carbon credits to the project owner involved presentations of in-depth analyses of domestic and international market by a private consultancy company who is continously involved in the project through technical support.

Case Project 4 is an example of building on existing relations. The project owner has worked closely with the financial partner, an airline company, for many years. In 2006, the foundation suggested the airline to fund a climate mitigation project for the first time. The contract was signed in 2008. Besides sponsorship, the airline is also involved in communication activities to promote the project. Since the project is a pilot project and will not deliver carbon credits, there are no buyers involved in the project.

For other case projects, financial partners were identified through participation in international meetings called by the credit buyers or institutions interested in buying carbon credits. Contact with the investors was the result of an intensive search carried out systematically over several years. Other projects have established the contact with financial partners through participation in capacity-building programmes and with the assistance of local consultants.

In summary, the forest carbon projects have different starting points for their projects to mature and for their approach to devolve responsibilities, i.e. to communities as they grow. Nevertheless, there is generally a need for platforms that provide networking opportunities for investors and project developers, especially at a national level. Regional carbon forums, which were originally focused on capacity building for CDM and standard carbon projects have since evolved to a much larger spectrum including forestry, agriculture and REDD+. However, in the light of the current state of the carbon market, forest carbon projects tend to be overlooked by investors when compared to other carbon activities from, for example, the energy sector. Multilateral organizations in collaboration with national entities should therefore aim to facilitate forums that target investors and project developers from the forestry sector and should be organized at a national level. In the next chapter the financial situation of forest carbon projects and their differences are reflected, as well as the projects' financial set-up.

4. The current financial situation of forest carbon projects and their financial attractiveness

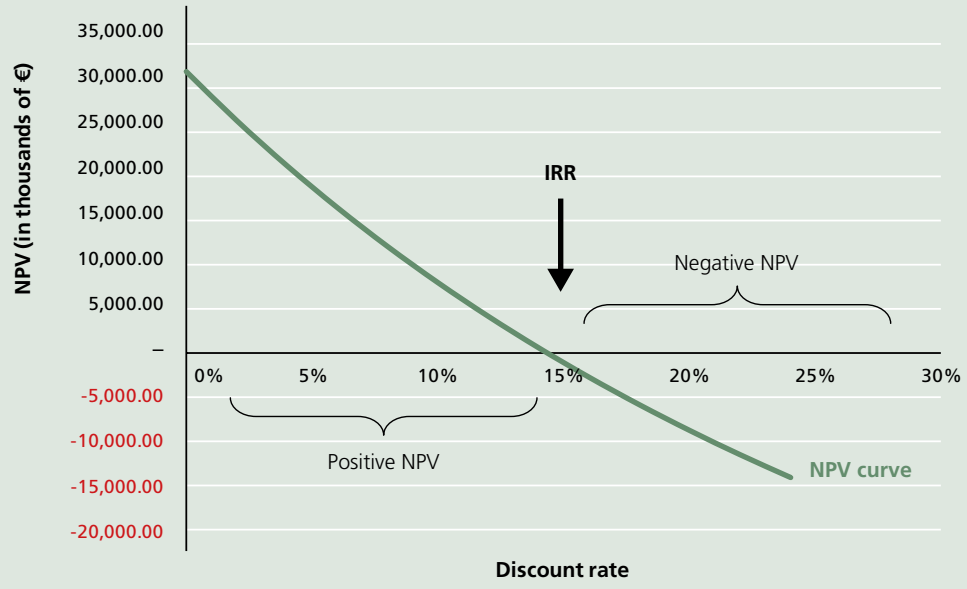
Financial indicators like Net Present Value (NPV) and Internal Rate of Return (IRR) determine the attractiveness of a project because they allow the investor to compare different available investment options. They determine why investors make the decision to invest in one or the other project. Throughout this section, the project analysis process of investors and a financial analysis of some of the case studies, with a special focus on the role of carbon credits, are conducted. Then the case studies' situation is compared to standard projects on the market, to establish their current position in regards to these other projects. Finally, a scenario analysis will try to illustrate how certain aspects of REDD+ initiatives can be improved to reduce risk and thereby increase their financial attractiveness. Additionally some suggestions will be outlined to further improve investment attraction. There are options other than IRR and NPV, like expectation values and soil expectation values. These measurements can be applied as well, since the projects deal with natural resources investment, and thus forests.

4.1. DEFINITION OF FINANCIAL INDICATORS

Net Present Value (NPV)

The NPV is the difference between a project's present value of benefits and present value of costs. Benefits of a project are represented by the flow of cash resulting from investing in it. To do the calculation correctly it is necessary to convert benefits and costs that occur at different points in time into the same terms: value of money today i.e. present value of benefits and costs. Discounting future benefits and costs converts them into comparable values (Berk et al., 2012). So essentially, the NPV is the sum of future discounted cash flows over the lifetime of the project, including the necessary initial investment. This initial investment is represented as a negative amount in the calculation, representing a cash outflow, i.e. a cost that needs to be covered by the following cash flows.

FIG. 5 | The Net Present Value as a function of the discount rate



Source: Berk et al, (2012)

Discount rate

The discount rate represents the opportunity cost of capital for the investor. It is the interest rate the investor could earn when investing his capital elsewhere at the same level of risk. In other words, it represents the foregone gain from other opportunities available under the same risk levels. Discounting future cash flows recognizes the time value of money. Money today is worth more than money at some point in the future, because of the time that has passed and hence the opportunity of investing somewhere else. Therefore only discounted cash flows reflect the real value of money at any point in time.

Internal Rate of Return (IRR)

The internal rate of return is a percentage that reflects the portion that the investor will get in return relative to the investment made. The Internal Rate of Return (IRR) of a project is the discounted cash flow rate of return. In other words, the IRR is the discount rate at which the project's NPV is equal to zero. The IRR needs to be higher than the opportunity cost of capital (the discount rate used to calculate the project's NPV) in order to get a positive NPV and make the project financially attractive (Brealey et al, 2009).

Figure 5 illustrates all three financial indicators: NPV, discount rate and IRR and their relationship to one another.

BOX 3 | Investment analysis

Before taking the decision to invest in projects or to go forward with projects, investors and project developers use various tools to analyze a project and to tackle uncertainty in benefit and cost forecasts. There are various types of investment analyses that will be explained below.

Sensitivity analysis

A sensitivity analysis brings out assumptions (amount of cash flows, revenues and costs) made when calculating the NPV and analyzes how the NPV and the project´s profitability changes when the underlying assumptions change (Berk et al, 2012). Each of the assumptions are tested. Thereby it brings the effects of possible assumption errors to light.

Scenario analysis

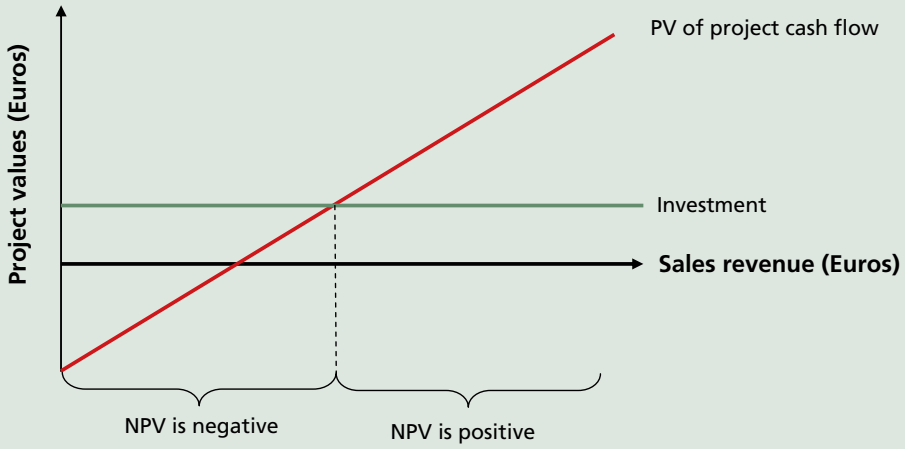
A scenario analysis takes a look at how a certain project would perform under different scenarios. To estimate all variables that affect future cash flows, various assumptions are made, as previously stated. Changing some of the interrelated variables will yield different scenarios and give the investor an idea of possible outcomes considering various levels of performance. It furthermore helps them to gain knowledge about the worst-case scenario. Commonly a best-case scenario and a worst-case scenario are calculated. Investors conduct these analyses to know how serious it will be if their estimates are wrong.

NPV break-even analysis

Investors and project managers focus on finding the point at which the NPV of the project switches from negative to positive, i.e. at what point real returns are experienced. Discounted cash flows instead of simple costs and revenues are tracked and initial investment is taken into account (Brealey et al, 2009).

Below is a general illustration of what the NPV break-even analysis looks like in theory:

The important point that the NPV break-even graph makes is that to find the accurate point in time where the project begins to experience real returns, it is necessary to take two things into account: the initial investment and the time value of money (represented by the PV). Real returns are those that give investors profits once the initial investment has been recovered.



Source: Brealey et al (2009)

BOX 4 | Investor decision rules

After the investment analysis, investors will apply different rules to follow to choose the best projects, such as these ones defined by Berk et al. (2012).

Net Present Value rule (NPV rule)

The rule states that the investor should invest in any project with a positive NPV and the larger the NPV is, the higher the benefits that will be earned from the projects. When having various projects to choose from, investors choose the project with the highest NPV.

Internal Rate of Return rule (IRR rule)

Here the investor chooses to invest in the projects with the high IRRs, but only if the IRRs are higher than the respective discount rates used to calculate the NPVs. However, using the IRR rule can be misleading because IRR does not account for the difference in scale between projects and is very sensitive to the timing of cash flows (the year in which the cash flows are received).

Equivalent Annual Annuity (EAA)

The EAA approach is used when evaluating projects with different life spans. It assesses the annual cash flows from an investment and compares them between projects.

Profitability Index (PI)

When evaluating projects with different resource needs (when initial investment amounts between the compared projects vary) the PI approach is used. It measures NPV per unit of resource consumed, dividing the NPV of a project by its required investment. This measure is adopted when there is a budget constraint for the investor.

4.2. ANALYSIS OF THE CURRENT FINANCIAL SITUATION OF THE CASE STUDIES

The comparison between the case study projects is difficult because their sizes, length and levels of risk vary and their discount rates are not the same. Directly comparing them would not be correct, due to the fact that only NPVs and IRRs from projects with similar conditions, namely life spans, discount rates and initial investments, can be compared. The eight projects studied differ widely in these conditions, so the comparison made here is not a direct comparison.

4.2.1 Financial structure

The financial structure of a project reflects the mix of sources that were used to finance a specific project. Most projects are financed through grants, but since they are neither debt nor equity, they cannot be classified into these two types.

According to UNEP Risoe Centre (2007), the financial structure of a project changes as it moves through its different stages. The planning phase is considered to have the highest levels of risk and is, as a consequence, mostly financed through grants and equity. The construction phase, with moderate risk, is financed through debt and equity. This is usually due to the fact that lenders, such as financial institutions, are reluctant to give loans for investments with high levels of risk because they know that there is a high possibility that they might not get repaid (UNEP Risoe Centre, 2007).

Table 2 gives an overview of the financing sources of all the projects that were used as case studies in this publication. Detailed information on the financial structure are presented for the following three projects:

TABLE 2 | Source and amount of finance of all case projects

Case project	Source	Name of source	Amount
1	Private investor	Asiyla Gum SARL	US$ 7,560,000
2	Private investors	Novacel, Suez, Umicore	€ 31,390,000
3	Private investors	No information	€ 105,000
4	Grant scheme	Air France	€ 4,482,061
5	Private investor	Ferrero Spa	Confidential
6	Grant scheme	BMU	€ 2,096,959
7	Private investors and grant	FAS, Bradesco Bank, Coca Cola Company, Marriott International	US$ 41,392,425
8	Grant	Mexican Government	US$ 391,544

Source: project in-depth surveys and PDDs

Case Project 2: Ibi Batéké Forestry Carbon Sink (Democratic Republic of Congo)

Case Project 2 is being developed and implemented by Novacel SPRL. Finance comes from many sources, including private firms like Suez and Umicore, among others. Novacel currently possesses the land rights and was able to attract private investment through the World Bank's BioCarbon Fund.

The detailed composition of the projects sources of finance is as follows: Table 3

Table 4 shows how the proportions of financing sources change as the project progresses. During the planning phase finance from private companies and equity is prominent and decreases as the project moves through the subsequent phases to only two per cent and three per cent respectively. Capital from generated income plays an ever-increasing role in financing the project's continuity. During the operational phase, 95 per cent of the money comes from this source.

Case Project 3: Protection of Cameroon estuary mangroves through improved smoke houses (Cameroon)

Case Project 3 is financed by a grant scheme and private investors. As it is indicted in the Table 5, thirty-eight per cent of financing comes from private investors and 62 per cent from a grant. The amounts stated here are only financing the planning phase because no finance has been found for the next phases yet.

TABLE 3 | Financing sources for Case Project 2

Financiers/investors	Total amounts	Proportion
Private companies	€ 1,700,000	5%
Equity	€ 2,600,000	8%
Reinvested income from project	€ 26,750,000	85%
Grant	€ 170,000	1%
Development assistance	€ 170,000	1%
Total	€ 31,390,000	100%

Source: In-depth Survey (2)

TABLE 4 | Changes in financing sources for Case Project 2

Financiers/investors	Planning phase	Implementation phase	Operational phase
Private companies	34%	12%	2%
Equity	41%	23%	3%
Reinvested income from project	0%	62%	95%
Grant	7%	2%	0%
Development assistance	18%	1%	0%
Total	100%	100%	100%

Source: In-depth Survey (2)

TABLE 5 | Financing sources for Case Project 3

Financiers/investors	Total amounts	Proportion
Private companies	€ 40,000	38%
Grant	€ 65,000	62%
Total	€ 105,000	100%

Source: In-depth Survey (3)

TABLE 6 | Financing sources for Case Project 7

Financiers/investors	Total amounts	Proportion
Reinvested income from project	US$38,142,425	92%
Grant	US$2,000,000	5%
Project developer equity	US$1,250,000	3%
Total	US$41,392,425	100%

Source: In-depth Survey (7)

TABLE 7 | Changes in financing sources for Case Project 7

Financiers/investors	Planning phase	Implementation phase	Operational phase
Reinvested income from project	0%	93%	93%
Grant	15%	7%	0%
Project developer equity	85%	0%	7%
Total	100%	100%	100%

Source: In-depth Survey (7)

Case Project 7: Juma Sustainable Development Reserve Project (Brazil)

Case Project 7 in Brazil received funds from the Amazonas State Government and Bradesco Bank to cover part of the first phase costs. Furthermore, the Marriott International hotel chain is financing the first four years' running expenses of the project (2008-2012) with US$2 million: Table 6

Equity and grant financing play a large role in the first phase of the project. However this changes in the implementation phase where reinvested capital from generated income becomes the predominant source with 93 per cent: Table 7

In summary, most of the case study projects are financed through grants. This is mainly due to the fact that many are conducted as pilot projects. The high risk associated with the projects increases the preference of governmental and non-governmental organizations to give grants rather than loans. It furthermore reflects the reluctance of the private sector to get engaged with large investments due to this high-risk perception. Companies fund such projects as part of their corporate social responsibility programmes, not as part of their investment portfolio because the impact of investing in forestry projects and CSR projects are generally very difficult to quantify in monetary terms. The fact that carbon credits achieved from REDD projects are excluded in markets, such as the EU ETS and others, makes it even more difficult to engage the private sector in this area.

4.2.2. Financial indicators

All case-study project managers were asked to fill out a survey which included a section on financial data. They were asked to provide information on forecasted yearly cash flows, the lifetime of the projects, NPVs, discount rates and IRRs. Only a few projects were able to give part of the information that was required with most providing incomplete data either because it was confidential or it was not estimated or calculated by the project managers (which was the case with some NPVs, IRRs and cash flows). In some cases, knowledge about the percentages of revenue made from the different activities was missing, which makes it understandably difficult to estimate cash flows and subsequent financial indicators.

According to Brealey et al (2009), the process of calculating financial criteria is normally done by following these steps: Figure 7

Firstly, project cash flows need to be forecasted. Consequently the opportunity cost of capital needs to be estimated. The opportunity cost of capital is the rate of return investors could get at the capital market with the same level of risk. The opportunity cost of capital is then used to discount the future cash flows. All of the discounted cash flows are added together to get the Present Value (PV) of the project. The final step is to calculate the NPV of the project to assess if it is worth more than it costs. This is done by subtracting the initial investment from the PV (Brealey et al, 2009).

Annex 2 provides a guide on how to calculate the financial indicators that were mentioned here and illustrates the application through a hypothetical example.

All project managers should go through these four steps. However, not all projects were able to provide the data concerned. The difficulty and complexity of estimating financial indicators for forest carbon projects mean companies prefer to give charity funds to finance environmental projects as part of their CSR programmes, without expecting any positive return.

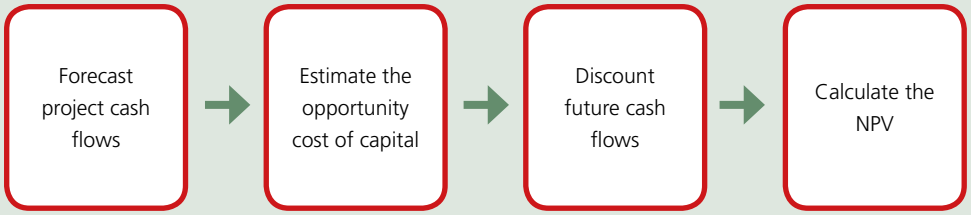
The following table Table 8 shows data for the projects, which provided some information regarding NPV, discount rate, IRR and duration period. The differences in size are considerable. This is due to the fact that these projects vary in regard to overall project volume, discount rates used and project lifetime.

Many projects stated their IRRs but not their NPVs or discount rates, or the other way around. It therefore remains unknown how some of the projects calculated their financial criteria. Without information of cash flows estimated NPVs and IRRs will be far from accurate. Case Project 2 in the Democratic Republic of Congo and Case Project 6 in Indonesia provided some cash flow information and will therefore be used to illustrate examples.

Hypothetically, a project's cumulative discounted cash flow should look like the curve in Figure 8. The curve tracks the discounted cumulative cash flows on a yearly basis. This means that all discounted cash flows at the point of each year are accumulated (summed together). For example for year five, the point on the graph is the sum of the all discounted cash flows from year one to year five. The intercept of the curve (intersection at the y-axis) represents the initial investment that is made in year 0. The discounted cash flows for each year are the Present Values (PVs) for each year. So the sum of PVs at each point on the curve yields the Net Present Value of the project at that point. Therefore the difference between the x-axis and any point on the curve represents the NPV at that point. The difference at the last point on the curve – which indicates the end of the project – and the x-axis, is the total NPV for the project. As indicated by the increase of the curve, the project should get increasingly positive cash flows over time. At the point where the curve crosses the x-axis, the initial investment has totally been recovered and, from this point on, the NPV of the project becomes positive indicating real benefits.

In the following graph, the cumulative cash flows for Case Project 2 are illustrated. The blue line indicates the cumulative cash flow without discounting it back to the present, which is why it will pass the x-axis faster than the red line. The problem though is that it does not reflect the benefits in terms of money today and therefore does not account for the opportunity cost of capital.

FIGURE 7 | Steps to calculate financial criteria



Source: Brealey et al. (2009)

TABLE 8 | Case project financial indicators

Case project	NPV	Discount rate	IRR	Duration of the project
2	€ 70	20%	-	20 years
7	€ 30,020,578*	2%	46%	44 years
1	-	-	9%	30 years

* Exchange rate: US$ 1 = € 0.725 on 8/11/2011

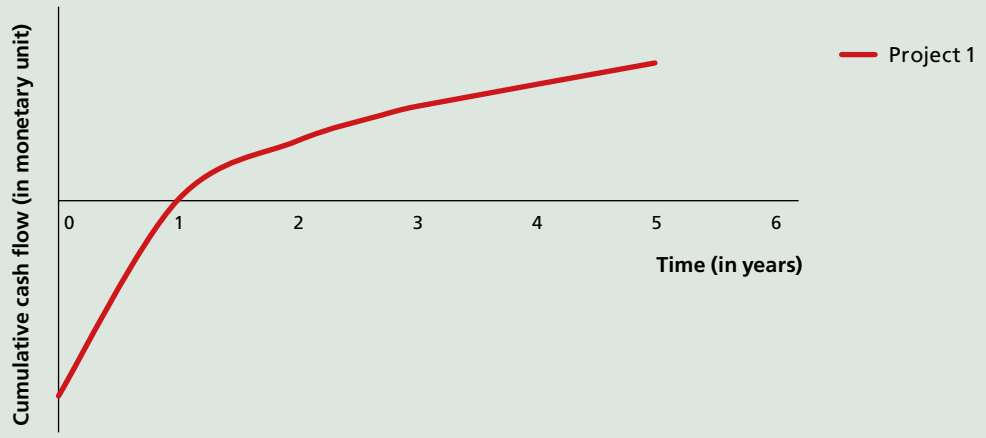
Source: Case project in-depth surveys

However it is included in the graph to illustrate the difference such an error would make in the real breakeven point. The red line instead traces the discounted cash flow, reflecting "real" benefits. Figure 9

Case Project 6 in Indonesia did not provide information about the discount rate they used to calculate their project's financial criteria. However, to be able to construct a cumulative discounted cash-flow graph it is necessary to know the discount rate. Indonesia's central bank indicates a discount rate of six per cent (Central Intelligence Agency, 2012). Since forest carbon projects are associated with higher risk levels and therefore higher opportunity costs of capital, using a higher discount rate would be more appropriate. Project managers adjust the discount rate for risk by adding a certain percentage to the central bank's discount rate. This is a method to incorporate risk into the calculation of the NPV which will be discussed in detail in the risk section. The discount rate of the project is consequently estimated to lie between 15 and 20 per cent. For the graph, the higher discount rate of 20 per cent was assumed to show the effect of greater risk on the time it will take to generate a positive NPV (when the red line crosses the x-axis). Figure 10

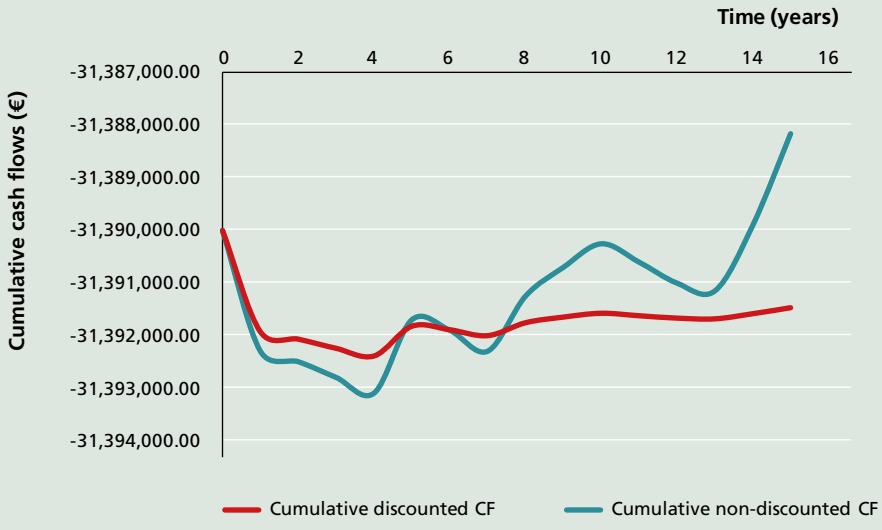
Most of the case studies show that the projects are conducted on a pilot basis. Most projects expect to add other activities during the passing of the time which were not considered at the beginning and therefore

FIG. 8 | Cumulative discounted cash flow for hypothetical Project 1



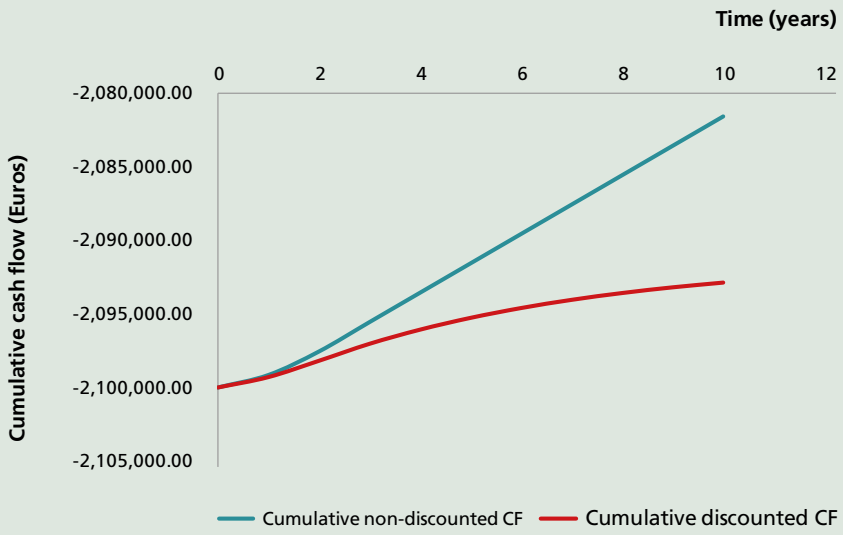
Source: Adapted from UNEP Risoe Centre (2007)

FIG. 9 | Cumulative cash flows for Case Project 2



Source: Chenost & Mushiete (2011)

FIG. 10 | Cumulative cash flows for Case Project 6



Source: Merang (2010)

were not counted into the calculation of the project's initial financial data. Average, non-forest projects have a clear boundary and specification of their activity scope, so it is possible to calculate their finances from the beginning when searching for investors. Since there is no clear boundary of activities in forest carbon projects, as most of the case studies show, it is difficult for the project managers to calculate how much capital they will need over the lifetime of the project and how much revenue they can generate. Capital requirements and revenue are preliminary estimates and make it more difficult for the investor to get a clear picture of the project and ascertain whether it represents an attractive investment opportunity or not.

4.2.3. Carbon credit revenue

The activity of generating carbon credits is used by all of the case study projects except Case Project 4, which is currently not planning to generate carbon credits. Carbon credits are a support activity to get additional revenue, and are not normally the core source of revenue. Two examples are provided below. The Case Project 2 generates 31 per cent of its revenue from carbon credits and Case Project 1, 19 percent. Figure 11 + Figure 12

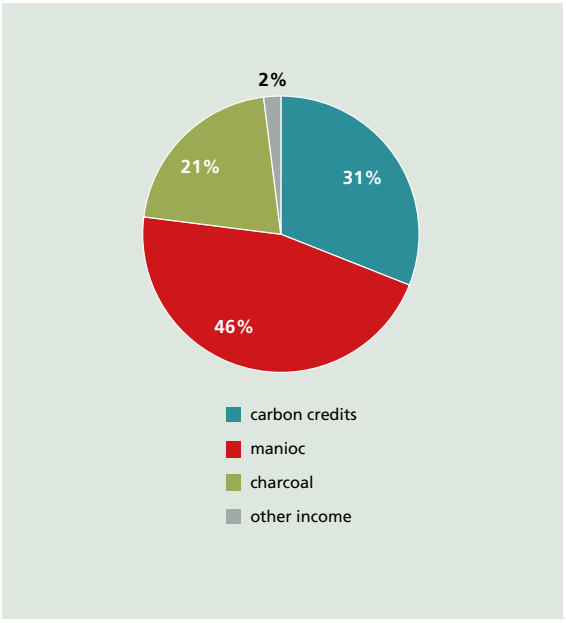
Carbon credits are used as an additional and not as a main revenue-source activity. This is due to the fact that their markets are not yet considered to be fully established markets, risk is high and prices are still very low. On the other hand, many investors might be attracted to the project because it includes a REDD+ activity. A global agreement on carbon emissions and carbon pricing would largely benefit the development of carbon markets, especially for REDD+ activities.

Other projects, for instance Case Project 7, aim at receiving revenues from the sale of CERs only. The additional income that is generated by the local communities under the project through sustainable activities, remains in the communities hands.

4.2.4 Comparing the case study forest carbon projects to standard projects

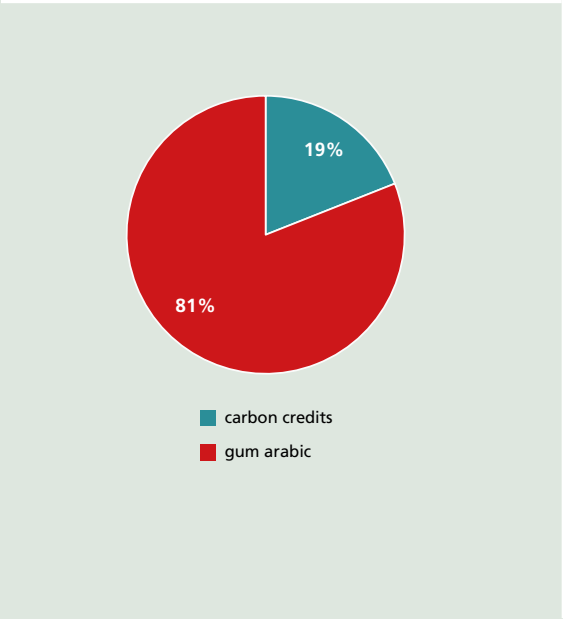
A comparison between forest carbon projects and standard, non-forest projects on the market, is necessary to

FIG. 11 | Case Project 2's sources of revenue



Source: Chenost & Mushiete (2011)

FIG.12 | Case Project 1's sources of revenue



Source: CASCADe (2007-2010)

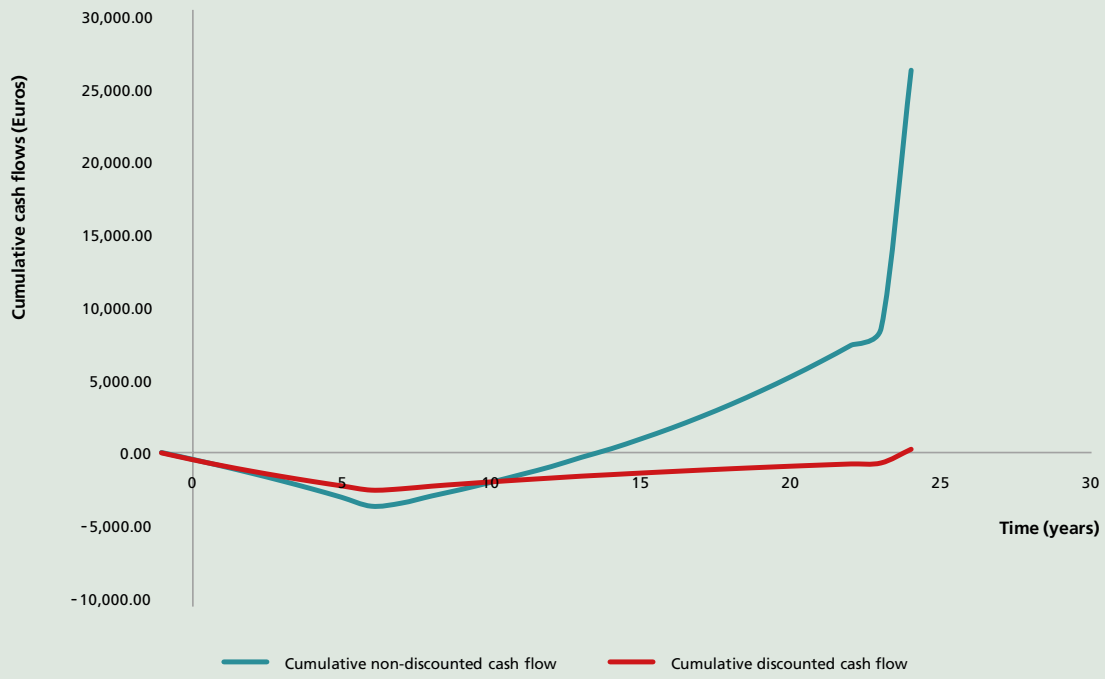
evaluate the gap between the two and assess their current state. The comparison however is limited because of the different conditions of the projects like discount rates, size and lifetime among others. A real comparison is therefore not possible because of these varying conditions.

The following graphs show an example of each for illustration purposes only. The first graph shows the cumulative cash flows for a standard project. It can be observed that the red line, which represents the discounted cash flow, crosses the x-axis at year 24 of the project and will become positive after this year. It indicates that the project has recovered all of its initial investment at year 24 and from that point on starts to experience positive returns, shown by a positive NPV. The 24-year period is not a standard period to recover all costs; rather it depends on the discount rate. If the discount rate is low this period would be shorter and if the discount rate is high this period would be longer. Figure 13

This second graph again illustrates the cumulative cash flow for Case Project 2 discussed above. It can be seen that it will take considerably more time than 24 years to recuperate the initial investment made. This is because the higher discount rate flattens the curve and thereby decreases the slope. Figure 14

Consequently, some common characteristics of forest carbon projects can be identified. They usually require large initial investments in relation to the returns that are generated. For the Ibi Batéké project this amounts to more than €31 million. Additionally, it takes a long time before any return is achieved. This is illustrated by the graph. The red line is quite flat and will need more than 25 years to pass the x-axis. Moreover, these types of projects are associated with high levels of risk (Chenost

FIG. 13 | Cumulative cash flows for a standard project



Source: Author's own construction

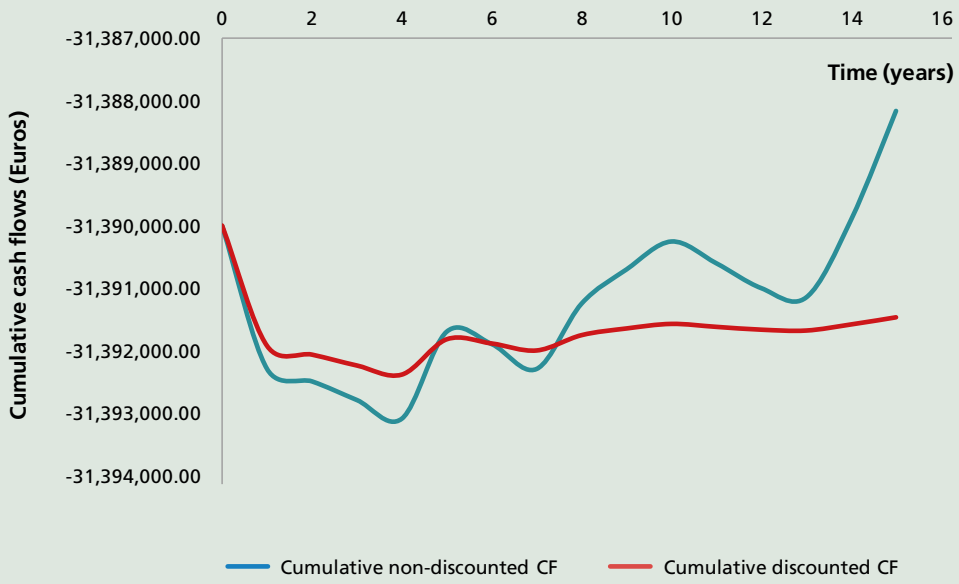
et al, 2010). These criteria make it even more difficult to improve financial attractiveness and widen the gap between "average" projects and REDD+ projects.

4.2.5 Scenarios for forest carbon projects

Below, various discount rate scenarios for two projects are graphically illustrated. What can be observed in both graphs is that the higher the discount rate, the flatter the curve and the longer the time it takes for the curve to cross the x-axis. Projects with high risk or which investors perceive as risky generally have a higher discount rate than less risky ones. The use of a higher discount rate indicates that the capital invested is more valuable now than in the years ahead because there is substantial uncertainty about getting it back. Box 5 in the risk section shows some ways in which investors assess a project's risk and how it affects its NPV and IRR. Therefore, the higher the discount rate the more time it will take for the project to cover its investment and generate positive returns for its investors. Figure 15 + Figure 16

Reducing risk and thereby reducing the discount rate will improve the financial indicators of a certain project and increase the likelihood of a positive NPV and

FIG.14 | Cumulative cash flows for Case Project 2



Source: Chenost & Mushiete (2011)

a shorter amount of time until real returns are experienced. This is generally true for any project, not only forest carbon projects. However, since forest carbon projects are associated with high levels of risk, it is even more important for them to take action to mitigate their risk. In the section on risk, various tools will be presented on how to reduce risk.

4.2.6 Scenarios for carbon credit revenue

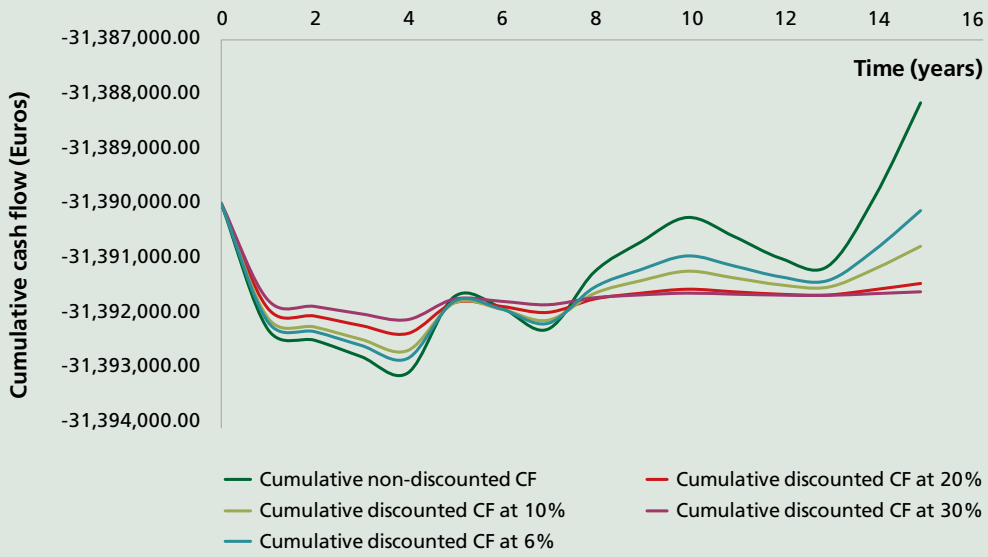
Carbon credit prices are, as mentioned before, very volatile (World Bank, 2012). They depend not only on supply and demand but also on macroeconomic factors like political agreements. Carbon credit prices influence the revenue for forest carbon projects and are therefore important to increase their financial situations. If the forest carbon projects are able to sell their carbon credits at higher prices on the market, their revenue and therefore their financial situation will improve. The cash flows would be higher and the NPV and IRR would also be higher.

To give practical examples for carbon credit scenarios, a low, average and high carbon price will be stated and used to calculate the different scenarios for each of the eight projects. Based on the current index carbon price lies by around €6.98 per tonne (May 2012), the following prices were picked: Table 9

Table 10 shows, the different prices per tonne are multiplied by the minimum and maximum tons that will be generated by each project. Table10 + Figure 17

Figure 17 shows the difference in revenue scenarios for carbon credits generated from Case Project 5. Each line

FIG. 15 | Cumulative cash flows with different discount rates for Ibi Batéké



Source: Chenost & Mushiete (2011)

represents one of the scenarios: low, middle and high prices for a tonne of CO_2. The lines furthermore show that the revenue made also depends on the quantity of credits that the project can generate. As the exact tonnes of emissions that will be reduced per year vary, the quantity of credits that can be sold will change, resulting in a variation in the revenue.

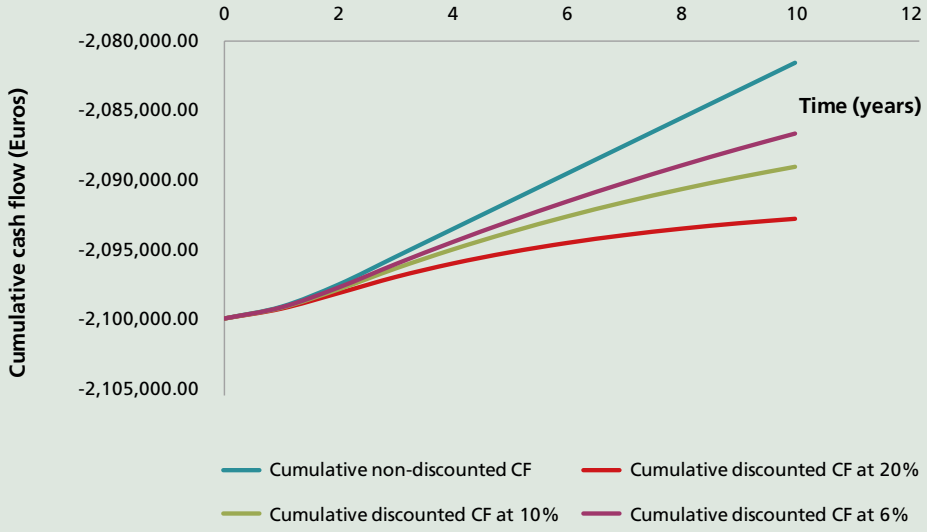
The revenue from REDD+ activities should be sufficient to persuade local communities to engage in them. It means that REDD+ activity revenue should be at least the same as the revenue that they could earn from other activities. Otherwise it would be more profitable for them to pursue any other good alternative that might be destructive to forests and land.

4.3 WHERE DO THE FINANCIAL PROBLEMS LIE?

Essentially, what forest carbon projects need to become financially attractive is to reduce the risk-adjusted discount rate by reducing risk. In the section of risk, a detailed explanation of the effects of risk on a project's attractiveness is presented and the ways to reduce risk are indicated.

Due to the current high risk, forest carbon projects that pair a carbon credit activity or another REDD+ activity with another business activity that can be profitable on its own will increase their probability of success and thereby reduce the perceived risk. The REDD+ activity is supplementary and is used to increase the revenue for a project. The main activity, however, is expected

FIG. 16 | Cumulative cash flows with different discount rates for Case Project 6



Source: Merang (2010)

TABLE 9 | Carbon price scenarios

Level	Carbon price (€ per tonne)	Carbon price (US$ per tonne)*
High	€ 8.00	US$10.00
Average	€ 5.00	US$ 6.30
Low	€ 3.00	US$ 3.78

* converted on June, 2012

TABLE 10 | Scenarios for revenue from carbon credits

Case project	Currency in thousands	Amount of carbon credits (in thousands of tonnes of CO_2 per year)	High scenario	Average scenario	Low scenario
1	US$	20 – 99.99	200 – 999.99	126 – 629.99	75.6 – 377.99
2	€	20 – 99.99	160 – 799.99	100 – 499.99	60 – 299.99
3	€	5 – 99.99	40 – 159.99	25 – 99.99	15 – 59.99
4	Is not yet planning to sell carbon credits				
5	€	5 – 99.99	40 – 159,992	25 – 99.99	15 – 59.99
6	€	100 – 49.999	800 – 3,999.99	500 – 24,999.99	300 – 1,499.99
7	US$	500 or more	5000 or more	3,150 or more	1,890 or more
8	US$	20 – 49.999	200 – 4,999.99	126 – 3,149.99	75 – 1,889.99

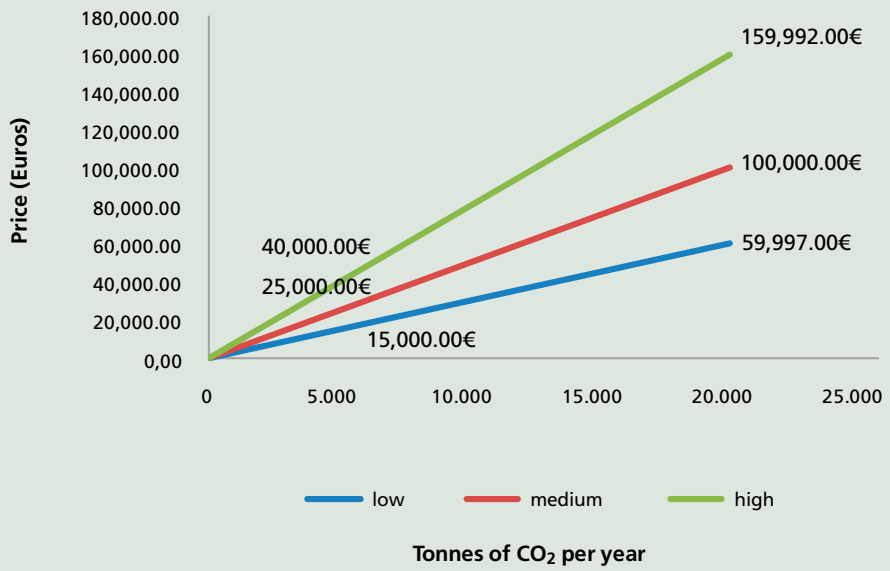
Source: Case project in-depth surveys

to generate most of the revenue. If this activity fails to deliver, the project has a high probability of failure. The purpose of the main activity is to provide more security to make the investor less worried about losing his/her investment. The examples from the case studies that are provided in section 5.4.2 illustrate this point.

Furthermore, forest carbon projects require higher carbon prices than are currently present in the market. This requires more stringent policies towards emissions and a clear signal from governments of Annex 1 countries that it will be very costly for businesses that do not take action to reduce their emissions. To increase carbon prices, it would be necessary that these governments put regulations in place that make carbon emissions expensive, not only on a national level, but globally. Only then companies will see that they can benefit from making carbon-reducing investments (Reinhardt, 2007). This action would be a large step towards making REDD+ and other carbon-reducing projects more attractive and profitable. The higher price would work as an incentive to invest in carbon credits and forest carbon projects.

Local governments, not only national governments, should put specific regulations and financial mechanisms into place in order to reduce country risk perceptions. It would increase the confidence of investors that invest in forest carbon projects to recover their capital. This is positively illustrated by the Amazonas Sustainable Fund (FAS) that was created by the Brazilian state of Amazonia. A more detailed illustration on how FAS works will be provided in the risk section of the publication.

FIGURE 17 | Revenue from carbon price scenarios for Case Project 5



Source: In-depth Survey(5

5. The role of risk in project financing

Risk is a key element in investment decisions and plays a decisive role in whether a project is able to attract investors or not. Forest carbon projects are commonly associated with high levels of risk (Chenost et al., 2010). It is therefore necessary to take a closer look at this issue and to clarify what risk actually is, how it affects investment decisions of the private sector and how projects can reduce specific risks to become financially attractive. For the sake of the analysis, this section treats the carbon market/REDD market as an already-developed generic market. However, what needs to be kept in mind is that it actually is a fairly new market which has not yet reached maturity and its development is still in the first stages.

This section is structured as follows: First, a definition is provided and risk is classified into categories including perceptions of the project developers surveyed. Second, an insight into a risk assessment of private investors is provided and risk quantifying tools explained. Third, some actions to mitigate risks at country, corporate and project level are discussed, using theory and practical examples from the case studies. At the end of the section, final considerations regarding the role of risk are presented, including the main barriers to attract finance.

5.1. RISK DEFINITION

Before discussing the role of risk, it is necessary to explain what is meant by risk, because it is a concept with various associations and definitions. Risk is generally defined as any event that may sabotage the profitability and success of a project (Roberts, 2007). This definition provided by Roberts (2007) will be referred to throughout the text. Nonetheless, it is necessary to make clear that not all uncertainties are risks. Events that have already occurred cannot be prevented and are therefore issues with which the project manager has to deal, not risks. Not identified or anticipated events are threats, not risks, because they were not initially considered when assessing the project risk. The only events that can be considered risks are those that are identified and are possible to mitigate by preventing them from happening or reducing their effects if they were to happen (Roberts, 2007).

5.2. RISK CLASSIFICATIONS

In general, risks are classified into economic, political, social and natural risks. Economic risks include funding risks, price risks and exchange rate risks. Rule of law, overall political stability and government effectiveness are some examples of political risks. Social risks are those regarding violence and corruption levels. Finally, natural risks are events such as draughts, fires, flooding and forest diseases.

In the context of this publication, risks can be divided more specifically into classic risks and carbon risks. Classic risks are all that concern project-specific risks (inside risks) and external risks of the environment in which the project is executed. Carbon risks, instead, are all events associated directly with carbon credits: reduction of carbon stocks due to natural or human causes, carbon market risks (especially price fluctuations) and risks of carbon ownership (Chenost et al., 2010).

Another way to classify risks is to categorize them according to the project phase in which they arise. Project phases are usually divided into planning, construction and operation.

The following risks can be identified at each project development stage (UNEP Risoe 2007): Table 11.

5.2.1. Prominent risks identified by forest carbon projects

In order to introduce empirical evidence from the case studies, project managers were asked to rank several risks according to which they thought were the most prominent for their projects. The following table shows a ranking of the most commonly identified risks. Figure 18.

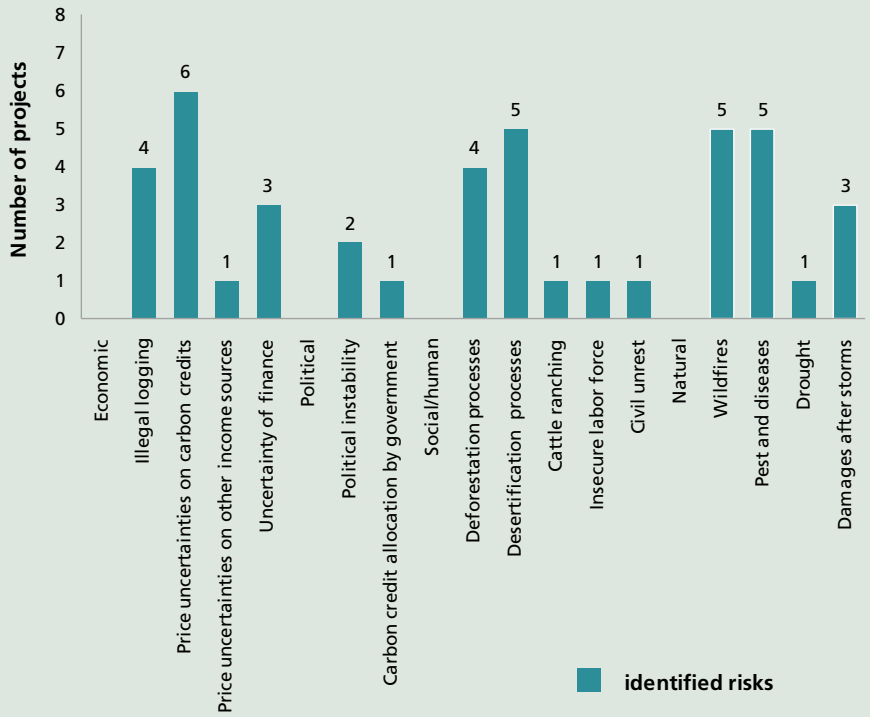
The figure suggests that mostly natural risks and risks that could potentially reduce the area used for carbon credit creation are considered most threatening. The highest consensus was found regarding risks of price changes of carbon credits. This supports the overall point of view of this report that carbon markets are still not established and mature. The question remains as

TABLE 11 | Risks arising at the three stages of a project

Planning	Construction	Operation
Feasibility risk • Conduct studies to assess feasibility of the project License risk • Permits that depend on authorities and which are necessary to start the project	Risk of overstepping time limits • If the project is not delivered on time or does not perform according to the specified time schedule Risk of overstepping budget limits • If the costs and capital requirement are higher than expected	Financial risk • Negative impacts of changes in financial variables on project performance (exchange rate fluctuations, inflation, etc.) Market risk • Price fluctuations of the project's products (carbon or non-carbon) Supply risk • If key inputs cannot be supplied as expected maybe due to price changes Operating risk • If operation and maintenance costs increase Regulatory, political and legal risk • Instability inhibiting operations (wars) Technology risk • Non-performance of equipment Counterparty risk • Failure to honor established contracts

to how this market can be effectively developed. Before private investors will actively engage in providing financing for REDD+ initiatives to a large extent, carbon markets need to be successfully established and reach a "business as usual" state. Only in this way can price uncertainties be significantly reduced to a level that is common for other established markets. A global agreement, under the UNFCCC or any other global scenario, could create a commitment arena and genuine emission-reduction pledges, especially from developed countries. This will have the potential to unleash offset mechanisms such as carbon markets or other types of REDD+ crediting mechanisms. Box 5

FIG. 18 | Identified risks by project developers from the case studies participating in the publication



Source: Case project in-depth surveys

5.3. HOW PROJECTS CAN REDUCE THEIR RISK TO BECOME ATTRACTIVE INVESTMENT OPTIONS

Different initiatives can be taken at country and state levels (involving government and international aid organizations), at corporate level (cooperating with financial institutions or known companies who can take over the liability for profits) and at project level (reducing project specific risks).

States and governments should review and establish national policies to protect their forest areas. Strong regulations should be put in place to secure forest conservation. Emphasis on implementation and especially policy enforcement is imperative in order to be successful. Development aid organizations should cooperate with national and local governments, channeling their funds through these formal streams to REDD+ initiatives. Providing support, these aid organizations can help develop the initiatives in this field, establishing a successful framework. It is of utmost importance to make sure that policies, regulations and incentives are aligned, because ambiguous or contradicting policies can undermine the effort. Time and large funding is required, but if this is done effectively it can create the basis for REDD+ programmes and initiatives through experience (Brohé et al, 2009; Rao, 2000).

BOX 5 | How investors and project developers assess project risk

Investors and project developers conduct risk assessments because risk is a major decision-making driver if an investment is conducted or not.

According to Embrechts et al (2005), risk is "the quantifiable likelihood of loss or less-than-expected returns" and is expressed in economic terms. Consequently, financial risk consists of three categories:

- Market risk: changes in commodity prices, exchange rates, bonds and stocks
- Credit risk: risk that borrowers will not repay their loans on time or repay only part of them
- Operational risk: risk of losses from inadequate internal handling and processing

If a company just finances a project through a loan, credit risk and market risk are the two categories in which risk should be quantified to establish the level of risk of such a project. If a company also operates the project, it will be more interested in quantifying operational risk and market risk. Probability theory is used to quantify risks. Risks are random variables that can create profits or losses. A specific time period (t) is considered and formulas for a profit-and-loss distribution are prepared. The changes of these variables will affect the outcome of the calculation and will show a loss or a profit for the previously assessed period of time (Embrechts et al., 2005).

$$NPV = \sum_{t=1}^{n} \frac{\alpha_t ACF_t}{(1+k_{rf})} - \text{Initial Investment (IO)}$$

The Certainty Equivalent approach aims at converting estimated cash flows from a project into certain cash flows. The cash flows are multiplied with a certainty equivalent factor alpha, in order to get a risk-free cash flow. Certain cash flow = estimated cash flow * certainty equivalent factor, where * is the multiplication sign. The certainty equivalent factor can vary from zero to one. The more certain the cash flow, the higher the certainty equivalent factor. Now the cash flow reflects an adjusted cash flow (risk adjusted). The discount rate used to discount this stream of adjusted cash flows if the risk-free rate.

$$NPV = \sum_{t=1}^{n} \frac{FCF_t}{(1+k^*)^t} - \text{Initial Investment (IO)}$$

The Risk-adjusted Discount Rate approach aims at incorporating risk into the NPV formula. A percentage is added to the discount rate. The higher the level of risk, the higher will be the percentage added. The adjusted discount rate will be therefore higher, when the risk is higher. However, since the denominator is elevated by t, the cash flows from the last years will be more heavily discounted and reflect more risk. If this is not the case, the Certainty Equivalent approach should be used.

Grant donors and investors can use some risk reducing strategies as well. Donors could establish and demand requirements for fund eligibility of a country such as those the Forest Carbon Partnership Facility of the World Bank is implementing. A certain amount of the funds can specifically be directed at risk-reducing actions that are specified beforehand. In order to reduce the misuse of funds, donors and investors can conduct periodic controls such as monitoring and auditing, demanding detailed reports stating what the funds have been used for. Additionally, corruption reports can be demanded as a prerequisite for countries and projects to be eligible for funds.

Companies should not wait for politicians to agree on carbon policies. However it is necessary to establish a global and clear agreement on carbon trading in order to reduce carbon market risk and forest carbon project risk. Large companies have the funds to act now and many of them have realized that they might gain an advantage by engaging in carbon reducing activities and supporting forest carbon projects. Or at least many have recognized that it will not hurt them to engage in such activities, rather it would be harmful not to do anything because of public pressure.

For a company, forest carbon projects are however not the only way to become "carbon neutral". Energy efficiency increase, promoting clean technologies and recycling materials are some examples. Therefore it might not be attractive for all companies to invest in forest carbon projects. It would only be important for companies whose supply chain entails forests or some of their products depend on forests. An example would be a furniture company. Most furniture is made of wood coming from forests. This company should be concerned about deforestation, because at some point there might not be any forest left to provide its most important raw material. It would prove beneficial for its business to engage in forest carbon projects. Thereby it could reduce its carbon footprint and secure the supply for its business.

The main focus lies on the ways to reduce project specific risk, which is why these various case studies have been conducted. A detailed discussion is provided below.

5.3.1. Tools to reduce project-specific risk

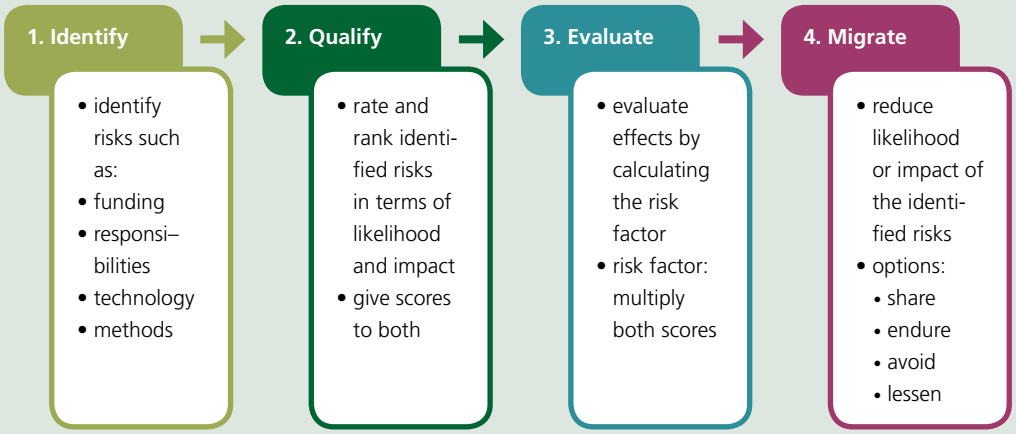
Project developers need to calculate risks concerning their projects to assess investment calculations. There are many ways in which risk can be managed and reduced.

According to Roberts (2007), effective risk management consists of the following steps: Figure 19

In the identification stage, all potential risks (and issues) inherent to the project are listed and categorized. The qualifications of the identified risks are then rated and ranked according to their likelihood and their impact on the project. Roberts (2007) proposes to create a matrix with scores from 0 to 11 for impact, and scores from 0 to 10 for likelihood. For both, the value of zero stands for the least impact or likelihood, and 11 or 10 respectively stand for the highest impact or likelihood. At the end each identified risk has two scores: one for likelihood and one for impact. In the evaluation stage both scores are multiplied in order to assess the relative value of the risk or issue. Those that carry the highest risk factors need to be paid special attention and prioritized for mitigation. In the final stage, prominent risks need to be mitigated. Depending on the type of risk a different combination of mitigation options can be used. Roberts (2007) identified some options: share, endure, avoid and lessen risks. A risk can be reduced by sharing it with, for example, an insurance company, a project partner or a public or financial institution. The enduring option is only selected if the project can live with the risk. Therefore the risk of harming the project in a significant way cannot be too high. Certain risks can be avoided by being proactive and preparing alternative solutions, so that when these risks arise, an alternative is ready for implementation. The last option, lessening the risk, focuses on reducing either the likelihood of the risk arising or the impact it will have if it arises.

The most famous strategy to reduce risk used by investors is the diversification strategy. It is also referred to as portfolio management. Especially investors in stock markets use this strategy. It simply consists of instead of

FIG. 19 | The effective risk-management process



Source: Roberts (2007)

putting all investments into one basket, different investments are selected with varying levels of risk and varying expected returns. This is a crucial point. Each activity the project developer plans to perform under a certain project should have different risk levels in order to effectively reduce the overall risk. In the next section, examples of these in the case study projects are provided.

5.3.2. Examples from case studies

The discussion on risk reduction strategies has so far focused on theoretical aspects. However, it is imperative to provide practical insights on how risk can be dealt with. The case studies were conducted for exactly this purpose: to provide real-life examples and possible solutions. Most of the projects surveyed tackled risks associated with carbon market uncertainties by diversifying revenue sources. Their various activities are meant to support each other and reduce risks if one of the activities fails to perform as expected.

Case Project 1

A good example for how a diversification strategy did not prove successful is Case Project 1. This project relied on two activities to create revenue: gum extraction from its reforestation activity of Acacia Senegal and carbon credits. However, revenue from gum extraction was too optimistic, since a fairly high and stable price of gum was assumed at the beginning of the project. The problem with commodities is that they usually have large fluctuations in price, if they are not considered essential for life. Carbon credits only accounted for 19 percent of total revenue. The rest was expected to be generated by selling gum. When the gum price drastically fell during the last years, the project crashed. The problem was that too much revenue was expected to come from only one source. Furthermore, the business of selling gum alone without any REDD+ component was not proven to be successful. If Asiyla would have been more cautious and introduced another activity to generate revenues, there might be a chance that the project would still be running. The lesson learned here is that if a project has as major source of revenue from a commodity which exceeds 80 percent, it needs to be established first if producing and selling this commodity is a profitable business by itself.

Case Project 2

Case Project 2 is a good example for reducing project-specific risk. Case Project 2 identified specific risks to the project. The project has identified wildfires as one of the prominent risks to its activities. Accordingly a fire-management plan has been established to reduce wildfire risk, which is common to the area of the project. Public awareness, a firebreak network and water-tank availability are part of this plan. Furthermore, the plantation of various tree species is aimed at reducing pest risk. (Ibi Batéké PDD, 2010). It is necessary though to differentiate between the physical risks, those that are specific to the projects such as wildfires and risks of pests, and the financial risk regarding price fluctuations in the market. In this case, Case Project 2 has made plans to specifically reduce physical risks.

Case Project 5

Case project 5 combined an existing profitable activity with REDD+ activities. This project in Georgia seems to be similar in structure to Case Project 1. Both projects rely on two activities to generate revenue, a commodity being the main revenue source and carbon credits as the secondary source. In Case Project 1 the commodity is gum and in the case of Case Project 5 it is hazelnuts. But when considering Case Project 5 more in detail, it becomes evident that the concept and business model is different from that of Case Project 1. The main business is the production of hazelnuts for a private company. The project therefore has a secure buyer of its commodity, thereby reducing revenue associated risk. Furthermore, the business of hazelnuts has lower risk than others because the price is relatively stable. Then the decision was taken to combine this business with carbon credits as an additional source of revenue, stemming from the increase in biomass. Risk is then only or mostly associated with carbon credit revenue where the price is volatile. Risk was reduced by relying on a low-risk main activity with a secure buyer and supporting it with a REDD+ activity.

Case Project 7

Case Project 7 identified its risks and consequently developed a risk mitigation plan. This plan lays down all actions necessary to mitigate each identified risk. Deforestation monitoring, control activities and a buffer of 10 per cent carbon stocks that is maintained in the project area exemplify some of the measures taken. The buffer was created as part of an investment risk-management strategy and was based on the risk assessment of the Voluntary Carbon Standard (VCS). Furthermore, to secure the necessary flow of resources after the crediting period, the aim is to set up a permanent fund (Juma PDD, 2009). Although this fund is partially secured by the Amazon Fund, 90 per cent of the project's financial resources from FAS come from the private sector, from companies like Marriott International, Samsung and Coca-Cola Brazil, among others (In-depth-Survey(7)), which proves that it is attractive due to its reduced risk. Some project components are secured through a contribution that the Amazon Fund is making to the Bolsa Floresta Programme. Additionally the Bradesco Bank channels the funds and acts as a third party, assuming responsibility for repayment.

The direct involvement of the local Amazonas State Government and the Amazon Fund, which is managed by the Brazilian Development Bank (BNDES), not only decreases the risk that investors perceive but secures active engagement of the local communities. Without them the project could not be successfully implemented. Local government instead of national government usually has a larger implementation power and enjoys more confidence from society due to its closeness to the local communities engaged. This is especially prominent in large countries. The project directly benefits local communities due to the fact that they receive part of the project income and other benefits like healthcare and education. This encourages their further involvement and commitment, securing a sustainable long-term effort. Case Project 7's business model illustrates the concept of embedded innovation from Simanis and Hart (2009) that relies on the co-creation process together with the community to create a new business. Co-creation creates trust, which is of the utmost importance to the success of the project.

In conclusion, Case Project 7's success did not come only from engaging in activities mostly with carbon credit revenues but from its unique business model that is designed to reduce investor risk and creates added devel-

opment value for communities that are committing to "zero deforestation".

5.4 FINAL CONSIDERATIONS WITH REGARD TO RISK

From the previous discussion about risk it has become clear that forest carbon projects are being constrained by major barriers to attract financing from the private sector. In order for them to move from a "new type of business" stage to being recognized as standard projects not restrained to forests, tools for overcoming these barriers need to be found. However, first it is necessary to understand what each barrier entails and why it presents a major problem for forest carbon projects. In the following part, each barrier will be discussed in detail.

5.4.1 Main barriers to finance

Throughout the section and from the conducted case studies, the following three barriers to finance for forest carbon projects have been identified: 1) project risk barrier, 2) carbon market risk barrier and 3) the barrier caused by higher performance of substitute activities.

Project risk barrier

Forest carbon projects are characterized by high levels of risk, which makes them unattractive for private investors, especially risk averse investors. Their fear of losing their investments will usually scare them away from this type of project and others will demand a high rate of return as compensation. Most private investors have so far funded forest carbon projects for Corporate Social Responsibility (CSR) purposes, without real return expectations. Many other companies fund forest carbon projects in the hopes of reducing their carbon footprint and thereby avoiding penalization from governments. But the long-term purpose should be to attract private investors because forest carbon projects are profitable opportunities, and not charity, or "green-washing" opportunities. Using some tools presented above and rethinking the business model of a project could certainly reduce project specific risk to overcome this barrier. That should be the first step in moving towards financial attractiveness.

Market risk barrier

New markets, like in this case the carbon market, are subject to risk. However all markets, new or established, are exposed to risk. Of course, new markets have higher risks than mature markets but project managers and investors cannot control them. This market risk needs to be understood as a macroeconomic risk, that is, a risk coming from the overall economy. Diversification strategies can therefore only reduce project specific risks, not market risks, because they depend on many complex factors arising in the external environment. The fact that carbon market risk is higher than risks affecting established markets constitutes a barrier for capital competition with similar conditions.

Creating policies to develop carbon markets and/or REDD+ crediting mechanisms and providing incentives for the private sector to engage to help them move towards a mature state will considerably reduce their risk. This shift might enable carbon markets to effectively compete for investors in the global marketplace.

The largest problem of carbon markets today is that the price of carbon is highly volatile because it depends, as in any other open market, on demand and supply. The different policies implemented in each carbon market make it difficult to have one congruent and world-wide "manual". Not all companies are subject to emission reduction regulations because not all countries have a carbon market or the same standards of regulation of the matter.

Performance barrier

Another reason it is so difficult to establish and successfully run forest carbon projects is that communities will prefer engaging in other activities that are more profitable than REDD or REDD+ activities. Deforestation for the sale of timber generates greater and more immediate income for communities located in forest areas. Agricultural plantations and cattle also provide a higher source of income. If communities do not see that they directly benefit from REDD+ activities and other activities while maintaining the forest areas, they simply will not get on board, because for many it is a decision of survival. Not only higher income activities are drivers of deforestation, but also the necessity of covering the ba-

sic needs of an ever growing population. For example the growing food demand for more and more people requires more land for agriculture, directly increasing deforestation for this purpose due to the fact that efficient technologies are not available. Many developing countries have policies that do not provide any incentive to protect their forests. Policies are weak or, if they are specified, not enforced. Most of the time, this is due to the weak power of governments and the remoteness of the forest areas. This issue increases the attractiveness of deforestation for agricultural, timber or other purposes.

Cutting down trees is easier, quicker and more profitable than protecting and maintaining the forest through REDD+ activities. Therefore it is necessary to find a way of controlling deforestation by giving people the right incentives for forest conservation. Once it is obvious that deforestation is more costly and provides less income than conservation activities, a change in behavior is very likely to occur.

6. Sustainable development benefits of forest carbon projects

Besides using financial performance and GHG emission reductions as indicators of a project's sustainability, development criteria including economic, social and environmental sustainability dimensions can be useful instruments for assessing how the project can potentially be used to create synergies with national development objectives.

In the literature, the main focus of sustainable development analyses of carbon projects has traditionally been on environmental resources and the maintenance and composition of stocks of resources or "capitals" (human, manmade, social and environmental) over time. To estimate projects' forest carbon outcomes there are two dimensions which are included, namely the change of forest area and the change of biomass in the respective project areas. Nonetheless, all of the forest carbon case projects included in this report and the documents reviewed concluded that their projects have a positive impact on forest conservation and reduced carbon emissions. Most of the projects are in an early state of implementation or have been operating for a short period of time, i.e. with restoration still being very small in order to bring tangible changes in habitat, and therefore many projects report to currently be in a phase of assessing such changes.

Additional to the primary goal of forest carbon projects being to reduce carbon emissions, many projects also lead to co-benefits in terms of welfare improvements for the local population. A proportion of the financial resources generated by the projects will in most cases be allocated through payment for environmental services schemes to the participating communities in the project area. This turns into concrete and direct benefits, including access to clean water, healthcare, information, productive activities and other welfare improvements for some of the most marginalized and vulnerable populations who are dependent on the forest for their survival.

This chapter reflects on the contribution to sustainable development of the forest carbon case projects. The analysis is based on the self-reported impacts from the forest carbon case projects and therefore mainly positive contributions to sustainable development can be measured since the projects are unlikely to report negative impacts about their own projects. In spite of the limitations of this approach, namely that it cannot be concluded how much projects contribute to sustainable development, it does indicate potential sustainable development contributions of the forest carbon projects.

As seen in Table 12, the case projects report to contribute on a number of dimensions to sustainable development benefits. Explicitly, all the projects contribute to the economic dimension of sustainable development with employment creation and income generation as the most likely impacts. The majority of the case projects also report on a number of social benefits, especially within education and working condition aspects.

A more detailed overview of the distribution of the reported benefits per project is given in Table 13. The more impact a project reports, the higher the possible magnitude of impacts. A project with benefits in almost all categories is likely to provide a higher contribution to sustainable development than a project with fewer reported benefits. However, a project with few reported benefits can have a higher impact than a project with many reported benefits if the magnitude of the reported benefits is high and if these benefits are perceived as very important within the local and national context. The importance of different benefits is context-specific according to national and local specificities.

6.1 SOCIAL IMPACTS

Health

One dimension of sustainable development concerns health benefits. Some of the projects (Case Projects 1, 2, and 7) have built a hospital or health center or provided access to ambulance boats for the local population in areas where there were no health facilities previously. Another project provides complete medical insurance (Case Project 5) for all employees in the project area where 50-60 per cent of the population lives below the poverty line and people generally cannot afford appropriate medical services. Case Project 3 provides direct health benefits in terms of reduced local air pollution, while Case Project 7 provides better access to clean water from rainwater capture systems and filters and

TABLE 12 | Summary of reported benefits

Sustainable Development Dimension (reported by each of the eight case projects)	Yes	No	N/A
Social			
Are there any direct health benefits due to the project activities?	5	2	1
Are there any changes in terms of education, research and/or increased awareness?	7	1	-
Are there any improvements in local working conditions, including safety, through the project's activities?	7	1	-
Economic			
Are there any new employment opportunities through the project's activities?	8	-	-
Are there any improvements in income generation opportunities through the project's activities?	8	-	-
Environmental			
Since the start of the project, have you observed any changes in the biodiversity of the natural habitat/animals?	5	3	-
Since the start of the project, have you observed any changes in the biodiversity of the natural habitat/plants?	5	2	1

distributes mosquito nets to project employees. Another obvious health benefit of households arrives from the income generated from the projects, which potentially improves living conditions and food diversity.

For all projects except one, employees receive safety training relevant to their field of work that helps reduce the number of accidents. It is reported several times that most workers find the training useful and applicable in their own households as well.

As a result of the described health initiatives, projects could expect that the health status of employees and their families will be improved in a lasting manner which could have a positive spill-over effect on employees' work efficiency. One project, however, states that their project is not dealing with any health issues, as health issues are perceived as a responsibility of the government and there is already an effective healthcare network and medical facilities in the region.

Capacity building: Education, learning, and awareness creation

The projects typically have programmes supporting education, building and improving facilities at schools in the nearby communities and promote awareness-raising campaigns through local radio programmes and documentary films. These efforts, which include provision of knowledge of key alternatives to slash and burn and involvement of local communities in, for example,

TABLE 13 | Detailed overview of reported benefits

Project no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Profit	Yes	Yes			Yes			
Non-profit			Yes	Yes		Yes	Yes	Yes
Size	Medium	Medium	Small	N/A	Small	Large	Very large	Medium
Social								
Are there any direct health benefits due to the project activities?	Yes	Yes	Yes	N/A	Yes	No	Yes	No
Are there any changes in terms of education, research and/or increased awareness?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Are there any improvements in local working conditions, including safety, through the project's activities?	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Economic								
Are there any new employment opportunities through the project's activities?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Are there any improvements in income generation opportunities through the project's activities?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Environmental								
Since the start of the project, have you observed any changes in the biodiversity of the natural habitat/ animals?	Yes	Yes	N/A	Yes	Yes	No	No	Yes
Since the start of the project, have you observed any changes in the biodiversity of the natural habitat/ plants?	Yes	No	N/A	Yes	Yes	Yes	No	Yes

rehabilitation, have significant potential to start a behavioral change in individuals, which will have a positive influence on the environment.

Other reported capacity-building initiatives include the training of employees by professionals (such as engineers and mechanics), both on-site and through training workshops held on a regular basis. In other cases hands-on training sessions are provided to new workers who receive basic training aimed at broadening skills in their discipline and in related activities. Landholders are provided with the technical assistance needed to enroll in the project activity and the training and technical advising necessary to successfully establish and manage the reforestations, including training in treatment of forest diseases and pests.

Other projects (Case Project 7) also initiate community-strengthening activities aimed at promoting the organization of community groups and the training of community members in sustainable production methods to improve their earning capacity. Training activities also include training community health agents to assist others in case of any first aid needed. Some projects inherently include training on gender roles and on household economy.

Training on technological improvements, including technology transfer and capacity development, is incorporated for some of the projects, including for environmentally-sound land management technologies.

6.2 ECONOMIC IMPACTS, CREATING JOBS AND INCREASING INCOME

Many of the project activities provide significant employment opportunities, as well as expanding economic development through land rehabilitation, improved production potential and the provision of new opportunities for export.

A common characteristic of the selected forest carbon projects is the generation of income and employment opportunities for the communities within or near the project areas. Besides regular employment opportunities, other initiatives are supported. Case Project 3, for example, reports to invest in the construction of smoke ovens by local technicians and in data collection activities by local data collectors. Such initiatives potentially enhance local employment and capacity building efforts.

Employment prospects arising from the carbon projects often generate alternative income opportunities to traditional income generating activities such as livestock grazing and growing food crops. In Case Project 2, for example, investment in high-intensity manpower represents almost 30 per cent of the whole investment in the first three years of the project. Activities such as forest restoration and reforestation require the hiring of professional tree gardeners but also the training of local people, thus offering them new employment opportunities. In some projects, the project activities have also offered job opportunities and/or experience and capacity building to several local students and villagers.

The alternative agricultural practices implemented by the projects are generating additional revenues to local communities. Case Project 4, for example, includes hydro-agricultural infrastructures such as dams in order to increase the area of land that people can use for growing crops.

Other projects (Case Projects 6 and 7) offer access to microcredit for the local communities in the project area which potentially contributes to capital availability for diversified small business activities. One example of a project investing in local communities is the investment made by the Case Project 7. The project invested in nut dryers and boats, enabling the local people to cut out middlemen and add value to their product and hence the income generated from their land.

6.3 SUMMARY

The evidence from the review of other projects indicates sustainable development benefits and confirms the findings from other studies, where the literature includes a large number of sustainable development indicators. The limitation of the approach used here, being

the self-reported benefits, does not make it possible to explore negative impacts, e.g. the exclusion of women, quality of jobs, distributional issues, tensions between projects and communities or of costly restrictions on poor households for which forest-based businesses (i.e. selling different forest products) are their main income sources, which have been found in other studies (Brown et al. (2004), Jumbe and Angelsen (2006); Schackleton et al (2002); Edmunds and Wollenberg (2003), Caplow et al. (2011).

This chapter has focused on a limited number of social and economic indicators. Selection of project priorities that characterize the broader development context, for example as reflected in national plans and sectorial strategies, may be suggested or evaluated in stakeholder sessions and/or related to political decisions or official plans that have been developed in other policy contexts.

7. Conclusions and the way forward

Strategies to reduce CO_2 emissions from deforestation have gained significant momentum on the international climate change agenda. REDD+ provides an opportunity to create financial incentives for carbon sequestration and consequently climate change mitigation along with co-benefits for local communities and biodiversity. However, although international negotiations continue to make progress towards an agreement on a REDD+ framework, several issues still remain. Large amounts of investment will be required and while public multilateral efforts are building readiness on the ground, private sector engagement continues to be reluctant due to high risks associated with forest projects. Furthermore, legal issues related to land tenure, forest ownership and carbon rights require much stronger influence from state governments through national legislation, which poses significant challenges for countries with weak governance capacity. Existing forest carbon activities and REDD+ pilot projects are therefore pivotal for building experience and testing ways for a financial mechanism to reduce deforestation and transfer benefits to managing communities. Such emerging lessons and results will be critical for the successful development and implementation of future national REDD+ strategies.

This study set out to draw lessons from eight carbon forest projects, based on their institutional structure and financial aspects including risks and community benefits. The diversity of the projects demonstrated in itself the many ways and opportunities that REDD+ presents to the forest sector and communities in developing countries. The variety in the number of stakeholders involved in each of the case projects shows that there are several ways to implement forest carbon projects and REDD+ activities. These range from small-scale projects with relatively few stakeholders to larger institutional arrangements that have engaged a much wider group of stakeholders. While the involvement of a larger number of stakeholders might complicate the institutional set-up and increase transaction costs, such projects are likely to receive more visibility and opportunities to attract investors and carbon credit buyers. A few of the case projects were entirely financed and managed by private companies, others were organized as part of a company's CSR strategy and some were set up through a public-private partnership. Due to the issues surrounding REDD+ activities (land tenure, user rights etc.), public-private finance schemes are in many cases preferable, as the private sector is more likely to engage in projects that have already received funding from a bi- or multilateral fund. Such projects will also stand a better chance of being transitioned into future national REDD+ strategies or programmes as well as in relation to MRV and national baselines. Altogether this increases their attractiveness to investors.

The analysis of the eight different case projects shows that many of them need to improve their financial structure in order to reduce the high risk that investors perceive and to ensure long-term funding. The majority of the projects rely on grants, or are only viable if emission reductions can be sold, generating vital revenue. It is highly recommended that forest carbon projects diversify their activity portfolios and thereby their revenue sources. This would considerably secure their financial sustainability in the medium and long term.

It is necessary that governments provide the conditions to attract and secure investments for their REDD+ initiatives. One way of doing so is to create national REDD+ programmes instead of isolated projects. The deforestation issue needs to be addressed through an integrated approach which includes cross-sectorial participation and involvement. The deforestation problem implies a competition for resources and in this sense countries need to make large efforts to integrate REDD+ policies with those from agriculture, energy and mining, which are competing for natural resources. The inter-sectorial coordination, vision and goals for REDD+ need to be consistent with the development priorities of a country and should to be very explicit. Otherwise any efforts made by REDD+ initiatives will be undermined by existing policies that provide contradicting incentives. REDD+ should also be linked with national or local planning. If this is not the case, it will be an isolated effort and most likely will not reduce the deforestation. This is one of the main challenges that countries will be faced with.

It is crucial for REDD+ initiatives to go through a testing phase, such as that which the Amazonas State started with its Bolsa Floresta Programme. This initiative from the Brazilian state enabled REDD+ initiatives

to be scaled up at a national level, now known as the Amazon Fund. This testing phase should help to establish financial mechanisms. These could include specific country budgets, budgets combined with ODA funds and funds from strong administrative institutions such as the National Development Bank. The aim of such financial mechanisms is to reduce the risk perceptions of private investors and to attract them to invest in REDD+ initiatives.

Another issue that needs to be improved is the control and the monitoring of REDD+ emission reductions or avoided emissions. The MRV system needs to give strong confidence to investors and ensure that their investment will achieve a reliable result. Consequently, recognized methodologies and procedures need to be established. Procedures and control or audit mechanisms should be very clear. This refers not only to the results obtained by the REDD+ initiatives but to how the funds were administrated as well. Many investors are reluctant to give funds to government programmes or initiatives because corruption is generally seen as a main risk factor in many developing countries. If monitoring and control are conducted at a state level instead of a national level, perceptions about corruption could be decreased. Local control is closer to the physical place of the REDD+ initiatives and could increase the transparency through the creation of accounts for each region or state.

Financing REDD+ continues to be the stumbling block in both international negotiations and at project level. Generating carbon revenues from forest project activities usually requires a much longer period of time than carbon projects from other sectors and it is therefore important that the financial gap between project implementation and issuance of tradable carbon credits is fully accounted for in the business plan. Moreover, the unstable carbon market and the lack of demand pose serious uncertainty for REDD+ finance and project viability. Funds for implementation and operational costs and the over-supplied carbon market constitute the primary challenges reported by the project developers in this study. Therefore, although revenues from carbon credits might provide an opportunity to attract project financing, they are rarely sufficient in covering all related project costs. As the case projects show, forest carbon projects stand a better chance of long-term operation when they are designed to rely on revenue from a standard activity as their main source of income, for example agro-forestry. In fact, the proportion of revenue expected from the sale of carbon credits constituted a small share in most of the case projects. However, this also poses a risk if commodity prices drop, as illustrated by Case Project 1 where a large amount of the project revenue was lost due to a fall in the gum price. It is therefore recommendable to identify as many viable activities that can generate income in order to withstand market instability.

Another prominent issue, already mentioned earlier, is the demand for carbon credits from REDD+ initiatives. All the developing countries' efforts will not be enough if the demand for potential REDD+ credits is not increased. REDD+ funds play a role as well. However these will be created with the demand of REDD+ credits. The lack of demand is not giving strong signals or incentives for local entrepreneurs to seriously embark on REDD+ initiatives. An increase in demand can only be achieved through more stringent targets for emission reductions in developed countries or Annex 1 countries under the UNFCCC. For the increased demand to have a positive impact for REDD+ initiatives, the sequestered or avoided emissions from these initiatives need to be accepted, at least to some extent, in emission trading schemes around the world. REDD+ credits should therefore be accepted as a way to offset the emissions of companies from developed countries.

To help offset the weak demand for carbon credits in the global market is the creation of regional or national carbon markets in developing countries to stimulate demand that could, in turn, help finance REDD+ projects. In fact many developing countries are already generating their own national emission trading schemes, including the development of the Brazilian regional markets in Sao Paolo and Rio de Janeiro.

Moving forward, REDD+ will need to further invest in developing institutional capacities and strategies that involve both public and private partnerships. Existing projects should be integrated into national strategies or

programmes. Public involvement is therefore advantageous as early on in the project phase as possible as government approval will be necessary for a shift from voluntary initiatives towards national/jurisdictional approaches. Successful investment in activities that strengthen institutional frameworks for forest governance, land tenure rights and community engagement can altogether make REDD+ an effective means to combat deforestation. Local communities need to be given the right incentives and, most importantly, need to be able to receive an income that will encourage them to choose REDD+ activities instead of destroying forests for other economic activities. However the success of REDD+ initiatives will ultimately have to be measured by the extent to which long-term benefits will reach the community level and the surrounding biodiversity in an internationally measurable and transparent way.

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Annex 1: Project overview

1.1 | Case Project 1: Asiyla Gum A/R CDM Project (Senegal)	
Project information	
Project type/technology	Commercial afforestation
Project size	20,000 hectares (5500 hectares pilot phase, 14,500 hectares2nd phase)
Project developer	ASIYLA Gum SARL
Project status	Pilot plantation phase completed, plans to initiate 2nd project phase
Scope	Gum plantation, carbon sequestration
Funding scheme	Market-mechanism
Organization type	Private institution
Baseline	N/A
Verification	Verified
Co-benefits	Biodiversity, social/community, local employment
Methodologies	AR-AM0009 "Afforestation or reforestation on degraded land allowing for silvopastoral activities – Version 4.0"
Standards	NAD – National Authority Design

Status
The project is currently seeking buyers to purchase carbon credits (In-depth(1), 2011).

Baseline
Over 98 per cent of the population depends on farming and agriculture and both activities are seriously threatened by the loss of soil fertility and the continuous depletion of pasture. In the absence of restoration activities led by Asiyla through acacia plantation, shrub steppe will decline. The consequences are an increase in poverty followed by the collapse of the animal and agricultural productions (PDD(1), 2010).

Land use/forest activities
Enhancement of forest carbon stock (reforestation) through the planting of 2.2 million trees on degraded soil (BasicQuestionnaire(1), 2011).

Agro-forestry activities offer opportunities for local residents in the plantation area, where soil fertility has improved since before the project (In-depth(1), 2011).

Destination of carbon credits
The carbon credits generated are destined for both the compliance and voluntary markets (In-depth(1), 2011).

Additionality
The most recent version of the "Combined tool to identify the baseline scenario and demonstrate additionality in the A/R CDM project activity" has been applied (PDD(1), 2010).

Leakage
It is expected that the project activity will not cause any significant leakage, because the proposed A/R CDM project activity takes place on degraded land (PDD(1), 2010).

Permanence
Temporary credits (tCER) issued for the GHG removal by sinks achieved through the proposed A/R CDM project have been chosen for addressing non-permanence (PDD(1), 2010).

Costs and financing needs – funding sources
Generated income is based on Arabic gum production (accounting for 81 per cent) and revenue from the sale of carbon credits (accounting for the remaining 19 per cent) (CASCADe, 2011).

Integration into national REDD policies
Not applicable (N/A).

Official land tenure and land-use rights of the project area
All project lands are owned by the project entity and are legally registered in accordance with applicable land tenure and with the Senegalese legislation. The land tenure was deliberated by the municipalities (PDD(1), 2010).

The land of the project area is referred to as "national land" and allocation is under the responsibility of the rural community. Once the land has been allocated and residents have initiated activities such as tree planting, they become owners of the land (In-depth(1), 2011).

Forest management strategies and tree planting initiatives
The project is using a strategy of even-aged forest management and agro-forestry with only native tree species (In-depth(1), 2011).

Primary challenges
A major challenge for the project has been to ensure enabling financing under implementation, before carbon credit revenues is generated (In-depth(1), 2011).

1.2 | Case Project 2: Ibi Batéké Forestry Carbon Sink (Democratic Republic of Congo)

Project information	
Project type//technology	Reforestation on degraded lands and clean energy
Project size	4220 hectares
Project developer	NOVACEL sprl
Project status	Implemented in 2008, 30 year lifetime, CDM registration in 2011
Scope	Sustainable forest management, afforestation/reforestation, enhancement of forest carbon stocks
Funding scheme	Market-mechanism
Organization type	Private sector
Baseline	Historical, modeled/projected
Verification	Verified
Validation	Validated
Co-benefits	Social/community, local employment
Methodologies	AR-AM0009 "Afforestation or reforestation on degraded land allowing for silvopastoral activities – Version 4.0"
Standards	CDM, VCS

Status
Currently the project is seeking investors but not buyers (In-depth(2), 2011).

Baseline
The baseline scenario is the continuous repetition of fires and subsequent grass re-growth, significantly disturbing vegetation dynamics (CASCADe, CASCADe – Selected carbon project in the bio-energy and forestry sectors, 2010). Recommendations aimed at limiting burning practices by growers and hunters are not enforced and non-compliance with these requirements is widespread in the country (PDD(2), 2010).

Land use/forest activities
- The rehabilitation of degraded lands
- A reduction in pressure on forests around Kinshasa (these forests are under strong pressure for charcoal, fuel wood and timber supply)
- The contribution to natural regeneration by controlling bushfire
- The mitigation of climate change through the capture of greenhouse gases (Topa, 2009).
- Contribution to food security through cassava production using intercropping methods (agro-forestry standards)

Destination of carbon credits
Carbon credits are destined for both the compliance and voluntary markets and the buyers are the BioCarbon Fund (CDM standard) and ORBEO (VCS standard) (In-depth(2), 2011). An emission reduction purchase agreement (ERPA) has been signed between the project developer and the World Bank's BioCarbon Fund on the purchase of 500,000 CERs to be generated by 2017 (WorldBank, News Release No. 2011/359/SDN, 2011).

Additionality
The project is considered additional as the degraded lands which are reforested under the project activities would have remained without forest cover (Ernst & Young, 2010). The additionality is demonstrated through barrier analysis and common practice analysis as requested in the methodology (Ernst & Young, 2010).

Leakage
Leakage was estimated for all leakage sources as foreseen by the methodology. It was demonstrated that emissions from leakage of activity displacement (pre-project grazing and fuelwood collection) is zero (Ernst & Young, 2010).

Permanence
Temporary credits (tCER) issued for the GHG removal by sinks achieved through the proposed A/R CDM project have been chosen for addressing non-permanence (PDD(2), 2010).

Costs and financing needs – funding sources
The World Bank's BioCarbon Fund has had played a fundamental part in enabling NOVACEL sprl to obtain investment from private firms (Suez and Umicore) to finance necessary upfront investments. Also, it has attracted the participation of another carbon buyer, the French company Orbeo, which is buying a similar amount of credits (WorldBank, 2009).

Integration into national REDD policies
The project has been identified by the DRC's Ministry of Environment as a model and building block for a national REDD+ strategy, which is under preparation with support from GEF and UN-REDD (WorldBank, News Release No. 2011/359/SDN, 2011).

Official land tenure and land-use rights of the project area
NOVACEL currently possesses the land use rights, including the trees and future emission reductions for the duration of the project. The project land is the estate of the project owner, who was granted land rights by the traditional chief of the area following customary rules back in 1966. To secure the land title to the project area, the Ministry of Land Affairs granted the use of the IBI estate through a 25-year lease and NOVACEL is currently applying for a permanent concession title to the area.

Forest management strategies and tree planting initiatives
The project is planting more exotic species than native species. This may be because the project is an afforestation activity that focuses on clean energy by replacing fossil fuel energy generation by charcoal production, fuel wood and afforestation for agroforestry (cassava).

Primary challenges
The biggest barrier for the project to overcome was to find financing due to the political and conjectural context of the DRC. This barrier was also linked to the uncertainty of the carbon market which frightened most of the contacted investors (In-depth(2), 2011).

1.3 | Case Project 3: Protection of Cameroon estuary mangroves through improved smoke houses (Cameroon)

Project information	
Project type/technology	Bioenergy/energy efficiency
Project size	N/A
Project developer	Cameroon Wildlife Conservation Society (CWCS)
Project status	Project activities started in 2009; version three of the project PDD was completed in the 1/7-2010
Scope	Sustainable forest/natural resource management, energy efficiency, reducing emissions, conservation
Funding scheme	Market-mechanism
Organization type	Private institution
Baseline	Historical, modeled/projected
Verification	N/A
Validation	Validated
Co-benefits	Biodiversity, social/community, local employment
Methodologies	AMS-IIG: "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass" version 2
Standards	CDM

Status
The project is seeking buyers, investors and technical assistance (In-depth(3), 2011).

Baseline
The baseline scenario is that local communities will continue smoking fish in traditional, less efficient smoke houses, thereby maintaining a large wood consumption from the unmanaged neighbouring mangrove forests (CASCADe, CASCADe – Selected carbon project in the bio-energy and forestry sectors, 2010). No sustainable management practices have been implemented in the fuel wood collection areas (PDD(3), 2010).

Land use/forest activities
The management strategy of the area is community-based multiple use forestry following a simple zoning plan (community use zone: habitation and wood collection, strictly protected zone, regeneration zone, biomass monitoring zone). Only native tree species are planted within the project area (In-depth(3), 2011). The project helps to:

- Fight against climate change globally through the reduction of greenhouse gases
- Bring wood consumption down so as to allow natural recovery of forests and/or reforestation
- Diminish fuel wood bill for fish processing
- Use of clean technologies that have been proven effective
- Ecosystem and biodiversity protection
- Sustainable use of national natural resources

Destination of carbon credits
The carbon credits generated are destined for both the compliance and voluntary markets (In-depth(1), 2011).

Additionality
The project activity is the first of its kind in Cameroon and there has not been any widespread dissemination programme for improved smoke houses in the project region. Therefore, it can be concluded that the project activity is additional (PDD(3), 2010).

Leakage
In order to assess leakage, monitoring includes data on the amount of woody biomass saved under the project activity that is used by non-project households/users (who previously used renewable energy sources). For this purpose, the annual quantity of wood used by the household outside the project boundary will be surveyed each year and compared to the one before the implementation of the project activity (PDD(3), 2010).

Permanence
Not available (the project will run for 10 years).

Costs and financing needs – funding sources
The project is still looking for investors (In-depth(3), 2011). CWCS finances the improved technology, does its monitoring specifically for CDM and implements training for the fish smokers. The improvement of smoke houses will be financed with funds raised by CWCS and CDM revenues (PDD(3), 2010).

Integration into national REDD policies
Not applicable

Official land tenure and land-use rights of the project area
The land in the project areas is government-owned and managed land, where part of the land covers wetland areas which are in the final stage of becoming a terrestrial and marine national park.

Forest management strategies and tree planting initiatives
The forest management plan is designed upon community-based multiple use forestry following a simple zoning plan with a community use zone: habitation and wood collection, strictly protected zone, regeneration zone and biomass monitoring zones in mangrove forest. Only native trees are planted within the project area (In-depth(3), 2011).

Primary challenges
Financing has been and still is the main barrier to the project and the sale of carbon credits is the only means of generating revenue. If no buyer is found who can commit to all carbon credits until 2020 or if the prices collapse in the carbon market then the project might not be implemented (In-depth(3), 2011).

1.4 | Case Project 4: The Holistic Conservation Programme for Forests (HCPF) (Madagascar)

Project information	
Project type/technology	REDD+ pilot project
Project size	More than 500,000 hectares
Project developer	GoodPlanet, WWF Madagascar
Project status	In implementation: The project period is 2008-2012
Scope	Sustainable forest management, reducing emissions, afforestation/reforestation, conservation, enhancement of forest carbon stocks, etc.
Funding scheme	Fund-based
Organization type	NGO
Baseline	Not yet developed
Verification	N/A
Validation	N/A
Co-benefits	Biodiversity, social/community, local employment
Methodologies	Methodology for Estimating Reductions of GHG Emissions from Mosaic Deforestation
Standards	No standards

Status
Currently the project is not seeking investors or other assistance (In-depth(4), 2011)

Baseline
The baseline scenario and project scenario are under development and will be available by February 2012 (BasicQuestionnaire(4), 2011).

Land use/forest activities
Reducing emissions from deforestation
- Creation of new protected areas
- Transfer of forest and natural resources management to local communities
- Alternative, sustainable and income-generating agricultural practices, such as agro-forestry, longer crop rotations and fallow periods.

Enhancement of forest carbon stock (afforestation and reforestation)
- Restoration of degraded forest landscapes
- Reforestation for sustainable fuel-wood production

Sustainable management of forest
- Transfer of forest and natural resources management to local communities

Destination of carbon credits
The project will first estimate the credits potentially generated by its activities before considering selling any credit (In-depth(4), 2011).

Additionality
N/A

Leakage
N/A

Permanence
N/A

Costs and financing needs – funding sources
The project is financed by Goodplanet and fully funded by Air France through a grant-scheme that covers implementation of project activities, PDD writing and operational cost for the first four years (In-depth(4), 2011).

Integration into national REDD policies
WWF will be involved in the national REDD strategy and the methodology developed in this project (WWF – Overall Goal and Objectives).

Official land tenure and land-use rights of the project area
Government owned and managed land as well as collective tenure and land-use rights (In-depth(4), 2011).

Forest management strategies and tree planting initiatives
The project is based on different types of forest management, including an active forest landscape restoration activity, combined with the other forest management activities that the project contributes to in Madagascar. The project area has a mix of native and exotic species, where more than 50 per cent of the planted trees are native species (In-depth(4), 2011).

Primary challenges
The primary challenges met by the project have been the instable political situation in Madagascar, civil unrest and subsequent insecurity. These factors impacted the implementation of the project by slowing or stopping activities conducted. The project is still facing these challenges as the involvement of national, regional and local authorities in crucial processes is lacking and insecurity remains an issue for local communities and staff. Finally, with an illiteracy rate of up to 85 per cent of the local population in some areas, it is unlikely that within a few years' time, those people would be able to efficiently manage the resources themselves (In-depth(4), 2011).

1.5 | Case Project 5: Afforestation with Hazelnut Plantation in Western Georgia (HAP) (Georgia)

Project information	
Project type/technology	Afforestation on degraded lands
Project size	Plantation area: 2401 ha; nature conservation area: 250 hectares
Project developer	Agrigeorgia LLC
Project status	Implemented in 2009; accounting period is 50 years
Scope	Conservation of forest carbon stocks, sustainable management of forest, enhancement of forest carbon stock, sustainable management of land-cover mosaic, reducing emissions from grassland degradation
Funding scheme	Market-mechanism
Organization type	Private sector
Baseline	Historical
Verification	N/A
Validation	Validated by TÜV SÜD
Co-benefits	Biodiversity, social/community, local employment
Methodologies	CarbonFix Standard 3.1 with CDM AR-ACM0001 ver. 4; own carbon sequestration model
Standards	Registered with CarbonFix Standard 3.1

Status

The project is seeking buyers for carbon credits (In-depth(5), 2011).

Baseline

The baseline scenario can be characterized by the progressive degradation of abandoned agricultural land. Furthermore, while parts of the project area became abandoned, other parts were exposed to poorly-managed activities (i.e., destructive grazing, degradation of wind breakers, deforestation for fuel wood and illegal waste dumping at several locations in the project area), within a context of uncertain rights of common use (In-depth(5), 2011). Overall unemployment rates in the project region are above 50 per cent (In-depth(5), 2011), and between 50 and 60 per cent of the Georgian population lives below the poverty line. The surrounding communities predominately rely on cattle ranching and subsistence crop and fruit farming for a living (PDD(5), 2011).

Land use/forest activities

- Carbon sequestration in hazelnut trees, contributing to mitigation of climate change.
- Restoration of previously degraded soils and vegetation cover.
- Protection of watersheds with newly established ecosystem buffers.
- Conservation of over 250 hectares of natural forests

Destination of carbon credits

The credits generated are destined for the voluntary markets, including pre-compliance markets, focusing on CRS and voluntary offsetting clients and, finally, for internal CSR of Ferrero Spa (In-depth(5), 2011).

Additionality

In absence of the project activity the land would have been subject to ongoing degradation due to anthropogenic pressure (over-grazing, unsustainable cultivation practices and waste dumping, among others) (TÜV SÜD Industrie Service GmbH, 2011).

Leakage
A study conducted on the potential leakages from project activities identified two categories of leakages:

Leakage from the displacement of fuel wood use
- Estimated to be insignificant as locals only collect dead wood for fuel wood.

Leakage resulting from the displacement of cattle grazing activities.
- Displacement of cattle grazing due to the project activity is expected to happen on lands with the same characteristics of the project area's baseline conditions. The computed leakage of the displacement of cattle ranching is estimated at a total leakage of one tCO2/hectare

Permanence
Risk assessment procedures have been described as to how the project is protecting itself against possible risks that could endanger the permanence of the project and which activities are implemented to mitigate them. The project owner will ensure the forest's long-term sustainability through management practices aimed at supporting natural self-regulative ecosystem functions. Timber will not be harvested in protected forests unless it is required for fire management in exceptional cases (PDD(5), 2011).

Costs and financing needs – funding sources
The project owner, Agrigeorgia LLC, obtained funding from its parent company, Ferrero Spa Italy, on the condition that carbon credits are developed as a means to reduce project risks and improve its attractiveness in terms of climate mitigation actions. The project owner has fully financed the project, receiving 95 per cent of carbon credits and the remaining five per cent of credits are reserved for the carbon project developer (TÜV SÜD). The first 5-10 years of the project revenues generated from carbon credits are crucial to overcome operational costs, until revenues from fruit and nut products can become significant (In-depth(5), 2011).

Integration into national REDD policies
N/A

Official land tenure and land-use rights of the project area
A long-term Purchase and Sale Agreement between Ferrero, Agrigeorgia LLC and the Georgian Government is in place to insure that all plantation activities are permitted and secured for the lifetime of the project. The agreement clearly indicates that Agrigeorgia LLC is permitted to plant hazelnut trees on its land and to establish relevant infrastructure in order to ensure that the proposed project activities will be sustained in the long term. (PDD(5), 2011).

Forest management strategies and tree planting initiatives
The project is doing agro-forestry and even-aged forest management with monoculture species. The planted trees are mixture of native and exotic species, with more than 50 per cent of them being native species. The project also includes an area which is not actively managed but is used for conservation areas, providing passages for wildlife and improving local biodiversity.

Primary challenges
In the initial phase of the project, the ability to demonstrate the attractiveness of carbon credits to the project owner was complicated due to lack of proper national and regional data, such as forest definitions, for commencing in-depth surveys of domestic and international markets (In-depth(5), 2011).

1.6 | Case Project 6: Merang Pilot REDD+ Project (MPRP) (Indonesia)

Project information	
Project type/technology	REDD project
Project size	265,953 hectares
Project developer	Government of Musi Banyuasin District & Government of South Sumatra Province
Project status	In implementation. Project start: October 2008
Scope	Carbon Stock Conservation, enhancement of forest carbon stocks, reforestation
Funding scheme	Fund-based
Organization type	Public sector
Baseline	Modelled
Verification	N/A
Validation	The project has not yet been validated
Co-benefits	Biodiversity, social/community, local employment
Methodologies	Tier three, MRV Carbon Accounting Methodology
Standards	The MRPP are exploring opportunities of using the VCS and CCB/REDD+ SE standard

Status
The project is seeking investors, donations, technical assistance and buyers of carbon credits (In-depth(6), 2011).

Baseline
Ongoing illegal activities leading to deforestation, peat land degradation and peat oxidation and forest fires are causing large emissions of GHG (529,681 t CO_2e/yr.). Without the project, the Merang peat forest will continue to degrade or, in the worst case scenario, be lost completely (Dr. Steinmann, Schmidt, Solichin, Setijono, Sidiq, & Rayan).

Land use/forest activities
Conservation of current carbon stocks in the peat dome is enforced by forest rangers preventing further degradation and deforestation of the Merang Peat Swamp Forest by monitoring and limiting illegal logging. The MRPP is also working on improved fire management and canal blocking of peat drainage to reduce emissions from forest fires and peat oxidation. In a later project stage, degraded peat land areas are planned to be restored by setting up several community forestry projects. (BasicQuestionnaire(6), 2011).

Destination of carbon credits
The carbon credits generated will be sold in both compliance and voluntary markets, focussing on large corporation CSR (In-depth(6), 2011).

Additionality
Without the project, the Merang peat forest will degrade furthermore or be lost completely (Dr. Steinmann, Schmidt, Solichin, Setijono, Sidiq, & Rayan).

Leakage/permanence
A threat analysis to forest coverage of peat swamp forests in Southern Sumatra has been conducted together with a fire management plan and an illegal logging assessment (Forest and Carbon Monitoring).

Costs and financing needs – funding sources
Project costs, covering preparation costs (PDD, certification, etc.), implementation costs (2010-12) and the employment of a forest ranger (to reduce illegal logging) are estimated at US$800.000.

The proposal of the MRPP was based on supporting studies financed by the EU-MRPP 2008. The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) is financing the MRPP project as a grant scheme of up to €2,096,959 for project period 2008-2011.

Total estimated emission reduction value (assuming a VER price of US$10) is US$4,167,250 (Dr. Steinmann, Schmidt, Solichin, Setijono, Sidiq, & Rayan).

Integration into national REDD policies
The project was developed in close cooperation with the Indonesian government and supports Indonesia's REDD readiness phase (Dr. Steinmann, Schmidt, Solichin, Setijono, Sidiq, & Rayan).

Official land tenure and land-use rights of the project area
The project area land is owned by the Indonesian Government (In-depth(6), 2011).

Forest management strategies and tree planting initiatives
The MRPP is using a strategy of uneven-aged forest management with mixed species and agro-forestry. Only native species are planted within the project zone (In-depth(6), 2011).

Primary challenges
The MRPP lists the slow international REDD process as a main barrier to the project implementation, along with lack of capacity and competence and the hesitant approach by investors and brokers, due to the many uncertainties connected to the REDD and REDD+ methodology. The lack of an appropriate and well-functioning carbon market and sufficient demand for carbon offsets are seen as critical factors for the project's further development (In-depth(6), 2011).

1.7 | Case Project 7: Juma Sustainable Development Reserve Project (Brazil)

Project information	
Project type/technology	REDD project
Project size	589,612 hectares
Project developer	Amazonas Sustainable Foundation (FAS)
Project status	The project was initiated in July 2006
Scope	Avoided deforestation, sustainable forest management, conservation
Funding scheme	Privately funded and voluntary donations
Organization type	Private-public partnership
Baseline	Modeled
Verification	N/A
Validation	Validated and certified under CCBA
Co-benefits	Biodiversity, social/community, local employment
Methodologies	Methodology to Quantify GHG Emissions Reduction from Frontier Deforestation (under ongoing validation in VCS)
Standards	CCBA

Status

The project is looking for donors (In-depth(7), 2011).

Baseline

The environmental baseline for Case Project 7 is based on the Sim Amazonia I model, which indicates there will be a strong deforestation trend in the near future due to agriculture and cattle production expansion as well as road pavement. This could result in the loss of up to 30 per cent of Amazonas State's forest cover by 2050 with an estimated emission of nearly 3.5 billion tonnes of CO_2. The Sim Amazonia I projections indicate that the region where the Juma reserve is located is highly vulnerable to deforestation (In-depth(7), 2011).

Land use/forest activities

- Avoiding deforestation
- Environmental conservation
- Participatory forest management
- Agroforestry (planting native trees) (Basic Questionnaire(7), 2011)

Destination of carbon credits

The carbon credits are directed towards the voluntary market. Voluntary offsetting by Marriott Hotel customers is responsible for the majority of emission reductions generated from the first project phase. Other large amounts are absorbed by corporations for CSR purposes (In-depth(7), 2011).

Additionality

The creation of the Juma Reserve and the project's measures of conservation and development do not represent the business-as-usual scenario. The project activities are considered additional (Schröder & Medina, 2008).

Leakage

It is not expected that the implementation of project activities will generate any offsite decreases in carbon stocks. The project implementation is expected to additionally reduce deforestation outside the project boundaries as compared to the baseline scenario, thereby producing "positive leakage" (PDD(7), 2009).

Permanence
Specific reserves will be created to guarantee a final delivery of the RED credits. These reserves will be kept on hold during the crediting periods, making them available as the carbon credit certificates are emitted for the subsequent periods. This way, a non-permanence buffer of 10 per cent is created as an investment risk-management strategy. The buffer is based on the risk assessment of the Voluntary Carbon Standard (VCS) (PDD(7), 2009).

Costs and financing needs – funding sources
The initial funding for the project came from the Amazonas State Government, Bradesco Bank and Coca Cola Brazil. The Marriott International hotel chain has also contributed to funding. The total cost of the programme over the project's lifetime (2006-2050), discounted to 2009, is around US$24 million at a discount rate of five per cent and US$41 million at a discount rate of two per cent (Viana, Grieg-Gran, Della Mea, & Ribenboim, 2009).

Integration into national REDD policies
The Case Project 7 intends to contribute to projected reduction targets from the National Climate Change Programme and generate lessons learned that can be replicated in other areas such as MRV (monitoring, reporting and verification), distribution of benefits, community involvement, etc. (Viana, Grieg-Gran, Della Mea, & Ribenboim, 2009).

Official land tenure and land-use rights of the project area
The majority of the families living in the Juma Reserve do not have land titles or personal documentation. The land is owned and managed by Amazonas State.(In-depth(7), 2011).

Forest management strategies and tree planting initiatives
The management strategy in the Juma Reserve is based on agro-forestry and only native trees are planted in the project area (In-depth(7), 2011).

Primary challenges
During all phases of the project, logistical issues are some of the biggest barriers to be overcome due to the huge distances from the project site to the nearest centre: it is fundamental to act according to the communities' timing and urgency and logistics in Amazonas State are very cost-effective.

Ensuring permanent emission reductions is fundamental, but significant expenditures are likely to be needed. Legislation is another barrier in respects to carbon credit commercialization. Since at a federal level these discussions are not a common sense, project proponents had to deal with different scenarios (In-depth(7), 2011).

1.8 | Case Project 8: Carbon sequestration in communities of extreme poverty in the Sierra Gorda of Mexico (Mexico)

Project information	
Project type/technology	Reforestation and REDD+ project
Project size	Reserve area: 383,567 hectares; REDD component: 2,626.64 hectares
Project developer	Grupo Ecológico Sierra Gorda IAP; Bosque Sustentable A.C
Project status	Under implementation: Project was initiated in January 1997
Scope	Sustainable forest management, afforestation/reforestation, conservation
Funding scheme	Market-mechanism, voluntary donations
Organization type	NGO
Baseline	Projected
Verification	N/A
Validation	Validated in June 2011 by Rainforest Alliance under the CCBA with Gold standard
Co-benefits	Biodiversity, social/community, local employment
Methodologies	CDM methodology AR-AMS0001/Version 4.1; Local methodology and standard
Standards	The project has been submitted for validation under the CCB and VCS standard

Status

The project is seeking investors and donors (PDD(8), 2010).

Baseline

The area under project surveillance is heavily degraded and natural regeneration is currently not an option due to extensive cattle ranching and subsistence farming. These practices are destructive and harmful towards the natural habitat, threatening the area's biodiversity. Grasslands are a combination of native and invasive species in poor conditions due to overgrazing. Croplands are predominately corn and beans, with poor yields due to location on steep slopes, high rates of erosion and soil loss (Sierra Gorda).

Land use/forest activities

The project is undertaking the following activities to generate carbon credits:

- Reducing emissions from deforestation and forest degradation through participatory forest management
- Conservation of forest carbon stocks through participatory forest management and conservation
- Sustainable management of forest through participatory forest management and conservation
- Enhancement of forest carbon stock (afforestation and reforestation) through reforestation and management of natural regenerations (BasicQuestionnaire(8), 2011)

Destination of carbon credits

Voluntary markets (including pre-compliance markets). The current carbon sales are from reforestations under a voluntary mechanism and donations. However, the project has not yet begun selling credits from the REDD project. The project has been approached by different corporate clients who are looking to compensate their emissions under a CSR scheme (In-depth(8), 2011).

Additionality
The project is using steps outlined in the A/R methodological tool (Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities, Version 1), but applying only the barrier analysis as per AR-AMS001 to demonstrate that a proposed A/R CDM project activity is additional and not the baseline scenario (PDD(8), 2010) (Sierra Gorda Ecological Group).

Leakage
The project has conducted a leakage survey of landholders and landowners. The results of this survey showed that crop cultivation and cattle ranching has been displaced due to project activities. The surveys showed that these displacements did not cause deforestation, as these activities were moved to areas already being utilized for crops cultivation or the total amount of displaced usage in terms of hectares is minimal. Leakage is projected to be insignificant (PDD(8), 2010).

Permanence
The project will employ a range of strategies to ensure permanence (PDD(8), 2010) (Sierra Gorda Ecological Group).

- A self-insurance buffer will be implemented. This buffer will consist of 20 per cent of each reforestation being withheld from sale, to compensate for unplanned loss as well as insufficient carbon capture in a given reforestation.
- To ensure long-term ownership of land participants must hold title to the land.
- To reduce illegal logging participants are required to replant in case of unexpected tree loss.
- Clearing will only be permitted in accordance with management plans.

Costs and financing needs – funding sources
The Mexican government has committed to public funding of US$391,544 for reforestation from 1997-2013. As the project was also a component of the "Biodiversity Conservation in the Sierra Gorda Biodiversity Reserve", some project activities were financed from 2001-8 by the Global Environment Facility (PDD(8), 2010). The financial scheme of the project is based on compensation from clients' emissions directly transferred into PES, according to vegetation type and the amount of carbon stored. Agreements are signed between CSR clients and local forest owners for yearly payments based on PES. This means that forest owners will receive around US$90 per hectare/year which is a large portion of the carbon revenues. 15 per cent of the carbon income is reserved for operational costs (In-depth(8), 2011).

Integration into national REDD policies
The project has full support from both federal and state governments and fully integrates with the national REDD strategy (IUCN, 2011). When the project is verified under VCS and CCBA it will become part of the national REDD strategy (In-depth(8), 2011).

Official land tenure and land-use rights of the project area
The project zone is operating on three types of customary and legal property: private property, ejidos and community property (PDD(8), 2010).

Forest management strategies and tree planting initiatives
The developers do not actively manage any of the forest or engage in tree planting in the area of the project. However, the land was purchased for carbon sequestration to avoid it being damaged or degraded by livestock. This gives the forest and land area the opportunity to naturally regenerate with the species native to the region and develop into forest, meaning the project fulfills the criteria about being recognized as a forest carbon project.

Primary challenges
The primary challenges for the SGBR has been:

- The expensive and long period of having all the necessary elements integrated into one coherent product.
- The efforts to make the SGRB set-up match with the criteria of CDM, VCS and CCBA. SGRB found that the process of these standards often were not flexible with the reality of the project, making the process of verification long and exhausting (In-depth(8), 2011).

Annex 2:
Financial indicators – the calculation process

Step one: future cash flows

Predict the future cash flow stream for the life time of the project. The table shows illustrates a calculation of future cash flows for a project with duration of t years.

TABLE A 2.1 | Calculation of future cash flows

Year	Money inflow	Money outflow	Future Cash flow (FCF)
0	0	Initial investment	Initial investment
1	Revenue year 1	Expenses year 1	Revenue year 1 – expenses year 1
2	Revenue year 2	Expenses year 2	Revenue year 2 – expenses year 2
3	Revenue year 3	Expenses year 3	Revenue year 3 – expenses year 3
…	…	…	…
t	Revenue year t	Expenses year t	Revenue year t – expenses year t

Step two: discount rate

Find the appropriate discount rate, i.e. the opportunity cost of capital for the project. Managers typically use the discount rate offered by the central bank of their country. Then an extra percentage is added to reflect the level of risk of the project. This percentage is arbitrary and therefore difficult to estimate. It just reflects the level of risk that the project developer thinks is appropriate for the project.

Step three: calculate the NPV

First each future cash flow has to be discounted by the discount rate. Then all of the numbers are summed up and finally the initial investment is subtracted as it is in the formula below.

$$NPV = \sum_{t=1}^{n} \frac{FCFt}{(1+k)^t} - \text{initial investment}$$

FCF refers to future cash flow. The cash flow from year zero is the initial investment. Each cash flow is discounted by the discount rate k (which was calculated in step two) and elevated by the year t to account for the time value of money. To illustrate, the calculation would be as follows:

$$NPV = - \text{initial investment} + \frac{FCF_1}{(1+r)^1} + \frac{FCF_2}{(1+r)^2} + \frac{FCF_3}{(1+r)^3} + \ldots + \frac{FCF_t}{(1+r)^t}$$

This NPV should be positive, otherwise it does not make sense to engage in the project.

Step four: IRR

Calculate the Internal Rate of Return. The IRR is the discount rate that makes the NPV zero. It is a percentage that shows how much the project is returning in relation to the investment. It is, like the NPV, an indicator if the project is worth undertaking. Similarly, it should be higher than zero, but not only that, it should be higher than the discount rate k in order to represent a profitable investment opportunity.

$$NPV = \sum_{t=1}^{n} \frac{FCFt}{(1+k)^t} - \text{initial investment} = 0$$

EXAMPLE:

To give a better understanding how this is done in practice, the following hypothetical project will illustrate these steps. The hypothetical project "A" has a life time of 20 years and has estimated **future cash flows** (in USD) that are shown in the table below:

The **discount rate** is composed of the discount rate offered by the central bank of the country where project "A" will be developed plus a percentage to include the risk level of the project.

The central bank offers a discount rate of six per cent. The project developer for project "A" thinks that there is some risk involved. So an extra five per cent is added to the discount rate that the central bank offers. The discount rate k for the project is then equal to 11 per cent.

The NPV of project "A" is then computed as follows:

$$NPV = - 20.000.000 + \frac{-1.950.000}{(1+0,11)^1} + \frac{-1.700.000}{(1+0,11)^2} + \frac{-1.100.000}{(1+0,11)^3} + \ldots + \frac{79.990.000}{(1+0,11)^{20}}$$

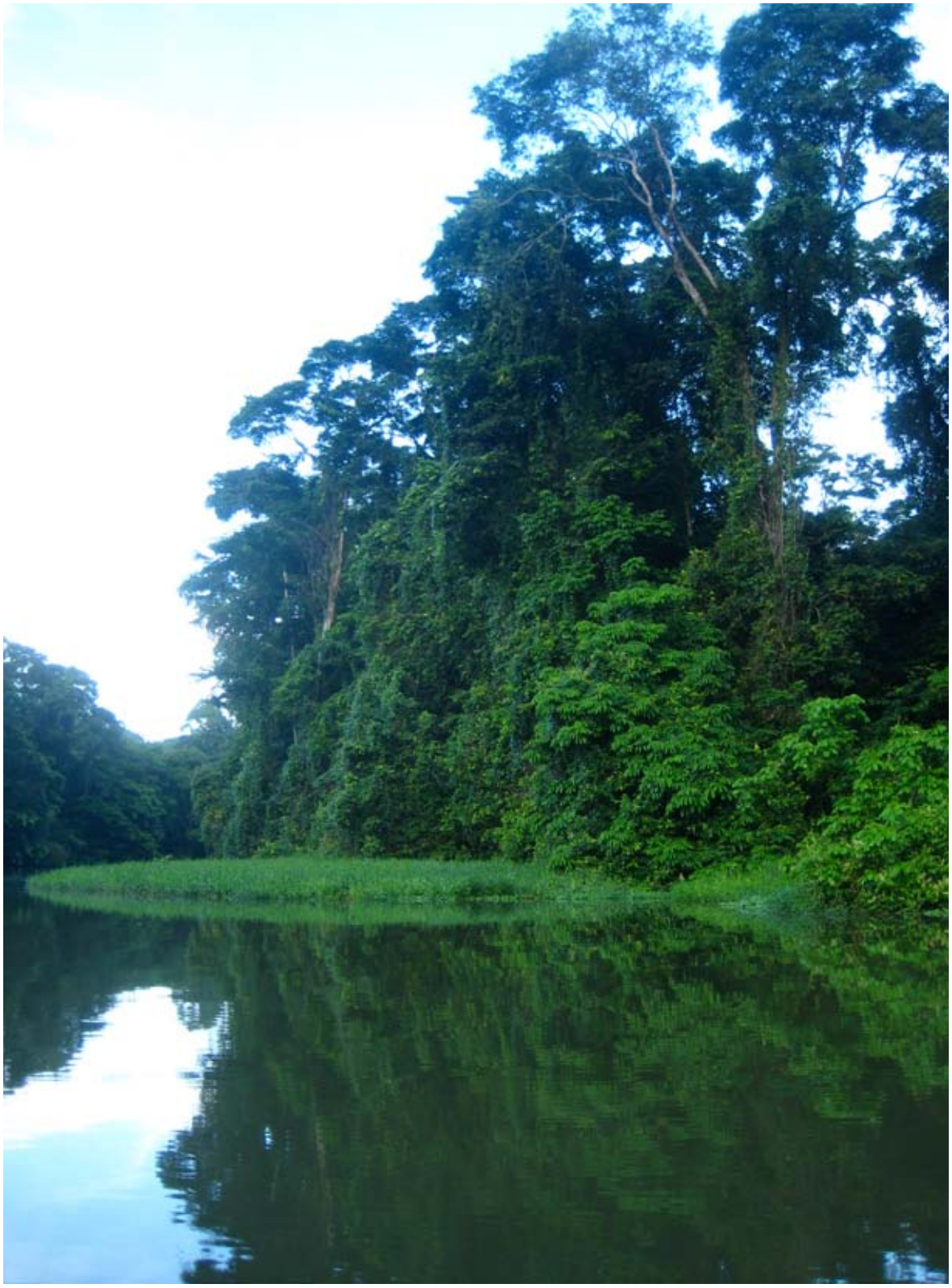
$$= 16.176.920$$

TABLE A 2.2 | Future cash flows for project "A"

Year	Inflow	Outflow	Net
0	0.00	20,000,000.00	-20,000,000.00
1	50,000.00	2,000,000.00	-1,950,000.00
2	300,000.00	2,000,000.00	-1,700,000.00
3	900,000.00	2,000,000.00	-1,100,000.00
4	1,000,000.00	2,000,000.00	-1,000,000.00
5	1,000,000.00	2,000,000.00	-1,000,000.00
6	1,100,000.00	1,000,000.00	100,000.00
7	4,000,000.00	1,000,000.00	3,000,000.00
8	4,000,000.00	1,000,000.00	3,000,000.00
9	4,000,000.00	1,000,000.00	3,000,000.00
10	10,000,000.00	1,000,000.00	9,000,000.00
11	10,000,000.00	1,000,000.00	9,000,000.00
12	10,000,000.00	1,000,000.00	9,000,000.00
13	10,000,000.00	1,000,000.00	9,000,000.00
14	10,000,000.00	500,000.00	9,500,000.00
15	25,000,000.00	500,000.00	24,500,000.00
16	25,000,000.00	200,000.00	24,800,000.00
17	25,000,000.00	200,000.00	24,800,000.00
18	25,000,000.00	200,000.00	24,800,000.00
19	25,000,000.00	200,000.00	24,800,000.00
20	25,000,000.00	200,000.00	24,800,000.00

The **IRR** of the project has to be higher than 11 per cent to be attractive. In this case the IRR is equal to 15 per cent. For the investor this means that engaging in this project will yield positive returns, as they are paying less (11 per cent) than they are getting back (15 per cent).

The IRR is easy to calculate in a spreadsheet in Excel. The formula is: =IRR(value rang;0). Press Enter and the value (in percentage form) will appear. The value range is the sum of all the cash flows from year zero until year 20 (in this case). The value that one wants to get is the IRR, therefore one writes 0 in the second space of the formula.



This technical report draws lessons on finance options and barriers related to project activities from the forest sector. It investigates the economics of implementing forest and REDD+ projects through a number of case studies from Africa, Latin America and Asia, by analyzing real forest and REDD+ investments. The report sets out to advise policymakers, financial sector stakeholders and project developers on how to structure REDD+ initiatives and implement national REDD+ strategies, especially in relation to attracting private and/or public investments. The report has been funded by the UN-REDD Programme.

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