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The Role of the Public Sector

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Dedication

To my patient & incredible family

Ipsa scientia potestas est

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INTRODUCTION

Recent changes in climate have caused impacts on socio-ecosystems on all continents and across the oceans, showing significant vulnerability and exposure of human and natural systems to climate variability (Field et al., 2014). Global mean surface temperature is projected to exceed the 2 °C (IPCC, 2013) “dangerous target” agreed by the world's governments in Copenhagen under the United Nations Framework Convention on Climate Change (UNFCCC) (UNFCCC, 2009, 2/CP.15). Higher levels of warming will increase the likelihood of severe and pervasive impacts, increasingly amplifying climate-related risks to natural and human systems (Field et al., 2014).

While there is the need to reduce greenhouse gas emissions, a critical task ahead us is to adapt the capacity of natural and human systems to cope with the changing climate. Given that present-day development choices will affect the risks of climate change in the coming decades (Field et al., 2014), adaptation activities undertaken today can put the world on more sustainable climate-resilient development pathways.

Adaptation finance – financial support for adaptation activities – has been recognized as a pivotal element toward this end since the outset of the international climate negotiations. It is a key ingredient of international efforts in support of vulnerable countries as climate change could reverse decades of investment in development. Indeed, Article 4.4 of the Convention states that developed countries (Annex I and Annex II¹) *shall*

- “[...] *provide new and additional resources [...] to meet the agreed full incremental costs*” associated with “*preparing for adaptation to the impacts of climate change*”.
- “[...] *assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects*” (UNFCCC, 1992).

Developing countries, who have contributed the least to the drivers of climate change, are expected to be disproportionately affected given the uneven distribution of climate impacts and their relatively limited adaptive capacity (Parry et al., 2007).

In accordance with the decisions taken under the UNFCCC in the Copenhagen Accord, and subsequently the Cancún Agreements, developed countries committed to the goal of mobilizing jointly USD 100 billion a year by 2020 to address the needs of developing countries (UNFCCC, 2009, 2/CP.15; UNFCCC, 2010, 1/CP.16). The Agreements note that

¹ Annex I refers to industrialized countries that were members of the OECD in 1992, plus 12 countries with “economies in transition”, (EIT) including the Russian Federation, the Baltic States, and several Central and Eastern European States. These countries are included in the Annex I of the UNFCCC (1992). Annex II Parties consist of the OECD members of Annex I, but not the EIT Parties (UNFCCC.int).

“funds [...] may come from a variety of sources, public and private, bilateral and multilateral, including alternative sources” (UNFCCC, 2009, 2/CP.15; UNFCCC, 2010, 1/CP.16).

By setting for the first time quantified “climate finance” targets, the 2009 Copenhagen Accord initiated a focused debate on climate finance. A whole host of questions have risen from both donor and recipient countries, investors, civil society and academia. These have included inquiries regarding the volume of finance needed to tackle adaptation (and mitigation) challenges, the possible sources of funding streams, their governance and management, and their final recipients (i.e. which countries, sectors and actors).

Moreover, since Copenhagen the “*monitoring, reporting and verification*” of international climate finance has been considered increasingly critical to assess progress towards the fulfillment of developed countries’ commitments and to build trust between Parties. Nevertheless, despite a number of organizations have been actively monitoring, tracking and analyzing different pieces of climate finance flows, obtaining a clear picture on developed countries’ achievements remains difficult.

The UNFCCC reporting system based on the so-called National Communications (Articles 4.1 and 12) – where Parties are required to indicate “*new and additional*” financial resources provided to implement their commitments under the Convention – is hampered by data gaps and inconsistencies in reporting approaches and methodologies (UNFCCC, 2011b). It lacks transparency, comparability and comprehensiveness (see e.g., Buchner et al., 2011b; Ellis et al., 2010a,b; Tirpak et al., 2010; Corfee-Morlot et al., 2009; Fransen, 2009). The recently introduced Biennial Reports (UNFCCC, 2010, 1/CP.16), which were seen as a step forward towards more frequent, transparent and consistent reporting across Parties (Ellis et al., 2011), still leave room for inconsistencies, because not defining a number of aspects (see EU, 2014).

Existing climate finance tracking efforts are driven by different objectives (Buchner et al., 2011a), and use different definitions, accounting methods and reporting approaches (Caruso and Ellis, 2013).

The main obstacle to consistently monitoring, reporting and verifying international climate finance is the absence of an internationally agreed definition of what counts as “climate finance” (Haites, 2011; Stadelmann et al., 2011; Buchner et. al., 2011a,b; Forstater and Rank, 2012) or, more specifically, as “adaptation finance”. There is not a centralized system for tracking all relevant climate flows (Clapp et al., 2012), and the intricate linkages between adaptation and development finance make adaptation particularly difficult to measure (Braur and Kaur, 2009).

The measurement of relevant flows is further complicated by the Copenhagen Accord reference to private finance and its role in the achievement of the long-term USD 100 billion goal. Quantifying “private climate finance” is a complex endeavor due to definitional, methodological and data gaps. In fact, there is no formal definition of “private climate finance”, and no dedicated tracking system (Buchner et al., 2011b).

Nevertheless, the question that chiefly preoccupied international climate fora since the Copenhagen Accord, which was agreed in the midst of the financial and economic crisis, has been “how” to mobilize private resources rather than defining meanings. Private sector capital, in fact, has been increasingly seen essential to scale up resources to the level formally stated in the Cancún Agreements and required by the magnitude of the climate change challenge. In many stakeholders view, in fact, private capital will have to represent the majority of the investment needed (AGF, 2010; UNFCCC, 2012) which, for adaptation, have been estimated in several billion dollars per annum (see UNFCCC, 2014; WB, 2010; Parry et al., 2009; UNFCCC, 2007).

While most of the international discourse initially focused on mitigation, and how private actors could invest to reduce their own emissions, there is now a growing interest in the role of private sector's resources in adaptation. Nevertheless, despite a normative international policy position prompting to the involvement of private actors, there remains lack of clarity and limited empirical knowledge about the actual role of the private sector in adaptation (Surminski et al., 2013; Agrawala et al., 2011; Agrawala and Fankhauser, 2008; PWC, 2010). The rules of engagement, in particular, are hardly understood.

Initial research efforts on this topic have discussed the theoretical role for different private entities (see Agrawala and Fankhauser, 2008; Tompkins et al., 2010; Berrang-Ford et al., 2011), identified and classified the various actors involved (PWC, 2010; Tompkins et al., 2010; Agrawala et al., 2011), or the rationale for involvement (e.g., Persson et al., 2009). Other studies have assessed the potential of international private investment to support the adaptation needs of developing countries (Atteridge, 2011), or assessed private sector's progresses in adapting to climate change (Agrawala et al., 2011). Most recent research efforts analyzed those enabling conditions that need to be in place at a country-level to stimulate private sector adaptation (Stenek et al., 2013).

Empirical evidence on how public resources can be successfully managed, delivered, and by the means of which financial instruments in order to attract private resources remains instead scarce. Knowledge is particularly lacking with respect to businesses operating in developing countries. Acknowledging Buchner et al. (2011a, 2012 and 2013a), little is known on how much and what type of finance is currently flowing from developed to

developing countries in support of adaptation actions and whether existing public sector investments are targeting those barriers that inhibit private investments.

Research questions and motivations

Against this background, the present doctoral dissertation aims to advance academic knowledge on adaptation finance by focusing on the following main questions:

1. How much, what type and in which way is 'adaptation finance' currently flowing to developing countries in pursuit of the commitments made by developed countries under the UN Convention?
2. How can public finance be managed and channeled in order to successfully incentivize and engage private actors to contribute towards countries' adaptation efforts?

The first research question aims to investigate current flows of adaptation finance and related tracking issues in order to: (i) develop a baseline on international financial flows invested in pursuit of climate resilience objectives in developing countries; (ii) provide empirical evidence on how current public investments support and/or stimulate private sector action with the aim of mobilizing additional funds toward this end; (ii) build evidence to support the ongoing debate on the measurement and reporting of developed countries climate finance commitments.

This analysis is believed to be useful to the UNFCCC Standing Committee of Finance (SCF) that was tasked by COP to prepare a Biennial Assessment and Overview of Climate Finance Flows (UNFCCC, 2011, 2/CP.17), and to consider ways to strengthen methodologies for reporting climate finance (UNFCCC, 2012, 5/CP.18).²

The second research question, instead, aims to investigate the strategies, instruments and "entry points" that public actors can use and lever to stimulate private investments in climate resilience. This assessment intends to contribute to the development of the knowledge base needed to equip governments with insights on models that can help unlock additional climate finance flows and/or increase implementation of adaptation activities on-the-ground. It can also inform decision-makers about the challenges faced on-the-ground, but also of promising strategies that can address them.

To answer the thesis research questions the analysis focuses on Development Finance Institutions (DFIs) (i.e. Multilateral and Bilateral Development Banks), and their role in helping governments to deliver the commitments made under the UNFCCC and the related private finance mobilization objectives.

² The entity tasked to assist the Conference of the Parties with respect to the measurement, reporting and verification of the support provided to developing country Parties (UNFCCC, 2010, 1/CP.16).

The hypothesis is that DFIs are in a privileged position to identify how to best deploy adaptation finance and how to involve private actors to contribute toward countries' climate-resilient development objectives. This is because they “*occupy an intermediary space between public aid and private investment*” (Dickinson, 2007), are the holders of long-standing expertise in the areas of development assistance. They are also key players of the global climate finance *landscape* (Buchner et al., 2012). Furthermore, over the past decade, DFIs have increased the volume of resources allocated to enabling and engaging with private businesses as well as the level and range of the financial and advisory services offered to them (Nelson, 2010; Perry, 2011).

By empirically assessing real-world financing practices, this study intends to demonstrate their role in the context of adaptation finance, bringing an original contribute to the academic literature. This study also aims to distill lessons that could inform policy- and decision-makers about how to best deliver scarce public resources to achieve climate-resilient development objectives.

The underlying rationale of this doctoral dissertation is the concept of climate finance effectiveness. Acknowledging that different stakeholders involved in international climate finance have different views with respect to the meaning of the word “effectiveness” (see Ellis et al., 2013), this research is driven by the following considerations:

- First, quantifying and characterizing adaptation finance flows is a prerequisite to the assessment of the effectiveness of adaptation investments, thereby the provision of evidence-based analysis supporting adaptation policy, planning and investment decision-making; It is a prerequisite to scaling up climate finance efforts to achieve the UNFCCC long-term goal.
- Second, understanding how to engage the private sector in adaptation is important to increase the scale and efficiency of adaptation actions. This is because private actors can enable greater investments in vulnerability reduction measures, can enhance adaptation options by mobilizing technical capacity for the development of new climate-resilient products and services, lower their costs, as well as accelerate the replication of climate-resilient approaches (UNFCCC, 2008a; GEF, 2012; Biagini and Miller, 2013).

As underscored in the Busan Partnership on Effective Development Co-operation (2011),³ the private sector is a key partner in the delivery of effective development co-operation and to build climate-resilient societies. Its successful involvement, in fact, can

³ The Busan Partnership on Effective Development Co-operation, which was agreed to by 150 countries, outlines the relevance of climate finance and of extending the scope of the principles for effective development finance beyond aid (Ellis et al., 2013). Focusing on the role of the private sector in development policy implementation, the Busan Partnership document recognizes the “*central role of the private sector in advancing innovation, creating wealth, income and jobs, mobilizing domestic resources and in turn contributing to poverty reduction*”.

help ensure the sustainability of public interventions, thereby enhance the effectiveness of public aid.

Methodology and research steps

This research adopted a multi-method approach blending qualitative and quantitative approaches. In particular, it involved:

- A desk-based review and analysis of major climate finance publications and of existing studies compiled by various organizations involved in the mapping and tracking of relevant climate flows;
- The collection and analysis of empirical data on climate adaptation finance flows;
- A series of interviews with stakeholders operating in the area of climate finance and business development in developing countries, as well as participation to relevant conferences;
- A bottom-up case study approach.

First, the literature review allowed mapping relevant flows and elements needed to comprehend and develop the *landscape of adaptation finance*. It included an exploration of relevant concepts, data sources, and the methodologies used to collect and present data as well as an investigation of related tracking issues. The review informed:

- (i) The selection and design of the methodological framework adopted to systematize the web of flows characterizing the adaptation finance architecture;
- (ii) The identification of relevant secondary data sources; and
- (iii) The design of the primary data collection approach used to retrieve quantitative data from a wide range of sources and complementary qualitative information not otherwise available.

Second, a number of semi-structured interviews or ad-hoc interactions with experts from DFIs and research organizations served to gain further insights and understanding into the methodological approaches used to track adaptation-relevant interventions, and the strategies adopted to engage private actors.

Third, a case study analysis was used as a strategy to investigate how public resources can be deployed on-the-ground to engage private actors in building climate resilience. The case study applied the analytical framework developed in the context of the San Giorgio Group,⁴ involving, inter alia, financial modeling, risk assessment, and a cost and benefit analysis.

⁴ For further information see: <http://climatepolicyinitiative.org/sgg/>.

Structure of the thesis

Following this introductory section, Chapter 1 presents the relevant background as to why a clear and comprehensive picture on current adaptation finance flows is important in the context of the UNFCCC and beyond. Developing and building on work undertaken for Buchner et al. (2011a, 2012 and 2013a,b), it also outlines the key elements laying the foundations for the quantitative analysis of current adaptation finance flows and the methodological framework adopted for the assessment. It concludes providing insights on “entry points” for public intervention, that could be harnessed to engage private actors in the management of climate risks.

Chapter 2 applies the Buchner et al. (2011a, 2012 and 2013a) *landscape* framework to assess the current magnitude and nature of adaptation finance flowing from developed to developing countries. It also brings empirical evidence on how current public investments support and stimulate private sector action in climate resilience, and highlights the limitations and shortcomings of existing tracking and reporting practices.

Chapter 3 showcases empirical evidence from a case study investigating the strategies developed and challenges faced by the International Finance Corporation (IFC) in the development of a project aimed at building climate resilience in the agriculture sector through private sector participation. The case study brings evidence-based analysis on elements that can create the long-term “business case” for private involvement in climate resilience.

Chapter 4 investigates the role and tools of private sector-oriented International Development Finance Institution (IFIs) to stimulating and supporting private adaptation. It focuses on how, and to what extent, these institutions have systematically integrated climate risk management approaches in their investment appraisal procedures and standards, and how they are “operationalizing” the concept of climate adaptation in their private sector operations. It provides considerations on how to streamline and enhance private sector engagement.

Additional information per chapter is provided in the annexes.

Concluding remarks

This doctoral dissertation does not aim to offer final answers, but rather to take stock of the current status of the *landscape* to stimulate debate and learning. It remains a preliminary baseline assessment against which to build further research undertakings.

The topics assessed in this research have been evolving fast in the past few years and, therefore, the analysis presented have to be contextualized in the time frame in which they

were developed (2012-2014). Further developments are foreseen in view of the 21st Conference of the Parties (COP) that will take place in Paris in 2015. COP 21 is the time and place where countries planned to achieve an agreement on a new international legally binding treaty on climate change (see UNFCCC, 2011, 1/CP.17). In that circumstance, the lessons learned over these years – also through the research undertaken in the context of this thesis and of the author’s work at Climate Policy Initiative – may help inform the rules of the international response to climate change.

References

- Agrawala S. and S. Fankhauser. 2008. *Economic Aspects of Adaptation to Climate Change*. Costs, Benefits and Policy Instruments. Organization for Economic Co-operation and Development. Paris, France.
- Agrawala S., Carraro M., Kingsmill N., Lanzi E., Mullan M., Prudent-Richard G. 2011. *Private Sector Engagement in Adaptation to Climate Change: Approaches to Managing Climate Risks*. Organization for Economic Co-operation and Development. Environment Working Papers 39, Paris, France.
- Atteridge A. 2011. *Private Sector Finance and Climate Change Adaptation. How Can Voluntary Private Finance Support Adaptation in Developing Countries?* Policy Brief. At: <http://www.sei-international.org/mediamanager/documents/Publications/Climate-mitigation-adaptation/policybrief-privatesectorfinance-adaptation.pdf>.
- Berrang-Ford L., Ford J.D. and Paterson A. 2011. *Are we Adapting to Climate Change?* Global Environmental Change Vol. 21 (2011) 25-33.
- Biagini B. and Miller A. 2013. *Engaging the Private Sector in Adaptation to Climate Change in Developing Countries: Importance, Status, and Challenges*. Review Article. Climate and Development, Vol. 5, Issue 3, 2013. Pages 242-252.
- Buchner B., Falconer A., Hervé-Mignucci M., Trabacchi C., and Brinkman M. 2011a. *The Landscape of Climate Finance*. A CPI Report. Climate Policy Initiative, Venice.
- Buchner B., J. Brown and J. Corfee-Morlot. 2011b. *Monitoring and Tracking Long-Term Finance to Support Climate Action*. Organization for Economic Co-operation and Development (OECD) and IEA, COM/ENV/EPOC/IEA/SLT (2011)3, Paris, France.
- Buchner B., Falconer A., Hervé-Mignucci M., Trabacchi C. 2012. *The Global Landscape of Climate Finance*. CPI Report, Venice. At: <http://climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2012/>.
- Buchner B., Hervé-Mignucci M., Trabacchi C., Wilkinson J., Stadelmann M., Boyd R., Mazza F., Falconer A., Micale V. 2013a. *The Global Landscape of Climate Finance*. CPI Report, Venice. At: <http://climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2013/>.
- Buchner B., Painter C., Trabacchi C., and Wilkinson J. 2013b. *The Role of Development Finance Institutions and Development Banks in Scaling Up Green Investments*. Proceedings of Scaling-up Green Economy 2013; 2013 September 5; KfW, Frankfurt. Venice: Climate Policy Initiative.
- Busanhlif. 2011. *Busan Partnership for Effective Development Co-Operation - Fourth High Level Forum On Aid Effectiveness*, Busan, Republic Of Korea, 29 November - 1 December 2011 <http://www.oecd.org/dac/effectiveness/49650173.pdf>.
- Caruso R. and J. Ellis. 2013. *Comparing Definitions and Methods to Estimate Mobilised Climate Finance*. Organisation for Economic Co-operation and Development, Paris, May 2013. At: <http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=COM/ENV/EPOC/IEA/SLT%282013%292&docLanguage=En>.
- Clapp C., Ellis J., Benn J. and Corfee-Morlot. 2012. *Tracking Climate Finance: What and How?* Organization for Economic Co-operation and Development. COM/ENV/EPOC/IEA/SLT(2012)1. May 2012, Paris, France.
- Corfee-Morlot J., Guay B. and Larsen K.M. 2009. *Financing for Climate Change Mitigation: Towards a Framework for Measurement, Reporting and Verification*. OECD/IEA Information Paper, Paris, October 2009.
- Dickinson T. 2007. *Development Finance Institutions: Profitability Promoting Development*. OECD, Paris, France. At: <http://www.oecd.org/dev/41302068.pdf>.
- Ellis J., G. Briner, S. Moarif and B. Buchner. 2011. *Frequent and Flexible: Options for Reporting Guidelines for Biennial Update Reports*. Organisation for Economic Co-operation and Development, Paris, May 2011. At: <http://www.oecd.org/env/cc/48073760.pdf>.
- European Union (EU). 2014. *Submission by Greece and the European Commission on Behalf of the European Union and its Member State*. Athens, 21 February 2014. At:

http://unfccc.int/files/documentation/submissions_from_parties/application/pdf/el-02-21-biennial_reports.pdf.

Field C., Barros V., Mach K., Mastrandrea M. et al. 2014. *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Technical Summary*. IPCC, Working Group. At: <http://www.ipcc.ch/report/ar5/wg2/>.

Forstater M. and R. Rank. 2012. *Towards Climate Finance Transparency*. Aidinfo / Publish What You Fund, London, UK. At: <http://www.publishwhatyoufund.org/updates/news/towardsclimate-finance-transparency/>.

Fransen, T. 2009. *Enhancing Today's MRV Framework to Meet Tomorrow's Needs: The Role of National Communications and Inventories*. World Resources Institute Working Paper. Washington, DC: World Resources Institute. At: <http://www.wri.org>.

Global Environmental Facility (GEF). 2012. *Private Sector Engagement in Climate Change Adaptation: Prepared by the GEF Secretariat in Collaboration with the International Finance Corporation*. GEF/LDCF.SCCF.12/Inf.06. May 2012. At: <http://www.thegef.org/gef/sites/thegef.org/files/documents/Note%20on%20Private%20Sector.pdf>.

Haites E. 2011. *Climate Change Finance*. *Climate Policy*. 11, 963–69.

High-level Advisory Group on Climate Change Financing (AGF). 2010. [cited as AGF, 2010]. *Public Interventions to Stimulate Private Investment in Adaptation and Mitigation*. Work stream 7 paper New York, United States. At: http://www.un.org/wcm/webdav/site/climatechange/shared/Documents/AGF_reports/Work_Stream_7%20Public_Private.pdf.

Intergovernmental Panel on Climate Change (IPCC). 2013: *Summary for Policymakers*. In: *Climate Change 2013: The Physical Science Basis*. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. At: <http://www.ipcc.ch/report/ar5/wg1/>.

Nelson J. 2010. *The Private Sector and Aid Effectiveness: Toward New Models of Engagement*. The 2010 Brookings Blum Roundtable Policy Briefs. Washington D.C.

Parry M., Arnell N., Berry P., Dodman D., Fankhauser S., Hope C., Kovats S., Nicholls R., Satterthwaite D., Tiffin R., and Wheeler T. 2009. *Assessing the Costs of Adaptation to Climate Change - A Review of the UNFCCC and Other Recent Estimates*. London: International Institute for Environment and Development (IIED). At: <http://pubs.iied.org/pdfs/11501IIED.pdf>.

Parry M.L., Canziani O.F, J.P. Palutikof and Co-authors. 2007. *Technical Summary*. *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 23-78.

Perry G. 2011. *Growing Business or Development Priority? Multilateral Development Banks' Direct Support to Private Firms*. Center for Global Development, Washington D.C.

Persson Å., Klein J.T., Kehler Siebert C., Müller B., Hoffmaister J., Lazarus M., Takama T. 2009) *Adaptation Finance under a Copenhagen Agreed Outcome*. Stockholm: Stockholm Environment Institute. Stockholm Environment Institute, October 2009. At: <http://www.environmentportal.in/files/adaptation-finance-copenhagen.pdf>.

PwC. 2010. *Business Leadership on Climate Change Adaptation: Encouraging Engagement and Action*. PricewaterhouseCoopers LLP (UK), London. At: <http://www.pwcwebcast.co.uk/encouraging-engagement-and-action-full-report.pdf>.

Stadelmann M, Roberts T.J. Michaelowa A. 2011. *Accounting of Private Climate Finance. Types of Finance, Data Gaps and the 100 Billion Dollar Question*. Climate Strategies Working Paper, August 2011.

Stenek V. Amadado J.C., Greenal D. 2013. *Enabling Environment for Private Sector Adaptation. An Index Assessment Framework*. International Finance Corporation. Washington D.C. At:

http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/cb_home/publications/publication_enablingenvironmentadaptation_landing.

Surminski S. and Eldridge J. 2013. *Observations on the Role of the Private Sector in the UNFCCC's Loss and Damage of Climate Change Work Programme*. Centre for Climate Change Economics and Policy Working Paper No. 159 Grantham Research Institute on Climate Change and the Environment Working Paper No. 142.

Tirpak, D., A. Ronquillo-Ballesteros, K. Stasio, H. McGray. 2010. *Guidelines for Reporting Information on Climate Finance*. World Resources Institute Working Paper., Washington DC. At: http://pdf.wri.org/working_papers/guidelines_for_reporting_information_on_climate_finance.pdf.

The World Bank. *Economics of Adaptation to Climate Change*. A Synthesis Report Final Consultation Draft. August 2010. Washington, D.C. At: http://siteresources.worldbank.org/EXTCC/Resources/EACC_FinalSynthesisReport0803_2010.pdf

Tompkins E.L., Adger W.N., Boyd E., Nicholson-Cole S., Weatherhead K., Arnell N. 2010. *Observed Adaptation to Climate Change: UK Evidence of Transition to a Well-Adapting Society*. Global Environmental Change, Vol. 20.

United Framework Convention on Climate Change (UNFCCC) website [cited UNFCCC.int] at: <http://unfccc.int/focus/finance/items/7001.php#intro>.

United Framework Convention on Climate Change (UNFCCC). 1992. *United Nations Framework Convention on Climate Change*. United Nations 1992. FCCC/INFORMAL/84, GE.05-62220 (E) 200705. At: <http://unfccc.int/resource/docs/convkp/conveng.pdf>.

----- . 2007. *Investment and Financial Flows to Address Climate Change* Climate Change Secretariat. Bonn, Germany.

----- . 2008a. *Investment and Financial Flows to Address Climate Change: an Update*. Technical Paper, FCCC/TP/2008/7, 26 November 2008. At: <http://unfccc.int/resource/docs/2008/tp/07.pdf>.

----- . 2009. *Copenhagen Accord*. Decision adopted by the Conference of the Parties 2/CP.15. FCCC/CP/2009/11/Add. At: https://unfccc.int/documentation/documents/advanced_search/items/6911.php?priref=600005735.

----- . 2010. *Report of the Conference of the Parties on its Sixteenth Session, held in Cancún from 29 November to 10 December 2010*. Decision 1/CP.16, Paragraph 18. <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf>.

----- . 2011. *Report of the Conference of the Parties on its Seventeenth session, held in Durban from 28 November to 11 December 2011*, Decision 1/CP.17 and 2/CP.17. At: <http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf#page=58>.

----- . 2012. *Report of the Conference of the Parties on its Seventeenth session, held in Doha from 26 November to 8 December 2012, Decision 5/CP.18*. At: http://unfccc.int/cooperation_and_support/financial_mechanism/standing_committee/items/6878.php.

----- . 2012. *Report on the Workshops of the Work Programme on Long Term Finance Doha*. 6 November 2012. FCCC/CP/2012/3. At: <http://unfccc.int/resource/docs/2012/cop18/eng/03.pdf>.

----- . 2014. *Summary Report on the in-Session Workshop on Long-Term Climate Finance in 2014*. 22 September 2014. FCCC/CP/2014/3. At: <http://unfccc.int/resource/docs/2014/cop20/eng/03.pdf>.

UN. 2011. United Nations, *World Economic Situation and Prospects*, 2011, chap. 3. At: <http://www.un.org/esa/analysis/wess/wesp2011files/2011chap3.pdf> .

CHAPTER 1.

SETTING THE SCENE

This chapter sets the context of the study by providing relevant background on adaptation finance and its institutional architecture. It represents a starting point to identify and comprehend existing data sources, the relationships between the various elements of the *landscape* and their influence on private sector finance.

It starts by outlining the rationale behind the analysis presented in Chapter 2 and describing the methodological framework adopted to systematize and categorize the various elements of the so-called international *Landscape of Climate Finance* with relevance to adaptation (see Buchner et al., 2011). It continues by characterizing relevant flows and actors, and providing insights on possible “entry-points” for private finance. It concludes by outlining some of the main outstanding issues calling for further research, and the reasons for investigating the topics presented in Chapter 3 and 4.

This chapter develops and builds on research undertaken for Buchner et al., (2011a; 2012 and 2013a,b), Haites (2013) and Smallridge et al., (2013). Further desk-based analysis was undertaken to complement the findings of these studies.

1. Introduction and background

Finance is a fundamental component of the international community’s response to climate change since the early days of the climate change negotiations. From the outset, the United Nations Framework Conventions on Climate Change (UNFCCC) established developed countries’ obligations to provide financial resources in support of developing countries’ mitigation and adaptation efforts (UNFCCC, 1992, Article 4.3).

International finance for adaptation gained momentum and enhanced political status with the adoption of the Bali Action Plan (BAP) at the thirteen session of the Conference of the Parties (COP) in 2007 (UNFCCC, 2007a). Importantly, the BAP called for “*enhanced action on the provision of financial resources and investment to support action on mitigation and adaptation*” by, inter alia, mobilizing both public and private-sector funding and investment (UNFCCC, 2007a). It emphasized the equal relevance of “*enhanced action*” on both adaptation and mitigation, thus attributing equal importance to these two complementary components of a response strategy to global warming. Until then, discussions on the issue of mitigation and related commitments overshadowed adaptation concerns (Persson et al., 2009).

The Copenhagen (2009) and Cancún (2010) Conference of the Parties (COP) set two other significant milestones in the climate finance discourse with relevance for adaptation. Developed countries pledged in the Copenhagen Accord, and formally reaffirmed in the Cancún Agreements, to “mobilizing jointly USD 100 billion per year by 2020 [...] to address the needs of developing countries” (UNFCCC, 2009, 2/CP.15; UNFCCC, 2010, 1/CP.16). These funds “may come from a wide variety of sources, public and private, bilateral and multilateral, including alternative sources of finance” (UNFCCC, 2010, 1/CP.16). The Copenhagen Accord and the Cancún Agreements also set the short-term goal of providing funds “[...] approaching USD 30 billion for the period 2010–2012, with a balanced allocation between adaptation and mitigation”, so-called Fast-start Finance (FSF). The Cancún Agreements also invited both public and private actors to “undertake and support enhanced actions on adaptation”, and also reaffirmed the role of the private sector to fund adaptation and mitigation in developing countries.

In light of developed countries’ commitments, a system to measure, report and verify the relevant financial flows across a variety of sources is needed to assess progress against the collective financial obligations made in Copenhagen and Cancún, thereby building trust and accountability amongst countries (Buchner et al., 2011b). It is also needed to build a comprehensive picture of the scale, type and use of the resources provided, and a prerequisite for ensuring their effective and productive use (Buchner et al., 2011a,b). Such a system is essential to help manage and guide the allocation of resources, as well as evaluate whether the right volume and mix of finance is being provided to address countries’ socio-economic climate vulnerabilities through public and/or private initiative.

While the relevance of such a system is widely recognized (e.g. Corfee-Morlot et al., 2009; Buchner et al., 2011b; Tirpak et al., 2010), and acknowledging the progresses that have been made in the reporting under the UNFCCC (see UNFCCC, 2011, 2/CP.17; UNFCCC, 2012, 19/CP.18), existing climate finance tracking efforts are not complete, comparable or transparent (Buchner et al., 2011a,b).

Climate finance tracking is complicated by several factors. The main obstacle is the lack of an internationally agreed definition of what qualifies as climate finance (Forstater and Rank, 2012; Haites, 2011; Buchner et al., 2011a,b) or, more narrowly, of what qualifies as a climate or an adaptation intervention. There is neither agreed methodology for tracking nor basis for measurement (Buchner et al., 2011b), and there is not a centralized system for tracking all relevant climate flows (Clapp et al., 2012). Further, there is currently no agreed definition of “private climate finance”, and existing sources of private sector data are limited in scope and detail (Clapp et al., 2012).

1.1 The definitional issue

The terminology related to central concepts regarding the provision of financial resources is not operationally defined in the Convention. The language used leaves ample room for interpretations (Machado-Filho, 2011), and its practical interpretation has been the source of substantial debate and controversy (see Corfee-Morlot et al., 2009; Romani and Stern, 2011). Parties' divergent political views on how much should be made available, to whom, and from which source(s), has made it difficult to achieve an agreement on a definition of climate finance, and to establish the basis for financial accounting rules or a measurement system for tracking relevant flows (Buchner et al., 2011a,b).

Adaptation brings additional terminological and methodological challenges in terms of measuring progress against the commitments made under the aegis of the UNFCCC (e.g. Article 4, UNFCCC, 1992; UNFCCC 2010, 1/CP.16), as well as in terms of resource management.

First, a commonly agreed, concrete and discriminating definition of adaptation is missing under the UNFCCC (Persson et al., 2009). The Convention, in fact, has not specified which activities and which type(s) of financial flows should be considered towards the USD 100 billion goals, and how to systematically track all relevant climate flows. It is worth noting that the findings of country-level studies, such as UNDP (2013), Terpstra et al. (2013a), Ampri et al. (2014), and Caravani et al. (2014) also raise questions regarding who should determine what constitutes adaptation-relevant (Caravani et al., 2014). Donors and development partners' perspectives on what constitutes adaptation are, in fact, often different from those of recipient countries (Caravani et al. 2014).

Second, adaptation is intricately intertwined with development,⁵ making difficult to distinguish it from other forms of development finance and to identify the "*incremental costs*" referred to in the Convention (Brown and Kaur, 2009). Many adaptation activities, in fact, overlap with traditional development activities (Buchner et al., 2011b), and many conventional development interventions (such as social protection or disaster risk reduction programs) can influence the ability of communities to adapt (Levine et al., 2011).

Third, adaptation takes place in response to multiple stimuli. It is therefore conceptually and practically problematic to identify whether adaptation takes place in response to development pressures or to changes in climatic conditions (see Berrang-Ford et al., 2011; Levine et al., 2011).

⁵ See related discussions in Burton et al., 2002; Adger et al., 2003; O'Brien et al., 2004.

Fourth, adaptation is highly contextualized within a system (Smit and Pilifosova, 2002) and, therefore, dependent upon context-specific factors including climatic, institutional, and socio-economic ones. As such, an activity supporting adaptation objectives in one context may result in “maladaptation”⁶ in another (Tirpak et al., 2010). There is also considerable debate about the extent to which countries need to adapt, what needs to be prioritized, and the level and type of finance necessary to fund adaptation needs (Brawn and Kaur, 2009; Persson, 2009).

Fifth, adaptation can refer to measures tackling climate risks at different points in time. As such, it can refer to measures (i) improving the ability of responding to current climate variability and risks (often called adaptation deficit); (ii) building the capacity of facing incremental changes in current climate-related risks; (iii) enabling to address future climatic and environmental conditions (anticipatory adaptation), which might be different from today’s ones.⁷ Adaptation is a dynamic phenomenon, evolving over time in response to a changing climate (Hallegatte, 2009). As Terpstra (2013b) pointed out, actions that may represent effective adaptation today may no longer count as effective adaptation years from now. Indeed, the capacity to adapt is dynamic (Parry et al., 2007) as is the socio-economic context and, as noted by Arnell (2011), the iterative climate risk management approach that should be taken to tackle climate change under uncertain conditions.

In addition to technical challenges, the political economy of adaptation can also influence the process of tracking adaptation finance, which is inherently political (Michaelowa and Michaelowa 2011; Jones, 2012).

These characteristics of adaptation represent challenges to the identification of what types of activities should be tracked and how should be accounted against international commitments. They represent challenges to both donor and recipient countries, which are requested to report on the support provided and on the support received (see UNFCCC, 2010; 1/CP.16 and UNFCCC, 2011, 2/CP.17).⁸

For recipient developing countries the challenges can be even higher. Donor countries and institutions, in fact, use a variety of definitions and criteria to identify climate finance, as well as different classifications for type of activities (Tirpack et al., 2012). Decisions makers in these countries need a complete and clear picture as well as accurate data to coordinate and manage funds from across multiple organizations, and fundraise for national climate change-related activities (Tirpack et al., 2012).

⁶ McCarthy et al. (2001) define “maladaptation” as an adaptation activity that increases vulnerability to climatic stimuli.

⁷ Adapted from Jones et al. (2012).

⁸ In the context of the UNFCCC support includes financial resources, technology, and capacity building.

The lack of clear definitional boundaries under the UNFCCC, and of consensus on methodologies, has so far hindered understanding. The bodies in charge of reporting on adaptation spending find the tracking process confusing and cumbersome due to the ambiguity in classification criteria (Bhattarai et al., 2011; Jones et al., 2012), thereby not useful to plan and program expenditure.

Thus, practitioners and policy makers still lack the tools to comprehend the scale of the financial resources allocated to adaptation, how and where funds are being spent, and if finance corresponds to countries' needs. This is critical to consistently and transparently monitor the progress made toward financing climate adaptation and ensuring socio-economic systems are prepared to manage the likely impacts of a world on a 4 °C warming trajectory (IPCC, 2013; WB, 2012).

2. Methodological approach and framework

This chapter was completed through a desk-based review and analysis of most relevant literature in the field. It builds on earlier research efforts such as Buchner et al. (2011b), and research undertaken by the author in the context of Buchner et al. (2011a, 2012 and 2013a,b).

Following Buchner et al. (2011a,b) this research adopts a two dimensional framework to systematize the complex interplay of flows characterizing climate finance in general, and adaptation finance in particular.⁹ This framework is used as a reference to characterize relevant flows and to compile and present the data gathered to develop the so-called *Landscape of Adaptation Finance* presented in Chapter 2. The two dimensional framework characterizes financial flows as follows:

- On the horizontal axe, along their lifecycle, that is from sources, through to intermediaries, instruments, disbursement channels/recipients, and final sectoral uses / geographic destination;
- On the vertical axe, according to their source of origin i.e., whether of public, private or of public-private nature.

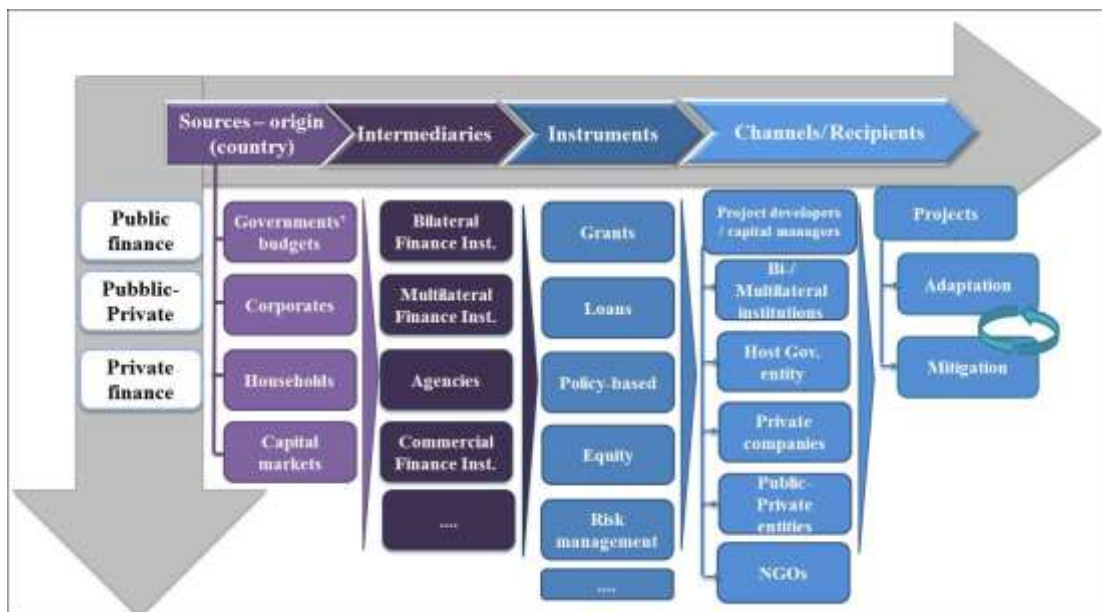
Figure 1 illustrates this framework, providing an overview of the elements characterizing the *landscape*, and underscoring the existence of more information underneath the possible categories along these dimensions. This linear representation of flows is, in fact, a simplification (Buchner et al., 2012). In reality, the relationships existing between flows are more complex involving, for instance, intermediate layers of instruments (such as between

⁹ This framework, which is presented in Figure 1, develops from Corfee-Morlot (2009) and describes the statistical coverage of the OECD- DAC system.

governments, intermediaries and ultimate recipients), and feedback loops. Resources can in fact go back and forth between actors.

Moreover, the distinction between categories is not a clear cut. Governments (public finance), for instance, may stand behind seemingly private investments (Buchner et al., 2012) and, vice versa, private actors can stand behind public intermediaries via shareholdings.¹⁰ Different instruments can also be combined together to meet investors' various needs (see e.g. Trabacchi et al., 2012). Furthermore, certain activities can target both adaptation and mitigation because, as noted by Klein et al. (2007), synergies (but also trade-offs) can exist in some sectors such as agriculture (Niggli, 2009), forestry (Ravindranath, 2007) and infrastructure (Satterthwaite, 2007).¹¹

Figure 1. The dimensions of climate finance.



Source: adapted from Buchner et al. (2011a, b) and Corfee-Morlot et al. (2009).

In this research, and hereafter, the words 'adaptation to climate change' and 'building climate resilience' are used interchangeably. Climate resilience refers to "the ability of a system [...] to anticipate, absorb, accommodate or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration or improvement of its essential basic structure and functions" (IPCC, 2012; 2007). Adaptation measures can enhance climate resilience (Parry et al., 2007).

¹⁰ The ownership structure of some intermediaries e.g., Multilateral Development Banks (MDBs), is not fully public, but rather a mix of public and private. In addition, MDBs also raise resources on capital markets via public and private placements.

¹¹ For instance, adaptation measures in forestry, soil and water conservation or cropping practices, is an example of synergy between adaptation and mitigation because these measure can also contribute to curb greenhouse gases (Ravindranath, 2007). Mitigation projects can facilitate or hinder people's efforts to adapt, and adaptation measures can affect ecosystems' potential to sequester carbon (Locatelli, 2010).

3. The *Landscape of Climate Finance*: what is relevant for adaptation?

This section characterizes each stage of the finance chain portrayed in the two dimensional framework. It also provides insights on key “entry points” for private finance.

3.1 Main Sources and intermediaries of adaptation finance

Finance with relevance for adaptation can be of public and/or private nature, stemming from governments budgets – of national and/or sub-national level – households (including family-level economic entities and high-net-worth individuals) and corporate actors. Corporates’ resources stem from business operations, while households’ ones from income and savings, including entrepreneurial or inherited wealth (Buchner et al., 2012). These entities can also access capital markets, including by issuing climate-themed bonds to raise additional resources.

3.1.1. Private finance

Businesses – which can span from multinational companies, micro and small- medium size enterprises through to farmers’ cooperatives – and households can contribute to adaptation finance as taxpayers via general taxes, fees and/or other policy requirements (e.g., the 2% levy on the Clean Development Mechanism project proceeds financing the Adaptation Fund). Alternatively, they can ‘voluntarily’ contribute as opportunistic investors (profit or cost-savings driven) via autonomous investments and market participation (Persson et al., 2009).

‘Voluntary’ investments in adaptation-relevant activities can be driven by the self-interest of private actors to protect own climate-sensitive assets and/or revenue generating operations. They can also be driven by corporate social responsibility strategies and/or philanthropic initiatives. It is difficult to evaluating and capturing these investments. In fact, while households and corporates do engage in autonomous adaptation activities (see e.g. GEI, 2011) – most likely as a reaction to observed impacts rather than as a forward-looking strategy aimed at anticipating projected changes (Klein, 2007; Miller and Stenek, 2013) – they do not typically label their actions as ‘adaptation’. The management of climate risks is likely to occur as part of standard risk management or planning processes and, hence, not explicitly categorized as an adaptation response to climate change. Information can also be kept confidential for competitive reasons. As a result, data are lacking and not routinely collected according to any agreed definitions.

An exception is the UNFCCC “Private Sector Initiative” (PSI) database, which features a number of voluntarily reported case studies of adaptation activities being undertaken by private companies. Financial aspects related to the various actions presented in the

database, however, are not readily available or, whether specified, not verified by the UNFCCC secretariat.¹²

In an attempt to estimate and evaluate private flows, most of practitioners' attention has so far focused on international private sector flows such as Foreign Direct Investment (FDIs) and philanthropic donations as indicative of where the private sector autonomously finds investment opportunities.

Regarding FDIs, Atteridge (2011)¹³ finds that key sectors in terms of adaptation and local populations' needs in developing countries have been relatively unattractive to private FDIs. Siebert and Dzebo (2014), which focused on pan-African Least Developed Countries, observes competition between FDIs and adaptation priorities in some countries – e.g., between investment in large-scale agriculture and small landholders for water rights. Above these ad hoc analyses, it is challenging to identify and determining the relevance of FDIs to adaptation, particularly via top-down approaches. In fact, no tracking methods to date exist for climate-related FDIs. Existing databases provide limited information as dividing FDIs into a few economic sectors and not featuring details on the type of investments.¹⁴

With respect to philanthropic donations, practitioners believe that they may represent a relevant source of concessional adaptation finance for developing countries given their historical contribution to developmental activities.¹⁵ Levina (2007) provides early insights on the role of private Foundations in areas relevant to adaptation (e.g. agriculture, health, environmental conservation, etc.), showing that the total annual giving of top 100 grant-making US-based Foundations in these areas was in the order of UDS 5.5 billion (based on data as of June 2007). More recent analysis on their adaptation-relevant contributions,, however, do not provide robust evidence, data are lacking, inconsistent, and/or not systematically tracked.¹⁶

3.1.2 Governments' budgets

Most government funding comes from general taxes, but some also raise revenue from e.g. carbon pricing mechanisms, levying businesses and households. These resources can then

¹² For further details, see the UNFCCC web site at <http://unfccc.int/>.

¹³ Atteridge (2011) assessed the historical distribution of historical distribution of both equity and debt flows including FDIs, portfolio investment and international bank lending.

¹⁴ See e.g. the FT FDIintelligence (www.fdiintelligence.com) or the UNCTAD FDI statistics (www.unctad.com).

¹⁵ See e.g., OECD (2003) or Marten and Witte (2008).

¹⁶ More recent analysis (Searle and Al-Khafaji, 2013), noted that over the 2008-2010 period only about USD 40 million appeared to be specifically directed toward adaptation. This estimate, however, appears too narrow considering that the Rockefeller Foundation alone invested USD 70 million in the Asian Cities Climate Change Resilience Network initiative in 2009 (Rockefellerfoundation.org).

The OECD is leading promising efforts towards capturing such flows are currently ongoing (see OECD, 2013a). The OECD has been tracking data from private voluntary agencies and, since 2011, also project-level donations from the Belinda and Gates Foundation (Smith, 2011). Detailed data on climate-related activities is however not available. It has also started cooperating with the US Foundation Center (covering more than 10,000 Foundations) and hope this will lead to improving coverage and understanding with regard to climate-relevant private grants to developing countries (OECD, 2013a).

be allocated in pursuit of specific national or international adaptation objectives e.g. through Official Development Assistance (ODA).

Governments' flows can include the provision of policy incentives and/or direct contributions to capital instruments in the case of direct government ownership and state-owned banks (Buchner et al., 2011a). Though policy instruments, as well as the setting of appropriate regulatory frameworks, among the others, Governments have an important role to play to creating and maintaining an enabling environment for adaptation.

Developed countries Governments' budgets expenditures targeting adaptation objectives in developing countries are reported to:

- The UNFCCC in the National Communications and, more recently, in Biennial Reports (Annex II Parties – decisions 4/CP.5, 2/CP.17 and 19/CP.18). Biennial Report, which Parties recently (2014) submitted to the UNFCCC, also encourages Parties to report information on the activities undertaken to mobilize private finance.

Despite recent improvements, these systems still lack transparency, comparability and comprehensiveness (see e.g., EU, 2014; Buchner et al., 2011a,b; UNFCCC, 2011b; Ellis et al., 2010a,b; Tirpak et al., 2010; Corfee-Morlot et al., 2009; Fransen, 2009).

- The OECD, that systematically collects activity level adaptation-related official development finance data within the broader statistical Development Assistance Committee (DAC) Creditor Reporting System (CRS)¹⁷ across all DAC member governments.¹⁸ The climate change adaptation “Rio marker” approved by the DAC in 2009 allows to identify relevant flows. This marker indicates that an activity qualifies as adaptation if “*it intends to reduce the vulnerability of human or natural systems to the impacts of climate change and climate-related risks, by maintaining or increasing adaptive capacity and resilience*” (OECD, 2011).¹⁹ The all-encompassing definition of the OECD Rio marker suggests that a wide variety of factors can contribute to build resilience to today's and future climate conditions. To help classifying projects this definition is complemented by eligibility criteria and a few examples of activities.

Rio marked data are presented along with descriptive information such as on sector, geography and activity type.²⁰ The marker is assigned at project level, and data report

¹⁷ The OECD Creditor Reporting System (CRS) is a statistical system used to monitor aid targeting the objectives of the Rio Conventions.

¹⁸ OECD DAC members reporting against Rio markers: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, EU Institutions, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and United States. New members who will report in future are Slovenia, Slovak Republic and Poland.

¹⁹ The Rio marker also includes eligibility criteria specify that the adaptation objective needs to be explicitly indicated in the activity documentation, and that an activity should contains specific measures targeting socio-ecosystem vulnerabilities (OECD, 2011).

²⁰ For additional information see <http://www.oecd.org/dac/stats/crsguide.htm>.

total funding committed/disbursed to a given project (100% qualifies, or 0% – frequently a standard fraction of 50% or 40%) (OECD, 2013b). In addition to ODA, DAC members have also started to voluntarily report climate-related non-concessional official development finance, but coverage is currently limited (OECD, 2014; 2013a).²¹

3.1.3 Capital markets

Public and/or private sector institutions and individuals can mobilize additional long-term funds on capital markets (i.e. markets for financial securities) through various forms of investment vehicles (equity, debt and structured finance).

The bond market, in particular represents for governments and Development Finance Institutions (DFIs) an opportunity for raising new finance for adaptation or other climate-relevant purposes from private investors (Persson et al., 2009).

For instance, DFIs have started to raise capital for eligible climate change mitigation and/or adaptation-related projects²² from ‘socially responsible investors’ via so-called climate-themed bonds (Persson et al., 2009).²³

The value of outstanding climate-themed bonds can help to gauge the fundraising potential of capital markets. As of March 2013, this amounted to USD 346 billion (Climate Bonds Initiative and HSBC, 2013). Bonds issued in sectors relevant for adaptation measures, e.g. to finance climate-resilient agriculture practices like crops resistance to drought, or resilient water supply infrastructure are, however, yet to feature in the bond market according to Climate Bonds Initiative and HSBC (2013).

3.1.4 Intermediaries

Intermediaries administer and manage governments’ climate finance flows distributing it to final recipients/borrowers through diverse disbursing channels and by the means of different financing instruments.

Finance is intermediated for various reasons ranging from the expertise and network of the intermediary, through to legal requirements, diversification or to benefit from economies of

²¹ To qualify as ODA, financial assistance has to have a grant element of at least 25% (calculated at a rate of discount of 10%) see (OECD, 2008). Funds that do not include a sufficient grant element to qualify as development assistance are the so-called Other Official Flows (OOF).

²² For example, since 2008, the World Bank has raised USD 6.4 billion equivalent in Green Bonds while its private sector arm, the International Finance Corporation has raised almost USD 3.5 billion (WB web site, 2013; IFC web sites, 2014). Eligible adaptation projects under the World Bank/Skandinaviska Enskilda Banken (SEB)’s Green Bonds include e.g. protection against flooding (including reforestation and watershed management); food security improvement and implementing stress-resilient agricultural systems (which slow down deforestation); sustainable forest management and avoided deforestation (World Bank, 2013; Persson, 2009).

²³ Climate-themed bonds are fixed income, liquid financial instruments that have enabled to attract private sector climate finance, expanding the investor base for climate-friendly projects worldwide (WB, 2014).

scale (Buchner et al., 2011a,b). It is also because these intermediaries are able to leverage additional finance for projects in the form of private and/or public co-financing.

Following and building on Buchner et al. studies, the principal intermediaries relevant for adaptation finance are:

- Development Finance Institutions (DFIs) – including Bilateral (BFI), Multilateral (MDBs), National Development Banks (NDBs), including Sub-Regional Development Banks,²⁴
- Countries' bilateral cooperation agencies;
- UN organizations (e.g. UNEP, UNDP); and
- Dedicated Climate Funds operating through national, regional or multilateral organizations.

DFIs raise funds from a variety of sources, comprising capitalization from governments and borrowing programmes, income from operations (e.g., retained earnings and returns on investments) and debt financing through, as mentioned, bond issuance on capital markets. Bilateral agencies, UN organizations and Climate Funds, instead, mostly rely on governments' voluntary contributions.

Data on DFIs commitments in pursuit of adaptation are inconsistently available and tracked (Buchner et al., 2011a; 2012, Buchner et al., 2013b). Albeit recent efforts are striving to move towards enhance convergence (see e.g. AfDB, 2012 et al., and Ecofys-IDFC, 2012; OECD, 2014), many DFIs do not yet have in place a methodology for tracking climate finance (Buchner et al., 2013a,b), lack dedicated resources to collecting data, have insufficient reporting systems (AFD, 2014), or do not disclose their data for confidentiality issues.

UN and bilateral cooperation agencies flows complying with ODA criteria are reported in the OECD-CRS database. An ad-hoc study should be pursued to highlight their actual contribute, which typically goes beyond pure intermediation (Buchner et al., 2012).

Climate Funds, which are a set of financing vehicles where governments pool their resources in pursuit of adaptation objectives, are typically funded with voluntary non-refundable contributions by donor countries – reaching USD 2.1 billion as of April 2014

²⁴ MDBs are entities with multiple governing members, including those from both developing borrowing and developed donor countries aimed at providing financial and technical support to developing and emerging countries, and/or coordinate support among their member countries (Atteridge et al., 2009; WorldBank.org). BFIs are institutions funded and governed by individual countries with the aim of providing aid, contributing technical support, or investing in selected development activities in developing or emerging countries (Atteridge et al., 2009). They are often part of a government ministry (GoC, 2014); NDBs are generally owned, funded and governed by a single national government and pursue domestic development mandates (UN-DESA, 2005), which can be general or focused on specific niches – such as financing small- and medium-sized enterprises, encouraging infrastructure development, or supporting a country's agribusiness sector (IDFC, 2012).

(ODI/HBF, 2014).²⁵ Mainly relying on UN agencies and DFIs for the implementation of projects, and committing resources with co-financing requirements, Climate Funds can enable the mobilization of resources from financing partners such as multilateral, regional or national organizations, and support the integration of adaptation concerns in the context of larger development interventions.

Adaptation-targeted Climate Funds exist both under the UNFCCC and outside of it.

- Under the UNFCCC, COP 7 (Marrakesh Accords, 2001) established the Least Developed Countries Fund (LDCF), the Special Climate Change Fund (SCCF) and the Adaptation Fund. At COP 16 in Cancún it also established the Green Climate Fund (GCF) (UNFCCC, 2010, 1/CP.16), which is expected to significantly contribute to attaining the adaptation goals of the international community.²⁶
- Outside the Convention there is the Pilot Program for Climate Resilience (PPCR) of the Climate Investment Funds and other multi-thematic multilateral, bilateral and national Climate Funds (e.g. the EU' Global Climate Change Alliance (GCCA)).²⁷

The PPCR is the largest adaptation focused Fund, with total pledges in the order of 1.3 billion (WB, 2014). It is the first fund for adaptation offering concessional loans in addition to grants (CIF, 2011a) and is the most targeted toward private sector involvement in climate resilience (see CIF, 2012 and CIF, 2013).

Data on Climate Funds contributions for adaptation measures are available in Funds' official documents and through the ODI/HBF Climate Funds Update online database, which however does not have a comprehensive coverage. The lack of regular and detailed information on the status of finance, use of inconsistent terminology or its differing interpretation, is a hurdle to the monitoring of Climate Funds' flows (Watson et al., 2012). Generally, there is also more transparency and consistency in the reporting of multilateral Climate Funds than on bilateral and national ones (Watson et al., 2012).

3.1.5. Commercial financial institutions

Private intermediaries can include:

²⁵ Governments' contributions (resources deposited) to the Adaptation Fund, LDCF, PPCR, SCCF according to ODI/HBF, 2014.

²⁶ In Cancún parties decided that "a significant share of new multilateral funding for adaptation should flow through the GCF" (UNFCCC, 2010) and that the Fund will aim for a balanced (50:50) allocation of its resources between mitigation and adaptation (GCF, 2014).

²⁷ National Climate Funds have been established in recent years by developing countries governments in order to manage both national and international climate finance resources, of both public and private nature. These Funds can facilitate the collection, blending, coordination of, and accounting for climate finance at the national level (UNDP, 2011; Gomez-Echeverri, 2010). They are also seen as mechanisms to enhance countries' ownership via 'direct access' to international climate finance resources (UNDP, 2011; Glemarec and Yannick, 2011). Countries that have established National Climate Funds include Bangladesh, Indonesia, Rwanda, Ecuador and Thailand (UNDP, 2011; FS-UNEP, 2012; Bccrf-bd.org and WB).

- Commercial banks, including microfinance institutions, to finance actions at the local level;
- Insurance companies to provide risk transfer mechanisms;²⁸
- Venture Capital Funds, to e.g., finance early stage technologies and entrepreneurship (which are typically not supported by DFIs);
- Infrastructure Funds, to e.g. support and/or incentivize the climate proofing of infrastructure assets.

With the exception of insurance companies (see e.g. UNFCCC, 2007b,c; Hoeppe and Gurenko, 2006) and microfinance institutions (Agrawala and Carraro, 2010²⁹ and Hammil et al. 2008), the role/potential of these entities has not yet been fully investigated nor their potential fully harnessed in the context of adaptation. As a result, there is lack of knowledge on their contribution to and/or on the level of engagement of these entities – which manage more than 71 trillion USD in assets (Gupta et al., 2014 based on Inderst et al., 2012) – in climate resilience.

3.2 Instruments

Instruments are the actual mean used to support adaptation projects; they define the agreement and the responsibilities existing between a financier and a project developer. The type of financial instruments used to finance adaptation measures can be as critical as the overall amount provided, and an element of contention in the contexts of the political economy of adaptation. Many developing countries and scholars, in fact, consider adaptation finance as a compensation for damages and, therefore, to be provided via grant transfers (see e.g., Harmeling, 2008; Müller, 2008).

A variety of economic and policy instruments can be used by public and/or private investors/financiers³⁰ to support, implement and scaling up adaptation efforts. By addressing demand and/or supply financing needs, each of instruments have different roles and potential with respect to private sector engagement in adaptation (see e.g. AGF, 2010; WBG, 2011, 2011; Smallridge et al., 2013). WBG (2011) highlights that the type of public financing that is deployed influences considerably the level of private finance leveraged.

In this research thesis attention is focused on financial and non-financial instruments, including grants, loans, domestic policy-based support and de-risking instruments (Buchner et al., 2011). The following instruments are also relevant in the context of adaptation and in encouraging private adaptation, but out of the direct scope of this research:

²⁸ See e.g., Linnerooth-Bayer and Mechler, 2011; MCII, 2009; SwissRe, no date.

²⁹ Agrawala and Carraro (2010), in particular, noted that the share of micro-financed activities contributing to reducing vulnerability to current climate risks in Bangladesh and Nepal represented 43% and 37% respectively of the portfolio of 22 microfinance institutions.

³⁰ In addition to Agrawala and Fankhauser (2008), also Bräuninger et al. (2011) presents an overview of relevant instruments.

- Risk management instruments such as insurance schemes including reinsurance and microfinance mechanisms;³¹
- Environmental trading markets, price signals and payment for ecosystem services (Agrawala and Fankhauser, 2008);
- Policy instruments such as regulatory measures and incentives (building standards/codes; zone planning, impact assessments) (Agrawala and Fankhauser, 2008; Stenek et al., 2013).

3.3 Disbursement channels / recipients

On the ground, a number of entities can benefit/borrow or be involved to disburse climate adaptation finance to end-users, or to implement projects and programs. The type of organization engaged is important to ensure that adaptation finance flows effectively to the local level, to mobilize additional resources, and to deliver self-sustaining results.

The source-channel relationship can involve a number of international and national actors in a complex web of interactions (as example see Figure 2). They can be public, private or public-private (Public Private Partnerships), ranging from central and local government agencies, line ministries, financial institutions, non-governmental organizations or businesses. They can be local, regional, national, or international.

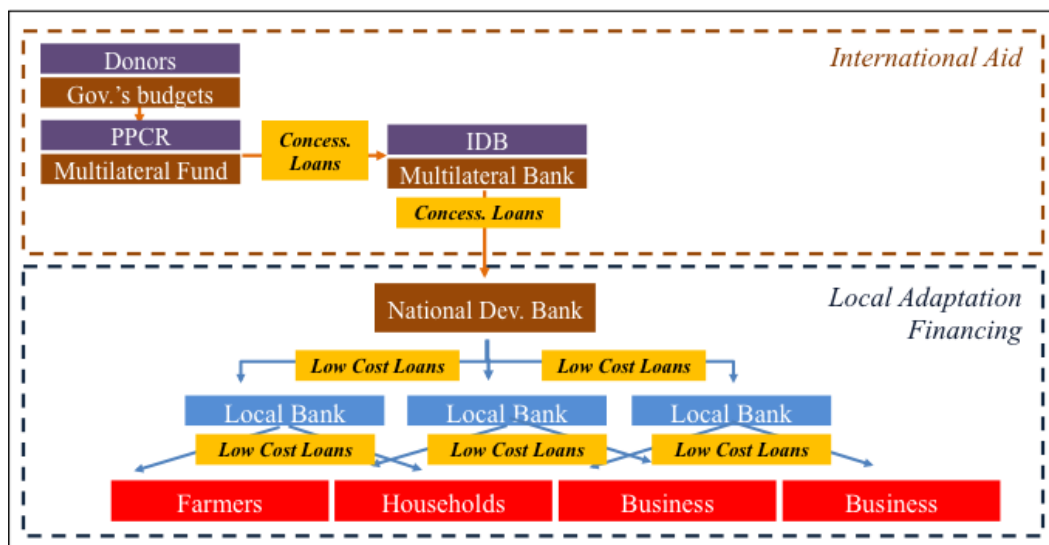
The availability of information about the channel / recipients of finance can help to better comprehend the linkages existing between public and private resources across the lifecycle of adaptation finance flows.

At the international level, however, there is no aggregated information available on the breakdown of finance by type of disbursement/recipient organization. Therefore, tracking the flow of finance through top-down approaches, from the global to the national and local level, is difficult because of the lack of data (see Terpstra et al., 2013a). The OECD CRS tracks the channel of delivery i.e. the entity that has implementing responsibility over the funds and is directly accountable (OECD, 2010). The ODI/HBF tracks the “first” beneficiary of Climate Funds’ resources, but information is particularly lacking on MDBs and NDBs’ flows given the lack of an integrated data reporting and management system.³² There is also not yet agreement on definitions and classifications of the various implementing partners /recipients across tracking systems.

³¹ Insurance mechanisms are the most widely discussed in literature because of their dual role in the context of adaptation. On one hand they can support post-disaster recovery by recompensing policyholders for the losses incurred, on the other, if premiums are risk-commensurate, they can incentivize policy holders to undertake risk prevention measures (Agrawala and Fankhauser, 2008). The role of insurance in developing regions, however, remains limited because of the low penetration (Linnerooth-Bayer et al., 2011) mainly due to the absence of adequate enabling conditions. (For relevant literature on insurance, see e.g., Agrawala and Fankhauser, 2008; Linnerooth-Bayer et al., 2008, Hess and Syroka, 2005)

³² In their forthcoming AfDB et al. (2013), a group of MDBs plans to provide insights the first recipient of climate finance.

Figure 2. Example: entities planned to be involved in the distribution of adaptation finance from the international to the local level. It refers to one project concept endorsed by the Pilot Program for Climate Resilience in Saint Lucia.



Source: author's elaboration based on CIF (2011).

3.4 Final sectoral uses and ultimate recipients

There is not international agreement on eligible sector or how to categorize adaptation finance flows. The OCD-DAC CRS, the ODI/HBF Climate Funds Update and DFIs use different sectoral categories to aggregate relevant flows.

The UNFCCC (2008) and UNFCCC (2009b) group adaptation measures in three broad categories covering measures aimed at:

- Reducing the vulnerability of socio-economic activities by integrating future climate risks in planning, design and implementation (e.g. infrastructures);
- Expanding the adaptive capacity of socio-economic activities to deal with current and future (e.g. capacity building on irrigation conservation);
- Adapting to impacts of climate change that would not otherwise be initiated (e.g. channels to divert water flows from melting glaciers).

Some adaptations measures have a public good character and, as such, in governments' realm (e.g. research, climate and weather data). Others, the majority, fell under the responsibility of private actors as it is in these actors' rational self-interest to undertake actions that reduce their exposure to climate risks or to exploit possible business opportunities (Agrawala and Fankouser, 2008). Adaptation, however, can also have a shared benefit nature i.e. the benefits of individual actions are shared by others (e.g. with respect to water supply) (Mendelsohn, 2000), thereby limiting the incentives of private actors to make capital investments to adapt to climate change. As a result government

action would be needed as market will underinvest relative to the social optimum (Mendelsohn, 2000).

3.5 “Entry points” of private finance

As discussed in previous sections, the private sector encompasses a variety of actors, from the international and/or domestic level. Each has different capabilities, exposure to climate risks, and motivations to invest. Therefore, they can have different roles in the *landscape* as well as specific needs.

These elements shape the “entry points” for public finance and, therefore, need to be properly understood in order to design financial instruments and business models capable of harnessing their investment potential as: (i) source of finance; (ii) project developers and technology provider (iii) financial intermediaries (see Figure 3).

Source of finance

Private actors can finance adaptation measures, directly or indirectly, as profit or non-profit seekers. For instance, philanthropists / high-net worth individuals can contribute to Climate Funds or directly to projects without expecting direct financial returns. Businesses or financial institutions seeking market returns could invest in e.g., dedicated securities such as climate-theme bonds.

Project developers, implementer and technology provider³³

Corporations – spanning from multinational through to small, medium and micro enterprises – can invest to incorporate climate considerations into project design (WBG et al., 2010), “climate-proof” own assets and business operations at risk (e.g. with floods defenses), or purchase insurance products to transfer a given risk (Stenek et al., 2013).

They can also provide specific technologies, services and products relevant for adaptation,³⁴ as well as implement projects in partnership with, or on other entities’ behalf (also via public-private partnerships);

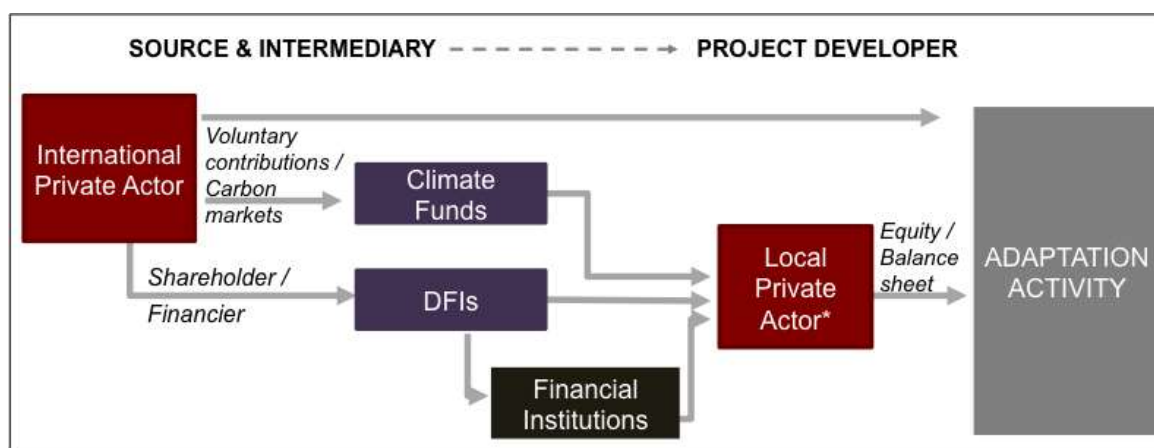
Intermediary/channel

Financial institutions can provide products and services to address specific investment needs at the local level, also channeling DFIs’ resources (see Figure 3). Given that the majority of adaptation actions will occur at the local level, financial institutions engagement to finance actions at the sub-national level would be critical to enable private sector investments in climate resilience.

³³ See e.g. SEI (2009); IFC (2010); WBCSD (2008).

³⁴ For technologies see e.g. Christiansen et al. (2011).

Figure 3. Examples of “entry points” for private finance with relevance for adaptation



Source: author’s elaboration Note: (*) Local private actors can also be entities with mixed national-international ownership.

Barriers to private investments in adaptation

Under perfect market conditions, self-interested behavior, would lead corporations, finance institutions and households to undertake all adaptation investment that can generate net benefits (Mendelsohn, 2000). However, in reality, a number of barriers inhibit private investments, namely:³⁵

- Lack of capacity, knowledge and information on the risks and the opportunities that might arise from changing weather patterns and how to manage them;
- Lack of access to capital, oftentimes due to the incomplete information of financial institutions and their lack of capacity;
- Deficient regulatory frameworks or adequate policies and incentives, which are not tailored to stimulate adaptation;
- Mismatch between possible return on climate-resilient investments and the time-horizon used by most investors to assess risk-adjusted returns, associated with operational uncertainties.

4. Advancing understanding of adaptation finance

Scaling-up resources to the levels required to strengthening countries’ resilience to climate vulnerability and change is a challenge that cannot be met by governments’ action alone. The private sector needs to be involved in the equation. Yet opportunities for businesses to get involved in activities building climate resilience are not always obvious or actionable.

Private investments typically occur if the risk-adjusted returns are positive and competitive. Therefore, whilst for mitigation-relevant investments such as those in renewable energies

³⁵ Sources: IFC (2010); Agrawala et al., (2011); AGF (2010); Biagini & Miller (2013); Steneck et al. (2013).

profitable economic models are relatively clearer to investors (this also thanks to the Kyoto Protocol's Clean Development Mechanism (CDM)), business models for adaptation are more difficult to identify, particularly in developing countries.

In the context of mitigation a carbon price, for instance, can provide effective signals for undertaking mitigation measures, but this is unlikely to happen in the context of adaptation. The private sector is likely to invest in adaptation on a case-by-case basis rather than based on models that can be supported by international policies (Lindenberg and Pauw, 2013). National policies and regulations, however, have a key role to play to create incentives and favorable market conditions for adaptation.

Given the specific challenges of adaptation investments, how to use relatively limited public resources to stimulate private investments while addressing local adaptation needs?

Given the lack of a dedicated and clear overview of how much and in which way adaptation measures are currently financed, and empirical evidence on public sector strategies and tools to address barriers to private action, the following chapters aim to:

- First, investigating the *landscape of adaptation finance*, assessing current developed towards developing countries adaptation finance flows, and by trying to identify how public investments are currently supporting and stimulating private action in climate resilience (Chapter 2);
- Second, by bringing empirical evidence on those public interventions that can create the “business case” for adaptation and by assessing the role of DFIs towards this end (Chapter 3 and 4).

Filling these research gaps is relevant because decisions and actions taken by the private sector will have a strong bearing on countries' ability to transition towards climate-resilient development pathways.

5. References

- Adger W.N., Huq S., Brown K., Conway D., and Hulme M. 2003. *Adaptation to Climate Change in the Developing World*, Progress in Development Studies, 3(3), pp. 179–195.
- African Development Bank (AfDB), Asian Development Bank (ADB), European Investment Bank (EIB), European Bank for Reconstruction and Development (EBRD), Inter-American Development Bank (IADB), International Finance Corporation (IFC) and World Bank]. 2012. *Joint Report on Adaptation Finance 2011*. At: <http://www.afdb.org/fileadmin/uploads/afdb/Documents/GenericDocuments/Joint%20MDB%20Report%20on%20Adaptation%20Finance%202011.pdf>.
- African Development Bank (AfDB), Asian Development Bank (ADB), European Investment Bank (EIB), European Bank for Reconstruction and Development (EBRD), Inter-American Development Bank (IADB), International Finance Corporation (IFC) and World Bank]. 2013. *Joint Report on Climate Finance 2012*. At: <http://www.afdb.org/fileadmin/uploads/afdb/Documents/GenericDocuments/Joint%20MDB%20Report%20on%20Adaptation%20Finance%202011.pdf>.
- Agence Française de Développement (AFD). 2014. Discussion with AFD staff (Pierre Forestier), May 2014.
- Agrawala S. and S. Fankhauser. 2008. *Economic Aspects of Adaptation to Climate Change. Costs, Benefits and Policy Instruments*. Organization for Economic Co-operation and Development. Paris, France.
- Agrawala S., Carraro M. 2010. *Assessing the Role of Microfinance in Fostering Adaptation to Climate Change*. OECD Environment Directorate, Working Paper no. 15 ENV/WKP(2010)1 Feb. 2010.
- Ampri I., A. Falconer, Wahyudi N., Rosenberg A., Ampera B., Tuwo A., Glenday S., Wilkinson J. 2014. *The Landscape of Public Climate Finance in Indonesia*. An Indonesian Ministry of Finance and CPI report. At: <http://climatepolicyinitiative.org/publication/landscape-of-public-climate-finance-in-indonesia-3/>.
- Arnell N. 2011. Policy: *The Perils of Doing Nothing*. Nature Climate Change, 1,193–195 (2011), doi:10.1038/nclimate1157. At: http://www.nature.com/nclimate/journal/v1/n4/fig_tab/nclimate1157_F1.html.
- Atteridge A. 2011. *Will Private Finance Support Climate Change Adaptation in Developing Countries. Historical Investment Patterns as a Window on Future Private Climate Finance*. Stockholm Environment Institute, Stockholm, Sweden.
- Berrang-Ford L., Ford J. and Patterson J. 2011. *Are we Adapting to Climate Change?* Global Environmental Change, 21, 25-33.
- Bhattarai, R., Bogati, R., Bird, N., O'Donnell, M., Lee, J. and Sigdel, E. R. (2011) *Nepal Climate Public Expenditure and Institutional Review (CPEIR) final report*. Capacity Development for Development Effectiveness Facility for Asia and Pacific. At: <http://www.odi.org.uk/resources/docs/7551.pdf>.
- Biagini B. and Miller A. 2013. *Engaging the Private Sector in Adaptation to Climate Change in Developing Countries: Importance, Status, and Challenges*. Climate and Development, Vol. 5, Issue 3, 2013 Pages 242-252. Lindenberg
- Bräuninger et al. 2011. *Application of Economic Instruments for Adaptation to Climate Change*. Perspectives GmbH Hamburg Office. At: http://ec.europa.eu/clima/policies/adaptation/what/docs/economic_instruments_en.pdf.
- Brown J and N. Kaur. 2009. *Financing Adaptation: Matching Form with Function*. Overseas Development Institute (ODI). At: <http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/5078.pdf>.
- Buchner B., Falconer A., Hervé-Mignucci M. and Trabacchi C., Brinkman M. 2011a. *The Landscape of Climate Finance*, CPI Report, Venice, October 2011.

- Buchner B., Falconer A., Hervé-Mignucci M., Trabacchi C. 2012. *The Global Landscape of Climate Finance*. CPI Report, Venice, at: <http://climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2012/>.
- Buchner B., Hervé-Mignucci M., Trabacchi C., Wilkinson J., Stadelmann M., Byod R., Mazza F., Falconer A., Micale V. 2013a. *The Global Landscape of Climate Finance*. CPI Report, Venice, at: <http://climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2013/>.
- Buchner B., J. Brown and J. Corfee-Morlot. 2011b. *Monitoring and Tracking Long-Term Finance to Support Climate Action*. Organization for Economic Co-operation and Development (OECD) and IEA, COM/ENV/EPOC/IEA/SLT (2011)3, Paris, France.
- Buchner B., Painter C., Trabacchi C., and Wilkinson J. 2013b. *The Role of Development Finance Institutions and Development Banks in Scaling Up Green Investments*. Proceedings of Scaling-up Green Economy 2013; 2013 September 5; KfW, Frankfurt. Venice: Climate Policy Initiative. Available from: <http://climatepolicyinitiative.org/wp-content/uploads/2013/09/CPI-Brief-for-DFI-DB-meeting.pdf>.
- Burton I., Huq S., Lim B., Pilifosova O. and Schipper E.L. 2002. *From Impacts Assessment to Adaptation Priorities: The Shaping of Adaptation Policy*, *Climate Policy* 2: 145-59.
- Caravani A., Nakhoda S. and Terpstra P. 2014. *The Rio Markers in Practice*, Oversea Development Institute and World Resources Institute, London and Washington.
- Christiansen L., Olhoff A., and Trærup S., 2011. (eds.): *Technologies for Adaptation: Perspectives and Practical Experiences*, UNEP Risø Centre, Roskilde, 2011.
- Clapp C., Ellis J., Benn J. and Corfee-Morlot. 2012. *Tracking Climate Finance: What and How?* Organization for Economic Co-operation and Development. COM/ENV/EPOC/IEA/SLT(2012)1. May 2012, Paris, France.
- Climate Bonds Initiative and HSBC. 2013. *Climate Bonds and Climate Change: the State of the Market in 2013*, commissioned by HSBC, prepared by the Climate Bonds Initiative in association with HSBC Climate Change Centre of Excellence, June 2013. www.climatebonds.net.
- Climate Investment Funds (CIF). 2011. *Saint Lucia's Strategic Program for Climate Resilience*. At: <https://www.climateinvestmentfunds.org/cifnet/?q=country/saint-lucia>.
- Climate Investment Funds (CIF). 2012. *Proposal for Additional Tools and Instruments to Enhance Private Sector Investments in the CIF*. Joint Meeting of the CTF and SCF Trust Fund Committees, Washington, D.C., May 1-2 2012, CTF-SCF/TFC.8/8.
- Climate Investment Funds (CIF). 2013. *Procedures for Allocating PPCR Resources on a Competitive Basis from a Set Aside*, February 2013, Washington D.C. At: <https://www.climateinvestmentfunds.org/cif/content/procedures-allocating-ppcr-resources-competitive-basis-set-aside>.
- Corfee-Morlot J., Guay B. and Larsen K.M. 2009. *Financing for Climate Change Mitigation: Towards a Framework for Measurement, Reporting and Verification*. OECD/IEA Information Paper, Paris, October 2009.
- Ecofys-IDFC. 2012. *Mapping of Green Finance Delivered by IDFC Members in 2011*, Höhne N., Khosla S., Fekete H., Gilbert A. At: https://www.kfw-entwicklungsbank.de/migration/Entwicklungsbank-Startseite/Entwicklungsfinanzierung/Umwelt-und-Klima/Zahlen-Daten-Studien/Studien-und-Publikationen/2012_Mapping-Report.pdf.
- Ecofys-International Development Finance Club (IDFC). 2013. *Mapping of Green Finance Delivered by IDFC Members in 2012*. At: https://www.idfc.org/Downloads/Publications/01_green_finance_mappings/IDFC_Green_Finance_Mapping_Report_2013_11-01-13.pdf.
- Ellis, J., S. Moarif and G. Briner .2010b. *Core Elements of National Reports*, OECD/IEA Information Paper, <http://www.oecd.org/dataoecd/28/32/45409866.pdf>.
- Ellis, J., S. Moarif, G. Briner, B. Buchner and E. Massey. 2010a. *Options to Revise Reporting Guidelines for Annex I and non-Annex I National Communications*, OECD/IEA Information Paper, <http://www.oecd.org/dataoecd/32/59/46553464.pdf>.

- European Union (EU). 2014. Submission by Greece and the European Commission on Behalf of the European Union and its Member State. Athens, 21 February 2014. At: http://unfccc.int/files/documentation/submissions_from_parties/application/pdf/el-02-21-biennial_reports.pdf.
- Forstater M., and R. Rank. 2012. *Towards Climate Finance Transparency*. Aidinfo / Publish What You Fund, London, UK. At: <http://www.publishwhatyoufund.org/updates/news/towardsclimate-finance-transparency/>.
- Fransen, T. 2009. *Enhancing Today's MRV Framework to Meet Tomorrow's Needs: The Role of National Communications and Inventories*. World Resources Institute Working Paper. Washington, DC: World Resources Institute. At: <http://www.wri.org>.
- FS-UNEP. 2012. *National Climate Finance Institutions Support Programme Case Study: The Indonesia Climate Change Trust Fund (ICCTF)*. Frankfurt School UNEP Collaborating Centre for Climate & Sustainable Energy Finance.
- GEI 2011. *Resilience and Adaptation to Climate Change: Electricity Utilities' Perspective*. GEI Climate Change Innovation through Innovation. COP17 Durban.
- Glemarec, Yannick. 2011. *Catalyzing Climate Finance: A Guidebook on Policy and Financing Options to Support Green, Low-Emission and Climate-Resilient Development*. United Nations Development Programme, New York, NY, USA.
- Gomez-Echeverri L. 2010. *National Funding Entities. Their Role in the Transition to a New Paradigm of Global Cooperation on Climate Change*. Climate Strategies, European Capacity Building Initiative. At: <http://www.climatestrategies.org/component/reports/category/55/266.html>.
- Green Climate Fund (GCF). 2014. Press Release. *Green Climate Fund Board Takes Key Decisions on Operations and Makes Progress on 'Essential Eight'*. February 2014. GCF- PA.02/14. At: http://gcfund.net/fileadmin/00_customer/documents/pdf/GCF_Press_Release_fin_20140222.pdf.
- Gupta et al., 2014. Cross-cutting Investment and Finance Issues. Chapter 16. Contribution to Working Group III – Mitigation of Climate Change. At: http://report.mitigation2014.org/drafts/final-draft-postplenary/ipcc_wg3_ar5_final-draft_postplenary_chapter16.pdf.
- Haites E. 2011. *Climate change finance*. *Climate Policy*, 11, 963–69.
- Hammil A., R. Matthew and E. McCarter. 2008. *Microfinance and Climate Change Adaptation*. IISD At: http://www.iisd.org/pdf/2008/microfinance_climate.pdf.
- Harmeling S. 2008. *Climate Change Adaptation Developing Countries: What the G8 Has to Deliver*. Discussion Paper. German Watch and WWF. At: <http://germanwatch.org/klima/g8adapt08.pdf>
- Hess U. and Syroka J. 2005. *Weather-Based Insurance in Southern Africa: The Case of Malawi*, World Bank, Washington, D.C.
- High-level Advisory Group on Climate Change Financing (AGF). 2010. [cited as AGF, 2010]. *Public Interventions to Stimulate Private Investment in Adaptation and Mitigation*. Work stream 7 paper New York, United States. At: http://www.un.org/wcm/webdav/site/climatechange/shared/Documents/AGF_reports/Work_Stream_7%20Public_Private.pdf.
- Hoeppe, P. and E.N. Gurenko, 2006: *Scientific and Economic Rationales for Innovative Climate Insurance Solutions*. *Climate Policy*, 6(6), 607–620.
- IFC. 2010. *A Strategy To Engage the Private Sector in Bangladesh*. Prepared By Asian Tiger Capital Partners. Prepared for the International Finance Corporation At: http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/IFC_pres_CC_PS_V8_Sep12010-IFC_%20sk.pdf.
- Intergovernmental Panel on Climate Change (IPCC). 2007. *Glossary of Terms used in the IPCC Fourth Assessment Report*. Cambridge University Press, Cambridge, United Kingdom, and New York, NY, USA, 398 pp. At: http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_appendix.pdf.
- Intergovernmental Panel on Climate Change (IPCC). 2012: *Authors and expert reviewers annex*. In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K.

Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.). A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 545-553.

Intergovernmental Panel on Climate Change (IPCC). 2013: *Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis*. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Jones L., Mitchell T., Villaneuva P.S. and Standley S. 2012. *Coding and Tracking Adaptation Finance: Lessons and Opportunities for Monitoring Adaptation Finance Across International and National Scales*. Overseas Development Institute (ODI).

Klein, R.J.T., S. Huq, F. Denton, T.E. Downing, R.G. Richels, J.B. Robinson, F.L. Toth, 2007: *Interrelationships Between Adaptation and Mitigation. Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 745-777.

Levina E. 2007. *Adaptation to Climate Change: International Agreements for Local Needs*. Organisation for Economic Co-operation and Development. COM/ENV/EPOC/IEA/SLT(2007)6, Paris, France. At: <http://www.oecd.org/env/cc/39725521.pdf>.

Levine S., Ludi E. and Jones L. 2011. *Rethinking Support for Adaptive Capacity: The Role for Development Interventions*. Africa Climate Change Resilience Alliance.

Lindenberg N., and Pauw P. 2013. *Don't Lump Together Apples and Oranges – Adaptation Finance is Different from Mitigation Finance*. The Current Column 2013 German Development Institute / Deutsches Institut für Entwicklungspolitik (DIE). Bonn, Germany. At: <http://www.die-gdi.de/en/the-current-column/article/dont-lump-together-apples-and-oranges-adaptation-finance-is-different-from-mitigation-finance/>.

Linnerooth-Bayer J., S. Hochrainer, R. Mechler, 2011: *Insurance against Losses from Natural Disasters in Developing Countries. Evidence, Gaps and the Way Forward. Journal of Integrated Disaster Risk Management*, 1(1). DOI10.5595/idrim.2011.0013.

Locatelli, B. 2010 *Local, global: Integrating Mitigation And*

Machado-Filho H. 2011. *Financial Mechanisms Under the Climate Regime*. In: Promoting Compliance in an Evolving Climate Regime., J. Brunnée, M. Doelle, L. Rajamani, (eds.), Cambridge University Press, pp.216–239, (ISBN: 9780521136136).

Marten R and J.M Witte. 2008. *Transforming Development? The Role of Philanthropic Foundations in International Development Cooperation*. At: http://www.gppi.net/fileadmin/gppi/GPPiRP10_Transforming_Development_20080526final.pdf.

McCarthy, J. J., O. F. Canziani, N. A. Leary, D. J. Dokken and others, Eds. 2001. *Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)*, Cambridge University Press. UK.

Mendelsohn R. 2000. *Efficient Adaptation to Climate Change*. Climatic Change 45: 583–600 + also economics cc <http://www.dvfu.ru/meteo/library/243886.pdf>.

Michaelowa A., and K. Michaelowa. 2011. *Coding Error or Statistical Embellishment? The Political Economy of Reporting Climate Aid*. World Development 39 (DOI:10.1016/j.worlddev.2011.07.020).

Miller A., and Stenek V., 2013. *The Challenge of Defining and Measuring Success in Private Sector Adaptation Projects: Insights from the IFC*. Climate-Eval. At: <http://www.climate-eval.org/?q=blog/challenge-defining-and-measuring-success-private-sector-adaptation-projects-insights-ifc>

Müller B. 2008. *International Adaptation Finance: The Need for an Innovative and Strategic Approach*. Oxford Institute for Energy Studies. At: <http://www.oxfordclimatepolicy.org/publications/documents/EV42.pdf>.

- Niggli U., A. Fließbach, P. Hepperly, and N. Scialabba. 2009. *Low Greenhouse Gas Agriculture: Mitigation and Adaptation Potentials of Sustainable Farming Systems*. Food and Agriculture Organization of the United Nations, Rome, Italy.
- O'Brien K., Eriksen S., Schjolden A. and Nygaard L. 2004. *What's in a word? Conflicting Interpretations of Vulnerability in Climate Change Research*. CICERO Working Paper 2004: 04.
- Organisation for Economic Development and Co-operation (OECD). 2003. *Philanthropic Foundations and Development Co-operation*. Off-print of the DAC Journal 2003, Volume 4, No. 3. At: <http://www.oecd.org/development/stats/22272860.pdf>.
- Organisation for Economic Development and Co-operation (OECD). 2008. Is it ODA?. At: <http://www.oecd.org/investment/stats/34086975.pdf>.
- Organisation for Economic Development and Co-operation (OECD). 2010. *Reporting Directives for the Creditor Reporting System*. DCD/DAC(2007)39/FINAL/CORR5. Paris, France. At: <http://www.oecd.org/development/stats/45917818.pdf>.
- Organisation for Economic Development and Co-operation (OECD). 2011. *Handbook on the OECD-DAC Climate Markers*. Paris, France. At: <http://www.oecd.org/dac/stats/48785310.pdf>.
- Organisation for Economic Development and Co-operation (OECD). 2013a. *OECD ENVIRONET and WP-STAT Workshop on Rio Markers, Climate and Development Finance. Main Points of Discussion*. 24-25 June 2013, Paris. DCD/M(2013)2/Final. At: <http://www.oecd.org/media/oecdorg/directorates/developmentco-operationdirectoratedcd-dac/environmentanddevelopment/OECD%20Rio%20Markers,%20Climate%20and%20Development%20Finance%20Workshop%20Summary,%20June%202013.pdf>
- Organisation for Economic Development and Co-operation (OECD). 2013b *OECD Workshop with International Financial Institutions (IFIs) on Tracking Climate Finance*, DCD/M(2013)1, March 2013, Paris. At: [http://www.oecd.org/dac/environment-development/DCD-M\(2013\)1-ENG.pdf](http://www.oecd.org/dac/environment-development/DCD-M(2013)1-ENG.pdf).
- Organisation for Economic Development and Co-operation (OECD). 2013d. DAC Working Party on Development Finance Statistics, *Climate Adaptation Marker: Quality Review*. DCD/DAC/STAT(2013)5. 11-13 June 2013, OECD Conference Centre, Paris.
- Organisation for Economic Development and Cooperation (OECD). 2013c. *Terms of Reference and Scope of Work For A Joint Environet And WP-Stat Task Team To Improve Rio Markers, Environment and Development Finance Statistics*. DCD(2013)8/ REV, October 2013.
- Organisation for Economic Development and Cooperation (OECD). 2014. *OECD Submission to the UNFCCC Standing Committee on Finance*. 20 January 2014. At: http://unfccc.int/cooperation_and_support/financial_mechanism/standing_committee/items/6881.php.
- Parry, M.L., O.F. Canziani, J.P. Palutikof and Co-authors 2007: *Technical Summary. Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L.
- Persson Å., Klein J.T., Kehler Siebert C., Müller B., Hoffmaister J., Lazarus M., Takama T. 2009 *Adaptation Finance Under a Copenhagen Agreed Outcome*. Stockholm: Stockholm Environment Institute. Stockholm Environment Institute, October 2009. At: <http://www.environmentportal.in/files/adaptation-finance-copenhagen.pdf>.
- Ravindranath N.H. 2007. *Mitigation and Adaptation Synergy in Forest Sector*. Mitigation and Adaptation Strategies for Global Change 12 843–853 pp. (DOI: 10.1007/s11027- 007- 9102- 9), (ISSN: 1381- 2386, 1573- 1596).
- Romani M. and Stern N. 2011. *Delivering Climate Finance: Principles And Practice For Funding The Fund*. Grantham Institute, London UK.
- Satterthwaite D. 2007. *Adaptation Options for Infrastructure in Developing Countries*. A Report to the UNFCCC Financial and Technical Support Division. United Nations Framework Convention on Climate Change, Bonn, Germany. 24 pp. Available at: http://unfccc.int/files/cooperation_and_support/financial_mechanism/application/pdf/satterthwaite.pdf.
- SEI. 2009. *Private Sector Finance And Climate Change Adaptation How Can Voluntary Private Finance Support Adaptation in Developing Countries?*, SEI Institute

Siebert K.C. and Dzebo. 2014. *Private Sector Finance for Adaptation in LDCs: Perceivable, Potential, or Improbable?* Stockholm Environment Institute.

Smallridge et al. 2013. Buchner B., Trabacchi C. Et al., 2012. *The Role of National Development Banks in Mobilizing and Intermediating International Climate Finance*, Inter-American Development Bank Report.

Smit, B. and O. Pillifosova. 2002. *From Adaptation to Adaptive Capacity and Vulnerability Reduction*. In J.B Smith, R.J.T. Klein, and S. Hug. (eds.), *Climate Change, Adaptive Capacity and Development*. London: Imperial College Press, pp. 9-28.

Smith K., Statistical Reporting by the Bill and Melinda Gates Foundation to the OECD DAC. OECD Development Co-operation Directorate. At: <http://www.oecd.org/dac/47539494.pdf>.

Stenek V., Amado J.C., Greenall D. 2013. *Enabling Environment for Private Sector Adaptation. An Index Assessment Framework*. International Finance Corporation. Washington D.C.

SwisseRe [no date]. *R4 Rural Resilience Initiative*. Partnership for resilient livelihoods in a Changing Climate. At: http://media.swissre.com/documents/R4_Initiative.pdf.

Terpstra P. 2013b. *The Difficulty of Defining Adaptation Finance*. World Resources Institute, October 2013, at: <http://www.wri.org/blog/difficulty-defining-adaptation-finance>.

Terpstra P. A. Peterson Carvalho., E. Wilkinson. 2013a. *The Plumbing of Adaptation Finance: Accountability, Transparency and Accessibility at the Local Level*. World Resources Institute Working Paper, November 2013. Washington D.C. At: <http://www.wri.org/sites/default/files/adaptation-finance-plumbing.pdf>.

The World Bank (WB). 2012. *Turn Down the Heat: Why a 4°C Warmer World Must be Avoided. A Report for the World Bank by the Potsdam Institute for Climate Impact Research and Climate Analytics*. Washington, D.C. At: <http://www.climateanalytics.org/publications/turn-down-heat-why-4%C2%B0c-warmer-world-must-be-avoided>.

The World Bank (WB). 2013. *Green Bonds Fact Sheet*. Treasury. At: <http://treasury.worldbank.org/cmd/pdf/WorldBankGreenBondFactSheet.pdf>.

The World Bank Group et al. 2011 [cited as WBG, 2011]. *Mobilizing Climate Finance a Paper* prepared at the request of G20 Finance Ministers. Washington D.C. At: <http://www.imf.org/external/np/g20/pdf/110411c.pdf>.

The World Bank. 2014. Strategic Climate Fund (SCF). Financial Report Prepared by the Trustee. As of March 31, 2014. At: http://fiftrustee.worldbank.org/webroot/data/CIF_SCF_TR_03_14.pdf.

Tirpak D., A. Ronquillo-Ballesteros, K. Stasio, H. McGray. 2010. *Guidelines for Reporting Information on Climate Finance*. WRI Working Paper. World Resources Institute, Washington DC. At: http://pdf.wri.org/working_papers/guidelines_for_reporting_information_on_climate_finance.pdf.

Tirpak D., K. Stasio, and L. Tawney (2012). *Monitoring the Receipt of International Climate Finance by Developing Countries*. World Resources Institute, Washington DC. At: http://pdf.wri.org/monitoring_receipt_of_international_climate_finance_by_developing_countries.pdf.

Trabacchi C., Micale V., Frisari G. 2012. *San Giorgio Group Case Study: Prosol Tunisia. Climate Policy Initiative Report*. CPI Report, June 2012.

United Framework Convention on Climate Change (UNFCCC). 1992. *United Nations Framework Convention on Climate Change*. United Nations 1992. FCCC/INFORMAL/84, GE.05-62220 (E) 200705. At: <http://unfccc.int/resource/docs/convkp/conveng.pdf>.

----- 2007a. *Bali Action Plan*. Decision adopted by the Conference of the Parties 2/CP.15 At: http://unfccc.int/meetings/bali_dec_2007/meeting/6319.php.

----- 2007b. *Consultation with Insurance Sector on Finance and Investment Flows to address Climate Change* London, 20 June 2007. At: https://unfccc.int/files/cooperation_and_support/financial_mechanism/application/pdf/summary_of_views_20_june_consultation_-_shannon_update.pdf.

----- 2007c. *Investment and Financial Flows to Address Climate Change*. UNFCCC. At: http://unfccc.int/resource/docs/publications/financial_flows.pdf.

- 2008. *Investment and Financial Flows to Address Climate Change: An Update*. Technical Paper. FCCC/TP/2008/7. UNFCCC.
- 2009b. *Investment and Financial Flows to Address Climate Change: An Update*. Technical Paper. FCCC/TP/2008/7. UNFCCC.
- 2009. *Copenhagen Accord*. Decision adopted by the Conference of the Parties 2/CP.15. FCCC/CP/2009/11/Add. UNFCCC. At: https://unfccc.int/documentation/documents/advanced_search/items/6911.php?preref=600005735.
- 2010. *The Cancun Agreements: Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (1/CP.16)*. UNFCCC.
- UNFCCC. 2011a. *Compilation and Synthesis of Fifth National Communications*. UNFCCC, Bonn, Germany. At: <http://unfccc.int/resource/docs/2011/sbi/eng/inf01a02.pdf>.
- 2011. *Report of the Conference of the Parties on its Seventeenth Session, held in Durban from 28 November to 11 December 2011*. Decisions adopted by the Conference of the Parties. Decision 2/CP.17. FCCC/CP/2011/9/Add.1. At: <http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf>
- 2012. *Common Tabular Format for UNFCCC Biennial Reporting Guidelines For Developed Country Parties*. At: <http://unfccc.int/resource/docs/2012/cop18/eng/08a03.pdf#page=3>.
- United Nations Development Programme (UNDP). 2011. *Blending Climate Finance Through National Fund*. At: http://www.undp.org/content/dam/undp/library/Environment%20and%20Energy/Climate%20Change/Capacity%20Development/Blending_Climate_Finance_Through_National_Climate_Funds.pdf.
- United Nations Development Programme (UNDP). 2013a. *Country Reports on Climate Public Expenditures and Institutional Reviews (CPEIR)*. At: <http://www.climatefinance-developmenteffectiveness.org/publications.html>.
- Watson C., Nakhooda S., and Caravani A. Schalatek L. *The Practical Challenges of Monitoring Climate Finance: Insights from Climate Funds Update*. Climate Finance Policy Brief. Overseas Development Institute and Heinrich Böll Foundation. At: <http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/7468.pdf>.
- World Business Council for Sustainable Development (WBCSD). 2002. *Towards a Sustainable Cement Industry*. Geneva: WBCSD.

CHAPTER 2.

THE LANDSCAPE OF ADAPTATION FINANCE

1. Introduction

A number of outstanding definitional, methodological and practical challenges impede the establishment of a robust, harmonized system to track, measure, report and verify financial flows invested toward adaptation goals across a wide spectrum of organizations. The lack of an agreed upon definition of 'adaptation finance' under the UNFCCC, its intertwined nature with development and its multifaceted aspects, have not helped to clarify what qualifies as an adaptation projects and what should be accounted against the long-term financial goal stated in the Cancún Agreements (UNFCCC, 2010, 1/CP.16). Decisions over what can and cannot be labeled 'adaptation' are not only technical in nature, but also influenced by diverse political drivers, vested interests and incentives (Jones et al., 2012).

At present, there is no integrated centralized system for collecting and assessing relevant sources of climate finance, and no agreed basis or methodology for comprehensive measurement (Buchner et al., 2011a; Clapp et al., 2012). Existing data collection systems for climate finance are not necessarily complete or comparable, have various objectives and accounting approaches (Buchner et al., 2011a,b). Data on financial flows targeting adaptation are scattered and not always presented in a consistent format (Terpstra et al., 2013).

As a result, policy- and decision-makers have limited understanding on the volume, nature and use of the resources made available by developed countries to support developing countries' adaptation needs. The lack of a harmonized and centralized system or framework for tracking all relevant climate flows raises questions about efficacy, transparency and accountability (Terpstra et al., 2013).

The current information gap on adaptation finance flows is an impediment to accountability and the provision of quantitative-based evidence supporting adaptation policy and investment decision-making. It hinders the ability of developed countries' policy- and decision-makers to comprehend whether current spending is aligned with recipient countries' needs and priorities and, ultimately, whether their resources are being spent productively. This information gap also hinders the ability of developing countries' policy- and decision-makers to comprehend whether international finance is aligned with national financial efforts and policy objectives, thereby to best plan expenditures in support of national and local climate change adaptation plans. It is an impediment to coordinating

efforts, thereby understanding whether existing patterns of finance generate inefficiencies or “adaptation aid-orphans”.

Furthermore, the current information gap and definitional ambiguities around the concept of adaptation can hamper governments and international organizations’ ability to understand whether and how current public financing approaches and instruments target enablers of private investments in climate resilience. Hence, it hampers the ability of systematically learning lessons from existing approaches or identify strategies and business models that can be sustainable without subsidies over the long-run, and/or that could be scaled up or replicated.

Filling this information gap is thus critical to enable policy makers and investors to allocate and channel climate adaptation finance effectively, but also to build trust among developed and developing countries that progress is being made, and can improve results over time as best practices are shared and replicated. It is a prerequisite for scaling-up climate finance efforts from the current (unknown) level to the USD 100 billion goal.

This chapter, which is an integral part of Buchner et al. (2013a), is a first step towards ‘filling this gap’. By applying and building on the Buchner et al., (2011 and 2012) framework, it estimates adaptation finance flowing from developed to developing countries in 2012. The purpose of this Chapter is to inform and stimulate the ongoing debate on adaptation finance and the need to scaling-up financing efforts by providing evidence-based analysis on the state of play. It aims to contribute to ongoing efforts intended to enhance understanding on how public resources are supporting adaptation interventions. More specifically, the main objectives of this research are to:

- Assess the magnitude and nature of adaptation finance currently flowing from developed to developing countries;
- Evaluate the relative contributions of various actors operating in the so-called *landscape* of adaptation finance to gauge the relative relevance of Development Finance Institutions’ (DFIs) role;
- Identify where (i.e. sectors and geographies) adaptation finance is flowing and how it reaches its target objectives (i.e. through which institutions involved in the delivery of finance and/or implementation of projects and programs);
- Identify if and how current public investments support and stimulate private sector action in climate resilience;
- Highlight limitations and shortcomings in existing tracking and reporting practices, and the associated impact on available estimates.

The remainder of the paper is organized as follows. The next section outlines the methodological approach used for gathering and analyzing data. Section 3 illustrates the results of the analysis presenting the main findings for each stage of the lifecycle of adaptation finance flows. It then focuses on DFIs' flows and the type of activities supported in 2012 with the aim of engaging domestic private sector actors in contributing towards countries' adaptation agenda. Finally, it provides an overview on the main tracking issues and, in section 4, concluding remarks.

2. Data and methodology

2.1 Operational definition and scope of adaptation finance

Being an integral part of Buchner et al. (2013), this research builds on the definitions, methodologies, and framework developed for Buchner et al. (2011a and 2012).

In the absence of an internationally acknowledged definition, this research adopts an operational definition of 'adaptation finance' to collect and aggregate comparable data across a wide variety of primary and secondary sources.

More specifically, to determine what qualifies as 'adaptation' this research relies on the definition of the OECD-Development Assistance Committee Rio marker on climate change adaptation, and the 'context- and location-specific' approach developed by the joint initiative of major Multilateral Development Banks (MDBs) (see AfDB et al., 2012 and 2013). The approach followed by the French Development Agency (AFD) (AFD, 2012) and the International Development Finance Club (Ecofys-IDFC, 2012; 2013) was also considered to understand the comparability of data across multilateral and bilateral flows, as well as national ones. In addition to these data sources, the choice of the sectoral breakdown used to aggregate flows against final uses was also informed by third-party expertise.³⁶

The scope of the analysis is limited to public flows in support of "*a range of activities, from information and knowledge generation, to capacity development, planning and the implementation of climate change adaptation actions*" (OECD, 2011). Private flows are not covered due to data availability issues, unresolved methodological difficulties, and the lack of adequate reporting systems (see Clapp et al., 2012; Buchner et al., 2012; 2013). To date, in fact, there is no agreed upon and common definition of private finance, neither a methodology to measure these flows (Stadelmann, Michaelowa, & Roberts, 2013). Existing data are limited and of very poor quality. Dedicated and bottom-up analysis could help to

³⁶ A Steering Committee composed of experts from DFIs and research organizations provided expert advice during the development of the Buchner et al. (2013a) project, helping to understand available data and the various linkages between flows.

better gauge the actual level of involvement of private actors in climate vulnerability reductions measures³⁷ and comprehend how to quantify private sector flows.

Public data captured represent:

- Annual commitments rather than disbursements i.e., funds officially approved to a specific project or program by the Board of the reporting institution or by the means of a closure of a financing agreement, or similar actions;
- ‘Gross’ rather than ‘net’ flows, thereby capturing the face value of financial resources (including grants, low-cost / concessional debt, market-rate debt, equity and balance sheet financing) to shed light on the overall level of investments;
- Upfront investment costs and grants rather than the incremental component of investment costs stated in the Convention (UNFCCC, 1992, art 4.3).
- International resources flowing from developed to developing countries, the former defined as the members of the OECD at the end of 2012, while the latter as non-OECD countries. Multilateral Development Banks’ (MDBs) commitments are here considered as OECD to non-OECD flows, albeit acknowledging the mixed ownership structure of these entities.

It is worth noting that the focus on commitments rather than disbursements may affect the magnitude of flows given that committed amounts are often disbursed over a number of years, and are generally not adjusted ex-post for amendments or cancellations. Therefore, commitments may lead to potential overestimates (Buchner et al., 2011a and 2012). Disbursements would provide a more accurate picture of the actual volume of financial resources reaching a given country/sector in a given year, but at the international level data are lacking. Disbursements data are more readily-available at the national scale (see e.g., Ampri et al., 2014).

‘Net’ flows – i.e. “gross” flows adjusted by the amounts repaid by the recipient countries – would be an important lens for adaptation finance. This particularly because in some stakeholders’ views adaptation finance is a compensatory payment owed by the responsibility of industrialized countries for their historical emissions (e.g. Jones, 2012; WB, 2010a; Harmeling et al., 2008). Nevertheless, as discussed in AGF (2010), net flows are difficult to measure. There are also conceptual and practical challenges in accurately quantifying the ‘*full incremental cost*’ of adaptation investments referred to in the Convention (UNFCCC, 1992). This is because it would imply determining the difference between the

³⁷ UNDP (2013), for instance, presents a few insights on international and domestic private sector entities’ (including communities and cooperatives) investments in climate change related activities (see e.g. the Climate and Public Expenditure and Institutional Review undertaken in Nepal and Bangladesh).

additional costs of an adaptation intervention, and the costs of a development-as-usual one (see AfDB et al., 2013; Brown and Kaur, 2009).

With regard to the coverage of financial instruments, data exclude risk management instruments such as loan guarantees. Acknowledging the associated opportunity cost, accounting the value allocated against these types of instruments could result in double counting between, for example, the face value of full loan guarantees and loans with investment costs. It would imply tracking potential future amounts of finance that may be exercised only in particular circumstances, and required to pay for things other than investment costs in climate vulnerability reduction measures (e.g. payments for loan defaults). Nevertheless, it has to be acknowledged that risk management instruments do play a salient role in the investment and financing decision-making process, often being the enabler of private but also public investments (see Frisari et al., 2013; Trabacchi et al., 2012).

2.2 Data collection and aggregation approach

This research captures 2011 and 2012 data, the latest available at the time of undertaking the quantitative analysis (April-October 2013 and December-March 2014). The data that subsequently become available (e.g. OECD 2014a) do not influence the main findings of this research.

Empirical data and information were gathered from a wide range of primary and secondary sources. The main sources used, which are presented in further details in Table 1, are:

- i. The OECD-DAC Creditor Reporting System (CRS) Aid Activities database (OECD, 2013a), to identify governments' adaptation-related aid commitments;
- ii. The Fast-start Finance reports submitted to the UNFCCC, and a dataset compiled by the World Resources Institute and other research institutions (see WRI et al., 2013) to identify government flows beyond ODA;
- iii. The Climate Finance Update web site (ODI/HBF, 2014) and official documents to collect and verify data on Climate Funds' commitments;
- iv. A financial survey ad hoc developed to collect comparable primary data on DFIs' own resources committed for climate-relevant projects in 2012, as not otherwise publicly or readily available; DFIs' annual reports and a data set compiled by Ecofys-IDFC (2013) complemented the data collected via the survey;

- v. Third-party expertise as a complement to the desk-based assessment approach to gain clarifications on tracking methodologies, or suggestions when data and/or information were lacking or difficult to interpret.³⁸

Granularity, tracking and reporting approaches vary across data source. The financial survey used to retrieve DFIs data or DFIs annual climate finance reporting (e.g. AfDB et al., 2012), for instance, provide aggregated information on climate finance targeting adaptation, but do not have statistical character and lack of project-level details.

To minimize the risk of double counting, aggregated figures exclude:

- Bilateral Climate Funds from Climate Funds flows, because assumed to be accounted for in governments' adaptation-related bilateral aid reported in the OECD-DAC CRS database;
- Finance provided by BFIs (AfD, JICA and KfW), or channeled through multilateral Climate Funds from governments' flows retrieved from the OECD-DAC CRS database, because presented separately along with DFIs flows and because of the time-lag between the data in the OECD-DAC CRS database and DFIs' flows;
- Governments support provided to OECD countries that are ODA recipients i.e. Turkey, Mexico, Chile and Korea.

Government budgets' flows

The estimate of Governments budgets' flows captures the portion reported in the OECD's CRS database qualifying as Official Development Assistance (ODA). The lower bound of this estimate (USD 0.6 billion) includes only aid marked with climate change adaptation as its '*principal*' objective (score 2). The upper bound of the range (USD 6.4 billion) includes, in addition, financing for activities marked as '*significant*', comprising also activities marked as both adaptation and mitigation. The upper bound also includes an additional USD 0.4 billion identified in Fast-start Finance reporting for the same year.³⁹

When including BFIs and Climate Funds, the total amount of adaptation-marked ODA in 2011 ranged between USD 1.2 billion and USD 8.9 billion (the upper bound includes Fast-start Finance contributions).

³⁸ In addition to interactions with data providers, a Steering Committee composed of experts from DFIs and research organizations provided expert advice during the development of the Buchner et al. (2013) project.

³⁹ Countries FSF contributions targeting adaptation in 2011 were compared with bilateral aid reported in the OECD-DAC CRS database and, if higher, added to total governments' flows. U.S. government grant financing for USD 418.7 million was considered as additional to adaptation finance reported in the OECD-DAC CRS database thereby added to the total.

Table 1. Details on the sources of data used listed per type of flow.

Type of flow	Data source
Governments' budgets	
<ul style="list-style-type: none"> Bilateral adaptation-related aid by members of the Development Assistance Committee (DAC) 	<ul style="list-style-type: none"> OECD Creditor Reporting System (CRS) Aid Activities database OECD (2013a), which provides official project-level statistics on international aid activities. The "Rio marker" descriptive system allows identifying adaptation activities. Data refer to 2011 commitments, the latest available year at the time of undertaking the quantitative assessment. <p>OECD (2013a)</p>
<ul style="list-style-type: none"> Fast-start Finance (FSF) 	<ul style="list-style-type: none"> Countries FSF contributions targeting adaptation in 2011 <p> <ul style="list-style-type: none"> UNFCCC (2013) WRI et al. (2013) ODI et al. (2013) US State (2012) </p>
DFIs*	
<ul style="list-style-type: none"> Multilateral Development Banks 	<ul style="list-style-type: none"> Self-reporting of aggregated 2012 climate finance commitments via ad-hoc financial survey Annual reports Project-level databases <p>Among the others:</p> <ul style="list-style-type: none"> AfDB et al. (2012, 2013). EBRD (2012) IDB (2012a) OPIC (2012)
<ul style="list-style-type: none"> Bilateral Finance Institutions 	<ul style="list-style-type: none"> Self-reporting of aggregated 2012 climate finance commitments via ad-hoc financial survey Annual reports OECD-DAC CRS statistics <p> <ul style="list-style-type: none"> OECD (2013) AFD (2012) WRI et al. (2013) US State (2012) </p>
<ul style="list-style-type: none"> National & Sub-Regional Development Banks 	<ul style="list-style-type: none"> Self-reporting of aggregated data via ad-hoc financial survey Aggregated dataset from Ecofys-IDFC (2013) Annual reports <p> <ul style="list-style-type: none"> Ecofys-IDFC (2013) </p>
Climate Funds	
<ul style="list-style-type: none"> Multilateral Climate Funds 	<ul style="list-style-type: none"> ODI/HBF Climate Funds Update database (2014) Adaptation Fund project web site Climate Investments Funds web site Global Environmental Facility project web site MDG Achievement Fund – Environment and Climate Change thematic window – project web site <p> <ul style="list-style-type: none"> ODI/HBF (2014) Adaptation Fund (2013)⁴⁰ MDG (2013) GEF (2012) GEF (2013) CIF (2013) </p>

(*) Note: See Annex A for details on institutions covered

Development Finance Institutions' flows

The financial survey was developed under the guidance of selected experts and submitted to 21 international DFIs encompassing MDBs and Bilateral Finance Institutions (BFIs) (see Appendix A) in June-July 2013. The data gathering approach was conducted in conjunction

⁴⁰ Resources approved by the Adaptation Fund Board in commercial year 30/06/2012 - 30/06/2012.

with Buchner et al. (2013a) and Buchner et al. (2013b). Interactions with surveyed DFIs' representatives continued up to October 2013.

To identify the relative relevance of developing countries domestic adaptation financing, the survey was also submitted to 3 National Development Bank (NDBs). As advised by experts, part of NDBs' financial commitments was retrieved via Ecofys-IDFC (2013). NDBs flows are not counted against the total presented hereafter.

Surveyed DFIs received detailed guidelines for the identification and categorization of relevant projects per sector. To avoid double-counting with flows captured separately (e.g. bilateral adaptation-related aid commitments), DFIs were asked to exclude external resources from their reporting (i.e., bilateral or multilateral donors' resources). Institutions surveyed were asked to provide data corresponding to a 12-month period in USD million, using annual average exchange rates from local currencies to USD from the World Bank's indicators database (<http://data.worldbank.org/indicator/PA.NUS.FCRF>).

Sixteen of the twenty-five DFIs directly surveyed reported adaptation financing in 2012. Six DFIs contacted did not compile the survey due to e.g. internal reorganization issues, while nine DFIs did not finance adaptation activities in 2012.

To the extent possible, data retrieved were adjusted to exclude interventions not in line with the operational definition of adaptation finance adopted for the analysis, or the chosen categorization. For instance, in those cases where respondents provided sectoral breakdowns different from those requested in the survey, the project/category description, if available, was considered for allocating data against the selected categories, alternatively, to "others (multi-sector)" or "unspecified". Direct interactions with DFIs' representatives, DFIs project databases, annual reports or thematic publications were also used to fill data and information gaps, or gain additional insights on DFIs' financing strategies.

Private sector-oriented interventions

A keyword search approach was used to identify 2011/2012 public finance flows deployed in support of and/or to stimulate private sector action in climate resilience (see Appendix B for an overview of the terms used). The data sources investigated are outlined in Table 1 above.

The following multiple approach was used to quantify the split between DFIs' public and private: i) data on the recipient typology provided by DFIs in the survey; ii) DFIs' annual reports; iii) DFIs online project databases, when available; and iv) inquiry to DFIs stakeholders.

Where possible, identified private sector-oriented projects were classified against those factors that according to literature (e.g. Stenek et al., 2013; CIF, 2013; GCF/B.04/07, 2013; Agrawala et al., 2011) hinder private actors' ability to adapt, their incentives to act, and their perspectives towards the need to manage climate risks (Agrawala et al., 2011). These span from lack of awareness, technical and financial capacity, data and/or expertise to carry out climate risks (or opportunity) assessment, through to unfavorable policies, laws and regulations.

3. Results and discussion

The research finds that in 2011/2012 public institutions from developed countries committed at least USD 10-15.8 billion for activities with adaptation objectives in developing countries, USD 13 billion on average.⁴¹

These figures are a combination of Official Development Assistance (ODA) and non-ODA finance originating from developed countries' governments, dedicated Climate Funds and DFIs. On average, they represented approximately 58% of global adaptation finance identified in Buchner et al. (2013a). An estimated USD 11.5 billion committed by NDBs in pursuit of national climate-resilient development strategies, made up the remainder portion referred. NDBs tracking issues. The true magnitude of NDBs' flows can, however, be questioned given the status of "readiness" of the climate finance tracking approaches of some of these entities.

Despite shortcomings in tracking and inconsistencies in reporting approaches there is evidence that international financial commitments in pursuit of adaptation objectives have increased since the beginning of this decade (see UNFCCC, 2011a; Buchner et al. 2011, 2012, 2013, forthcoming 2014), and that climate change considerations are being increasingly mainstreamed into development co-operation practices (OECD, 2013b). This is particularly apparent when considering:

- Bilateral contributions reported to the UNFCCC in the past years: USD 0.3 billion in the Fourth National Communication (2001–2003), USD 1.9 billion in the Fifth (2005-2010) (UNFCCC, 2011a) and USD 2.1 billion (2011) in the recently submitted Biennial Reports;⁴²
- Countries bilateral and multilateral Fast-start Finance in support of measures with adaptation objectives estimated at USD 5.7 billion (2010-2012) (ODI et al., 2013).

⁴¹ These estimates may include resources directed to OECD countries such as Chile, Mexico and Turkey, which could not be fully excluded due to data availability issues.

⁴² For 2012, it is USD 1.6 billion. 2011 and 2012 figures include contributions through multilaterals. Source: Biennial Report Data Interface and Biennial Reports (see UNFCCC web site for details).

- Climate Funds' annual commitments for adaptation interventions, which between 2008 and 2012 increased with a compounded annual growth rate (CAGR) of about 73%, reaching a cumulative value of about USD 2.6 billion.⁴³

Nevertheless, notwithstanding these positive signals, current estimates appear to fall short of the potential investment needs. The economic costs of climate change for developing countries, in fact, range between USD 70 billion to USD 100 billion a year (the 2010-2050 average) for a 2 °C warmer world (WB, 2010b). In a 4 °C warming scenario, these costs are expected to rise steeply over time (de Bruin, 2014).

Sources and intermediaries: who are the main actors of the *Landscape*?

DFIs played a pivotal role in the *landscape of adaptation finance*, intermediating about 68% (or USD 8.8 billion) of the total adaptation finance flows captured. Governments bodies and Climate Funds committed, on average, the remaining 27% (USD 0.6-6.4 billion) and 4% (USD 0.5 billion) respectively.⁴⁴ Governments' non-refundable or highly concessional resources provided either directly or indirectly by pooling resources in Climate Funds or dedicated facilities (generally called Trust Funds), support and influence DFIs' ability to develop and finance a wide range of climate-resilient activities at preferable terms.

Table 2. Breakdown of 2011/2012 financial commitments by source (current USD billion and percentage)

Actor	USD billion	%
DFIs	8.8	68%
- MDBs	5.8	45%
- BFIs	3.0	24%
Governments	0.6-6.4	6%-38%
Climate Funds	0.5	4%
Total	10.4-15.8	100%

Note: The figures may not add up to the total exactly because of rounding.

Instruments: how is adaptation finance flowing?

In 2011/2012, USD 7.8-8.0 billion, or 61.5% of the total flows, was invested in the form of loans. More than half of this share (USD 4.5-4.7 billion) was delivered at lower than market terms, while the remaining USD 3.3 billion as investment expecting market rate returns.⁴⁵ Grants, which can include cash transfers or the provision of in-kind support for which the

⁴³ This figure includes bilateral Climate Funds. When considering Multilateral Funds only, the total is about USD 1.2 billion (25% of which disbursed) and the CAGR about 75%.

⁴⁴ To avoid double counting, this estimate excludes an additional USD 242 million provided by bilateral Climate Funds, because assumed accounted for in governments' budget data reported in OECD (2013).

⁴⁵ The total amount also includes equity contributions for an average of USD 13 million

recipient incur no legal debt,⁴⁶ represented the remaining 38% of the total, ranging between USD 2.2 to 7.7 billion.

While about 87% (USD 7.7 billion) of DFIs' adaptation commitments were extended in the form of loans, grants made up the majority of governments' bilateral adaptation-related aid and Climate Funds' commitments. This pattern reflects the role of governments' and climate finance adaptation-related aid in Low Income Countries, including least developed ones.⁴⁷

Recipients: who channels or implement adaptation projects?

Donors and host countries' government entities were the primary recipients/borrowers of an estimated 70.9% (USD 9.1 billion) of total adaptation finance commitments in 2012. Cooperation agencies and Non-Governmental Organizations (NGOs) implemented another significant share (11.5% or USD 1.5 billion).⁴⁸

While the majority of projects and finance was implemented by public sector actors (e.g. line ministries, cooperation agencies or UN organizations) and focused on public sector-oriented activities, the data captured suggest that an estimated USD 0.2-0.3 billion was invested to directly or indirectly⁴⁹ support or involve private actors in measures enhancing climate resilience. DFIs extended USD 158 million (2% of their total), while governments and Climate Funds USD 2.8-163.3 million and USD 16.8 million respectively. About 51% of total private sector-oriented aid from governments and Climate Funds was directed towards Upper-Middle Income countries. The lack of project-level data for the whole group of DFIs impedes to identify where the related 2012 commitments were specifically invested.

According to the projects description available in OECD (2013a), ODI/HBF (2014) and WRI et al. (2013), and information retrieved in DFIs annual reports or web sites, private sector engagement has mainly taken place through measures aimed at: (i) raising awareness, including on response measures (e.g. IFC, 2013a,b; EBRD, 2012); (ii) building the technical and financial capacity of e.g. small-medium businesses and local financial institutions to manage climate-related risks also through, among others, the establishment of dedicated credit facilities and risk transfer tools such as insurance schemes (e.g., OECD, 2013a; ODI/HBF, 2014); (iii) facilitating access to and promoting the adoption of best practices and modern technologies (e.g. IFC, 2012; OPIC, 2012).

⁴⁶ This is adapted from the OECD *Glossary of Statistical Terms*. At: <http://stats.oecd.org/glossary/>.

⁴⁷ The classification of countries by income is based on World Bank categorization see <http://data.worldbank.org/about/country-and-lending-groups>.

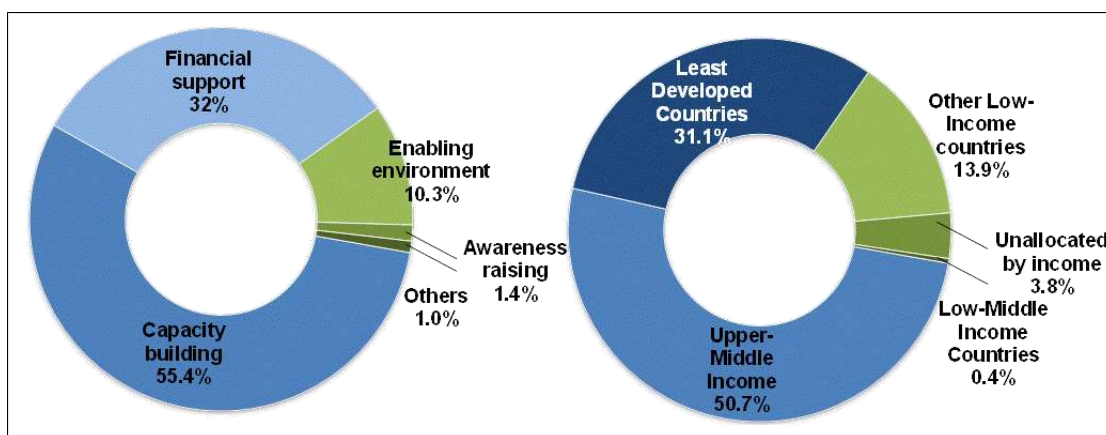
⁴⁸ The breakdown of DFIs commitments by recipients was estimated based on overall climate finance trends, and/or on information retrieved through interviews with DFIs' representatives, DFIs' web sites and/or annual reports.

⁴⁹ Indirect support refers to those measures implemented by a public sector actor e.g. line ministries or NGOs, but aimed at building the capacity of private actors and/or improving the enabling environment for private investments in climate resilience if and only if fine-tuned to specific type of private actors and aimed at putting in place incentives/mechanisms to steer their activities toward enhanced climate resilience.

Other activities identified include multiple objective measures aimed at improving the enabling environment by, for instance, supporting private sector policy formulation and advocacy.

Figure 4 below breaks down the private sector-oriented commitments identified in governments' and Climate Funds' flows, according to the type of barriers that literature indicated as hindering private actors' involvement in adaptation (see e.g. Agrawala et al., 2011), and to the recipient countries by income group.

Figure 4. 2011/2012 private sector-oriented commitments identified in governments and Climate Funds flows broken down by type of activity and income group, in percentage.



Source: author's elaboration based on OECD (2013a) and ODI-HBF (2014).

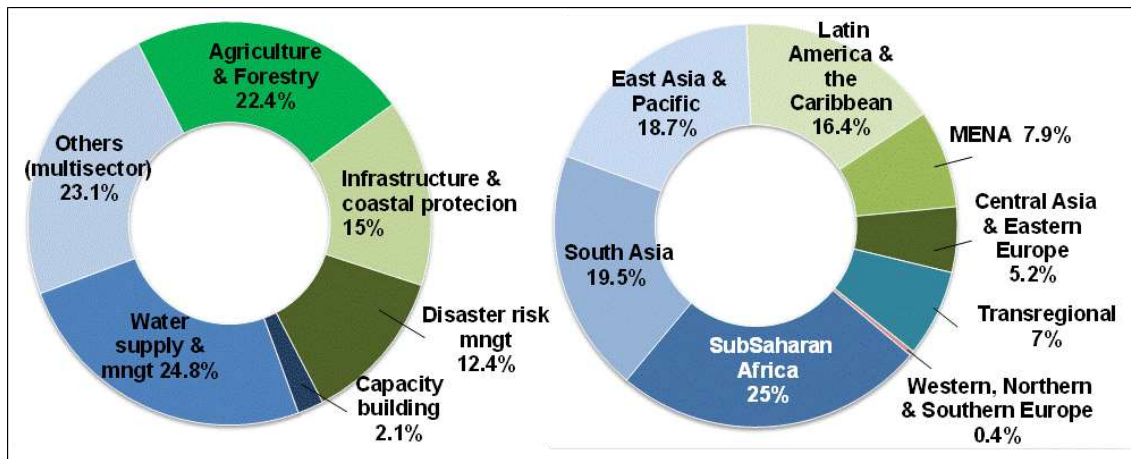
Sectoral and geographic recipients: where is adaptation finance going to?

In 2011/2012 adaptation financing was concentrated in a few sectors and regions. The largest portion (47% or USD 6.0 billion) was committed to increase climate resilience through improvements in the supply and management of water resources, and in agricultural, forestry and land use practices. Among the others, measures aimed at strengthening existing or building new infrastructures received an average 15.2%, (USD 2.0 billion), while other disaster risk management activities attracted an estimated 12.6% (USD 1.6 billion). Existing data and insights on past year's financing practices (see Buchner et al., 2012; IEG, 2012; UNEP, 2011; UNEP 2010; AFD, 2012), suggest that some institutions are placing an increasing emphasis on disaster risk reduction and management measures. This highlights the linkages existing between the disaster risk reduction and adaptation agendas, which in some stakeholders' view would need to be brought closer together (see OECD, 2014b; IPCC, 2012).

In terms of regional recipients, Sub-Saharan African countries and South Asia received almost half (45% or USD 5.8 billion on average) of total public commitments targeting

adaptation. The former was privileged by the allocation of governments and Climate Funds resources, while the latter by DFIs ones. The pattern of 2012 financing appears to be aligned with these regions' adaptation needs given their high exposure to future climatic upheavals, and their relatively lower institutional and financial capacity to address the consequences of these changes (see e.g. WB, 2012 and AFD, 2012). The lack of consistent series or country-level data for all flows is an obstacle to more in-depth analysis.

Figure 5. Break down of 2011/2012 public finance commitments by type of recipient sector and geography (current USD billion and percentage).

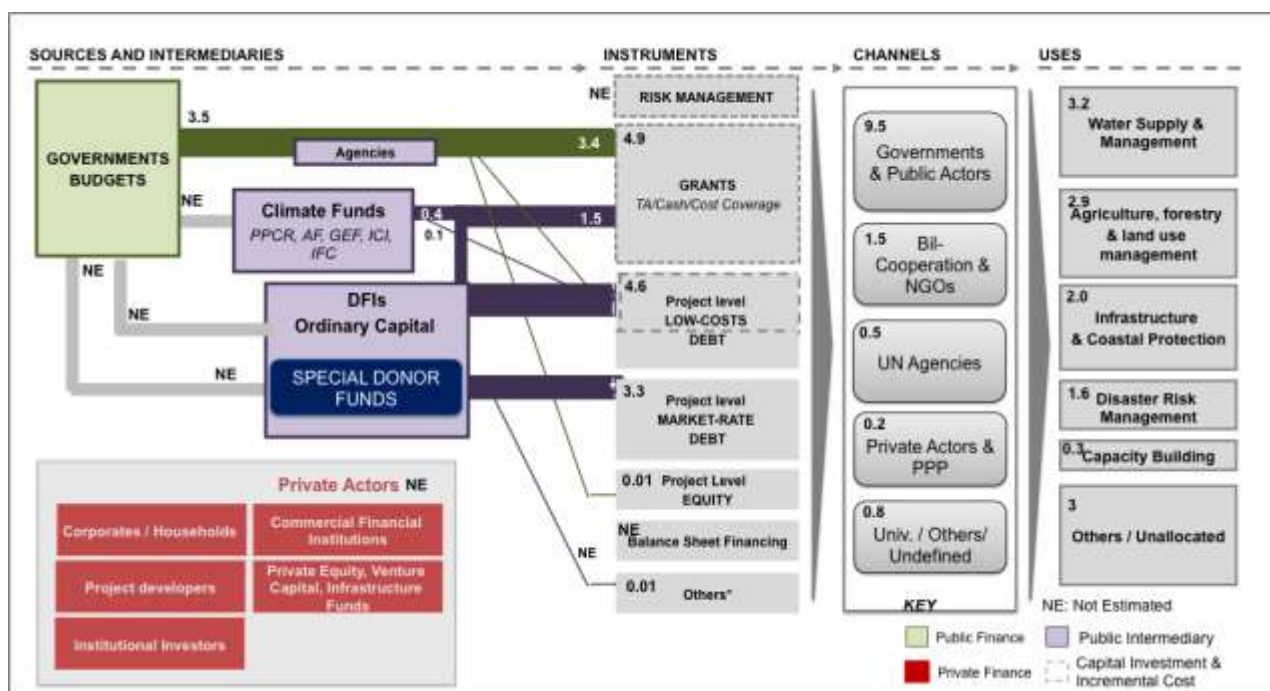


Source: author's elaboration.

Figure 6 below, the so-called *Landscape* (see Buchner et al., 2011), illustrates in a snapshot 2011/2012 public adaptation finance flows along their life-cycle.

Given their relative role in the *Landscape*, the following section focuses on describing more in details DFIs flows, breaking down their commitments along the main stages of the finance lifecycle. Chapter 2 ends with a discussion on the key tracking issues that influence the magnitude and nature of the estimates presented.

Figure 6. The Landscape of Adaptation Finance in 2011/2012 (in current USD billion)⁵⁰



3.1. The role of Development Finance Institutions in the Landscape of Adaptation Finance

With an average 68% of total adaptation finance commitments in 2011/2012, or USD 8.8 billion, DFIs represented the dominant source for projects pursuing climate resilience objectives in developing countries. This appears consistent with their long-standing expertise and roles in areas of development assistance with relevance to adaptation.

MDBs delivered nearly 66% (USD 5.8 billion) of the total DFIs' commitments, while BFIs about 34% (USD 3 billion).

A group of MDBs also distributed third party resources valued at USD 370 million (AfDB et al., 2013) from bilateral or multilateral donors such as the Pilot Program for Climate Resilience (PPCR) or the Adaptation Fund. BFIs, instead, who do not have access to this type of multilateral funding options, administered and delivered significant portions of governments' Fast-start Finance commitments (see Vieweg et al., 2012; Fransen et al., 2012; WRI et al., 2013).

⁵⁰ Notes: Flows are presented in USD billion and rounded to produce whole numbers. Where ranges of estimates are available, the mid-point is presented. Values presented in the graph may not match because of data availability issues. Instruments: (*) The category "other instruments" includes flows that could not be associated to other instruments. Project-level equity refers to equity reported as ODA in (OECD, 2013a); Risk management instruments are not counted against total commitments. Uses: (**) The category "other/unallocated" adaptation includes e.g. activities such as prevention of groundwater salinity through improved waste water infrastructures and waste management or health-related products. Not estimated arrows have a default width.

Governments' choice of intermediary institution and delivery modality influences their ability of mobilizing private investments. The U.S., for instance, relied for 32% (USD 722 million) of its 2012 Fast-start Finance commitments on the Overseas Private Investment Corporation (OPIC) given its focus on catalyzing private investments (US State Gov., 2013).⁵¹ Canada, instead, allocated USD 292 million of its Fast-start financing to the International Finance Corporation (IFC) – the private sector arm of the World Bank – to set up a co-finance facility specifically targeting the mobilization of private sector investments in developing countries though both mitigation and adaptation-oriented projects (Government of Canada, 2012; IFC, 2013c).⁵² The relevance of these strategies for adaptation remains to be seen.

Table 3. Insights on Fast-start contributions administered by BFIs in pursuit of adaptation measures, current USD in million, 2012 and 2010-2012

Donor country	DFIs	Adaptation-oriented FSF (% on tot and USD)	Time period
Japan	Japan International Cooperation Agency (JICA)	78% (USD 342)	2012
France	French Development Agency (AFD)	56% (USD 16 yearly average)	2010-2012 ⁵³
Germany	German Development Bank (KfW Entwicklungsbank)	41% (USD 54)	2012

Source: author's elaboration based on WRI et al. (2013)

Insights on DFIs adaptation finance commitments trends

Noting that some methodological refinements occurred in their joint tracking approach over the two years, data reported by AfDB et al. (2012) and AfDB et al. (2013) suggest a 34% year-on-year increase in MDBs' adaptation finance commitments in 2012.⁵⁴ Also JICA and KfW commitments, which together represented about 92.6% of BFIs' total adaptation financing in 2012, increased by 42% and 9% respectively compared to 2011. AFD's contributions, instead, decreased by a significant 66% in 2012, reaching the lowest level since 2007; according to AFD (2012) this drop was mainly due to a lower average amount of financing per project than in previous years.

⁵¹ This figure refers to finance in clean energy activities.

⁵² The facility also supports projects pursuing mitigation objectives. For private finance mobilization purposes, in 2012 and 2013 the Government of Canada also established the USD 250 million Canadian Climate Fund for the Private Sector at the IDB, and the USD 82 million (2013) Canadian Climate Fund for the Private Sector in Asia (IDB, 2012b; ADB, 2013). The Canadian's total Fast-start funding amounted to USD 1.2 billion.

⁵³ The volume specifically channeled by AFD in 2012 could not be determined as the year of commitment was reported as "unknown" in the dataset. Data reported in EU (2013) suggest that over the 2010-2012 period AFD channeled a higher volume.

⁵⁴ It is to be noted that MDBs refined their joint tracking approach within one year of MDBs' data reported to Buchner et al. (2012).

Instruments and recipients

About half of DFIs' adaptation commitments was extended in the form of low-cost debt (49.5%), and about the same share (48.6%) with the aim of managing climate risks in the water (27%) and agricultural sectors (22%). Two thirds of their commitments targeted climate vulnerabilities in South Asia (25%), Sub-Saharan Africa (23%) and the Latin America and Caribbean Region (20%). With 35% of their total (USD 1.1 billion), South Asia was the single main recipient of BFIs' financing, while countries in Sub-Saharan Africa and Latin America & the Caribbean were the main target of MDBs commitments, which allocated 29% (USD 1.7 billion) and 23% (USD 1.3 billion) of their total respectively. The patterns of DFIs' financial flows underscore the relative role played by the main financiers of adaptation-targeted projects, namely, the World Bank (WB), the JICA, and the Asian Development Bank (ADB). Together, these entities accounted for about 75% of total DFIs' adaptation finance in 2012.

MDBs – whose single largest share of financing targeted infrastructure and coastal protection projects (29%) – committed their financing predominantly at market-rate terms (55% of the total). This underscores the importance of grant or concessional funds from donors and Climate Funds, which can be “blended” alongside MDBs' own ones to achieve the level of concessionality required by the additional costs and risk premium of adaptation projects, or compensate for the real or perceived higher risks of pilot and demonstration projects.

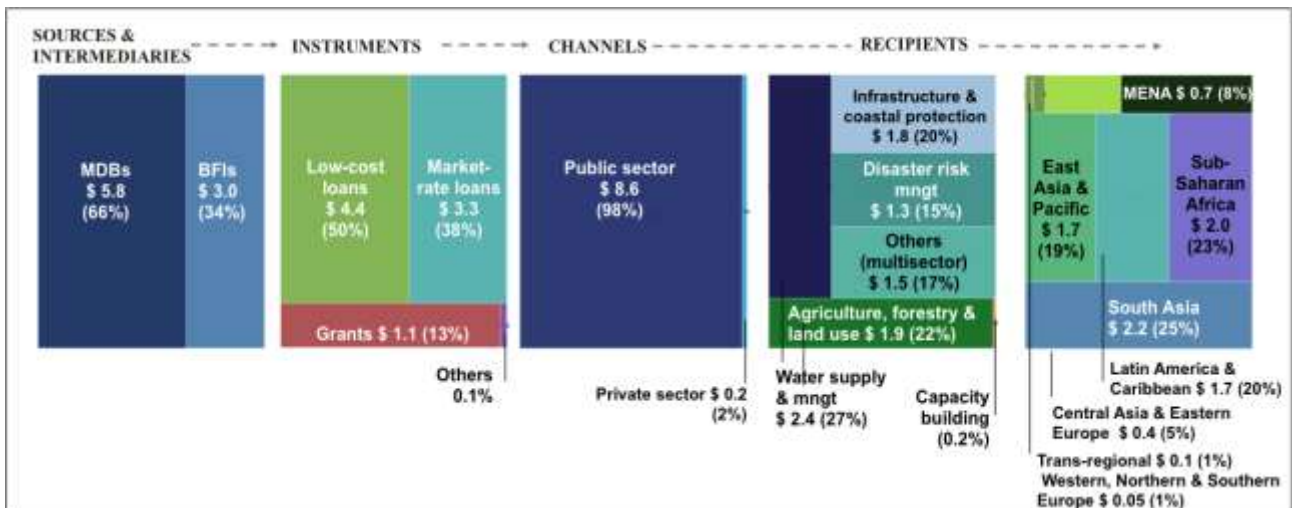
Donors' resources also enable MDBs to prepare and implement investments, though e.g. awareness-raising, market studies or technical assistance services in conjunction with financing to e.g. facilitate access to finance at affordable rates for water-efficient technologies (see e.g. EBRD, 2011). In particular, the Climate Investment Fund's PPCR is providing MDBs with access to grants and highly concessional loans⁵⁵ with the explicit objective of using these resources to engage the private sector in climate-resilient development activities (CIF, 2013a,b,c). In 2012 total commitments towards this end amounted to USD 8.7 million (ODI/HBF, 2014) but, as of March 2014, funding allocated to private sector-oriented projects amounted to about USD 104 million (CIF, 2014).

BFIs extended 73% (USD 2.2 billion) of their commitments in the form of below market-rate debt and 22% (USD 0.7 billion) as grants, focusing their interventions in the water supply and management sector that attracted 56% (USD 1.7 billion) of their financing. As suggested by data reported in Buchner et al. (2012) and UNEP (2011; 2010), in 2012 BFIs' financing strategies appeared to be in line with their past practices, but show a rebalancing

⁵⁵ Concessional loans are offered at near zero interest with a 75% grant element.

in favor of other activities. In 2012, in fact, disaster risk management measures and agriculture received about 23% and 15% of their total as compared to 4% and 10% in 2009. Disaster risk management interventions increasingly become an area where also the World Bank – a prominent financier of adaptation projects – placed a growing emphasis over the past years, focusing on e.g. the improvement of countries’ hydro-meteorological information systems (IEG, 2012).

Figure 7. Breakdown of public adaptation finance flows to developing countries in 2011/2012.



Source: author’s elaboration

In addition to investment loans/grants, DFIs’ support with relevance to adaptation also encompassed ‘non-project lending’ instruments, so-called policy-based instruments.⁵⁶ These instruments represented 24% of MDBs’ 2012 adaptation finance commitments, or about USD 1.3 billion, and were provided by the World Bank and the Inter-American Development Bank. Policy-based instruments accounted for 32% and 95% of their respective total commitments (AfDB et al., 2013).⁵⁷ Policy-based instruments are also used by BFIs, but due to data availability issues it was not possible to determine their relative importance on BFIs’ portfolios.⁵⁸

Through policy-based instruments DFIs’ resources are transferred in tranches in the form of loans or grants through recipient countries’ governments’ budgets in support of pre-

⁵⁶ Originated as Balance of Payments support during the global oil crisis in 1978 (ADB, 2011), policy-based loans are now used with the aim of supporting governments’ efforts to addressing climate change challenges by making tranche loan disbursement conditional to pre-determined policy and institutional reforms (IDB, 2012).

⁵⁷ The World Bank started Climate Change Development Policy Operation lending in 2012, with the approval of a total of USD 70 million (World Bank, 2012) while IDB has been using policy-based loans to deliver its climate financing since 2007. Policy-based lending accounted for about 17% of its total climate finance budget support in the Region (IDB, 2013).

⁵⁸ AfD, for instance, is financing adaptation projects in Indonesia, Vietnam, Mauritius and Mexico with Climate Change Development Policy Operations (DPSs), while KfW is planning on launching a scheme called Climate Change Policy Based Loans (CCPBL) for National Adaptation Plans (NAPs). According to AfD (2012), in 2012 AfD budget and sectoral support to governments and local authorities for the implementation of climate change policies amounted to EUR 473 million (~USD 608 million), about 20% of its “climate” commitment approvals. This figure includes financing to activities with both mitigation and adaptation co-benefits.

determined policy and institutional reforms (IDB, 2012c). Since they are implemented through national systems in support of national development plans, some studies (e.g., AfDB, 2012; Brown and Peskett, 2011) noted that they have demonstrated the ability to enhance countries' ownership, increase predictability of funding, and help to strengthen national budget processes. Strengthening relevant policy frameworks can help to incentivize private investments in climate-resilience (see e.g., Agrawala and Fankhauser, 2008).

Mobilizing private sector investments

According to data provided in the financial survey, and information retrieved in DFIs annual reports or web sites, it is estimated that DFIs delivered most of their resources (98%) to public sector actors, and about 2% (USD 158 million) directly to private entities. MDBs provided 76% of this private sector-oriented finance.

Given the lack of project-level details, secondary sources suggest that the USD 158 million was invested in activities aimed at strengthening private actors' climate risk management capabilities by, inter alia:

- Promoting water resources efficiency measures in water-intensive industries (e.g. pulp and paper and agribusiness) operating in water stressed areas (EBRD, 2012; KfW, 2012; IFC, 2013a; IFC and EBRD, 2013; DEG, 2014a,b);
- Strengthening energy infrastructures to withstand climate-related impacts (IFC, 2012a; Stenek et al., 2010);
- Promoting the adoption of best practices and modern technologies in agriculture to strengthen the productive capacity of small-medium organizations and cooperatives (IDB, 2012a; IFC 2012a,b; IDB, 2013a,b; OPIC, 2013).

These projects were mostly supported by the private sector arms of MDBs (e.g. IFC and EBRD), the private subsidiary of BFIs (e.g. DEF) and business-focused DFIs (i.e. OPIC).

Private sector-oriented DFIs, which operate at the interface between the public and private sectors (IFC, 2011), can offer and package together a wider array of financial and non-financial instruments as compared to their public sector counterparts (see e.g. IFC, 2011; Venugopal et al., 2012), helping to bringing projects to a state of "investment readiness" or demonstrating the viability of investments in new areas. How these instruments have been used and what is the specific role of private sector-oriented DFIs in the context of adaptation, however, remains to be assessed.

3.2 Main caveats

Ample room for improvement remains in the estimates presented, often due to the lack of readily available, project-level data, or consistent and comparable tracking approaches across the various data sources compiled. Moreover, some relevant information (e.g. AfDB et al, 2013) was not available during the planning data gathering phases (April-October 2013). In particular, the following caveats need to be highlighted:

Firstly, shortcomings in the data gathering approach. The survey developed to collect DFIs data, which was undertaken in the context and jointly with Buchner et al., (2013a,b), had to strike the balance between comprehensiveness and likelihood of responsiveness among the surveyed institutions. For instance, an improved survey template would help to derive more accurate geographical and recipient typology breakdown. It could help ensure that financing towards OECD countries such as Chile, Israel, Mexico or Turkey is fully excluded from Non-OECD estimates. It can also help to enhance the accuracy of the exact volume of DFIs' financing directed toward private sector recipients.

Secondly, the weakness of the keywords search methodology used to identify private-sector oriented interventions. The reliance on the projects description fields available in the OECD-DAC CRS and Climate Funds' datasets relies on the level and accuracy of the information reported. Albeit also the descriptions of the other projects featured in these datasets and, where available, the information provided in projects-related documents were duly taken into account, the information available is often insufficient to enable understanding on the type of intervention financed. Moreover, the online project databases of some DFIs are not intended for climate finance reporting and, therefore, offer limited information value.

Thirdly, reliance on a single year of adaptation finance commitments. Albeit various data sources were investigated in order to understand trends and the significance of data, a single year is not fully representative. Data series would enable more in-depth and meaningful assessments, but there is still relatively little data on which to base trend analysis. Climate change is not a traditional sector for donors and DFIs reporting of international development aid, hence, systems for tracking adaptation activities are still relatively in their infancy, and relevant expertise is still under development.

3.3 Main tracking issues

The following paragraphs aim to summarize the main tracking issues identified during the assessment. These issues hamper the quality of data and limit understanding about the true volume and nature of adaptation finance flows, and of climate finance more in general, thereby call for improvements.

First, an integrated statistical system for collecting and accessing data on public climate (adaptation) finance is not yet in place.

The lack of a comprehensive system for reporting and accessing data on international climate finance is an obstacle to the harmonization of tracking approaches. An integrated system would help to collect comparable data across sources and avoid the risk of double counting flows.

Secondly, organizations operating in the adaptation ‘Landscape’ use different approaches and methodologies to determine and account what qualifies as an adaptation project.

- MDBs: the “*purpose, context and activity-based approach*” approach used by a group of MDBs qualifies an activity as ‘adaptation’ if and only if demonstrating through robust evidence-based analysis to potentially tackling the current and future climate-related risks identified in a given context (AfDB et al., 2012; AfDB et al., 2013). It accounts only those components/portions of projects that contribute to adaptation benefits (rather than the entire project costs). Therefore, the volume publicly disclosed results from the aggregation of qualifying shares of projects’ costs.
- OECD-DAC CRS: The Rio marker Directive has a definition of adaptation-related aid and eligibility criteria (see OECD, 2011), but it leaves ample room for interpretation. It remains difficult to interpret, especially for non-environmental specialists; in particular, difficulties in understanding arise with respect to the difference between the ‘*significant*’ and ‘*principal*’ markers (OECD, 2014c,d). In fact, the Quality Review undertaken by the OECD (2013c) revealed a number of weaknesses in members’ application of the Rio marker. OECD (2013c) notes that the description of the activities marked as “*significant*” seldom made the adaptation objective explicit. Some of these activities did not have a particular focus on adaptation, appeared to be misclassified or targeting infrastructures projects which, to avoid over-estimation, should not be accounted in their entirety as adaptation-related. This is critical given that investments in adaptation are often part of larger investments.
- UNFCCC: It does not define what specifically qualifies as adaptation finance.

The MDBs’ approach is more granular, conservative and objective than the OECD Rio marker system, because: i) screening is operated at the level of project components rather than at the project level; ii) it is based on more restrictive eligibility criteria (OECD, 2013c,d,e).

Finally, the financial survey submitted to a number of DFIs, which requested them to explain their climate finance accounting practices, revealed that several institutions still do not yet have in place a methodology for tracking climate finance. This is particularly true for some BFIs (particularly, those who did not report adaptation financing in 2012), and NDBs, which account the full value of projects with adaptation potential in climate-relevant sectors (AFD, 2014). Albeit noteworthy efforts are ongoing to enhance tracking “readiness” and harmonize approaches e.g., in the context of the International Development Finance Club (IDFC) mapping initiatives (see Ecofys-IDFC, 2013), some NDBs still have limited accounting capacities which would need to be strengthened to ensure accurate reporting. Comparability issues remain between the approaches used by MDBs and members of the IDFC.

Thirdly, organizations currently involved in the tracking have different objectives and use diverse reporting format and requirements.

The Rio markers’ methodology was designed to provide an indication of donors’ policy objectives (qualitative assessment) in relation to aid activities rather than to offer precise quantitative measurement for reporting on international climate finance commitments (OECD, 2014c,d). Most donors use it as a basis to report to the UNFCCC in compliance with their responsibilities under Articles 4 and 12 of the Convention. Nevertheless, they then apply diverse approaches to adjust their reporting in conformity to the UNFCCC requirements (Parties are requested to report their ‘*new and additional*’ contributions; see Annex C for details).

The OECD-DAC CRS and the UNFCCC use different reporting approaches.

- The OECD-DAC CRS reports on activity-level financial commitments (and disbursement) for projects that have adaptation as a “principal” or “significant” objective. It features financing directed towards eligible aid recipients, which do not include all non-Annex I Parties. It reports ODA and, starting from 2010, also to other official flows (OOF), but Rio marking on the latter is still at an early stage (OECD, 2014c).
- The UNFCCC provides guidance on the categories and intermediaries of finance, and adopted a Common Tabular Format for reporting via the biennial reports. However, it does not provide specific guidance on eligible instruments, specific metrics (e.g. exchange rates) or on whether countries should report commitments or disbursements. It leaves room for interpretation, thereby impeding comparability across data and enhancing the risk of low transparency.

- DFIs, with the exception of those that have been reporting to the OECD-DAC, reporting remains ad-hoc, they do not report project-level information and do not have statistical character.

Thirdly, public disclosure and granularity of data can vary between actors.

The lack of consistent project-level data across institutions, or varying degree of disclosures, represents another obstacle to the accuracy of the estimates presented in this research.

It is often difficult to retrieve from governments' web sites or alike the documents of the projects reported in the OECD-DAC CRS database, or match them. MDBs maintain publicly available project databases, but these do not generally allow to identifying if a given project is labeled and/or counted as an adaptation project/components. Still, improvements are ongoing and visible (see e.g. the project documents of ADB).

The consistent availability of project-level data would allow gaining a full understanding on the type of activities actually financed, recipient countries targeted and the financial instruments used; it can also help ensure that double counting is avoided, and compile more comparable data set. Consistent disclosure of project documents can also enhance transparency and understanding.

Fourthly, DFIs' reporting approaches do not yet systematically allow to identify recipient entities and/or these are defined differently across institutions.

The tracking and reporting approach of some DFIs do not yet allow the identification of the typology of the first recipients/ borrower (i.e. whether public or private), or apply differing definitions (AFD, 2014). The OECD-DAC CRS provides incomplete information on the recipient typology.

Given the lack of agreement on the definition of "private climate finance", and on what should be accounted as "mobilized by developed countries", this would inevitably result in differing approaches and understanding on the portion of climate finance "mobilized". In addition, it can also be an impediment to the analysis of the type of support that can have the most potential to incentivize private actors in contributing towards adaptation objectives.

Fifthly, definitional and methodological obstacles still impede the tracking of private resources invested in adaptation. As a result, the landscape provides a partial picture of adaptation finance flows.

Positive developments

Despite the above outlined shortcomings in tracking and reporting of climate finance, some noteworthy improvements have been recently made. The following are worth noting:

- Steps towards the development of an integrated system: The OECD and a number of DFIs have been working together in order to harmonize approaches and, as of September 2014, most MDBs now report project-level climate finance data to the OECD, which plans to publish integrated bilateral and multilateral climate aid data for the first time in December 2014, at COP 20;
- Improvements in data quality: The OECD is working to improve the objectivity of Rio marking (see e.g. OECD, 2013d; OECD, 2014d) and their use for reporting against quantitative financial targets (OECD, 2014e).
- Enhanced ability to comprehend the links between public and private resources: MDB have been working to identify and jointly report on the public versus private recipients of their financing (EIB, 2014) and, for the first time, will publicly disclose details on this in their forthcoming joint report (AfDB et al., 2014 forthcoming). This report would also report distinct data on cross cutting activities, thereby enabling to identify the scale of their multiple objective activities which was not previously possible (EIB, 2014).

The OECD-led Research Collaborative on Private Finance is also working towards improving understanding on how to track and account private sector flows. Its efforts could help to fill the current knowledge gap on these flows.

4. Concluding remarks

This research present the first comprehensive analysis of the *landscape* of adaptation finance flowing from developed towards developing countries. It is the first seeking to identify public sector efforts in pursuit of private investments in activities leading towards enhanced climate resilience. It also gives insights on the main tracking gaps.

The study provides a baseline on which to build for measuring progress, planning scale-up financing and further improving tracking systems. It represents a snap shot in time to be further developed has expertise and knowledge on adaptation flows evolves.

Key findings

The study highlights that in 2011/2012 at least USD 10.0-15.8 billion of international public finance was committed with the objective of reducing the vulnerability of developing countries' systems to climate-related risks.

The prominent role played by DFIs highlights the relevance of these institutions as enabler of adaptation investments. DFIs intermediated about 68% (or USD 8.8 billion) of the total adaptation finance flows captured, while governments bodies and Climate Funds committed the remaining 27% and 4% respectively.

The bulk of adaptation finance flows, 74% of the total, was delivered in the form of low-cost loans and grants delivered through DFIs and government bodies. Loans were the primary instruments used by DFIs. In particular, MDBs supported climate resilient projects mainly via market-rate loans, which made up 55% of their commitments, while BFI by the means of low-cost loans. This can reflect MDBs stronger focus on climate-resilient infrastructure, which accounted for nearly 30% of their 2012 commitments.

The majority of projects and finance was implemented by and through public sector actors such as line ministries, cooperation agencies or UN organizations in pursuit of public objectives. An estimated USD 0.2-0.3 billion was instead invested to directly or indirectly⁵⁹ support or involve private actors in measures aimed at enhancing climate resilience. Available evidence suggests that, on average, DFIs provided 61% of these resources, mainly from their private sector arms/subsidiaries.

The analysis performed suggests that these resources were mainly invested to build private actors' technical and financial capacity, also by facilitating their access to and adoption of improved practices and technologies.

The lifecycle assessment of flows also highlights that donor governments and Climate Funds are giving to MDBs access to grants and concessional loans with the explicit purpose of stimulating private sector interventions.

Given the significant investments needed to address developing countries climate resilience challenges, maximizing private investment towards this end is not an end in itself, but rather a means to achieve climate-resilient development objectives. Yet there remains a gap in understanding how to best involve them in managing own and societal climate risks. Bottom-up case studies on specific interventions could help to identify the "entry points" for public finance, and distill lessons on strategies and approaches with scaling up and replicability potential.

Adaptation finance tracking

The estimates presented in this research remain uncertain. While the tracking of climate finance has significantly improved in the past years, and since the pioneering Buchner et

⁵⁹ Indirect support refers to those measures implemented by a public sector actor e.g. line ministries or NGOs, but aimed at building the capacity of private actors and/or improving the enabling environment for private investments in climate resilience if and only if fine-tuned to specific type of private actors and aimed at putting in place incentives/mechanisms to steer their activities toward enhanced climate resilience.

al., (2011), the lack of consistent definitions and harmonized approaches impedes comparability and undermines understanding on the actual magnitude and nature of adaptation finance flows. The scale of adaptation finance, in fact, depends upon the definition of adaptation adopted, and on what and how it is measured.

A number of efforts are currently ongoing to harmonize and streamline approaches and reporting standards across both multilateral and bilateral providers of adaptation finance, as well as monitoring institutions such as the OECD. There are preliminary steps towards the development of an integrated statistical data system for storing and accessing data on international public climate finance (i.e. MDBs reporting to the OECD-DAC). The availability of such system will facilitate comparison and integration across data sources as well as support a more effective allocation of adaptation finance.

The UNFCCC Standing Committee of Finance currently in the process of preparing its first Biennial Assessment and Overview of Climate Finance Flows has the opportunity to advance a definition of 'climate finance', and adaptation finance in particular. It could take concrete steps leading towards the development of such an integrated data system.

Ultimately, in fact, the objective of its Biennial Assessment should be to strengthen the monitoring and reporting of climate finance as, what matters, it to equip investors and decision markers with the tools needed to allocate resources effectively.

5. References

- Adaptation Fund Board (AFB).2013. *Adaptation Fund Trust Fund: Financial Report Prepared by the Trustee* (as at 31 March 2013). Bonn, Germany, 2013. AFB/EFC.12/8. At: https://www.adaptation-fund.org/sites/default/files/AFB.EFC_.12.8%20AF%20Trust%20Fund%20Financial%20Report%20%28as%20of%20Mar%2031,%202013%29.pdf
- Ampri I., A. Falconer, Wahyudi N., Rosenberg A., Ampera B., Tuwo A., Glenday S., Wilkinson J. 2014. *The Landscape of Public Climate Finance in Indonesia*. An Indonesian Ministry of Finance and CPI report. At: <http://climatepolicyinitiative.org/publication/landscape-of-public-climate-finance-in-indonesia-3/>.
- African Development Bank (AfDB). 2012. *Evaluation of Policy Based operations in the African Development Bank, 1999-2009 Review of Literature and Experience*. Operations Evaluations Department, High Level Evaluations Division (OPEV.2). At: <http://www.afdb.org/fileadmin/uploads/afdb/Documents/Evaluation-Reports/Literature%20review%20FINAL%20DRAFT.pdf>.
- African Development Bank (AfDB), Asian Development Bank (ADB), European Investment Bank (EIB), European Bank for Reconstruction and Development (EBRD), Inter-American Development Bank (IADB), International Finance Corporation (IFC) and World Bank]. 2012. *Joint Report on Adaptation Finance 2011*. At: <http://www.afdb.org/fileadmin/uploads/afdb/Documents/GenericDocuments/Joint%20MDB%20Report%20on%20Adaptation%20Finance%202011.pdf>.
- African Development Bank (AfDB), Asian Development Bank (ADB), European Investment Bank (EIB), European Bank for Reconstruction and Development (EBRD), Inter-American Development Bank (IADB), International Finance Corporation (IFC) and World Bank]. 2013. *Joint Report on Climate Finance 2012*. At: <http://www.afdb.org/fileadmin/uploads/afdb/Documents/GenericDocuments/Joint%20MDB%20Report%20on%20Adaptation%20Finance%202011.pdf>.
- Agence Française de Développement (Afd). 2012. *AFD Group's Climate Activity in 2012*. At: <http://www.afd.fr/webdav/shared/PORTAILS/SECTEURS/CLIMAT/AFD-Climate-related-activity-2012.PDF>.
- Agence Française de Développement (AFD). 2014. Discussion with AFD staff (Pierre Forestier), May 2014.
- Agrawala S. et al. 2011. *Private Sector Engagement in Adaptation to Climate Change: Approaches to Managing Climate Risks*. OECD Environment Working Papers, No. 39, OECD Publishing. <http://dx.doi.org/10.1787/5kg221jkf1g7-en>.
- Agrawala S. and S. Fankhauser. 2008. *Economic Aspects of Adaptation to Climate Change. Costs, Benefits and Policy Instruments*. Organization for Economic Co-operation and Development. Paris, France.
- Asian Development Bank (ADB). 2013. *Establishing the Canadian Climate Fund for the Private Sector in Asia under the Clean Energy Financing Partnership Facility*. Manila. At: <http://www.adb.org/sites/default/files/in80-13.pdf>
- Brown J. and Peskett L.2011. *Climate Finance in Indonesia: Lessons for the Future of Public Finance for Climate Change Mitigation*. EDC 2020. At: http://www.edc2020.eu/fileadmin/publications/EDC_2020_-_Working_Paper_No_11_-_Climate_Finance_in_Indonesia.pdf.
- Brown J and N. Kaur. 2009. *Financing Adaptation: Matching Form with Function*. Overseas Development Institute (ODI). At: <http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/5078.pdf>.
- Buchner B., Falconer A., Hervé-Mignucci M. and Trabacchi C., Brinkman M. 2011a. *The Landscape of Climate Finance*, CPI Report, Venice, October 2011.
- Buchner B., J. Brown and J. Corfee-Morlot. 2011b. *Monitoring and Tracking Long-Term Finance to Support Climate Action*. Organization for Economic Co-operation and Development (OECD) and IEA, COM/ENV/EPOC/IEA/SLT (2011)3, Paris, France.

Buchner B., Painter C., Trabacchi C., and Wilkinson J. 2013b. *The Role of Development Finance Institutions and Development Banks in Scaling Up Green Investments*. Proceedings of Scaling-up Green Economy 2013; 2013 September 5; KfW, Frankfurt. Venice: Climate Policy Initiative. Available from: <http://climatepolicyinitiative.org/wp-content/uploads/2013/09/CPI-Brief-for-DFI-DB-meeting.pdf>.

Buchner B., Falconer A., Hervé-Mignucci M., Trabacchi C. 2012. *The Global Landscape of Climate Finance*. CPI Report, Venice. At: <http://climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2012/>.

Buchner B., Hervé-Mignucci M., Trabacchi C., Wilkinson J., Stadelmann M., Byod R., Mazza F., Falconer A., Micale V. 2013a. *The Global Landscape of Climate Finance*. A CPI Report, Venice. At: <http://climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2013/>.

Buchner B., Stadelmann M. et al., *The Global Landscape of Climate Finance 2014 (forthcoming)*. A CPI Report, Venice

Canada's FS Financing Progress Report at https://unfccc.int/files/adaptation/application/pdf/fast_start_finance_progress_report_canada_-_final.pdf

Clapp C., Ellis J., Benn J. and Corfee-Morlot. 2012. *Tracking Climate Finance: What and How?* Organization for Economic Co-operation and Development. COM/ENV/EPOC/IEA/SLT (2012)1. May 2012, Paris, France.

Climate Investment Funds (CIF). 2012. *Proposal for Additional Tools and Instruments to Enhance Private Sector Investments in the CIF*. Joint Meeting of the CTF and SCF Trust Fund Committees, Washington, D.C., May 1-2 2012, CTF-SCF/TFC.8/8.

Climate Investment Funds (CIF). 2013. *PPCR Semi-Annual Operational Report*. Meeting of the PPCR Sub-Committee Washington, D.C. November 1, 2013PPCR/SC.13/3/Rev.1.

Climate Investment Funds (CIF). 2013b. Report on the Financial Status of the SCF (Prepared by the Trustee). CTF-SCF/TFC.12/Inf.3. Montego Bay, Jamaica. At: https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/CTF_SCF_12_Inf.3_Report_on_the_financial_status_of_the_SCF.pdf.

Climate Investment Funds (CIF). 2013c. *Procedures for Allocating PPCR Resources on a Competitive Basis from a Set Aside*, February 2013, Washington D.C. At: <https://www.climateinvestmentfunds.org/cif/content/procedures-allocating-ppcr-resources-competitive-basis-set-aside>.

Climate Investment Funds (CIF). 2014. *PPCR Semi-Annual Operational Report*. Meeting of the PPCR Sub-Committee Montego Bay, Jamaica, PPCR/SC.14/3.

Climate Investment Funds (CIF). 2014. *CIF Disbursement Report*. Washington D.C. At: https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/CIF_Disbursement_Report_July_1_December_31_2013.pdf

De Bruin, K. 2014. *Documentation and Calibration of the AD-RICE 2012 model* (No. 2014-3). Umea, Sweden.

DEG - Deutsche Investitions- und Entwicklungsgesellschaft mbH (DEG). 2014a. *Annual Report 2013*. Financial Statements and Management Report DEG - Deutsche Investitions- und Entwicklungsgesellschaft mbH April 2013 Cologne.

DEG. 2014b. Discussion with DEG staff (Christopher Cosack), February 2014.

EBRD. 2011. *The EBRD and Adaptation to Climate Change*. European Bank for Reconstruction and Development. London. U.K. <http://www.ebrd.com/downloads/research/factsheets/adaptation.pdf>.

EBRD. 2012. *Sustainability Report*. 2012. European Bank for Reconstruction and Development. London, UK.

Ecofys--International Development Finance Club (IDFC). 2013. *Mapping of Green Finance Delivered by IDFC Members in 2012*. At: https://www.idfc.org/Downloads/Publications/01_green_finance_mappings/IDFC_Green_Finance_Mapping_Report_2013_11-01-13.pdf.

European Union (EU). 2013. *Individual Actions Supported by EU Fast-start Financing*. At: http://unfccc.int/files/cooperation_support/financial_mechanism/fast_start_finance/application/pdf/individual_actions_supported_by_eu_fast_start_finance_public_turned_correct.pdf

EIB. 2014. Discussion with EIB staff, (Nancy Saich), May. 2014.

Fransen T., Stasio K., S. Nakhooda. 2012. *The U.S. Fast-Start Finance Contribution*. World Resource Institute, Overseas Development Institute, May 2012, Working Paper, At: <http://www.odi.org.uk/publications/6560-usa-america-fast-start-finance-unfccc-pledge>.

Frisari G., M. Hervé- Mignucci, V. Micale, and F. Mazza. 2013. *Risk Gaps: A Map of Risk Mitigation Instruments for Clean Investments*. Climate Policy Initiative. At: <http://climatepolicyinitiative.org>

GCF/B.04/07. *Business Model Framework: Private Sector Facility*. GCF/B.04/07. Meeting of the Board 26-28 June 2013, Songdo, Republic of Korea. Agenda item 4(e). At: http://www.gcfund.net/fileadmin/00_customer/documents/pdf/B-04_07_BMF_PSF_12Jun13_1745s.pdf

Global Environment Facility (GEF), 2012. *Progress Report on the Least Developed Countries Fund (LDCF) and Special Climate Change Fund (SCCF)*. Washington, D.C, GEF/LDCF.SCCF.13/Inf.02. At: <http://www.thegef.org/gef/sites/thegef.org/files/documents/LDCF.SCCF%20Progress%20Report%20Oct%2016.pdf>.

Global Environment Facility (GEF), 2013. "GEF Projects Database" [Internet]; [cited 2013 July 26]. Washington DC: Global Environment Facility. At: http://www.thegef.org/gef/project_list.

Harmeling S. 2008. *Climate Change Adaptation Developing Countries: What the G8 Has to Deliver*. Discussion Paper. German Watch and WWF. At: <http://germanwatch.org/klima/g8adapt08.pdf>

IFC. 2011. *International Finance Institutions and Development through the Private Sector*. Washington, D.C

IFC. 2012a. *Building Climate Resilient Communities through Private Sector Participation*. Summary - Project/Program Approval Request. Climate Investment Funds, Washington, D.C. Strategic Program for Climate Resilience, Nepal.

IFC. 2012b. *Private Sector Investment to Build Climate Resilience in Niger's Agricultural Sector*. At: <https://www.climateinvestmentfunds.org/cifnet/?q=country/niger>.

IFC. 2013a. *IFC Makes First Climate Adaptation Commitment*. [Internet]. At: http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/cb_home/news/feature_adaptation_mar2013.

IFC. 2013b. *Terms of Reference - The International Finance Corporation Evaluation of the "Promoting Climate Resilient Agribusiness Project (Nepal)"*.

IFC. 2013c. *IFC-Canada Climate Change Program 2012 Annual Report*. In partnership with the Government of Canada and IFC. Washington, D.C.. At: http://www.ifc.org/wps/wcm/connect/425f7980428e9a0682d8ae0dc33b630b/2012+Canada+Climate+Change+Program+Annual+Report_FINAL.pdf?MOD=AJPERES

International Finance Corporation (IFC) and European Bank for Reconstruction and Development (EBRD). 2013. *Climate Risk Case Study. Pilot Climate Change Adaptation Market Study: Turkey*. Washington D.C.

Independent Evaluation Group (IEG). 2012. *Adapting to Climate Change: Assessing the World Bank Group Experience Phase III*. Washington D.C.

Inter-America Development Bank (IDB). 2012a. Project Database. At: <http://www.iadb.org/en/projects/search-project-documents,1302.html>.

Inter-America Development Bank (IDB). 2012b. *Canadian Climate Fund for the Private Sector and the Americas*. 2012. At: <http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=37430372>.

Inter-America Development Bank (IDB). 2013a. [Internet]. *MIF, Nordic Development Fund Partner on "PROADAPT"*. Press Release April 2013. At: <http://www.iadb.org/en/news/news-releases/2013-04-17/mif-nordic-development-fund-partner-on-proadapt,10426.html>.

Inter-America Development Bank. (IDB). 2013. *PPCR Project Concept Note for the Use of Resources from the PPCR Competitive Set-Aside PPCR Private Sector Set-Aside*. St. Lucia: Supporting Climate Resilient Investments in the Agricultural Sector; PPCR Private Sector Set-Aside: <https://www.climateinvestmentfunds.org/cif/docs>.

Inter-America Development Bank (IDB). 2012c. Policy Loans

IPCC, 2012: Summary for Policymakers. In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 1-19.

Jones L., Mitchell T., Villaneuva P.S. and Standley S. 2012. *Coding and Tracking Adaptation Finance: Lessons and Opportunities for Monitoring Adaptation Finance Across International and National Scales*. Overseas Development Institute (ODI).

KfW. 2012. *Innovation Works Technology for Development Annual Report 2012 on Cooperation with Developing Countries*. https://www.kfw-entwicklungsbank.de/Download-Center/PDF-Dokumente-Jahresberichte/2012_Jahresbericht_E.pdf.

Millennium Development Goals Achievement Fund (MDG Achievement Fund). 2013. Trust Fund Factsheet. MDG Achievement Fund"; [Internet]; [cited 2013 July 25]. At: <http://mpmf.undp.org/factsheet/fund/MDG00>.

Müller B. 2008, *International Adaptation Finance: The Need for an Innovative and Strategic Approach*. Oxford Institute for Energy Studies EV 42. At: <http://www.oxfordclimatepolicy.org/publications/documents/EV42.pdf>.

OPIEC. 2012. *2012 Annual Report*. Building for Growth, Innovating for Change. Washington, D.C.

OPIEC. *Annual Report. 2014. Building for Growth, Innovating for Change*. Washington, D.C. At: <http://www.opic.gov/media-connections/annual-reports>.

Organisation for Economic Development and Co-operation (OECD) [no date]. *Glossary of Statistical Terms*. At: <http://stats.oecd.org/glossary/detail.asp?ID=1143>

----- .2011. *Handbook on the OECD-DAC Climate Markers*. Paris, France. At: <http://www.oecd.org/dac/stats/48785310.pdf>.

----- 2013a. *Creditor Reporting System Statistics 2013*. File, CRS 2011 [Internet]; [updated April 2014; cited 2013]. Paris: OECD. At: <http://stats.oecd.org/>.

----- . 2013b. *OECD DAC Statistics Aid to Climate Change Adaptation*. Paris. At: <http://www.oecd.org/dac/stats/Adaptation-related%20Aid%20Flyer%20-%20November%202013.pdf>.

----- . 2013c. DAC Working Party on Development Finance Statistics, *Climate Adaptation Marker: Quality Review*. DCD/DAC/STAT(2013)5. 11-13 June 2013, OECD Conference Centre, Paris.

----- . 2013d. *Terms of Reference and Scope of Work For A Joint Environet And WP-Stat Task Team To Improve Rio Markers, Environment and Development Finance Statistics*. DCD(2013)8/REV, October 2013.

----- . 2013e *OECD Workshop with International Financial Institutions (IFIs) on Tracking Climate Finance*, DCD/M(2013)1, March 2013, Paris. At: [http://www.oecd.org/dac/environment-development/DCD-M\(2013\)1-ENG.pdf](http://www.oecd.org/dac/environment-development/DCD-M(2013)1-ENG.pdf).

----- . 2014a. *Creditor Reporting System Statistics 2014*. OECD. At: <http://stats.oecd.org/>.

----- . 2014b. *Meeting of the OECD Joint DAC-EPOC Task Team on Climate Change and Development Co-operation*, 9-10 April 2014, Zurich, Switzerland. Summary Record of the meeting at: <http://www.oecd.org/dac/environment-development/dac-epoctaskteam.htm>.

----- . 2014c. ENVIRONET-WP-STAT Task Team on OECD Rio Markers: *First and Second Experts' Meeting on OECD RIO MARKERS, Environment and Development Finance Statistics*, 20-21 March 2014, and June 2014. Paris. (see also Paris, Event Presentations (see in particular Ms. Stephanie Ockenden, OECD Secretariat) and Summary. At: <http://www.oecd.org/dac/environment-development/joint-tt-march-2014.htm> and At: [72](http://www.oecd.org/dac/environment-</p></div><div data-bbox=)

[development/Second%20ENVIRONET-WP-Task%20Team%20Meeting%20-%20Main%20Points%20of%20Discussion_FINAL.pdf](#).

----- . 2014d. *First Proposals for Improvements to the Adaptation and Mitigation Rio Marker Definitions (Options 7-9 & 11)*. Prepared for the Joint ENVIRONET and WP-STAT Task Team on OECD Rio markers, Environment and Development Finance Statistics.

----- . 2014e. *OECD DAC Statistics & Rio Markers for Measuring & Monitoring Aid to Desertification*. Presentation Gaveau V and Ockenden S. At: <http://www.unccd.int/en/programmes/Capacity-building/CBW/Resources/Documents/5RC/DCPworkshop/ppt%206%20bis%20OECD%20Rio%20Markers.pdf>.

Overseas Development Institute (ODI) and Heinrich Böll Foundation (HBF) [cited ODI/HBF]. 2014. *Climate funds update database* [Internet]; [Last accessed, April 2014]. London; Washington DC: ODI/HBF. At: <http://www.climatefundsupdate.org>.

Overseas Development Institute (ODI), World Resource Institute (WRI), IGES, Open Climate Network. 2013. *Mobilising International Climate Finance: Lessons from the Fast-Start Finance Period*. At: <http://www.odi.org/publications/7987-mobilising-international-climate-finance-lessons-fast-start-finance-period>.

Stadelmann, M., Michaelowa, A., & Roberts, J. T. 2013. *Difficulties in accounting for Private Finance in International Climate Policy*. *Climate Policy*, 13(6), 718–737. doi:10.1080/14693062.2013.791146

Stenek V., Amado J.C., Greenall D. 2013. *Enabling Environment for Private Sector Adaptation. An Index Assessment Framework*. International Finance Corporation. Washington D.C.

Stenek V., Connel R., Firth J., Colley M., 2010b. *Climate Risks and Business, Practical Methods for Assessing Risk*. International Finance Corporation, Washington DC.

Stenek, V., J.C. Amado, and R. Connell, 2010: *Climate Risk and Financial Institutions. Challenges and Opportunities*. [Kamins, R., Hidalgo, A., Stenek, V. and Connell, R. (eds.)]. International Finance Corporation -World Bank Group; Washington, D.C., pp. 1-120.

Terpstra P. A. Peterson Carvalho., E. Wilkinson. 2013. *The Plumbing of Adaptation Finance: Accountability, Transparency and Accessibility at the Local Level*. World Resources Institute Working Paper, November 2013. Washington D.C. At: <http://www.wri.org/sites/default/files/adaptation-finance-plumbing.pdf>.

The World Bank 2012. Financing Agreement (First Climate Change Development Policy Operation) between Social Republic of Vietnam and International Development Association. Credit Number 5040-VN May 2012. http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/EAP/2012/06/07/15E6DD3A2588F2C385257A1600696960/1_0/Rendered/PDF/RAD1206492950.pdf

The World Bank. 2010a. *World Development Report*. Washington D.C. At: <http://web.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTWDRS/0,,contentMDK:23062354~pagePK:478093~piPK:477627~theSitePK:477624,00.html>.

The World Bank. 2010b. *Economics of Adaptation to Climate Change - Synthesis report*. Washington, DC: World Bank. <http://documents.worldbank.org/curated/en/2010/01/16436675/economics-adaptation-climate-change-synthesis-report>.

The World Bank. 2012. *Turn Down the Heat: Why a 4°C Warmer World Must be Avoided. A Report for the World Bank by the Potsdam Institute for Climate Impact Research and Climate Analytics*. Washington, D.C. At: <http://www.climateanalytics.org/publications/turn-down-heat-why-4%C2%B0c-warmer-world-must-be-avoided>.

Trabacchi C., Micale V., Frisari G. 2012. *San Giorgio Group Case Study: Prosol Tunisia. Climate Policy Initiative Report*. CPI Report, June 2012.

United Framework Convention on Climate Change (UNFCCC). 1992. *United Nations Framework Convention on Climate Change*. United Nations 1992. FCCC/INFORMAL/84, GE.05-62220 (E) 200705. At: <http://unfccc.int/resource/docs/convkp/conveng.pdf>.

- . 2009. *Copenhagen Accord*. Decision adopted by the Conference of the Parties 2/CP.15. FCCC/CP/2009/11/Add. UNFCCC. At: https://unfccc.int/documentation/documents/advanced_search/items/6911.php?prire=600005735.
- . 2010. *The Cancun Agreements: Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention* (1/CP.16). UNFCCC.
- . 2011a. *Compilation and Synthesis of Fifth National Communications*. UNFCCC, Bonn, Germany. At: <http://unfccc.int/resource/docs/2011/sbi/eng/inf01a02.pdf>.
- UNEP. 2010. *Bilateral Finance Institutions and Climate Change A Mapping of 2009 Climate Financial Flows to Developing Countries*. United Nations Environment Programme. 2010.
- UNEP. 2011. *Bilateral Finance Institutions & Climate Change A Mapping of Public Financial Flows for Mitigation and Adaptation to Developing Countries in 2010*. United Nations Environment Programme, 2011.
- United Nations Development Programme (UNDP). 2013. *Country Reports on Climate Public Expenditures and Institutional Reviews* (CPEIR). At: <http://www.climatefinance-developmenteffectiveness.org/publications.html>.
- US State Government. 2012. *Meeting the Fast Start Commitment*. U.S. Climate Finance in Fiscal Year 2011. Washington D.C. At: http://www3.unfccc.int/pls/apex/wwv_flow_file_mgr.get_file?p_security_group_id=1090408772142046&p_flow_id=116&p_fname=US_FSF_2012.pdf.
- Venugopal S. et al. 2012. *Public Financing Instruments to Leverage Private Capital for Climate-Relevant Investment: Focus On Multilateral Agencies*. WRI. At: http://www.wri.org/sites/default/files/pdf/public_financing_instruments_leverage_private_capital_climate_relevant_investment_focus_multilateral_agencies.pdf.
- Vieweg M., Esch A., Griebshaber L., Fuller F., Mersmann F., Fallasch F., De Marez L., et al. 2012. *German Fast Start Finance: Lessons Learned for Long-Term Finance*. Climate Analytics, Wuppertal Institute, GermanWatch, August 2012. At: http://www.climateanalytics.org/sites/default/files/attachments/news/2012-German_FSF_Study.pdf.
- WRI, ODI, IGES, Climate Advisers. 2013. *Fast-Start Finance Project and Programme Data Set v2.0*. At: <http://www.climatefundupdate.org/global-trends/fast-start-finance>.

Other references consulted

- African Development Bank (AfDB). 2013. *Climate Finance Tracking Guidance Manual Energy Sector*. At: <http://www.afdb.org/en/topics-and-sectors/sectors/climate-change/climate-finance-tracking-at-afdb/>.
- Biagini B. and Miller A. 2013. *Engaging the Private Sector in Adaptation to Climate Change in Developing Countries: Importance, Status, and Challenges*. Climate and Development, Vol. 5, Issue 3, 2013 Pages 242-252.
- Global Environment Facility (GEF), 2013b. *GEF Trust Fund Financial Report. Summary of Financial Information*. As of March 31, 2013 (Prepared by the Trustee). GEF Council Meeting, June 18 - 20, 2013, Washington, D.C. GEF/C.44/Inf.08. Washington DC: Global Environment Facility. At: http://www.thegef.org/gef/sites/thegef.org/files/documents/GEF.C.44.Inf._08_GEF%20Trust%20Fund%20Financial%20Report_0.pdf
- Global Environmental Facility (GEF).2012b. *Private Sector Engagement in Climate Change Adaptation: Prepared by the GEF Secretariat in Collaboration with the International Finance Corporation*. GEF/LDCF.SCCF.12/Inf.06, LDCF/SCCF Council, Washington D.C.
- Junghans L., S. Harmeling. 2012. *Different Tales from Different Countries. A First Assessment of the OECD "Adaptation Marker"*. Germanwatch, <http://germanwatch.org/de/download/6741.pdf>
- Organisation for Economic Development and Co-operation (OECD). 2013 *Joint ENVIRONET and WP-STAT Workshop on Rio Markers, Climate and Development Finance Statistics, 24-25 June 2013, Event Presentations*. Paris. At: <http://www.oecd.org/dac/environment-development/workshop-rio-markers-june-2013.htm>.

Organisation for Economic Development and Co-operation (OECD). 2013. *OECD Submission to the Standing Committee on Finance*. At: http://unfccc.int/cooperation_and_support/financial_mechanism/standing_committee/items/6881.php.

Organisation for Economic Development and Cooperation (OECD). 2014. *OECD Submission to the UNFCCC Standing Committee on Finance*. 20 January 2014. At: http://unfccc.int/cooperation_and_support/financial_mechanism/standing_committee/items/6881.php.

Stadelmann M, Roberts T.J. Michaelowa A. 2011. *Accounting of Private Climate Finance. Types of Finance, Data Gaps and the 100 Billion Dollar Question*. Climate Strategies Working Paper, August 2011.

Terpstra P. (2013). *The Difficulty of Defining Adaptation Finance*. World Resources Institute, October 2013. At: <http://www.wri.org/blog/difficulty-defining-adaptation-finance>.

The World Bank. 2012. *Typology of Activities With Climate Co-Benefits By WB Sector*. Washington D.C.

Appendixes

Appendix A – Development Finance Institutions

Multilateral Development Banks		Source of data
AfDB	African Development Bank	Self-reporting via survey
AsDB	Asian Development Bank	Self-reporting via survey
IDB	Inter-American Development Bank	Self-reporting via survey
EBRD	European Bank for Reconstruction and Development	Self-reporting via survey
EIB	European Investment Bank	Self-reporting via survey
IFC	International Finance Corporation	Self-reporting via survey
WB	World Bank (IDA and IBRD)	Self-reporting via survey
Bilateral Finance Institutions		Source of data
AFD	<ul style="list-style-type: none"> • Agence Française de Développement • Proparco 	Self-reporting via survey
COFIDES	Compañía Española de Financiación del Desarrollo	Self-reporting via survey
DEG	KfW Deutsche Investitions- und Entwicklungsgesellschaft	Self-reporting via survey
JICA	Japan International Cooperation Agency	Self-reporting via survey
KfW	KfW Entwicklungsbank	Self-reporting via survey
OPIC	Overseas Private Investment Corporation	Self-reporting via survey
BIO	Belgian Investment Company for Developing Countries	Self-reporting via survey
CDC	CDC Group plc - UK	Self-reporting via survey
FINFUND	Finnish Fund for Industrial Cooperation Ltd	Self-reporting via survey
FMO	Netherlands Development Finance Company	Self-reporting via survey
NorFund	Norwegian Investment Fund for Developing Countries	Self-reporting via survey
OeEB	The Development Bank of Austria	Self-reporting via survey
SIFEM / OBVIAM	Swiss Investment Fund for Emerging Markets	Self-reporting via survey
SIMEST	Società Italiana per le Imprese all'Estero	Self-reporting via survey
National & Sub-Regional Development Banks		Source of data
BNDES	Brazilian Development Bank	Self-reporting via survey
CAF	Development Bank of Latin America	Self-reporting via survey
KfW	KfW Mittelstandsbank KfW Privatkundenbank KfW Kommunalbank KfW Ipex-Bank	Self-reporting via survey KfW Annual Report 2012 KfW Financial Report 2012

CDB	China Development Bank	Data and elaborations based on Ecofys-IDFC (2013)
BANCOLDEX	Banco de Comercio Exterior de Colombia S.A.	
BCIE/CABEI	Central American Bank for Economic Integration	
BE	Banco del Estado de Chile	
BSTDB	Black Sea Trade and Development Bank of Greece	
CDG	Caisse de Dépôt et de Gestion, Morocco	
Exim	Indonesia Exim Bank	
HBOR	Croatian Bank for Reconstruction and Development	
KoFC	Korea Finance Corporation	
NAFIN	Nacional Financiera	
SIDBI	Small Industries Development Bank of India	
TSKB	Industrial Development Bank of Turkey	
VEB	Vnesheconombank Russia	

Note: Institutions highlighted in in grey did not finance adaptation measures in 2012.

Appendix B – Keyword search

The analysis was conducted on cores of keywords, as they have diverse derivatives. The eight words used are:

- *Actors*: banks; business; company(y/ies); corporate; enterprises; industry; PPP; private; SME.
- *Instruments*: insurance; micro-credit;
- *Focus*: adaptation, climate resilience

Appendix C – Details on climate finance tracking

Acknowledging the methodological differences existing between the UNFCCC and the OECD DAC systems, the exemplary table below shows the discrepancies between the reporting of Germany and the EU Institutions, which provided, on average, almost half of total bilateral adaptation-related aid (45%). The table also features Japan because, when considering the total amount of climate-marked ODA in 2011, thus including financing through BFIs and Climate Funds, Japan provided 28% of the total. Its reporting to the OECD is five times higher than reporting to the UNFCCC.

In the Biennial Reports “new and additional” was defined as follows:

- Germany: with regard to its Fast-start pledge as: the funds represent an increase over climate-related funds in 2009 or come from an innovative source of finance such as revenue from emissions trading;

- Japan: newly committed or disbursed finance which contributes to climate change measures in developing countries;
- The EU: the amount of financial support to mitigation and adaptation action in developing countries provided between 2008-2012.

Table 4. Differences in developed countries reporting on adaptation financing: OEC DAC CRS system versus UNFCCC

Reporting Parties	OECD-DAC CRS “principal” (in USD million)	OECD-DAC CRS “significant” (in USD million)	UNFCCC Biennial Reports (in USD million)
Germany	232	1,187	431* (EUR 309 million)
EU Institutions	27	360	123

Sources: OECD (2013); Germany, EU and Japan’s UNFCCC Biennial Reports.⁶⁰ Note: OECD data refer to total amount of climate-marked ODA in 2011 as reported in OECD (2013), excluding aid targeting also mitigation. Biennial reports data refer to total contributions through bilateral, regional and other channels. (*) when including contributions through multilateral channels, Germany’s financing would be higher by USD 115 million. EU Institutions and Japan did not provide financing through multilateral channels.

⁶⁰ Available on the UNFCCC web site at:
http://unfccc.int/national_reports/biennial_reports_and_iar/submitted_biennial_reports/items/7550.php.

CHAPTER 3.

MAKING CLIMATE RESILIENCE A PRIVATE SECTOR BUSINESS⁶¹

1. Introduction

The role of the private sector in contributing to address the climate change challenge has been increasingly emphasized in international political debates.

The private sector plays important roles in climate-relevant sectors, and is expected to take most adaptation decisions (Agrawala and Fankhauser, 2008). At the global level, it is responsible for 70–85% of total investment in new buildings, industry and critical infrastructures (UNISDR, 2013) and constitutes up to 86% of total investment and financial flows (UNFCCC, 2009). In developing countries it has steadily gained in economic importance relative the public sector (World Bank, 2012; World Bank, 2013), and 90% of the population in developing countries depends on private sector operations for their income (SER, 2011). Private sector decisions and behaviors have therefore the potential to lock countries into vulnerability profiles for a long time, or to set them on a more resilient development path.

The engagement of both international and domestic private actors is thus critical for successful adaptation (Pauw & Pegels, 2013). In particular, in developing countries, the involvement and climate-resilient development of the domestic private sector is of utmost relevance given that – as highlighted by (Kehler Siebert and Dzebo, 2013; Atteridge, 2011) – these countries have been relatively unattractive to international private investments. This is also because climate vulnerability depends on context-specific circumstances and, therefore, it is at the local level where adaptation needs to be managed (Ayers, 2011; Albadie et al., 2012) and climate resilience built.

The question is, how to engage domestic private actors in climate-resilient development?

According to economic theory and empirical studies, private parties *autonomously* adapt when confronted with change (Carter et al., 1994; Klein, 2002; Easterling et al., 2007) as the decision to adapt resides in these actors' rational self-interest (Mendelsohn, 2000). However, for autonomous adaptation to happen, and be effective, individuals must have the right *incentive, knowledge, resources and skills* (Fankhauser et al., 1999). Given that market are imperfect, or missing, that there are transaction costs (e.g., related to the

⁶¹ This paper benefited from a fruitful collaboration with Martin Stadelmann and was published as a CPI Working Paper in December 2013. This chapter is an adapted version of Trabacchi and Stadelmann (2013). Disclaimer: at the time of preparing this study the project assessed was still in progress so details on some of its aspects were unavailable and/or may have changed since then. It is acknowledged that many efforts are currently ongoing for the development of projects with climate resilience objectives. Thus, relevant sources should be consulted for more up to date information.

acquisition of information) (Mendelsohn, 2000) as well as behavioral (Michel-Kerjan, 2008) and capacity obstacles (OECD, 2011), private actors will under- or not invest in adaptation. Public intervention is required to ensure the provision of desirable levels of adaptation, particularly in case of “joint adaptation” i.e. those cases where the benefit of individual actions are shared with other individuals (Mendelsohn, 2000).

Designing and implementing successful public strategies towards this end, is one of today’s greatest challenges for governments, international organizations and communities (Stenek et al., 2013). Knowledge and experience on public strategies capable of involving the private sector to take action and mobilize resources for climate change resilience is still very limited. This is particularly true with respect to the engagement of small and medium enterprises (SME) in developing countries, which contribute up to 63% of these countries’ GDP (IFC, 2011). Empirical literature is still in its infancy.

To bring evidence on the strategies and levers that the public sector can use to involve domestic private actors to contribute towards countries’ adaptation efforts, and the associated challenges, this study examines the “*promoting climate-resilient agriculture*” project supported by the Pilot Program for Climate Resilience (PPCR) in Nepal.⁶² Developed and implemented by the World Bank Group’s private sector arm, the International Finance Corporation (IFC), this project was chosen as a case study because the first within the PPCR portfolio to attract the interest of local SMEs and engage them in the delivery of adaptation outcomes. It was also the first to move to the implementation phase.

In particular, the Nepalese project is used as a case study to investigate the following questions:

- Why is private sector engagement important to build countries’ climate resilience and what role can it play?
- How can international public climate finance be deployed to encourage domestic private actors to take action in building climate resilience and to align private interests with public objectives?
- Which drivers and incentives can the public sector lever to create a “business case” for long-term private involvement in resilience?

These inquiries aim also to enhance understanding on the overarching questions of the San Giorgio Group framework (see CPI, 2012):⁶³

⁶² In the Nepalese Strategic Program for Climate Resilience this project is part of component no. 4 titled “*Building climate-resilient communities through private sector participation*”. See CIF (2011a) and CIF [web site](#).

⁶³ The San Giorgio Group is a working group of key financial intermediaries and institutions engaged in green, low-emissions, and climate-resilient finance. See <http://climatepolicyinitiative.org/sgg/>.

- What is the role of public money?
- How can public money be best delivered (instruments and institutional channels)?
- How to ensure alignment of international and national public investment flows with each other and with private investment?
- How can continued learning be ensured?

Drawing evidence-based analysis on elements that can create the “business case” for adaptation can help to distill early lessons for future adaptation interventions. This is relevant in view of the impending Green Climate Fund (GCF)’s Private Sector Facility (PSF).

The paper is structured as follows. The next section introduces the relevant background on the PPCR and its arrangements for private sector engagement, while section 2 describes the case study method. Section 3 provides a brief overview of Nepal’s Strategic Program for Climate Resilience (SPCR) – the country’s adaptation investment plan developed under the PPCR – before going on to describe the project in detail. Section 4 presents the results of the main analysis undertaken namely: (i) a costs and benefits assessment of the project for key stakeholders; (ii) the identification and assessment of the risks born by the main actors involved in the project (iii) the evaluation of the sustainability, scalability, and replicability potential of the project’s approach to private sector engagement. The final section concludes

2. Background and approach

2.1. Background

The PPCR is a target program of the multi-donor Climate Investment Funds (CIF) aimed at supporting highly vulnerable countries – mainly least developed ones – to integrate climate risk and resilience into development planning and implementation (CIF, 2009a). In terms of capitalization the PPCR is the largest dedicated funding program for adaptation in developing countries. (ODI/HBF, 2013; CIF, 2014). It is also the one most targeted toward private sector involvement (e.g., CIF 2009a, CIF 2013c). The Program, which is executed by six Multilateral Development Banks (MDBs), is designed to allow for private sector involvement at different “entry points”: in its governance structure; in the planning and design of countries’ investment plans and associated projects as well as in their implementation.

At the governance level, private actors act as “active observers”⁶⁴, while during the planning and development of countries’ investment plans – the so-called Strategic Program for

⁶⁴ Private sector representatives act as “active observers” at the meetings of the PPCR governing body where they can suggest agenda items, take the floor in deliberations, and submit their views to committee members (CIF, 2011b). They are also involved as participants at

Climate Resilience (SPCR)⁶⁵ – private actors are consulted through cross-sectoral workshops, and dedicated studies (see e.g., CIF, 2010; PwC, 2012; Poshan, 2010). This involvement, undertaken as part of a broader stakeholders' engagement strategy,⁶⁶ enables to obtain their input and feedbacks, but also to raise their awareness about climate change risks and opportunities (CIF, 2009a; CIF, 2009b).

The private sector can then be engaged as partner in the implementation of projects, as co-financier and/or as vehicle to deliver resilience; it can also be the targeted beneficiary of PPCR interventions. On-the-ground, private actors can be involved through:

- The private and/or public sector arms of MDBs, via direct investments and technical assistance measures or, among others, initiatives aimed at strengthening the business environment;
- Tailored financial instruments i.e., the possibility to deploy PPCR's funds through a range of instruments (e.g. grants, concessional loans⁶⁷, and guarantees) – although some of these have only been used on a limited basis – with the aim of enabling MDBs to structure the financial package most suited to the project and the entity(ies) supported;⁶⁸
- A target funding allocation – so called private sector 'set aside' – established in November 2012 with USD 70 million in concessional resources to be allocated through a competitive process⁶⁹ (CIF, 2013c).

Administered by the World Bank, the PPCR supports projects and programs in 18 pilot countries and has allocated USD 1.1 billion to these countries' SPCRs (CIF, 2014). Endorsed SPCRs are at different stages of implementation (CIF, 2013a; CIF, 2013b).

In addition to Nepal, and including the project concepts endorsed under the first round of the private sector set aside (see Appendix A for details), the PPCR supports private-sector oriented projects in other 8 countries, for a total USD 112.4 million (CIF, 2014).

the regular Partnership Forums and at the Private Sector Forum, where they can provide input on strategic, technical, and performance matters.

⁶⁵ The SPCR is a document outlining countries' priorities, vision and strategy for integrating climate resilience into development planning. It defines the underlying investment plan proposed for PPCR support (CIF, 2009a). The SPCR reflect the PPCR's programmatic approach as opposed to the project-based approaches typically used by other funding mechanisms; A programmatic approach aims to develop projects within a multi-sectoral strategy so as to plan and implement resilience to climate risks in a coherent manner at strategic, regulatory, budgetary, and operational levels (CIF, 2009a).

⁶⁶ In addition to private actors, also representatives of civil society organizations, UN and bilateral donor organizations and government representatives take part in the broad-based consultations undertaken during the development of countries' SPCRs.

⁶⁷ In order to provide the minimum subsidy needed to induce the intended investment without causing market distortions (CIF, 2009a) in private sector-oriented projects the level of concessionality is determined on a case-by-case basis, according to the barriers identified in each project/program.

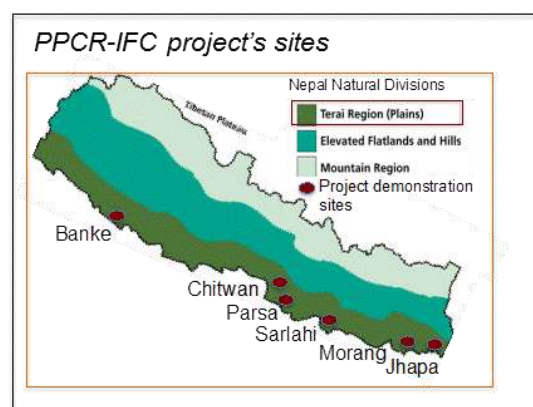
⁶⁸ For additional information on the financing instruments used under the CIF, see CIF (2013f) and CIF (2012b).

⁶⁹ The PPCR governing body established the private sector reserve to further stimulate private sector engagement, particularly in light of the limited number of projects with private sector participation in the PPCR portfolio – in the CIFs more generally (CIF, 2013a; CIF, 2013c; CIF, 2013e; CIF, 2011c). In November 2013, the PPCR governing body endorsed about USD 41 million in concessional loans to fund the development of 6 project concepts (CIF, 2013h; CIF, 2013g).

Nepal was chosen as a case study because it was the first among these countries to gain private actors' formal commitment to participate in activities contributing to build climate resilience; it was also the first to see its private sector project moving from design to implementation (see Appendix A). Its arrangements are also of particular interest because, by adopting a supply chain approach, it harnesses buyer and suppliers existing incentives, relationships and networks.

2.2. Methodology and case study area

This research adopts a case study approach coupled with desk-based analysis and semi-structured interviews with project's stakeholders, which were undertaken between November 2012 and September 2013. The group of stakeholders consulted included representatives of the Climate Investment Funds Administrative Unit, the PPCR focal points and the project officers of Multilateral Development Banks (MDBs), representatives of the Government of Nepal and of the local businesses involved in the project. Interviews were tailored according to the responsibilities and roles of these stakeholders in the selected agricultural project and related SPCR.



The case study applies the analytical framework developed under the aegis of the San Giorgio Group (see e.g. CPI, 2013), which is based on the following main pillars:

- The assessment and representation of the web of interactions between projects' stakeholders;
- A financial cash flow analysis to estimate the potential returns on investments for main contributors;
- A cost and benefit analysis, covering also broader socio-economic co-impacts/co-benefits;
- A risks analysis, to identify and assess the main risk involved in the project and the associated risk management practices.

The project assessed "*promoting climate-resilient agriculture*" is implemented in five selected districts of the Nepalese Terai region (IFC, 2012).

Nepal is among the most climate vulnerable country in the world due to its peculiar geography, mostly poor and resource dependent population, as well as weak institutional capacity to manage the range of climate challenges it will face (CIF, 2011a). Agriculture accounts for about 36% of its GDP and employs 74% of the labor force (WB, 2012a).

Contributing to about 56% of the country's annual cereal production (Regmi, 2007), Terai is the major food grain production area of the Nepal, thus the most relevant for the country's food security and economy. The project focuses on three crops cultivated in this region namely, rice, maize, and sugarcane. A diagnostic study commissioned by the IFC in 2012 identified these crops as being among the most vulnerable to changing climate conditions. They ranked the highest on a weighted average score evaluating, inter alia, climate change-induced variations in productivity, farmers' involvement, level of commercialization and interest among private players to embark on support services, and ease of partnership with growers (PwC, 2012). Crop production in the country is already challenged by, inter alia, limited access and use of stress-tolerant and quality seeds, poor and mostly rain-fed farming practices, and lack of access to finance (CIF, 2011a). Climatic changes may exacerbate the existing situation, worsening productivity rates and the already precarious food security of the country (Joshi et al., 2012).

Throughout the study the words 'adaptation to climate change' and building climate resilience' are used interchangeably. '[Climate] resilience' is "*the ability of a system [...] to anticipate, absorb, accommodate or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration or improvement of its essential basic structure and functions*" (IPCC, 2012). Adaptation measures can enhance resilience (Parry et al., 2007).

3. Context and overview

The project assessed, "*promoting climate-resilient agriculture*", is part of a broader set of interventions developed by IFC and other MDBs involved in the development and implementation of the country's SPCR. Appendix B provides more details on the Nepalese SPCR and related projects, which are a set of complementary components, aimed at tackling key priority risks challenging the country's climate-resilient development. The project's stakeholders interviewed underscored that the overall set of measures included in the country's PPCR program will also help to create more favorable conditions for the private sector, also generating business opportunities helping to manage climate-related risks.⁷⁰ Appendix B also features a detailed timeline (Figure 16), presenting key milestones in the development of the Nepalese PPCR program.

⁷⁰ For instance, component 2 "*Building Resilience to Climate-Related Hazards*", which is implemented by the World Bank, focuses on the upgrade of the country's hydro-meteorological network. The availability of weather data is a prerequisite for the development of insurance products that can help farmers to recover from climate-induced disasters.

3.1. PPCR private sector activities in Nepal

The Nepalese private sector is dominated by small and medium enterprises (GTZ, 2006), and characterized by informality.⁷¹ In the country there are also a few larger firms in the hands of powerful business families (GTZ, 2006). Small and medium enterprises constitute a major source of income in the rural and urban areas of Nepal (FAO, 2009).

Albeit constrained by political instability and inadequate infrastructures, the private sector is a critical partner in building Nepal's resilience to climate impacts, particularly because:

- It dominates key economic sectors vulnerable to climate change such as agriculture, which constitute a large share of the country's employment and GDP;
- It makes many decisions relevant to adaptation that could either 'lock' Nepal into a vulnerability profile or put the country on a path toward greater climate resilience (e.g. smallholder farmers decide on crops, irrigation and harvesting);
- It owns, operates, and manages assets and business operations with broader socio-economic relevance (e.g., energy plants);⁷²
- It has specific competencies, expertise, products, and services that can smooth the path to adaptation, (e.g., financial services).

To identify opportunities for engagement aligned with the country's adaptation priorities, the private sector was engaged early in the process leading to the development of the country's strategic program. The process, which involved extensive talks and diagnostic analysis, was supported by the establishment of a 15-member Technical Private Sector Working Group representing all the major sectors where contributions from the private sector had been foreseen.⁷³ The diagnostic analyses carried out during the development of the project proved essential to understanding local issues associated with changing climate conditions, identifying possible impacts, and developing countermeasures to mitigate risks.

These analyses also included a scoping assessment aimed at identifying local companies' vulnerabilities, adaptive capacity, and potentials in undertaking climate-resilient projects (CIF, 2011a; Poshan, 2010). The study also helped to identify the needs of the farming communities, their financing requirements, relevant implementation partners and modalities.

⁷¹ It is estimated that 70% of workers are employed in the informal sector (WB, 2012).

⁷² Poshan (2010) based on data from the Department of Electricity Development, and NCF (2010) states that in Nepal hydropower investments by the private sector dwarfed government investments by a ratio of 4:1.

⁷³ The Group – formed and led by the Federation of Nepalese Chambers of Commerce and Industry and facilitated by IFC – focused on the identification and formulation of priority sectors for private interventions, and led to the selection of the projects supported by the PPCR. The Group carried out consultations with 34 local companies, sub-national consultations, and a scoping study on climate change vulnerabilities, risks, adaptive capacity and opportunities for private actors (ADB, 2013b; ADB, 2012; Poshan, 2010). The discussions also highlighted that the private sector could have contributed in a broader number of sectors, including, for instance, the tourism and non-timber forest products sectors (CIF, 2011a).

The consultation process was central to improving the government's understanding of private sector involvement in the country's adaptation efforts (ADB, 2013b). This, in turn, was critical to its decision to allocate PPCR funds to private sector activities thereby including a private sector component in the country's strategic program that it endorsed together with the PPCR governing body in June 2011 (MoF, 2013a). The government, ultimately responsible for the allocation of PPCR resources to projects, was initially reluctant to involve the private sector in the preparation of the PPCR program, and concerned about the use of its resources to support private actors' activities (CIF, 2013g; IFC, 2013b; ADB, 2013b).

By building their awareness and understanding of their vulnerability to climate-induced risks, and the opportunities that may arise from changing climate conditions, the consultation process was also fundamental to overcoming the reluctance of private actors to participate in a government-administered program. The overall process also helped to elicit their interests, needs, and assess their capacity for utilizing PPCR resources and undertaking climate-resilient projects. It therefore helped to identify possible project partners (ADB, 2013b; Poshan, 2010).

Albeit during the development of the country's SPCR the role of the private sector emerged as cross cutting to all the investment components proposed for PPCR support (CIF, 2010), its engagement was ultimately prioritized the agriculture, infrastructure and the finance sector, through three distinct projects that aim to:

- Promote climate-resilient agriculture through capacity building of farmers and agricultural supply chain members, and facilitating better access to finance;
- Strengthen vulnerable infrastructures by building the risk management capacity of private hydropower plant operators; and
- Overcome the technical and market barriers preventing private actors from playing a role in building climate-resilient houses for low-income communities.

The PPCR allocated USD 9 million to these three projects (12% of the total USD 77 million assigned to the overall Nepalese PPCR program).⁷⁴ Seventy three percent of these resources were extended in the form of concessional loans while the remaining 27% are in grants.

The climate-resilient agriculture project was the first of these three private sector-oriented projects, and the first within the PPCR portfolio, to attract private actors' interest and move

⁷⁴ The initial volume of funds endorsed in June 2011 as per CIF (2011a) amounted to USD 86 million. The USD 77 million excludes USD 3.4 million related to MDBs' fee and programming budget and USD 14.4 million in concessional financing that, as a result of its decision of not borrowing money for non-revenue generating projects, the Government of Nepal decided not to borrow (December 2012); the USD 77 million includes the additional USD 5 million in grants allocated to the country by the PPCR governing body in November 2012 (CIF, 2013i; CIF, 2012c; CIF, 2011a; ADB, 2013a; MOF; 2013a).

to implementation. It is also the most critical in Nepal given the importance of the agricultural sector for the country's economy and households' livelihoods.⁷⁵

3.2. Project overview

The IFC-PPCR "*promoting climate-resilient agriculture*" project deploys public resources with the aim of strengthening the resilience of farmers growing rice, sugarcane, and maize to climate-induced risks by involving the following private actors:

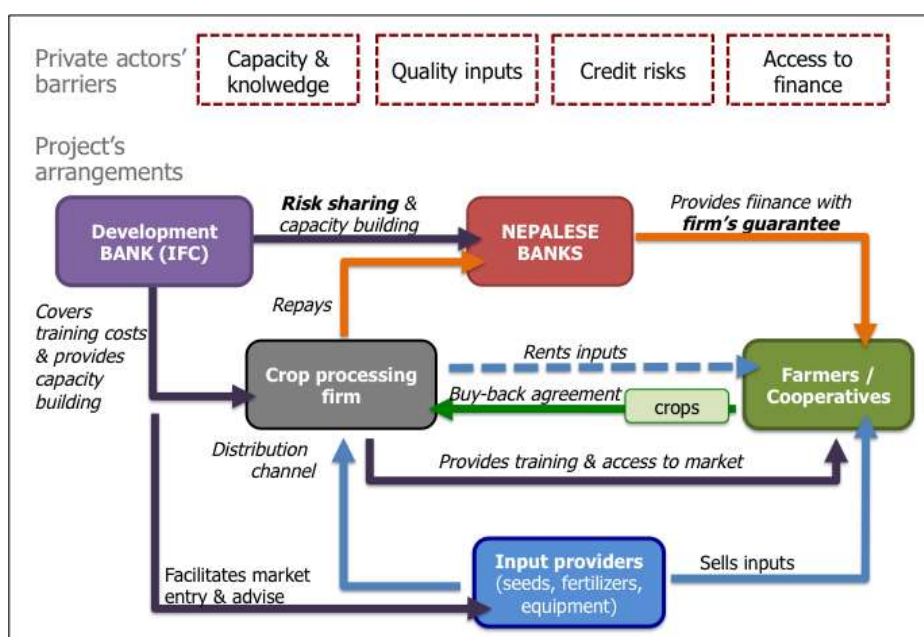
- Agribusinesses processing sugarcane, rice, and maize. By building the skills and knowledge of these companies' technical teams, dealers and extension officers, the project will enable and incentivize the participating agribusinesses to train a target of 15,000 farmers in their supply chains over a four-year time frame (with a two-year pilot phase), and facilitate their access to stress-resilient seeds, irrigation technologies, and fertilizers.⁷⁶
- Local commercial banks. By establishing risk-sharing mechanisms, providing advice on how to improve internal risk management systems, and supporting the design of appropriate financial products (e.g. working capital, input finance, and value chain finance), the project aims to tackle banks' risk and capacity gaps. This, in turn, is expected to enhance farmers' and other agricultural supply chain members' access to finance, and to financial products tailored to their needs.
- Mobile phone and ICT operators. The project envisaged to establish a SMS-based dissemination platform to deliver weather forecasts, advice on agronomic practices and market information to farmers. This, in turn, should enable farmers to better respond to climate-related hazards, thereby reducing or avoiding the associated agricultural losses.

As part of this project, IFC is also facilitating the entry of an Indian irrigation technology provider (Jain Irrigation) to the Nepalese market with the aim of promoting access to, and adoption of, water-efficient irrigation technologies, including solar pumps. This technology is seen particularly well-suited to a country with chronic electricity shortage (IFC, 2013b). Figure 8 shows the project's approach in a snapshot.

⁷⁵ With regard to the hydro and housing projects, in the first quarter of 2013, IFC identified hydropower companies that will invest in erosion resistant turbines with the support of PPCR concessional funding. The project in the housing sector – limited to a feasibility study and the development of housing and financing model – started in July/August 2013 (IFC, 2013b) (See also Devex, 2013 for additional information).

⁷⁶ The project adopts a so called 'trainers of trainers' approach i.e. 15 experts will strengthen companies' technical teams as well as dealers and vets skills, and/or embed new expertise in these companies. In turn, trained staff will then provide training to lead farmers (from individuals to farmers' cooperatives), who are then expected to train other farmers through demonstration and replication of practices. The set-up of demonstration plots within these companies will serve as learning-by-doing grounds for the farmers trained under the project, but also for others in surrounding areas.

Figure 8. Project's approach to addressing key barriers to climate-resilient agriculture



Sources: authors' elaboration based on CIF (2011a); CIF (2012b); IFC (2013c); IFC (2013d). Note: the processing firm could also act as intermediary of finance.

At the end of 2012, three private agribusiness firms (Golchha Group, Sharda Group, and Probiotech – part of Nimbus Group) signed a Memorandum of Understanding with IFC, committing to train the farmers in their respective supply chains on improved farming practices. Thus, to help to address key constraints to agricultural productivity and reduce these farmers' vulnerabilities to climate risks, also through improved linkages with output markets. These companies have strong self-interest in building farmers' skill, as their vulnerabilities and constraints affect crops yields, which can in turn directly impact their business operations.

At the time of writing, IFC was in the process of finalizing the cooperation agreements that define the detailed terms, conditions, and specific responsibilities of these companies in the project.

The project also raised the interest of some local commercial banks in partnering with IFC to expand lending to farmers and other members of the supply chain. In the short-term IFC aims to sign an agreement with one bank only and, at the time of writing this research, it was negotiating the terms of its possible involvement. Once proved the concept, other banks may be engaged.

The Indian irrigation technology provider recently signed a Memorandum of Understanding with the Nepalese government and is developing an irrigation strategy for the country (IFC, 2013b). It will use demonstration plots to showcase the benefits of irrigation technologies.

For IFC the approach developed for this project is not totally new as applied in the context of agricultural development (see e.g. IFC, 2013b; IFC, 2012a; IFC, 2012b). Its key innovation is its strategy to simultaneously target various actors of the agricultural value chain, and leveraging their respective incentives and networks to tackle multiple barriers to enhanced climate resilience (from agricultural inputs to final outputs). The project approach is however innovative in the context of adaptation given that projects funded so far by other major adaptation dedicated Funds have not targeted farmers' vulnerabilities through businesses.⁷⁷

By harnessing existing value chain relationships, the IFC-PPCR project is driven by the strong alignment of interest existing between buyers and suppliers of agricultural products. Based on this market driven forces, the long-term goal of the project is to build a sustainable business case for the involved agribusiness companies to train farmers on climate resilient agricultural practices beyond the project's life (IFC, 2013c).

Table 5. IFC-PPCR project stakeholders' descriptions and main roles.

	Description	Role		Financing Role
Government of Nepal	Ministry of Science, Technology & Environment along with other ministries and agencies.	PPCR focal point	Monitor, coordinate, and implement PPCR-related projects at the local level. Certifies seeds and undertakes research activities	Contributes in-kind resources, such as technical expertise, demonstration plots for showcasing irrigation methods, and develops policies and regulations.
	Agribusinesses: <ul style="list-style-type: none"> • Golchha Group (sugar division) • Sharda Group • Probiotech – Nimbus Group 	Diversified conglomerates, among the largest in the country, with mills processing maize, rice and sugarcane. They each have between 1,500 to 20,000 farmers in their supply chains.	Engaged to provide training to farmers. They can act as: loan intermediaries and/or guarantor providing buy-back guarantees; as input/technology dealers providing e.g. seeds or other agricultural inputs to farmers. IFC plans to support them in thereby developing new lines of business to disseminate irrigation equipment.	USD 0.3 million (USD 0.1 million each) in cash and in-kind contributions of staff time, equipment, facilities and demonstration plots*.
Local Commercial Banks		They hold 77% of Nepal's total assets and liabilities and have about 1,425 branches	Backed by a risk-sharing facility with IFC-PPCR and third-parties guarantee,	Expected to participate in a risk-sharing agreement with IFC, sharing risks

⁷⁷ This emerged from the assessment of the agricultural projects financed by the Adaptation Fund, the Special Climate Change Fund (SCCF) and the Least Developed Countries Fund (LDCF) since their inception. Projects reviewed were retrieved from these Fund's web sites.

		in the country, with a population of 95,000 per branch. Agriculture represents ≈3.7% of their total outstanding loans and advances (data as of July 2012).	they are expected to expand lending to the agricultural sector.	for about USD 10 million of investments.
Private actors	Farmers	Farmers growing sugarcane, rice and maize on less than 1 ha of land, on average, and have a household income of around USD 1,500 a year. Farmers are also organized in cooperatives, particularly sugarcane growers. Women provide the majority of agricultural labor.	Are expected to participate in training activities and invest in /adopt improved agricultural practices. Cooperatives will also be used to reach out to smallholder farmers.	Expected to invest own resources in climate adaptive inputs and technologies (not quantified); payment for training activities not required.
	PPCR	Multi-donor adaptation program within the Climate Investment Funds	Provides financial support	Provides about USD 2.1 million in grants and USD 3.6 million in concessional loans for this project.
International donors	International Finance Cooperation (IFC)	Multilateral Development Bank, World Bank Group's private sector arm	Executing agency of the private sector component of the Nepalese PPCR program and co-financier Strengthens the capacity of agribusinesses, farmers and of local bank(s)	Expected to structure and provide up to USD 8 million for a risk-sharing facility.

Sources: author's elaboration based on project's document (see References section) and interview with stakeholders. Note: (*) The companies final contributions will be determined in the cooperation agreements, currently being finalized.

The following sections focus on the engagement of agribusinesses, banks, and farmers, as mobile phone operators will only be involved at a later stage.⁷⁸

4. Results

This section describes the main analyses undertaken. At first it presents the results of the costs and benefits assessment for main stakeholders involved in the project, focusing on

⁷⁸ The IFC plans to target mobile phone operators once the creation/upgrade of the country's hydro-meteorological observation/forecasting network and of an ICT-based Agriculture Management Information System will be completed. This is part of another PPCR project executed by the WB (IBRD), and implemented by the Department of Hydrology and Meteorology, and the Ministry of Agriculture Development. Project closure is expected in 2018 (World Bank, 2012b).

the incentives driving agribusinesses. Then, the section reviews the risks faced by project stakeholders, and the elements that can help to mitigate, share, or transfer them among actors. In particular, the section concentrates on how the project’s arrangements aim to use risk allocation mechanisms to unlock local banks’ lending to investments in climate resilience. An evaluation of the potential sustainability, scalability, and replicability of the project’s approach to private sector engagement concludes the section.

4.1 Assessment of costs and benefits per main stakeholder

This section presents at first the costs and benefits to agribusinesses and banks then, it describes the potential benefits associated with the engagement of these actors to farmers and the Government of Nepal. Table 6 gives an overview of the expected benefits per main stakeholders.

Table 6. Main expected benefits per stakeholder.

	Expected Benefits	Agribusi- nesses	Banks	Far- mers	GoN	IFC/ PPCR
Non- financial & Strategic Benefits	Knowledge of and capacity for improved agricultural practices	x		x	x	
	Improved capacities in assessing and managing risks associated with agricultural lending		x			
	Larger supplier/customer base		x			
	Enhanced access to finance	x		x		
	Technology adoption	x		x	x	x
	Greater food security to climate-related risks			x	x	x
	Learning on climate-resilient interventions				x	x
Financial returns / benefits	Increased income and revenues	x	x	x		
	Climate-proofed agriculture, an important component of GDP				x	
	Improved balance of payments				x	
	Improved tax income				x	

Source: author’s elaboration. Note: The ‘x’ indicates that benefits have not yet been achieved given the early stage of the project.

4.1.1. Agribusinesses

The assessment of the “business case” reveals that agribusinesses stand to benefit from their investment in climate-resilient activities. Their investment of up to USD 95,000 each in the project (made up of both cash and in-kind contributions of staff time, facilities, and demonstration plots), is projected to be recouped around five years after all targeted farmers are trained, as improved supply of agricultural products should lead to higher

turnover and profits. The use of PPCR grants to cover the incremental costs associated with training farmers reduces the payback time by several years.⁷⁹

Agribusinesses have a strong incentive to engage in the IFC-PPCR project because farmers' poor farming practices and vulnerabilities to climate-induced risks directly impact the profitability and returns of their businesses. Insufficient supply of consistent quantity and quality of local rice, sugarcane, and maize crops, has already affected their businesses: some companies are running their plants below capacity (PwC, 2012; Golchha, 2013), while others have to procure supplies abroad at higher prices (Nimbus, 2013a). The sugar processing company, for instance, is running its plants at 75-80% of its capacity due to insufficient supply of sugarcane, but also delays in national price fixing (Bhaghat, 2010; Golchha, 2013), resulting in foregone revenues of about USD 0.4-0.5 million per year (author's elaborations).⁸⁰ Sugaronline (2013) and dcnepalevent.com (2012) reported that some Nepalese sugar mills even had to temporarily close down operations due to insufficient sugarcane supply.⁸¹

Farmers' traditional cultivation practices, limited awareness of and use of modern seed varieties, reliance on rain-fed irrigation systems, lack of access to and improper usage of fertilizers, as well as lack of post-harvest storage facilities, have led to low yields and crop losses, both in terms of quality and quantity (PwC, 2012; GoN, 2011).

Changing climate conditions could result in even lower yields, causing plants to run even further below their potential capacity, and shutdowns to become more common. Current climate risks such as floods and droughts are projected to intensify and become more frequent. For instance, the winter drought experienced in 2008/2009 – the worst in the country's history – has already had detrimental effects on agribusinesses' facilities, and affected 5.9% of rice and 0.2% of maize production areas across the country.⁸² In the Terai region, where the project is located, productivity is expected to shrink by 4-8% for sugarcane, 5-6% for rice, and 15%-16% for maize by 2030 (PwC, 2012).

Agribusinesses' involvement in the project is expected to lead to both financial and more strategic benefits.

Financial benefits are expected to mainly stem from enhanced and more regular supply of crops and improvement in the quality of crops. They therefore depend mainly on the

⁷⁹ These estimates refer to an agribusiness company processing sugarcane, and assume 340 farmers adopt improved farming practices in the pilot phase.

⁸⁰ These calculation are based on the following assumptions: sugarcane crushing capacity of 3,000 tonnes per day, plant used at about 75-80% of their capacity (Golchha, 2013), and running 150 days a year (Sugar Mill Association 2013); sugarcane purchases being responsible for 75% of overall sugar production costs; a net profit margin of 6% (see Appendix D), and prices of USD 54.4 per tonne of sugarcane (Ekantipur, 2013; exchange rate from Oanda 2013).

⁸¹ It should be noted that in some cases this was due to disagreement on the price of sugarcane (see dcnepalevent.com, 2012).

⁸² Calculated by dividing drought-affected area in 2009 (MoAD, 2013) by harvested area in 2009 (FAO, 2013).

outcomes of farmers' training, farmers' adoption of improved farming practices, and the commercial viability of the proposed measures. They will also depend on market prices for crops.

Assuming that farmers increase their productivity by 20% (standard scenario), the participating sugarcane processing company – the agribusiness for which we elaborated a financial model⁸³ – could expect to increase net revenues by at least USD 12,000 a year once all targeted farmers are trained and take up improved practices (see Appendix D for assumptions).⁸⁴

These benefit estimates are to be compared with costs in the order of USD 32,000 (lower estimate) to USD 95,000 (higher estimate) for staff time, facilities, and demonstration plots (see Figure 9). Estimates suggest that the sugar company's investment pays for itself in three to eight years under a productivity increase scenario of 20% (see Table 7).⁸⁵

Benefits may be different for rice and maize processing companies. In the case of the sugar company the outcome risks of training farmers are lower than the rice and maize processing companies' ones. Given the perishability of sugarcane, and its high transport costs, sugarcane farmers are likely to sell their produce to sugar processing companies operating near them. For the rice and maize supply chains, which involve a higher number of intermediary buyers as compared to the sugarcane supply chain, the relations between the agribusinesses and farmers are not as close and this increase the risk of "side-selling". Moreover, sugarcane is a "cash crop" while rice and maize are still cultivated more for subsistence rather than commercial reasons. Rice and maize companies will only benefit from the project if the capacity building activities undertaken can create direct relationships with farmers, thereby improving their loyalty, reducing/eliminating the market power of intermediaries and the risk farmers will divert part or most of their productivity gains to other possible customers.

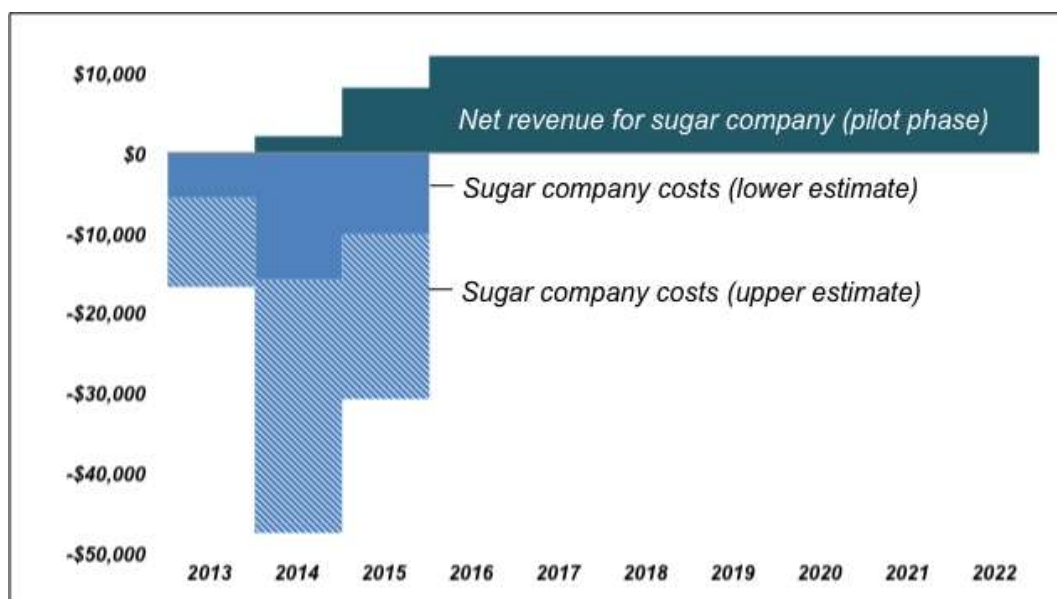
Table 7 shows the effect of the PPCR grant contribution in reducing the payback period of companies' initial investment. The question remains open whether the project will demonstrate that benefits for agribusinesses outweigh costs during the project's lifetime, thereby incentivizing them to remain engaged, and scale up training activities afterwards (see Section 4.3).

⁸³ The sugar processing company was chosen for the financial model because of two main reasons: it reaches most farmers out of the selected companies, and it has direct relationships to farmers, so there is less uncertainty in the calculations.

⁸⁴ Under a 10% productivity increase scenario, net revenues could increase by around USD 6,000. Whatever the productivity increase achieved it is not likely to have a significant impact on the revenues of involved agribusinesses, which is for instance USD 5-10 million a year in case of the maize processor (Nimbus, 2013b), and possibly higher in case of the sugar company (author's elaborations).

⁸⁵ It is worth noting that costs, benefits, and pay-back estimates are illustrative; agribusinesses may not calculate such financial benefits when considering their engagement in the project, but rather value the ancillary benefits associated with it such as improvement in crops quality which increases crops' value (e.g., Nimbus, 2013b).

Figure 9. Sugar processing company’s costs and revenues under the pilot project (standard scenario with 20% production increase, in current USD)



Source: author’s elaboration. Note: costs and revenues calculations assume project-related training to 567 farmers over 2 years and a 20% production increase; 340 trained sugarcane farmers adopt improved practices one year after the training, and that neither decay nor diffusion of farmers’ knowledge will happen after the project. If farmers’ knowledge were to decay, the revenues of the sugar company would decrease over time. If knowledge were to diffuse to other farmers, the revenues of the sugar company could increase further. To the extent possible, data are based on information based on project specifics (see Appendix D and E).

Without IFC’s know-how and about USD 1 million in grant funding from the PPCR to cover start-up costs, agribusinesses would not have engaged in training farmers in practices leading to enhanced climate resilience. PPCR cost coverage is needed because the project will not generate immediate, but rather future returns for these companies (see Figure 2), and/or help maintain revenues or reduce its volatility. IFC advisory service and PPCR cost coverage helps to buy-down the outcome risks associated with the non-traditional practices promoted under the project.

Table 7. Sugar company: impact of PPCR grants on the pay-back time of company’s contribution.

Productivity increase scenarios		Pay-back time with PPCR cost-coverage		Effect of PPCR cost-coverage on pay-back time*
		Upper estimate for contribution (USD 0.1 million)	Lower estimate contribution (USD 0.03 million)	
Low	10%	15.7 years	5.3 years	-27.6 years
Standard	20%	7.9 years	2.6 years	-13.8 years
High	30%	1.8 years	1.8 years	-9.2 years

Note: standard scenario in bold; () Assumes PPCR cost coverage of about USD 700,000 in the two-year pilot phase. This is 70% of the overall PPCR cost coverage over the four years and assumes that costs in the first 2 years of the project will be higher because of the development of training material and training experts in agri-businesses.*

Agribusinesses' decision to take part in the project goes beyond pure financial metrics. Interviews with one of the involved agribusinesses (Probiotech) and IFC indicate that there are strategic benefits not immediately linked to the direct financial outcomes of the project that companies seem to value even more (Nimbus, 2013a; IFC, 2013b and IFC, 2013g).⁸⁶

These benefits include:

- Increased know-how of training and climate-adaptive practices. Before the project started, some companies did not train farmers at all (rice processing company), or the training did not lead to intended outcomes (sugarcane processing company), either because of their limited knowledge about improved and climate-adaptive practices, or because of deficiencies in their training methods. Training is a key tool to have access to higher crops supplies and of higher quality.
- Monitoring and evaluation of the outcome of the training activities. The independent evaluation of the project commissioned by IFC will enable the agribusinesses (and IFC) to better understand what works, what does not, and where.
- Improved relations with farmers. This is more relevant for the rice and maize processing companies as the price of their crops is not centrally regulated, and they do not have direct links to farmers because according to Probiotech (2013) and IFC (2013b) they mainly procure these crops through intermediaries. Improved relationships, in fact, may lead to reduction in margins paid to intermediaries.⁸⁷ Moreover, farmers can also represent a potential customer base for agribusinesses selling seeds and fertilizers.

In addition, the opportunity to partner with IFC can motivate agribusinesses to get involved in the project because of two further benefits: First, IFC may invest in the involved companies and, second, it may engage these companies in follow-up projects and initiatives. Both of these benefits occurred for the maize company, Probiotech, that cooperated with IFC in a poultry project from 2010 to 2013 (IFC 2012a) and, more recently, received an IFC equity investment proposal for about USD 1.9 million (see IFC 2013c).

4.1.2 Local commercial banks

The analysis undertaken revealed that there are five main incentives that can motivate commercial banks to participate in the PPCR project:

⁸⁶ These benefits also accrued to sugar company (DSCL) who was involved in a similar IFC project in India, as highlighted during an interview with the company's management (DSCL, 2013).

- Market potential of the sector: The Nepalese agricultural sector has an estimated market potential of around USD 1.2 billion (NPR 105 billion), with an unmet credit demand of 36% (PwC, 2012).⁸⁸ Considering the limited penetration of bank services (Ferrari et al., 2006), farmers and other value chain actors are an untapped market. Lending to the sector can also represent an opportunity for diversifying their portfolio.⁸⁹
- Compliance with regulation on agricultural lending: The Nepalese Central Bank mandated commercial banks to enhance lending to productive sectors like agriculture to at least 10% of their total loan portfolio by mid-July 2014.⁹⁰ Agricultural loans, however, are ranked among the most risky due to their high likelihood of default, and this has implications for banks' Capital Adequacy Ratio.
- Addressing Capital Adequacy Ratio constraints, just above the mandatory regulatory requirement of 10% for several local banks.⁹¹ By partnering with IFC through the project's risk-sharing mechanism, these banks could increase their exposure to the agricultural sector without having to recapitalize.
- Enhancing capacity to evaluate and manage the risks specific to lending to the agricultural sector, and to develop appropriate financial products. This can help banks to improve their profitability and performance.

At present, agricultural lending represents only about 3% of Nepalese commercial banks' total loan portfolios, and about 2% in the case of the bank that has shown most interest in partnering with IFC in the project (average 2010-2012; NRB, 2012a; Ekantipur, 2013a). Direct lending to farmers is limited (NRB, 2012a) as it is considered too risky.

The Nepalese agricultural sector relies mostly on informal borrowing from saving and credit cooperatives, merchants, and relatives.⁹² This kind of borrowing is favored by farmers because of their general lack of appropriate collateral to apply for a bank loan, the limited reach of banks' branch networks, poor transport infrastructure, and the transaction costs typically associated with borrowing from banks (e.g., the relatively longer time frames banks require to issue a loan (Ferrari et al., 2006)).

⁸⁸ Figures refer to 2018. Previous estimates from the Nepalese Agriculture Development Strategy (2011 update) evaluated the investment potential in the sector at USD 223.4 million per annum (NPR 16.64 billion).

⁸⁹ Banks' credit portfolio, at present, is concentrated on the manufacturing sector trading and real estate. Banks may consider reducing their exposure to the real estate sector, for instance, which is currently subject to declining real estate prices (ICRA Nepal, 2013; Sapkota, 2012; NRB, 2012).

⁹⁰ The 10% mandate applies to lending to the agriculture and the hydropower sectors taken together. There is also a separate regulation introduced in 2011 requiring banks to allocate 20% of their total loan portfolio to a broader range of productive sectors including agriculture and hydropower. To favour the implementation of these directives the Central Bank provisioned that compliant banks will have access to a refinancing facility for agricultural loans at 0% interest rate. Non-compliant institutions, on the other hand, might be subject to a penalty fine. As of May 2013 there were no specific provisions on this regard. The Nepalese Bankers Associations has requested to the Central Bank to extend the deadline for compliance with the lending requirements for about 3-4 years (NRB Directive 3/068, Kaphle and Sigdel, 2013; NBA, 2013, PwC, 2012).

⁹¹ In 2012, the overall CAR of 16 out of 32 commercial banks operating in the country stood at 11.5% i.e., just above the mandatory regulatory requirement of 10%. In 2010 it was at 6.6% ([Himalayan Times 2013](#); NRB, 2012a).

⁹² PwC (2012) suggests that Savings and Credit Cooperatives served about 68.4% of the households surveyed in 2011. Ferrari et al., (2006) in the 2006 Access to Financial Services Survey found that about 38% of Nepalese households had an outstanding loan exclusively from the informal sector; 16% from both the informal and formal sector, while 15% exclusively from the formal sector.

From the banks' perspective, limited lending to the sector can be explained by the existence of a number of barriers including:⁹³

- The inadequate Capital Adequacy Ratio of several Nepalese banks⁹⁴ coupled with their poor risk management capabilities, which hinders their capacity to float loans for a high risk sector like agriculture;
- High transaction costs of reaching farming households, dealing with relatively small loans that are linked to seasonal and uncertain cash flows, as well as difficulties in collecting loan repayments;
- Difficulties in assessing farmers' creditworthiness due to their lack of credit history (WB, 2012; Ferrari et al. 2006);
- A lack of adequate collateral as farmers' assets are often not suitable or sufficient to secure loans;⁹⁵
- A lack of agricultural insurance coverage mechanisms that contributes to enhance banks' skepticism over the safety of investments made in the sector.⁹⁶

The prevalent subsistence nature of the Nepalese farming system (i.e. mainly intended for consumption rather than for sale) further reduces the attractiveness of the sector to banks.

At this stage of development of the project IFC is still liaising with the interested banks.⁹⁷ It is too early to know whether the banks will engage and whether this will result in a profitable venture for them. Profitability will depend on the demand for the financial products yet to be developed within the project, borrowers' risk profiles, the interest rate applied, and the fee that the bank will have to pay for the risk-sharing facility under negotiation.

As the risk-sharing facility will only provide coverage for loans financing the purchase of technologies and products that support the non-traditional agricultural practices disseminated via the training activities,⁹⁸ profitability will also depend on the additional risks associated with this kind of lending. Nevertheless, skills enhanced during the project can help banks improve their profitability and performance. There could also be opportunity costs involved in enhancing lending to agriculture for banks, such as lower lending to relatively more profitable and less risky sectors such as manufacturing (NRB, 2012a).

⁹³ Sources: IFC (2013b); IFC, (2013d); CIF (2012b); NRB (2012a); PwC (2012); Karki et al., (2010).

⁹⁴ The Capital Adequacy Ratio (CAR) measures the amount of resources a bank has to hold in the form of stockholders' equity in relation to the amount of its risk weighted credit exposures. The NRB placed agricultural loans in the 100% risk weight category.

⁹⁵ WB (2012) states that, on average, collateral can reach 260% of the loan value, and banks most commonly require personal assets. Therefore, farmers' assets might not be adequate or sufficient. The provision of collateral might be even more difficult for women, who undertake most of Nepal's agricultural work, since most of the land is held in the name of men, mostly working abroad (IRIN, 2013).

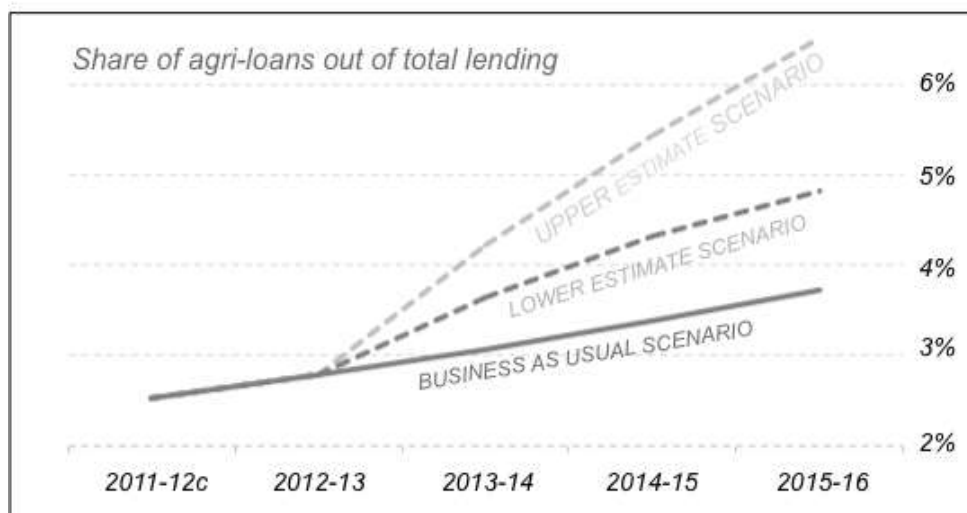
⁹⁶ Banks' poor investment decisions and inadequate analysis of market risks induced the liquidity crisis forcing several banks to fail in 2011 (Sapkota; 2012; NRB, 2012b; NRB, 2011; NRB, 2010).

⁹⁷ The latest update on the deal was received in September 2013.

⁹⁸ The tentative list of criteria for investments eligible under the risk-sharing facility include e.g. water-efficient irrigation technologies, weather information platform, climate-resilient seeds, fertilizers, environmentally controlled sheds, products for pest and disease management, etc. (IFC 2013b).

Figure 10 illustrates the possible effects of a risk-sharing facility of about USD 20 million (IFC, 2013b) on the agricultural credit portfolio of the bank that showed most interest in the project.⁹⁹ Section 4.2 provides additional details on the facility.

Figure 10. Illustrative – Bank’s lending to the agricultural sector as a result of the risk-sharing facility: three estimated growth scenarios from 2011/2012 (before the project) to 2015/2016.¹⁰⁰



Source: author’s elaboration. Note: key assumptions include: Three years duration of the risk-sharing facility (IFC, 2010) and an annual disbursement rate of the facility of 30%, 60%, 90%; to take into account the complexities associated with the financing of (and demand for) non-traditional agricultural practices, we assume that the facility will not be fully used. Repaid loans are not considered i.e. each dollar is lent only once over the duration of the facility; the business-as-usual (BAU) scenario applies a 22% compound annual growth rate (CAGR), calculated over the 2010-2012 agricultural lending portfolio (NRB, 2013c). The lower estimate scenario assumes that PPCR loans will substitute old loans. The upper estimate scenario assumes that PPCR loans are additional to BAU loans.

4.1.3 Farmers

The project set a target objective of increasing trained farmers’ productivity and incomes by 20% through training tools and technologies helping them adapt to climate change risks (IFC, 2013b and IFC, 2013d). Similar projects suggest that this goal is achievable (see Appendix E).¹⁰¹

The engagement of agribusiness firms as training providers has the potential to generate benefits to farmers beyond improving their knowledge of agricultural practices.

As agribusinesses and farmers are linked through the supply chain, farmers may benefit from (enhanced) access to:

⁹⁹ For confidentiality reasons, the name of the bank currently negotiating with IFC is not disclosed.

¹⁰⁰ This is an illustrative graph, based on strong hypothesis. At the time of writing the risk-sharing facility was still under negotiation. Then, there are several factors that could affect the leverage effect of the facility e.g., its uptake, the historical performance of banks’ portfolio; the size of individual loans issued; interest rate and profitability expected. As a reference, let’s consider that in Bangladesh, were IFC is running another private sector-oriented project under the PPCR, the expected impact of the project’s in terms of access to finance is to favour the increase of agri-lending to at least 2% of the total portfolio in 2 banks (CIF, 2013).

¹⁰¹ According to CIF (2011a) and CIMMYT (2010), for instance, improved varieties of seeds alone would result in a 20-30% increase in yields.

- More secure markets for their supplies, as companies may promote contract-farming arrangements, or offer purchase guarantees on crops produced under training interventions with the aim of ensuring their loyalty;
- Improved seed varieties, fertilizers and/or technologies otherwise not easily accessible (also new ones) through, for instance, agribusinesses' purchasing irrigation equipment and renting it to farmers;
- Finance, because the relation with companies may improve farmers' creditworthiness and attractiveness to banks through purchase guarantees and/or agribusinesses intermediation of loans (see section 4.2).

The involvement of banks with PPCR and IFC backing is another key factor helping tackling farmers' credit constraints while promoting the financing of practices aimed to increase resilience in agricultural production systems.

The involvement of commercial banks could also help to:

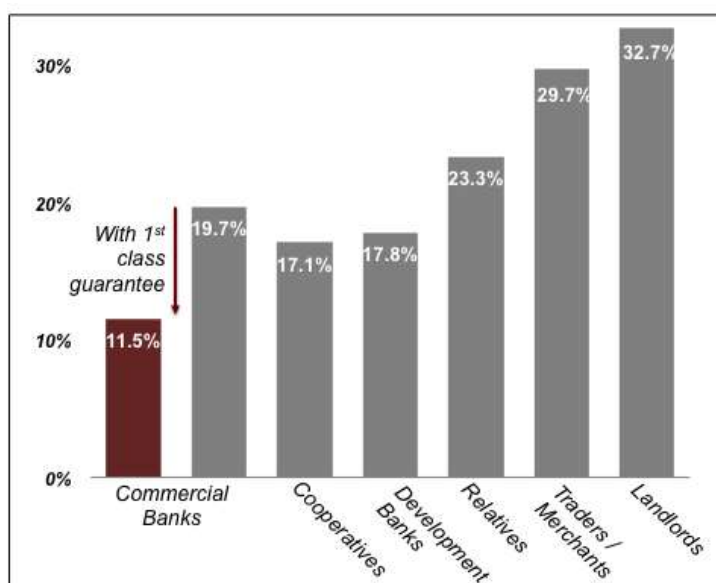
- Lead to more affordable terms and conditions for loans, at rates lower than those prevailing on the market, as suggested by the rates offered by banks with a guarantee from a rated financial institution (see Figure 11); this could help to shift farmers away from informal lending sources that typically provide loans at higher rates;¹⁰²
- Enable access to a higher volume of credits and services than other entities are able to offer;¹⁰³
- Promote farm diversification, which can help to increase farmers' adaptive capacity.

Under the project, farmers will not be asked to pay for the training activities, but rather incentivized to invest in improved and climate-resilient farming practices through training activities and by "proving the concept" in demonstration plots. These should translate into benefits that will more than repay investment costs of climate-adaptive products.

¹⁰² Karki et al. (2010) suggests that financial resources obtained by farmers via e.g. merchants and traders under the commitment of selling a predetermined amount of their produce at a rate irrespective of prevailing market prices, are mainly used to satisfy consumption rather than productive purposes.

¹⁰³ NRB (2013b), IFC (2013) and Ferrari et al. (2006) suggest that the amount of loans typically provided by e.g. micro-finance institutions is not sufficient to match many on-farm investments, or the needs of other bigger actors in the agricultural value chain. Moreover, micro-finance services currently remain inadequate in the country due to structural issues such as technical capacity, and governance weaknesses.

Figure 11. Level of interest rates demanded by various lenders in the agricultural sectors



Source: author's elaboration. Notes: Due to data availability issues due to the limited lending to the agricultural sector, the rate applied for loans with a first class bank guarantee from a rated bank are not specific to agricultural lending, and refer to the average made available by the institution that showed most interest to partner with IFC in the project, which is among those with the highest portfolio in the sector (IFC, 2013b). To provide another example, also other banks operating in the country for which data are available (e.g., Kumari Bank) apply a slightly lower interest rate, 11% on average (Kumari Bank web site). For guarantees from non-rated banks, rates range between 12 - 15%. The Central Bank (NRB, 2012) reports that the lending rates applied for loans from commercial banks in the agricultural sector in 2011 ranged from 9.5-13%. The other data depicted were retrieved from the PwC (2012) survey; for traders and merchants is depicted the average rate applied by the two.

4.1.4 The Government of Nepal

Agriculture is the mainstay of the Nepalese economy, accounting for around 36% of its GDP and 74% of its labor force (WB, 2012a). Analysis made prior and during the PPCR program preparation (see CIF, 2011a; GoN, 2010a) highlighted the challenges posed by changing climate conditions to the country's agricultural outputs. Droughts like the one Nepal experienced in 2008-09, for instance, destroyed crops across the country, more than halving yields in some districts and putting food security at risk.

Strengthening the climate resilience of the agricultural sector is therefore critical for the country's economy and the wellbeing of its citizens.

The Government of Nepal has made numerous efforts to promote agricultural-led growth, aiming to move from subsistence to commercial farming systems, but past programs have not yet led to intended results (e.g. Samriddhi, 2011; World Bank, 2011).¹⁰⁴

¹⁰⁴ Increasing the productivity of the agriculture sector is a key priority for the GoN, which plans to double spending (currently 8% of the budget, MoF, 2013b), and increase public lending in the sector (Himalayan Times, 2012).

The government's decision to allocate a portion of PPCR resources to address capacity and financial gaps in the private sector can help strengthen and improve this sector's performance, a cornerstone of any move from subsistence to commercial agriculture.

In the target districts, the IFC-PPCR project can help to strengthen the agricultural performance and improve food security, by providing:

- Know-how, for preventing and managing climate-related losses through improved practices leading to increased productivity and food security. If effective, practices demonstrated during the project may also generate positive spill-over effects promoting replication, also in the informal sector. The project can also contribute to overcoming the bottlenecks in existing capacity building activities supported by the government, which are suffering from lack of staff, funding and effectiveness, and whose trainers have limited expertise in climate change (IRIN, 2013; FAO, 2010);¹⁰⁵
- Access to new and/or improved technologies, such as solar-powered irrigation pumps from an Indian company with whom IFC is liaising to facilitate its entry in the Nepalese market and that, in agreement with the government, is developing the national irrigation strategy for the country;
- Stronger value chains for the key crops targeted by the project, and associated players, which may imply more secure provision of taxes, employment opportunities, as well as an improvement in the balance of trade thanks to reduced imports;¹⁰⁶
- A more supportive financial system capable of satisfying the need of the sectors, to favor private business growth and enable the shift to commercial farms.¹⁰⁷

The benefits for the government can be particularly high compared to similar projects implemented by NGOs or government entities.¹⁰⁸ If the project provides successful outcomes, agribusinesses may see enough benefits to continue training with lower or without public backing after the project period. NGOs, in contrast, would need additional financial support to continue the training further. Moreover, strengthening the performances of Nepalese-based companies can help to stimulate domestic industry and, therefore, local development.

¹⁰⁵ GAFSPFUND (2010) highlights that the training service delivery system does not meet farmers' demand; the level of coverage of the training system is about 15% of agricultural households nationwide. IRIN (2013) reports that one public technician is responsible for training an average of 1,500 farmers when in developed countries it is 400 farmers on average. Moreover, to receive advisory services, farmers have to reach public district centres which are often far away or not easily reachable because of inadequate transport infrastructure. In the 2012/2013 budget, around USD 0.6 million (NPR 57 million) was allocated to agricultural training (MoF, 2013a).

¹⁰⁶ The private sector currently (2012/13) contributes 19% of the Government's overall tax income, and this represents taxes on corporate profits only (MoF, 2013c). 2010 official imports of sugar, rice and maize amounted to USD 75 million (or almost 0.5% of GDP, see World Bank, 2013a) and actual costs are higher as these crops are also illegally imported from India (Goletti et al., 2012). In 2010, the agricultural trade balance was USD 350 million in deficit. The government has set a target of 50% reduction over the short-term (5 years) (MoAD, 2013b).

¹⁰⁷ Private banks pilot new practices, which may then be taken up by public banks, which in the past decade have had negative capital adequacy ratios and high non-performing loans (NRB, 2012a; Ferrari et al., 2006);

¹⁰⁸ A study from Intellectap (2010) in Asia reveals that small and local businesses are sometimes better able to respond to the needs of the poorest than government bodies or non-governmental organization.

Table 8. From inputs to final desired outcomes (project targets).

Time since intervention →

INPUT	OUTPUT	INTERIM OUTCOME	EXPECTED FINAL OUTCOME
<p>Public capital:</p> <ul style="list-style-type: none"> • ≈USD 2.1 million in PPCR grant resources for capacity building activities • ≈USD 10 million in guarantees for a risk-sharing facility with at least one bank <p>Private resources:</p> <ul style="list-style-type: none"> • ≈USD 0.3 million in cash and in-kind contributions from agribusinesses • ≈USD 10 million from the target bank for the risk-sharing facility. Additional resources will be invested to cover the cost of the facility and to lend to projects 	<ul style="list-style-type: none"> • Development of crop-specific training modules and methods to deliver climate resilience • 15 trainers instructed on climate resilience, embedded in companies' technical teams • Development of financing products and risk management training to the staff of the partnering bank(s) 	<ul style="list-style-type: none"> • Enhancement of at least 1,700 farmers' knowledge of climate-resilient, higher yielding farming practices • Enhanced availability of improved stress-resilient and high-yielding seed varieties and of improved technologies • Banks sustain the adoption of improved practices through the promotion of tailored financial products 	<p>Agribusinesses:</p> <ul style="list-style-type: none"> • Enhanced capacity and expertise on how to increase crops productivity and train farmers • Improved value chain relationships • More secure supply of rice, maize, and sugarcane, of higher quality; higher operational efficiency and profitability <p>Banks:</p> <ul style="list-style-type: none"> • Improved risk-management practices and ability to satisfy agricultural market needs <p>Farmers:</p> <ul style="list-style-type: none"> • Improved ability to cope with climate-related risks • Improved value chains relationships • 20% higher yields and income¹⁰⁹ <p>Government of Nepal:</p> <ul style="list-style-type: none"> • Climate-proofed agricultural sector and enhanced food security • Stronger and more resilient private sector • Increased revenues from taxes • Reduction of trade deficit • New employment opportunities

4.2 Project's risks and management

From the results of the assessment undertaken and the interviews with key stakeholders (IFC, 2013b) emerges clearly that private companies in Nepal are unlikely to invest in or borrow for improved agricultural practices unless the public sector reduces the risks associated with these investments.

The project's knowledge building, financial assistance, and risk-sharing arrangements can mitigate many of the risks, but several outcome risks still remain, particularly, uncertainties about farmers' investment in and adoption of improved agricultural practices.

IFC's know-how, experience in similar initiatives as well as relationships with some of the involved partners, can help to manage these risks, thereby enhancing the likelihood of success.

¹⁰⁹ A control or comparison group of farmers will be monitored to establish a credible baseline (IFC, 2013b; IFC, 2013e).

In this section is presented the evaluation of the risk profile of the Nepalese IFC-PPCR project. According to a typical risk management framework, at first the inherent risks faced by key project stakeholders are identified and assessed then, the analyses focuses on the strategies used to mitigate the most important risks i.e. those that could cause the project to fail. Lastly, the section outlines the final risk allocation and its implications for the major stakeholders.

4.2.1 Risk identification and assessment

To capture all significant sources of risk, risks are categorized according to the three main phases of the project:

- Development risks cover all the risks incurred before the project begins implementation, including the identification of suitable private partners and their engagement in relevant climate-resilient measures;
- Operation risks cover risks related to implementing and running the project, such as the inadequacy of the training measures and/or of their delivery method;
- Outcome risks cover the risks of not achieving the public policy objectives. For the IFC and the PPCR these risks include failure to deliver the intended climate resilience and food security objectives, and to demonstrate that private sector involvement in building resilience is achievable.

Next, identified risks are classified according to their probability of occurrence, or frequency (from very low to very high), and their potential impact on the project's objectives (again from very low to very high).

LOW RISK EVENTS

Risk events with low probability of occurrence and low to medium impact:

Low risk events were not identified. This because of the novelty of the project for the private sector, the uncertainties associated with planning adaptation measures in a country where the lack of reliable climate data is the norm, as well as the lack of evidence about the effectiveness of private engagement in meeting adaptation goals.

MODERATE RISK EVENTS

Risk events with moderate probability of occurrence, and medium to high impact:

- Changes in the Nepalese government's support to the PPCR program and projects,¹¹⁰ or changes in policies and regulation favorable to the project such as the mandate for

¹¹⁰ This is exemplified by the decision to not borrowing money to invest on non-revenue generating projects such as certain adaptation interventions that the government made in December 2012. This had repercussions for some projects within the country's program, which were endorsed more than a year before. The IFC-PPCR project was not affected because in this case PPCR money do not fell into the government sovereignty, but rather IFC, who is responsible for their repayment (CIF, 2013i; ADB, 2013a).

increasing the agricultural sector's share in banks' loan portfolios. These risks are shared among the PPCR, IFC, and the government itself, given that it is the ultimate beneficiary and has overall responsibility for the program (SPCR).

- Commodity prices risk: all actors operating in the agricultural sector face some level of revenue volatility given the nature of the market. Associated risks are borne by private actors, who are used to facing price uncertainties.
- Failure to deliver timely weather forecasts and agronomic information to farmers, which are critical to prevent climate-induced losses and fully enable farmers to implement improved agricultural practices over time.¹¹¹ IFC bears the risk, but shares it with the World Bank (IBRD) and, ultimately, the Government of Nepal. Under the PPCR framework, the World Bank is responsible for the creation and upgrade of the country's hydro-meteorological network and of the agricultural information management system, while the government is responsible for the country's overall adaptation program. Failure to set up an effective weather information network could affect IFC's ability to engage mobile phone operators and/or to deliver effective training measures.

HIGH RISK EVENTS

Risk events with high to very high impact, whatever the probability of occurrence:

- Failure to engage the private sector in the country's climate-resilient development program. There are several challenges that could have hampered IFC-PPCR's ability to involve private actors in the project, including: Nepal's complex terrain as a post-conflict Least Developed Country; private actors' limited understanding of climate-related risks and opportunities; and the government's limited understanding of the private sector's role in building climate resilience.

This risk, along with the risk of engaging unsuitable partners, would undermine the reputation of IFC and the overall credibility of the PPCR, and make it more difficult for it to fulfill its mandate. It would also likely result in partial losses of the donors' money used to develop the project.

- Failing to remove barriers to finance, such as the inability to structure risk-sharing mechanisms sufficiently attractive to local banks to effectively unlock their resources for lending to climate-relevant measures; or the inability of the planned training measures to stimulate demand for finance, thereby generating a deal flow. The lack of data and information at the farm level, the lack of borrower credit history, and banks' limited involvement in agricultural lending – coupled with the risk-sharing facility's loan criteria

¹¹¹ It is worth noting that even if good weather data is provided, farmers may not be able to interpret them and make appropriate decisions.

(see paragraph 4.2.2.1) – makes this a highly probable risk. IFC and the PPCR bear the reputational and financial risks.

- Inability to set up and deliver effective training measures due to the lack of skilled human resources to develop training activities relevant for coping with climate variability and change over time, or an inadequate delivery model.¹¹² Some types of training methods (e.g. written material), may not be effective in promoting farmers' adoption of new practices and inputs if they do not take their literacy levels and culture into account¹¹³ (see e.g., IFC, 2013g; Ganesh, 2006; Hamal and Anderson, 1982; DSCL, 2013). Failing to obtain farmers' interest and participation in training activities could affect the project's final outcomes. IFC and the PPCR assume these risks and share them with the agribusinesses given their direct involvement and contributions.

IFC also bears the risk that the agronomic practices proposed during the training activities will not remain relevant as climate varies and changes over time, and the risk of working with companies not familiar with the provision of training measures, and/or without direct relationships with farmers at the beginning of the project (e.g., the rice case). These factors also increase outcome risks for the companies involved.

The dynamic risk matrix (Figure 12) illustrates two aspects: risk allocation — where identified risk events originate and sit at project initiation; and risk response — how risk are managed and/or shifts among project's stakeholders through the use of risk transfer mechanisms (see arrows).

4.2.2 Risk management strategies and allocation framework

There is evidence to suggest that the project's risks and uncertainties are allocated to the stakeholders most suited to manage them. Nevertheless, if the project fails to deliver its intended objectives, the most vulnerable group of actors, farmers, will remain exposed to climate impacts.

Stakeholders' 'know-how' and the relationships between involved parties play an important role in the project risk allocation, and ultimately in its likelihood of success.

Regulation-related risks

The following arrangements can mitigate or help to avoid this type of risk:

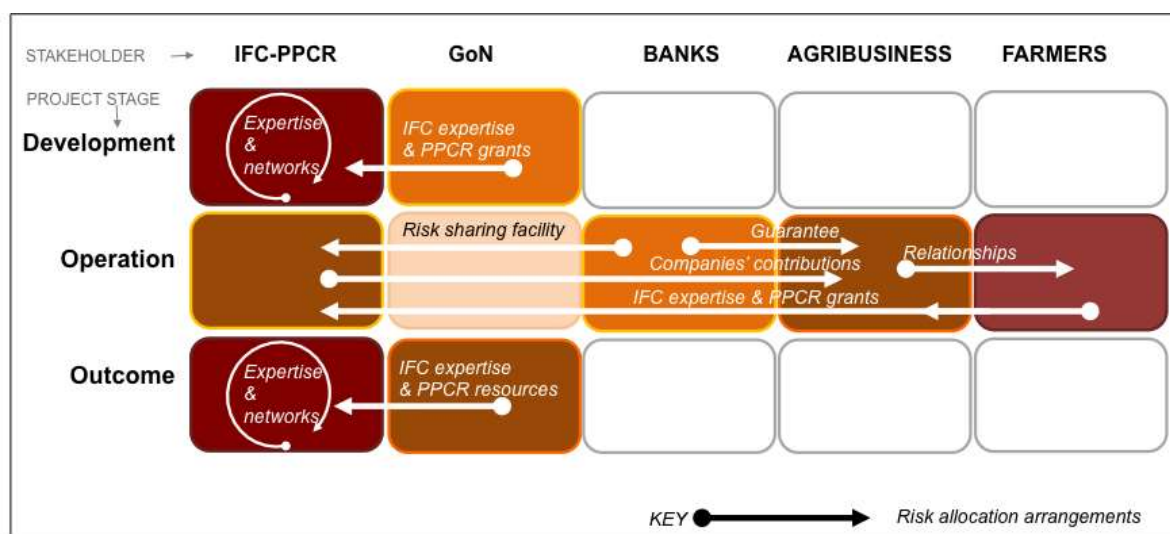
¹¹² Developing training tools tailored to farmers' climate resilience needs is still a relatively novel practice for IFC's staff, partnering organizations, and consultants. Agricultural inputs and technologies suitable to face the challenges posed by climate change might not yet be locally available and/or easily importable.

¹¹³ Nepalese farmers have demonstrated slow and weak adoption rates. Studies have found that only 5% to 10% of farmers are willing to take the risk of changing practices which may result in income risks. This is generally related to price and yield uncertainties and can vary greatly among farmers based on farm size, percentage of land ownership, farmer's age, level of education, etc. (e.g. IFC, 2013b; Kafle and Shah, 2012; Paudel and Matsuoka, 2008).

- The stable presence of IFC and of the other PPCR implementing agencies in the country;
- Ongoing dialogue through the coordination mechanisms under development within the PPCR for the implementation of the program (WB, 2013).

The regular PPCR Pilot Countries' meetings can create an additional platform for dialogue and may help to hedge this risk. Positive peer pressure from other PPCR countries also plays a role in motivating the Nepalese Government to support the PPCR process and deliver results.

Figure 12. IFC-PPCR project dynamic risk matrix.



Source: author's elaboration. Note: Colors refer to the relative risks taken by stakeholders. The darker the color, the high the risk. Risks are categorized according to their potential 'magnitude' multiplied by the 'likelihood of risk': from 'very high' in dark red, to 'high' in orange, 'moderate' in light orange and 'low' in yellow. Given the early stage of this project, we acknowledge the subjectivity of the weighting system.

Private sector engagement-related risks

In Nepal, the PPCR framework and IFC hedged these risks through:

- An intense consultation phase supported by the establishment of a Technical Private Sector Working Group and analytical studies (e.g. IFC, 2013b; ADB, 2012a; Poshan, 2010; PwC, 2012).
- IFC's previous experience in projects applying similar approaches, that is working with and through agribusinesses to reach out to farmers (see e.g. IFC, 2012b; IFC, 2013g; IFC, 2013h), and in promoting the use of stress-tolerant seeds such as in Bangladesh (see e.g. IFC, 2013i).
- IFC's existing relationships with some of the private partners involved in the project such as Probiotech, the maize processing company that has trained 2,000 poultry farmers, and some local banks such as the Himalayan Bank (Himalayanbank.com; IFC, 2012a; IFC.org).

- IFC's screening, appraisal tools, and standards, to ensure the integrity, credibility and suitability of selected partners.

Access to finance-related risks

IFC can mitigate part of these risks by leveraging its:

- Expertise in operating with financial institutions in developing countries, and in structuring risk-sharing facilities in the agricultural sector (e.g. IFC, 2010).
- Existing relationships with some local banks. IFC, for instance, has been collaborating with the Himalayan Bank since 2007, already entering into a guarantee facility agreement (Himalayanbank.com). According to IFC (2013b), this is one of the private banks with the most significant agribusiness portfolio and the one that showed most interest in participating in the project (see also Ekantipur, 2013a).

Moreover, PPCR resources cover part of IFC risk, as planned to provide the first loss coverage in the risk-sharing facility under discussion.

Finally, agribusinesses can mitigate part of the finance-related risks when acting as loan intermediaries and guarantors, or guaranteeing the buy-back of agricultural products (see Box 4 for details).

Training related-risks

IFC bears part of these risks and can mitigate them by:

- Previous experience in the development and provision of training to and through value chain actors,¹¹⁴ and in sourcing experts;
- Knowledge of crop-specific vulnerabilities and barriers to enhanced productivity developed during the preparation phase of the project, which can support the development of relevant training measures;
- Adoption of a phased training approach, including follow-up training activities and close monitoring through an external evaluator, which can allow for adjustments to farmers' behavior or climatic changes (IFC, 2013d).
- Technical backstopping by establishing relationships with expert partners.¹¹⁵

Agribusinesses also bear training-related risks, as they invest their own resources without a guaranteed return. For instance, they bear the risk that trained farmers will sell their produce to other companies (a high risk in the rice and maize supply chains), that they will not adopt improved agricultural practices (e.g. because the farmers remain unconvinced, or the practices are not affordable or cost-effective), or that delays in price fixation –

¹¹⁴ IFC has been cooperating with Probiotech, the maize processing company operating in the country's animal feed industry to strengthen the technical skills of Nepalese poultry farmers (IFC, 2012a).

¹¹⁵ These organizations include the International Centre for Integrated Mountain Development, a regional intergovernmental learning and knowledge sharing center, and the International Rice Research Center, a research and training organization.

determined at the national level for sugarcane— will delay farmers supplies, possibly resulting in crop decay (a high risk in the sugarcane supply chain). These risks remain substantial but can be mitigated with the establishment of closer relationships with farmers, enabled by the training activities, buy-back agreements for farmers' produce, and indirect financing arrangements.

Farmers also bear part of the risks because the adoption of new but ineffective farming practices could put their sources of income or livelihood at risk.

The effectiveness of the training measures will be critical to successfully promoting investment in practices delivering resilience and ensuring companies' and farmers' engagement in the long-term, thereby ensuring the sustainability and scalability of the project. They will also be critical to demonstrate that delivering adaptation via private actors can work.

4.2.2.1 Risk management strategies: addressing the risk of lending for climate resilience

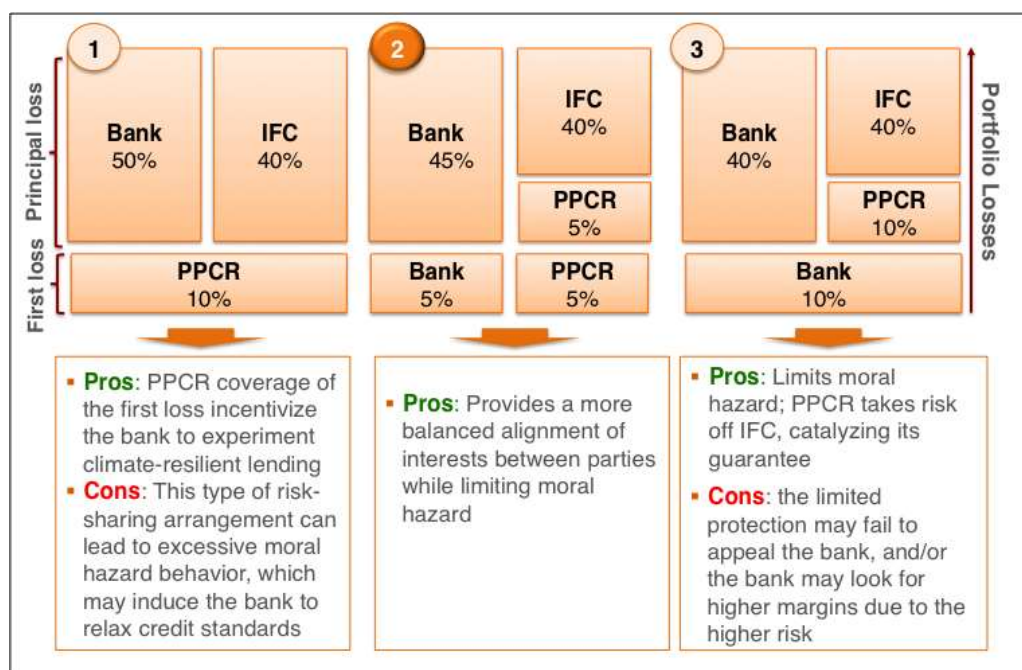
IFC is working to structure a USD 20 million risk-sharing facility to transfer 50% of the risks associated with a portfolio of eligible 'climate-resilient loans' from a local commercial bank to IFC and the PPCR (IFC, 2013b). The deal is still under negotiation and the set of criteria specifying the assets eligible to be covered under the facility still to be agreed (September 2013).¹¹⁶ IFC plans to close the deal with one bank before scaling it up to other institutions.

The facility is planned to take the form of an unfunded partial credit guarantee, shared *pari passu* with the partnering bank. Its structure, terms, and conditions, are critical to induce the bank to expand lending to the agricultural sector and experiment climate-relevant lending while avoiding moral hazard behavior. The pricing of the facility, which is linked to the profitability of lending, is another critical element as it can tip the balance in terms of demand and utilization of the facility itself (IEG, 2009; Mignucci et al., 2013). Narrow margins, in fact, would reduce the motivation of the bank to renounce part of them to pay for the facility. The pricing agreed by parties will depend on the riskiness of the underlying loan portfolio, IFC's costs of funds, and expected losses.

There are various options for allocating first and principal loss, depending on the specific needs of the partnering institutions and the nature of the assets to be covered by the facility ([IFC.org](http://www.ifc.org)). As illustrated in Figure 13, each approach implies different risk-sharing/pricing trade-offs.

¹¹⁶ In addition to the selection criteria, IFC and the client bank will also agree on the servicing procedures for defaulted assets. The disbursement of IFC funds are made if the criteria are met at the time of the call on the Risk Sharing Facility (IFC 2009).

Figure 13. Three different and possible options for the risk-sharing facility.



Source: author's elaboration based on IFC (2013b) and IFC (2009).

Option 2 – where the first loss is evenly shared between the PPCR and the prospect bank – would ensure a balanced alignment of interests between parties, while limiting the moral hazard risk that the partnering bank would relax its credit standards at the expense of IFC.

The use of PPCR's funds to cover part of the first loss tranche has the following effects:

- Removing some of the risks from IFC, which might have not been willing to engage in this venture without third party backup;
- Encouraging the bank to kick-start climate-relevant agricultural lending;
- Lowering the price of the facility as compared to the level IFC would have set it otherwise.

IFC's direct involvement and partial cover of the principal loss – to be used after the exhaustion of the first loss – enables the local commercial bank to share the risks with an entity relatively more suited to manage them. This could lead the partnering bank to reduce the interest rates applied for loans, to the advantage of farmers' (see Figure 4 in paragraph 4.1.3).

Involving value chain actors to reduce risks for banks

The involvement of agribusinesses as aggregators can contribute to further buy down credit risks and reduce the transaction costs of lending to farmers. Beyond risks, transaction costs typically prevent banks to reach out to small holders directly/individually, and thus the need for lead firms as aggregators to facilitate financing throughout the value chain.

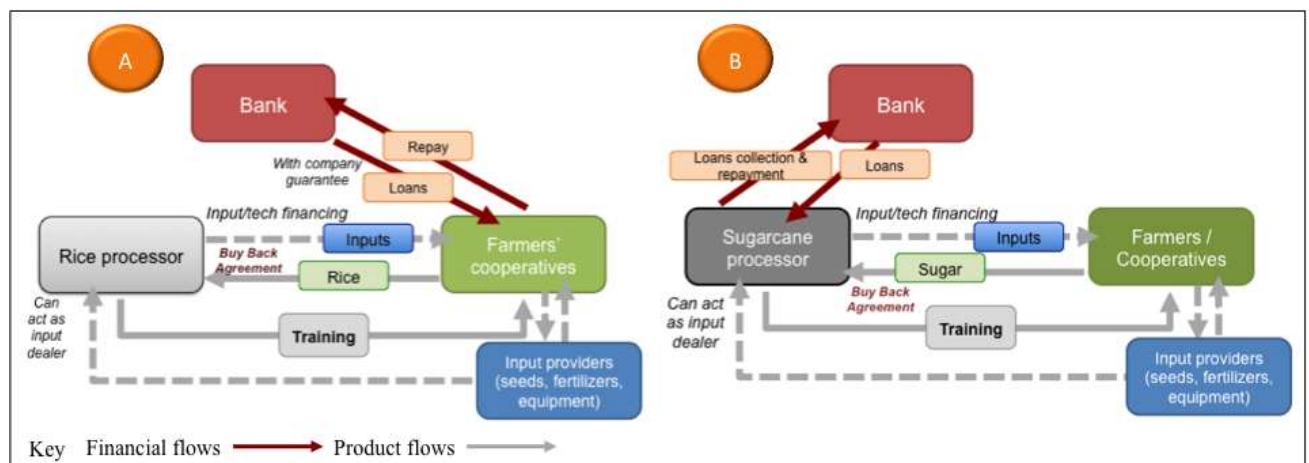
Agribusinesses, in fact, can act as vehicles to disperse and collect back the loans through value chain financing, and/or enhance farmers' creditworthiness via purchase guarantees on the crops supplied by farmers.

The relationships between agribusinesses and farmers can facilitate credit screening, monitoring, and enforcement. Farmers' willingness to maintain good relationships with their direct buyers make them less likely to default on loans, as it would possibly result in them needing to find another buyer.

These arrangements, which are not new in developing countries, differ according to the characteristics of the supply chains:

- In the sugarcane supply chain, where farmers and the processing company have direct interactions, lending could occur through agribusinesses, which can be liable for farmers' debt and loans repayment (Figure 7, option A).
- In the rice and maize supply chains, the looser relationship between companies and farmers may induce banks to lend to farmers' cooperatives on the basis of farmers group guarantees¹¹⁷ (Figure 14, option B). Interviews with the company involved in the maize chain (Probiotech, 2013) suggest that the company will be willing to provide a buy-back guarantee to farmers, as a way to ensure access to their products (see also e4nepal.com).

Figure 14. Possible financing arrangements among supply chain stakeholders



Source: author's elaboration based on IFC (2013b).

4.3 Can the project be sustained, scaled up, and replicated?

This section discusses whether the agribusinesses engaged in the project are likely to train farmers in climate-adaptive agricultural practices beyond the project's life. If the project performs as planned, in fact, agribusinesses will see the benefits of continuing to train farmers beyond the project's life, ensuring the sustainability of the intervention. The project has the potential to incentivize agribusinesses to sustain the training activities beyond the project's life, as they may have an even clearer business case in the longer term, thanks to economies of scale and learning.

The approach could also be extended to other agribusinesses if adapted to the particular circumstances of other crops and companies.

To draw early insights for replicability, this section also looks beyond the Nepalese case, to understand how other PPCR-supported projects have been performing to date in other pilot countries.

4.3.1 Sustainability: the long-term business case for building climate resilience

The overarching objective of the project is to build the business case for the agribusinesses involved to train farmers on climate-resilient agricultural practices beyond the life of the project. The results achieved and demonstrated by the project during the two-year pilot phase will play a big role in determining whether or not this will happen. IFC and agribusinesses will assess the cost and benefits of the training activities, and decide whether to continue.

At the end of the project's pilot phase, agribusinesses may see more benefits than costs in training additional farmers. This may occur because of one or a combination of the following reasons:

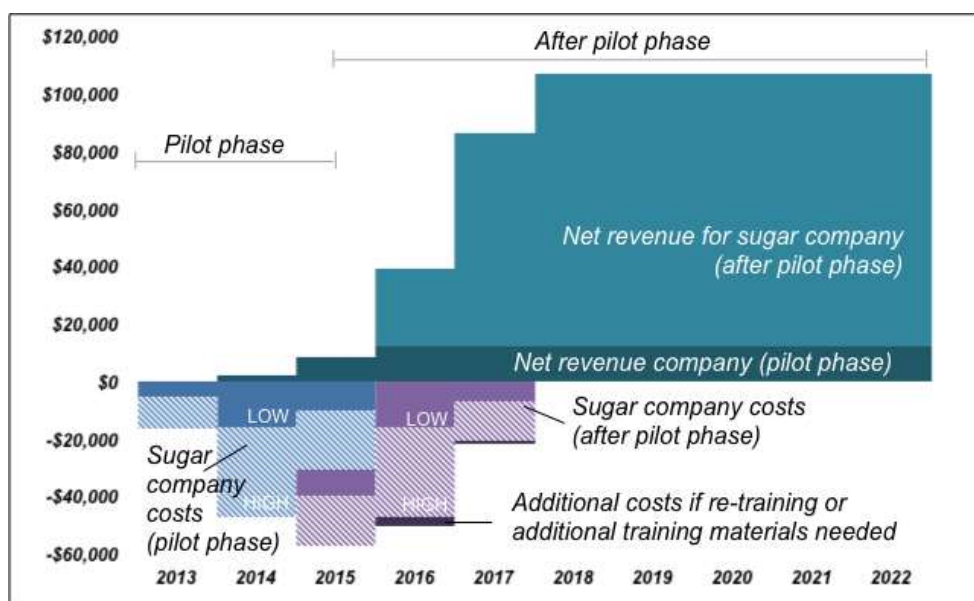
- **Start-up costs cease:** The agribusinesses will not have to cover the initial investment paid with the support of PPCR funds to create training materials. These are "sunk costs" that should not occur after the pilot period (or may just require slight adjustments).
- **Learning-effect during the project:** Learning-by-doing can improve the effectiveness of training farmers in improved agricultural practices, and generate efficiency gains. The approaches piloted during the project will have been tested, their reliability proved or shortcomings highlighted, and they will have been adjusted to maximize results.
- **Increased awareness of benefits:** During the project intervention, agribusinesses may become more aware of the benefits associated with addressing farmers' capacity gaps and vulnerabilities. This is particularly true in the case of the rice company, which was

not previously engaged in any training activity. The sugarcane and the maize processing companies, which are already engaged in training activities – the latter with farmers growing broilers (IFC, 2012a) – may become aware of the additional benefits of training farmers using the approach and practices promoted by IFC under the project, and the benefits of climate-adaptive seeds and irrigation technologies.

To illustrate the potential long-term business case, Figure 15 considers the case of the sugarcane-processing company to show the costs and benefits of extending training to 4,400 additional farmers in the two years after the pilot phase (mid-2015 to mid-2017). In a standard scenario, training of additional farmers will pay back in only two to seven months, as more farmers will be trained per year.¹¹⁸

Assuming the projects generate learning and result in efficiency gains, the benefits to companies may be even higher, and the payback period for their investment shorter. Additional gains can be generated by the demonstration effect of the project; farmers not involved in the training may replicate practices adopted successfully by “lead farmers”.

Figure 15. Sugar company’s costs and revenues (in current USD) – pilot phase and beyond.



Source: author’s elaboration. Notes: Projections assume that 4,400 additional farmers are trained after the pilot phase, of which 2,700 are assumed to adopt improved practices and increase their productivity by 20% (standard scenario).

Public financial support will likely still be needed to continue farmers’ training after the pilot phase, but can be gradually phased out. In our standard scenario, after the end of the pilot period, the project still covers USD 100,000 of the training costs per company over two years, assuming that PPCR grants are equally distributed over the 4 years of the project.

¹¹⁸ This assumes that the training costs and the associated increase in farmers’ productivity are the same as in the 20% standard scenario in the pilot phase of the project. See Appendix D and E for more information and details on assumptions.

PPCR funds and IFC support may be required for delivering additional training to reach an increasing numbers of farmers or to invest in content or tools,¹¹⁹ or because productivity increases are lower than expected. However, IFC plans to decrease the cost coverage over time, and this may be feasible, according to our financial calculations for the sugarcane processing company: even if the company had to pay for all IFC-PPCR costs in the two years after the pilot phase, the investment should still pay back in a relatively short time (0.8-1.2 years).

It is worth noting that in other IFC agricultural projects (not targeting climate resilience), IFC was able to reduce or even phase out the financial support provided, and agribusinesses remained engaged beyond the initial intervention. This was, for instance, the case for a project in India, where a sugarcane processor, DCM Shriram Consolidated Limited (DCSL), decided to scale-up training from 2,000 to 12,000 farmers under the project, and is even planning to reach 50,000 in a next phase (DSCL, 2013). From an initial coverage of 50% of the project's costs, public, and NGO subsidies were reduced to 40-45% in the follow up project (IFC, 2013b).¹²⁰

Furthermore, in the case of Probiotech – the maize processing company currently involved in the PPCR project – cost reductions of about 5 NPR per kilogram of broilers produced during a previous IFC project (IFC, 2012a) led to significant improvement in its business performance. This motivated Probiotech to scale up the model to 2,000-4,000 additional broiler-growing farmers, and to replicate it with maize farmers under the PPCR.

Success in past IFC projects, however, may be related to a combination of technical assistance and investments into companies: IFC invested in DCSL and it is currently in the process of acquiring an equity stake of Probiotech (IFC, 2013c). IFC's follow-up investment might be a salient element for agribusinesses to remain engaged beyond the project's life. As the World Bank's Independent Evaluation Group highlighted (IEG, 2011), IFC has achieved superior outcomes when combining technical assistance projects with investment in agribusiness partners. In contrast, it also highlights that results have been inferior when IFC has not followed up with investment, due to the lack of a partner company with the financial and technical capacity to support the type of interventions learned during the project's life.

¹¹⁹ In the case of an IFC project with the Indian sugar company DSCL the extension of training involved additional program development costs for the use of GPS and tablets to further improve training (DSCL, 2013).

¹²⁰ Discussions with DSCL suggests that IFC is still covering 50% of the follow-up costs, but this is mainly due to additional investments in GPS systems and tablets for the training activities; IFC costs would decrease if the same approach as in the initial phase were used (DSCL, 2013).

4.3.2 Is private engagement in climate resilience scalable and replicable?

Close monitoring and post-project evaluation of the Nepalese IFC-PPCR project will be essential to understanding what worked and what did not. It would contribute to the creation of a knowledge base for shaping future interventions aimed at engaging the private sector in climate resilience initiatives, including their scale-up and replication in other contexts.¹²¹

If the IFC-PPCR project in Nepal proves to be successful, its model could be scaled-up to reach out to more farmers, both through the agribusinesses involved in the project – which have around 22,000-36,000 farmers in total in their supply chains¹²² – and by engaging more agribusinesses processing the same crops or others in the country. For instance, IFC has already identified at least two other companies (one processing rice and the other sugarcane) that could be involved in the project (IFC, 2013b and IFC, 2013d).

Furthermore, peers can gain knowledge from and imitate farmers or other entities trained during the project. For example, farmers' cooperatives can share knowledge with peers or be imitated, generating positive spill-over effects.

However, there are some challenges to scaling up the project in Nepal. Examples include:

- Climate change affects crops in different ways, and constraints to enhanced productivity are crop-specific. Therefore, scale up is more likely to require public support if new crops are targeted, as new approaches tailored to these crops would be needed;
- Private players might be less interested in investing in subsistence crops than in commercial and cash crops like sugarcane.
- Agribusinesses operating in supply chains with a number of intermediary off-takers typically have weaker relationships with farmers and, therefore, fewer incentives to train farmers who could sell to different buyers (“side-selling”).

The project approach can be replicated in other countries. The project itself is a good example for this, as it already replicates an existing model used by IFC in agriculture development (e.g., IFC, 2010a).. Interviews with IFC staff (IFC, 2013b) suggest that this project incorporates lessons learned through previous experience in conventional projects, and that the lessons learned so far during the development of the Nepalese intervention have already been shared with other PPCR countries, such as Bangladesh (IFC, 2013b).

Nonetheless, replicating private sector engagement in other countries may face context-specific barriers as experiences in some other PPCR pilot countries have shown (CIF, 2013e; CIF, 2012d) (see Appendix C for more on these barriers). These include:

¹²¹ For a relevant discussion on the topic see also Biagini and Miller (2013).

¹²² Data from NPC-WFP-NDRI (2010); PwC (2012); CEAPRED (2013b); Golchha (2013); FAO (2013); Nimbus (2013a).

- Unfavorable investment climates and underdeveloped private sectors;
- Limited government awareness of the potential role of the private sector in climate-resilient development and reluctance to share climate finance aid with private actors;
- Short-term time horizon for investment return of many private sector players;
- Lack of data and technical skills.

4.3 Addressing barriers to scaling up and replicating private sector engagement in climate resilience

Challenges and delays experienced in some PPCR private sector projects call for enhanced efforts to create conducive frameworks, as well as the generation and diffusion of knowledge about market risks and opportunities. Identifying “game changers” is a complex task that requires time, experimentation, and flexibility.

Based on early insights from the PPCR and MDBs’ experience, the following strategies may help to address the barriers for fostering and scaling-up private actors’ involvement:

- Carry out in-depth market studies to identify business opportunities, market needs, and viability gaps as well as ways to improve enabling environments. They are also needed to identify where private action makes business sense and to design effective public interventions. MDBs have undertaken a number of these studies to develop projects for funding by the PPCR or by other mechanisms (see CIF, 2013a for e.g. Niger; EBRD and IFC, 2013). These studies and analyses, developed through direct interviews with and/or in cooperation with private actors, represent an important tool to promote awareness, share knowledge, identify business models, and possibly pave the way for future interventions. They can also help to educate and prepare governments to harness the local private sector’s potential for adaptation by identifying, for instance, opportunities for partnerships and collaboration.
- Create dedicated private sector funding mechanism such as the “private sector set aside” established by the PPCR governing body in November 2012 for allocating a predetermined volume of resources on a competitive basis (see CIF, 2012c).¹²³ This mechanism can provide further opportunities to experiment, while avoiding recipient governments feeling like they are “giving away” part of the resources received by donors.
- Provide both low-cost loans and grants to fill viability and capacity gaps therefore enabling private actors to play an active role in climate resilience. Grant resources are critical for generating the demand for investments in adaptation measures by financing

¹²³ Under the private sector set aside the PPCR governing body recently (November 2013) endorsed USD 41 million in concessional loan resources, out of the USD 70 million competitive set aside, for six private sector-oriented project concepts submitted by PPCR pilot countries through the AfDB, EBRD and IDB (CIF, 2013g and CIF, 2013h).

technical assistance measures. Concessional loans can help to incentivize these investments by buying down the additional costs and risks associated to non-traditional practices.

- Pilot and test private sector adaptation approaches in Middle Income Countries. Given the relative novelty of the topic for the private sector, testing approaches in countries with more developed private sectors where projects face relatively fewer barriers could help to generate the experience and track record needed to ensure the uptake of best practices and successful models in Least Developed Countries.

5. Concluding remarks

Understanding the possible role of the private sector in contributing to countries' adaptation efforts, and how to involve it in tackling countries' adaptation priorities, can help nations achieve climate-resilient development goals more effectively. Private sector engagement in is in fact critical to "climate-proof" key sectors of countries' economies and thereby secure climate-resilient development. The decisions and behaviour of this major engine of economic growth will determine whether developing countries move out of poverty in a resilient manner.

The agricultural sector in Nepal is highly vulnerable to the impacts of changing climate conditions. The private sector takes most of the investment decisions in this sector and could provide tools and services that can smooth the path to adaptation. Its successful involvement could stimulate scale up and replication of best practices, products and technologies.

Recognizing its potential, the PPCR – a multilateral mechanism channeling international climate finance resources – is supporting Multilateral Development Bank in piloting ways to engage private actors in activities associated with reducing countries' exposure to climate risks in alignment with these countries' adaptation priorities and strategies.

The assessed IFC-PPCR project in the Nepalese agricultural sector shows that private actors have economic interests to embed climate resilience considerations in their business practices. For agribusinesses, the exposure of the farmers that supply them to weather events, and the constraints on these farmers' productivity, can affect their ability to satisfy market demand and remain profitable over time, thereby incentivizing them to strengthen farmers' capabilities and resilience. Farmers also have strong incentives to participate in the IFC-PPCR project in order to learn how to avoid climate-induced losses, and how to increase their income through improved yields, better quality production and stronger ties with their output markets.

The early lessons shown by the IFC-PPCR project in Nepal also provide insights on those barriers preventing private action (knowledge, capacity, and risk gaps) that well-targeted public resources have to tackle to unlock these actors' potential. Specifically, the study identified three key interventions to address them:

- First, consultation and involvement of local actors early in the process, with the backing of evidence-based analyses. This process is essential to increase recipient governments' awareness of the potential of private actors in building resilience, to educate actors about climate-related risks and possible opportunities, and to identify business models enabling their participation. This is also critical to ensure alignment with countries' strategies and priorities.
- Second, tailored knowledge and capacity building measures to create private delivery models for adaptation interventions. This lays the foundation for long-lasting results, maximizing the potential outcomes from each dollar of public finance invested. The project provision of know-how to agribusinesses is important to enable them to train farmers operating in their supply chains in improved agronomic practices.
- Third, create innovative financing mechanisms to get local financial institutions on board. Local banks are critical to fully enable domestic private actors to invest in resilience; capacity building measures are then essential to create demand for investment and generate a deal flow.

The Nepalese experience also shows that the level of public support in private-sector oriented projects has to be limited to avoid market distortions and to ensure that public resources are spent effectively. In the Nepalese case, agribusinesses and banks are asked to contribute to the project – increasingly as they get results and gain experience in order to limit the risk of moral hazard behavior. Still, grant funding is an essential component to build their knowledge and capacity, and incentivize them to engage in ventures with uncertain outcomes.

The project is driven by a strong alignment of interest between the actors' involved in the projects. By harnessing existing buyers and suppliers' relationships and networks, the project leverages those market forces that can create the long-term business case for the agribusiness involved to train farmers on climate resilient agricultural practices beyond the life of the project.

Further experimentation and analysis is needed to scale-up and replicate efforts.

It is too early to fully assess the effectiveness of the PPCR model in involving private actors in building countries' resilience, and the likelihood of success of the interventions developed by IFC in Nepal. Nevertheless, the early insights drawn from this case study and from the

experience of the MDBs in other PPCR pilot countries and beyond, as well as interactions with experts, may provide decision makers with a better understanding of the challenges faced on-the-ground, but also of promising strategies that can address them.

Finding “game changers” is a complex undertaking that requires time, experimentation and flexibility. In addition to the approaches used in Nepal the following can be further explored:

- Dedicated private sector funding windows, with competitive allocation, to provide further and flexible opportunities to experiment, while addressing the reluctance of some governments to share international climate finance with the private sector
- Piloting and testing private sector engagement approaches in adaptation in Middle Income Countries as it can help to generate learning and identify best practice that could then be transferred to Least Developed Countries.

As PPCR projects focused on private sector engagement in climate resilience advance into the implementation phase, additional analysis of these projects, but also of others beyond the PPCR can provide further insights to fully understand shortcomings and offer additional evidence about how and where to make climate resilience a private sector business. This is a prerequisite to understand how to best scale-up and replicate successful interventions.

6. References

- Agrawala S. et al. 2011. *Private Sector Engagement in Adaptation to Climate Change: Approaches to Managing Climate Risks*. OECD Environment Working Papers, No. 39, OECD Publishing. Available at: <http://dx.doi.org/10.1787/5kg221jkf1q7-en>.
- Atteridge A. 2011. *Will Private Finance Support Climate Change Adaptation in Developing Countries. Historical Investment Patterns as a Window on Future Private Climate Finance*. Stockholm Environment Institute, Stockholm, Sweden.
- Asian Development Bank (ADB). 2012a. *Stakeholder Engagement in Preparing Investment Plans for the Climate Investment Funds. Case Studies from Asia*. Asian Development Bank and Climate Investment Funds. Manila, Philippines.
- Asian Development Bank (ADB). 2012b. *Shallow Tube-well Irrigation in Nepal: Impacts of the Community Groundwater Irrigation Sector Project Impact Evaluation Study December 2012*. Manila: Asian Development Bank.
- Asian Development Bank (ADB). 2013a. Discussion with Cindy Malvicini in February 2013.
- Asian Development Bank (ADB). 2013b. *Stakeholder Engagement in Preparing Investment Plans for the Climate Investment Funds. Case Studies from Asia, Second Edition*. Asian Development Bank and Climate Investment Funds. Manila, Philippines. Manila, Philippines.
- Bhagat S. 2010. *Capacity Utilization in Nepalese Sugar Industry*. In *Tribhuvan University Journal*, 27 (1-2). At: <http://tujournal.edu.np/index.php/TUJ/article/view/260>.
- Biagini B. and Miller A. 2013. *Engaging the Private Sector in Adaptation to Climate Change in Developing Countries: Importance, Status, and Challenges*. Review Article. *Climate and Development*, Vol. 5, Issue 3, 2013, Pages 242-252.
- Buchner B., Hervé-Mignucci M., Trabacchi C. Wilkinson J., Stadelmann M., Boyd R., Mazza F., Falconer A., Micale V., 2013. *The Landscape of Climate Finance 2013*. CPI Report. October 2013. Venice, Italy.
- Carter et al., 1994; Carter, T.L., M.L. Parry, S. Nishioka and H. Harasawa (eds.), 1994: *Technical Guidelines for Assessing Climate Change Impacts and Adaptations*. Report of Working Group II of the Intergovernmental Panel on Climate Change, University College London and Centre for Global Environmental Research, London, UK and Tsukuba, Japan
- Center for Environmental and Agricultural Policy Research, Extension and Development (CEAPRED). 2013a. Datasheet received per email, 27th May 2013, compiling information from the yearbooks *Statistical Information on Nepalese Agriculture 2006/2007, 2007/2008, 2008/2009, 2009/2010, 2010/2011*, issued by the Ministry of Agricultural Development, Government of Nepal, Khatmandu. CEAPRED. Khatmandu, Nepal.
- Center for Environmental and Agricultural Policy Research, Extension and Development (CEAPRED). 2013b. *Datasheet*, received per email, 27th May 2013, *compiling average cost of production for selected crops in selected Nepalese districts for the year 2010/2011*. CEAPRED, Khatmandu, Nepal.
- CIMMYT [International Maize and Wheat Improvement Center]. 2010. *Nepal and CIMMYT: 25 Years of Fruitful Partnership*. At: <http://www.cimmyt.org/en/>.
- Climate Investment Funds (CIF) web site at <https://www.climateinvestmentfunds.org/cif/ppcr>.
- Climate Investment Funds (CIF). 2009a, *Programming and Financing Modalities for the SCF Targeted Program, The Pilot Program for Climate Resilience (PPCR)*, July 2009. At: https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/PPCR_Programming_and_Financing Modalities.pdf.
- Climate Investment Funds (CIF). 2009b. *Guidelines for Joint Missions to Design the PPCR Pilot Programs*, June 2009. At: https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/PPCR_joint_mission_guidelines_final.pdf.
- Climate Investment Funds (CIF). 2009c. *Notification of Joint Multilateral Development Bank Programming Mission to Support Nepal's Preparation towards Developing the Pilot Program for*

Climate Resilience (PPCR) Strategic Program for Climate Resilience. August 2009. At: <http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Notification%20of%20Joint%20Mission%20Nepal-Aug%2017%202009.pdf>.

Climate Investment Funds (CIF). 2010. *Pilot Program on Climate Resilience (PPCR): Financing Modalities*, June 15, 2010, Washington DC. At: <https://www.climateinvestmentfunds.org/cif/node/1884>.

Climate Investment Funds (CIF). 2010. *Aide Memoire. Nepal: Pilot Program for Climate Resilience (PPCR)* World Bank / Adb / Ifc Joint Mission 15-21 November 2010, Nepal. At: <http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/FINAL%20PPCR%20Aide%20Memoire%20Dec%2010%20include%20annexes.pdf>

Climate Investment Funds (CIF). 2011a. *Strategic Program for Climate Resilience Nepal*. PPCR/SC.8/7, Cape Town, South Africa, June 2011. At: <http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/PPCR%207%20SPCR%20Nepal.pdf>.

Climate Investment Funds (CIF). 2011b. *Governance Framework for the Strategic Climate Fund*, Adopted November 2008 and amended December 2011. At: <http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/SCF%20Governance%20Framework-FINAL.pdf>.

Climate Investment Funds (CIF). 2011c. *Climate Investment Funds: Lessons Learned From Private Sector Interventions through MDB Intermediaries*, Joint Meeting of the CTF and SCF Trust Fund Committees Washington, D.C. November 3, 2011.

Climate Investment Funds (CIF). 2012a. *Nepal: Building Climate Resilient Communities through Private Sector Participation*. At: <https://www.climateinvestmentfunds.org/cifnet/?q=country/nepal>.

Climate Investment Funds (CIF). 2012b. *Proposal for Additional Tools and Instruments to Enhance Private Sector Investments in the CIF*, April 2012. At: http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/CTF_SCF_8_Proposal_for_Additional_Tools_and_instruments_for_private_sector.pdf.

Climate Investment Funds (CIF). 2012c. *Decision on Agenda Item 7, Allocation of PPCR Resources*. November 1, 2012. PPCR/SC.11/CRP.5. At: https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/PPCR_CRP.5_Decision_on_allocation_of_PPCR_resources.pdf.

Climate Investment Funds (CIF). 2012d. *Pilot Program on Climate Resilience (PPCR) Semi-Annual Operational Report*, PPCR/SC.11/3.Rev.1, October 19, 2012 – Meeting of the PPCR Sub-Committee Istanbul, Turkey.

Climate Investment Funds (CIF). 2013a. *PPCR Semi-Annual Operational Report*, PPCR/SC.13/3, October 7, 2013. Washington D.C. At: <https://www.climateinvestmentfunds.org/cif/taxonomy/term/412>.

Climate Investment Funds (CIF). 2013b. *PPCR Pilot Country Updates – October- April 2013*. Washington D.C. At: <https://www.climateinvestmentfunds.org/cif/node/12499>.

Climate Investment Funds (CIF). 2013c. *Procedures for Allocating PPCR Resources on a Competitive Basis from a Set Aside*, February 2013, Washington D.C. At: <https://www.climateinvestmentfunds.org/cif/content/procedures-allocating-ppcr-resources-competitive-basis-set-aside>.

Climate Investment Funds (CIF). 2013d. *Report on the Financial Status of the SCF (Prepared by the Trustee)* CTF-SCF/TFC.11/Inf.5 October 2013. Washington D.C. At: https://climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/CTF_SCF_TFC.11_Inf.5_Report_on%20the_financial_status_of_the_SCF.pdf.

Climate Investment Funds (CIF). 2013e. *PPCR Semi-Annual Operational Report*, PPCR/SC.12/3 April 2013, Washington D.C. Available from: <https://www.climateinvestmentfunds.org/cif/content/ppcr-semi-annual-operational-report-1>.

Climate Investment Fund (CIF). 2013f. *Update on the Use of Financing Instruments in CIF Investments*, April 2013, Washington D.C. At: <https://www.climateinvestmentfunds.org/cif/node/11663>.

Climate Investment Funds (CIF). 2013g. *Access to Competitive Funding for Innovative Programs and Projects that engage the Private Sector in PPCR*. [Web page last accessed in November 2013]. Washington D.C. At: <https://www.climateinvestmentfunds.org/cif/node/11440>.

Climate Investment Funds (CIF). 2013h. *Review and Selection of Concepts to be Financed from the PPCR Private Sector Set Aside*. PPCR/SC.13/4. October 2013. Washington D.C. At: <https://www.climateinvestmentfunds.org/cif/node/14023>.

Climate Investment Funds (CIFs). 2013i. *Approval by Mail: Nepal: Endorsement of Concept for Additional Resources (ADB)*, May 2013. Washington D.C. At: https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Approval_by_Mail_Endorsement_of_Concept_for_Additional_Resources_Proposed_Decision.pdf.

Climate Investment Funds (CIFs). 2013. *Pilot Program for Climate Resilience – Program Approval Request – Bangladesh* – Project: Promoting Climate Resilient Agriculture and Food Security (IFC). At: <https://www.climateinvestmentfunds.org/cifnet/?q=country/bangladesh>.

Climate Investment Funds (CIF). 2014. *PPCR Semi-Annual Operational Report*. Meeting of the PPCR Sub-Committee Montego Bay, Jamaica. PPCR/SC.14/3.

Climate Policy Initiative (CPI). 2013. 2013. *The San Giorgio Group Case Studies*, Venice, Italy. At: <http://climatepolicyinitiative.org/publication/san-giorgio-group-case-studies>.

Dcnepalevent.com, 2012. Three sugar mills halt production. 6th January 2012. Retrieved 6th June 2013. Available at: http://www.dcnepalevent.com/news_nepali_archive.php?nid=16303.

Devex. 2013. Tender *e-Consult: Nepal Feasibility Study for Climate Resilient Housing*. Project reference numbers, WB3069-06/13, TF080884, 1110333. At: <https://www.devex.com/en/projects/e-consult-nepal-feasibility-study-for-climate-resilient-housing-296213>.

Dillon A., Sharma M. and Zhang X. 2011. *Estimating the Impact of Access to Infrastructure and Extension Services in Rural Nepal*. Research Monograph. Washington D.C. International Food Policy Research Institute.

DCM Shriram Consolidated Ltd 2013. [Cited as DSCL. 2013]. Discussion with Sunil Radhakrishna, Senior Executive Director, conducted 12th June 2013.

ECIAfrica/DAI. 2012. *IFC Private Sector Support to Climate Resilience in Zambia. Mobile Phone Platform for Disseminating Information to Smallholder Farmers*. Produced by ECIAfrica/DAI for IFC. September 28 2012. Disclosed on May 2013. At: https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/PPCR_IFC_Zambia_a_Mobile_Phone_Platform_Public_Report_Feb_2013%5B1%5D.pdf.

European Bank for Reconstruction and Development (EBRD). 2013. Discussions with Craig Davies in September 2013.

European Bank for Reconstruction and Development (EBRD) and International Finance Corporation (IFC). *Pilot Climate Change Adaptation Market Study: Turkey*. Presentation delivered at the CIF meetings on October 30th, 2013. At: <https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/2013-10-31%20EBRD%20IFC%20Turkey%20Adaptation%20Market%20Study.pdf>.

Ekantipur. 2013a. *Bank Loans to Farm Sector Jump 65pc*. 3 October 2013. [Accessed in May 2013]. At: <http://www.ekantipur.com/2012/10/03/business/bank-loans-to-farm-sector-jump-65pc/361083.html>.

Ekantipur. 2013. *Sugarcane Price Hiked*. 12th February 2013. At: <http://ekantipur.com/2013/02/12/business/sugarcane-price-hiked/366996/>.

FAO, 2009. *Challenges and Opportunities for Nepal's Small and Medium Forest Enterprises*. Asia Network for Sustainable Agriculture and Bioresources Kathmandu, Nepa

(SMFEs) At: <http://www.fao.org/docrep/012/i1266e/i1266e00.pdf>.

Food and Agriculture Organization of the United Nations (FAO). 2010. *Agricultural Extension Services Delivery System in Nepal*. Food and Agriculture Organization of the United Nations, UN Complex, Pulchowk, Nepal. At: <ftp://ftp.fao.org/OSD/CPF/Country%20NMTPF/Nepal/AgExtServDelSysNepal.pdf>

Food and Agriculture Organization of the United Nations (FAO). 2013. *FAOstat database*. Data retrieved in 9th May 2013. At: <http://faostat.fao.org/site/535/DesktopDefault.aspx?PageID=535>.

Fatima. 2011. *Annual report 2011*. Multan: Fatima Sugar Mills Ltd, Fatima Group. At: <http://fatima-group.com/relianceweaving/pdf/RelianceReportJune2011.pdf>.

Ferrari A., Jaffrin G., Raj Shrestha S. 2006. *Access to Financial Services in Nepal*, The World Bank, Washington D.C. At: <http://siteresources.worldbank.org/NEPAEXTN/Resources/publications/415830-1174327112210/complete.pdf>.

Fankhauser et al., 1999. Fankhauser, Samuel, Joel B. Smith, and Richard S.J. Tol. 1999. "Weathering Climate Change: Some Simple Rules to Guide Adaptation Decisions." *Ecological Economics* 30 (1999) 67–78.

Golchha Group. 2013. [Cited as Golcha 2013]. Interview with Dunakar Golchha, Executive Director, conducted on 4th July 2013.

Goletti F., Mainal P, Landon-Lane C. et al. 2012. *Assessment Report, Technical Assistance for the Preparation of the Agricultural Development Strategy*. Manila: Asian Development Bank.

Government of Nepal (GoN). 2010a. *National Adaptation Program for Action (NAPA) to Climate Change*, Ministry of the Environment, September 2010.

Government of Nepal (GoN). 2011. *Submission of Nepal. Views on National Adaptation Plans*. Kathmandu: [Government of Nepal]. 16 August 2011. Retrieved 1st July 2013 from http://unfccc.int/files/documentation/submissions_from_parties/application/pdf/nepal.pdf.

Hervé-Mignucci M., Frisari G., Micale M., Mazza F., *Risk Gaps: First-Loss Protection Mechanisms*. A CPI Report, January 2013. Venice, Italy. At: <http://climatepolicyinitiative.org/wp-content/uploads/2013/01/Risk-Gaps-First-Loss-Protection-Mechanisms.pdf>.

Himalayan Times. 2013. *Half the Banks Need to Increase Capital*. *Himalayan News service 2013-02-12* At: <http://www.thehimalayantimes.com/fullTodays.php?headline=Half+the+banks+need+to+increase+capital+&NewsID=365726>.

Himalayan Times. 2012. *Government Aims to Double Agriculture Budget*. 3rd September 2012. Khatmandu: Himalayan Times. Retrieved 24th June 2013 from <http://www.thehimalayantimes.com/fullNews.php?headline=Government+aims+to+double+agriculture+budget&NewsID=32355>.

Himalayan Bank Limited Homepage. At: <http://www.himalayanbank.com/>.

International Finance Corporation (IFC). 2009. *Structured and Securitized Products. Risk Sharing Facility Product Description*. At: <http://www.ifc.org/wps/wcm/connect/1d022f00487c8d409ca4bd84d70e82a9/Risk+Sharing+Facilities.pdf?MOD=AJPERES>.

International Finance Corporation (IFC). 2010. *Ethiopian Coffee. Summary of Proposed Investment*. http://www.ifc.org/ifcext/spiwebsite1.nsf/ProjectDisplay/SPI_DP29228.

International Finance Corporation (IFC). 2012a. *Strengthening Critical Segments of the Poultry Supply Chain Sustainable Business Advisory - IFC Advisory Services in South Asia*: http://www.commdev.org/userfiles/SBA_PC_Nepal%20Poultry_Sep2012_EN.pdf.

International Finance Corporation (IFC). 2012b. *Sugar: A Sweet Spot for IFC Advisory Services*. 2012b. At: http://www.commdev.org/userfiles/SBA_PC%20-%20DACL%20Sugar%20-%20Sept%202012.pdf.

International Finance Corporation (IFC). 2013a. *Assessing Private Sector Contributions to Job Creation and Poverty Reduction*. At: http://www1.ifc.org/wps/wcm/connect/0fe6e2804e2c0a8f8d3bad7a9dd66321/IFC_FULL+JOB+STUDY+REPORT_JAN2013_FINAL.pdf?MOD=AJPERES.

International Finance Corporation (IFC). 2013b. Discussions with IFC staff (Anupa Aryal Pant, Ahmad Slaibi, Dieter Fischer, Haruisha Ohtsuka, Bradford L. Roberts, Vladimir Stenek, Harsh Vivek conducted between January and September 2013.

International Finance Corporation (IFC). 2013c. Project Database [Last accessed October 2013]. At: <https://ifcndd.ifc.org/ifcext/spiwebsite1.nsf/d011bd56046289dc85257b6000260169/6fa6c4d40a8956ba85257b63007089e1?opendocument>.

International Finance Corporation (IFC). 2013d. *Logic Flow for Nepal PPCR – Resilient Agribusiness*. Nepal.

International Finance Corporation (IFC). 2013e. *Terms of Reference - The International Finance Corporation Evaluation of the “Promoting Climate Resilient Agribusiness Project (Nepal)”*.

International Finance Corporation (IFC). 2013f. *Terms of Reference for Project Implementation Partner Promoting Climate Resilient Agriculture Pilot Program for Climate Resilience (PPCR) – Nepal*.

International Finance Corporation (IFC). 2013g. *Working with Smallholders. A Handbook for Firms Building Sustainable Supply Chains*. Washington D.C.

International Finance Corporation (IFC). 2013h. DSCL Sugarcane: *Improving Farmer Productivity in India*. Washington DC: International Finance Corporation. 1st June 2013. At: <http://www.ifc.org/wps/wcm/connect/e19e34804e65cf28b4b7bcfce4951bf6/SBA+Project+Examples+-+DSCL+Sugar.pdf?MOD=AJPERES>.

International Finance Corporation (IFC). 2013i. *Agri-Seed: Making Bangladesh’s Agricultural Sector More Sustainable*. Washington D.C. At: http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/sustainable+business+advisory+services/project+examples/sba-project-agriseed.

Independent Evaluation Group of the World Bank Group (IEG). 2009. *The World Bank Group Guarantee Instruments 1990–2007*. An Independent Evaluation. Washington D.C.

Independent Evaluation Group of the World Bank Group (IEG). 2011. *Evaluative Lessons from World Bank Group Experience - Growth and Productivity in Agriculture and Agribusiness*. Washington, D.C. World Bank. At: http://siteresources.worldbank.org/EXTGPAA/Resources/Agribusiness_eval.pdf.

ICRA Nepal web site [cited as ICRA 2013], last accessed in August 2013. At: <http://icranepal.com/>.

International Food Policy Research Institute (IFPRI). 2012. *Agriculture, Seed, and Innovation in Nepal: Industry and Policy Issues for the Future*. Joshi K.D, Conroy C. and Witcombe J.R. Project Paper December 2012. Washington, D.C.

Intergovernmental Panel on Climate Change (IPCC). 2012. *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. Glossary of Terms. Special Report of the Intergovernmental Panel on Climate Change. At: http://www.ipcc.ch/pdf/special-reports/srex/SREX_Full_Report.pdf.

IRIN. 2013. Analysis: *The Trouble with Nepal’s Agriculture*. 23 January 2013. New York: IRIN News (UN Office for the Coordination of Humanitarian Affairs). Retrieved 24th June 2013 from <http://www.irinnews.org/printreport.aspx?reportid=97321>.

Intelcap. 2010. *Opportunities for Private Sector Engagement in Urban Climate Change Resilience Building*. At: <http://www.intelcap.com/publications/opportunities-private-sector-engagement-urban-climate-change-resilience-building>.

International Rice Research Institute (IRRI). 2013. Rice in Nepal. Based on UN World Food Programme. [Web page – last accessed in July 2013] At: http://irri.org/index.php?option=com_k2&view=item&id=11213:rice-in-nepal.

Kafle B. and Shah P. 2012. *Adoption of Improved Potato Varieties in Nepal: A Case of Bara District*. Nepal Agricultural Research Council, Khumaltar, Lalitpur, Nepal. Sri Lanka Journals Online. At: <http://www.sljol.info/index.php/JAS/article/viewFile/4063/3311>.

Kaphle G.P. and Sigdel B.D. 2013. *Issues and Challenges of Agriculture vs. Rural Finance in Nepal: Involvement of Nepal Rastra Bank*. Presentation Prepared for 62nd Excom Meeting/Seminar organized by APRACA, Bangkok February 26 – March 1, 2013.

Karki S., DeWald J., Shahi M. 2010. *Value Chain Finance and Nepal: Perspectives and Insights*. MercyCorps Publication.

- Klein R. 2002. *Adaptation to Climate Variability and Change: What is Optimal and Appropriate?* At: http://svmrevproxy01.unfccc.int/files/adaptation/adverse_effects_and_response_measures_art_48/application/pdf/200205_klein_paper.pdf
- Michel-Kerjan, E., 2008: Disasters and public policy: Can market lessons help address government failures. Proceedings of the 99th National Tax Association conference, Boston, MA
- Mehran. 2012. *Annual Report 2012*. Karachi: Mehran Sugar Mills Limited. At: <http://www.mehransugar.com/annual.php>.
- Mendelsohn R. 2000. *Efficient Adaptation to Climate Change*. Climatic Change 45: 583–600 + also economics cc <http://www.dvfu.ru/meteo/library/243886.pdf>.
- Mirpurkhas. 2012. *Annual report 2012*. Karachi: Mirpurkhas Sugar Mills, Ghulam Faruque Group.
- Ministry of Agricultural Development (MoAD). 2012a. *TA 7762-NEP Preparation of the Agricultural Development Strategy (ADS). Assessment Report – Prepared for the Government of Nepal – With the support of ADB, IFAD, EU, FAO, SDC, JICA, WFP, USAID, DANIDA, DFID, and World Bank*. Kathmandu, Nepal, April 2012. At: <http://www.moad.gov.np/pdf/adsassessmentreport.pdf>.
- Ministry of Agricultural Development (MoAD). 2012b. *Statistical Information on Nepalese Agriculture 2011/2012*. Ministry of Agricultural Development, Government of Nepal, Khatmandu.
- Ministry of Agricultural Development (MoAD). 2013. Email by Prabhakar Pathak, Joint Secretary, Gender Equity and Environment Division, 8th July 2013. Ministry of Agricultural Development, Government of Nepal, Khatmandu.
- Ministry of Agricultural Development (MoAD). 2013b. *Summary of Draft Vision Report for the Technical Assistance (TA) 7762-NEP Preparation of the Agricultural Development Strategy*. [Web site page last accessed in November 2013]. At: <http://www.moad.gov.np/ads/index.php?pageid=153>.
- Ministry of Finance (MoF). 2013a. Discussions with Bhuban Karki – Under Secretary, Ministry of Finance, Government of Nepal, conducted between May and July 2013.
- Ministry of Finance (MoF). 2013b. *Public Statement on Income & Expenditure of Fiscal Year 2012-13*. Delivered by Finance Minister Mr. Shanker Prasad Koirala. 9 April 2013. Annex 1. Budget Summary 2012-13. Kathmandu: Government of Nepal, Ministry of Finance. Retrieved 5th July 2013.
- Ministry of Finance (MoF). 2013c. *Estimates of Expenditure for Fiscal Year 2012/13* (Including Line Item-wise and Source-wise). Annex 1. Service and functional details (including funding). Kathmandu: Government of Nepal, Ministry of Finance. Retrieved 5th July 2013.
- Nepal Bankers Association (NBA). 2013. Personal communications occurred in May 2013.
- Nepal Constitution Foundation. 2010. *Nepal's Strategic Program for Climate Resilience – Consultative Draft* (20/10/2010). At: http://www.ncf.org.np/upload/files/572_en_annex4.pdf.
- Nepal Rastra Bank (NRB) 2010. *Monetary Policy for Fiscal Year 2010/11*, Central Office Baluwatar, Kathmandu Nepal, Available at: http://www.nrb.org.np/ofg/policy.php?tp=monetary_policy&&vw=15.
- Nepal Rastra Bank (NRB). 2012. Quarterly Economic Bulletin. Volume 46, Number 4. Mid-July 2012, Research Department, Kathmandu, Nepal. Available at: http://red.nrb.org.np/publica.php?tp=economic_bulletin&&vw=5.
- Nepal Rastra Bank (NRB). 2012a. *Banking and Financial Statistics*. No. 58, Mid-July 2012. Bank and Financial Institutions Regulation Department, Statistics Division, Kathmandu, Nepal. Available at: http://bfr.nrb.org.np/bfrstatistics.php?tp=bank_fina_statistics&&vw=15.
- Nepal Rastra Bank (NRB) 2012b. *Monetary Policy for Fiscal Year 2012/13*, Central Office Baluwatar, Kathmandu Nepal. At: http://www.nrb.org.np/ofg/policy.php?tp=monetary_policy&&vw=15.
- Nepal Rastra Bank (NRB). 2013. [cited as NRB 2013a]. Web site, at <http://www.nrb.org.np>. Consulted between February and June 2013.
- Nepal Rastra Bank (NRB). 2013b. *Supporting Micro-Finance Institutions through Wholesale Lending, Micro-Finance Promotion and Supervision Department*, Nepal Rastra Bank. Presentation delivered at the Micro-finance Summit Nepal, 2013. Available at: <http://www.microfinancesummitnepal.org/?pg=ppr>.

- Nepal Rastra Bank (NRB) web site - *Statistics* [cited as NRB 2013c – last accessed on September 2013]. At: <http://www.nrb.org.np/statistics.php>.
- Nimbus. 2013a. Interview with Dinesh Kumar Goutam – Manager, Probiotech Industries, Nimbus Holdings, conducted 15th May 2013.
- Nimbus. 2013b Web Site [Last Accessed August 2013]. At: <http://www.nimbusnepal.com/sister-companies.html#sis26>.
- NPC-WFP-NDRI. 2010. Nepal - *Food Security Atlas*, July 2010. National Planning Commission– World Food Programme– [Nepal Development Research Institute](#), Khatmandu.
- Oanda. 2013. Historical Exchange Rates. Nepalese Rupee to US Dollars. Average 1st June 2012-1st June 2013. Retrieved 10th May 2013 from <http://www.oanda.com/currency/historical-rates/>
- Overseas Development Institute (ODI) and Heinrich Böll Foundation (HBF). 2013. *Climate Funds Update Database* [last accessed on October 2013]; [CFU 2013]. London; Washington DC, at: <http://www.climatefundsupdate.org>
- Organisation for Economic Co-operation and Development (OECD). 2013. *Deflators for Resource Flows from DAC Donors*. Paris: Organisation for Economic Co-operation and Development. Retrieved 3rd June 2013 from <http://www.oecd.org/dac/stats/Deflators%20base%202011.xls>
- Paudel P. and Matsuoka A. 2008. *Factors Influencing of Improved Maize Varieties in Nepal: A Case Study of Chitwan District*. Australian Journal of Basic and Applied Sciences, 2(4):823-834.
- Pauw P. and Scholz I., *Private Financing of Adaptation to Climate Change in Poor Countries? The Current Column of November 2012*. German Development Institute. At: [http://www.die-gdi.de/CMS-Homepage/openwebcms3_e.nsf/%28ynDK_contentByKey%29/MRUR-92EAUE/\\$FILE/German-Development-Institute_Pauw+Scholz_26.11.2012.pdf](http://www.die-gdi.de/CMS-Homepage/openwebcms3_e.nsf/%28ynDK_contentByKey%29/MRUR-92EAUE/$FILE/German-Development-Institute_Pauw+Scholz_26.11.2012.pdf).
- Parry M.L., Canziani O.F. Palutikof, van der Linden P.J. and Hanson C.E., Eds. 2007. *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press.
- Paw P., and Pegels A. 2013. *Private Sector Engagement in Climate Change Adaptation in Least Developed Countries: an Exploration*. Climate and Development, 2013 Taylor and Francis.
- Pender J., Nkonya E., Jagger P.; Sserunkuuma, D.; Ssali, H.. 2004. Strategies to increase Agricultural Productivity and Reduce Land Degradation: Evidence from Uganda. *Agricultural Economics*, 31 (2-3), pp. 181–195.
- Poshan B. KC. 2010. *Engaging the Private Sector in the Strategic Program for Building Climate Resilience (SPCR) in Nepal*. Prepared for the International Finance Corporation Nepal. Nepal.
- PriceWaterhouseCoopers (PwC) and Center for Environmental and Agricultural Policy Research, Extension and Development (CEAPRED). 2012. [Cited PwC 2012]. *Scoping Study on Climate Resilient Agriculture and Food Security – PPCR-Nepal*. May 2012. PriceWaterhouseCoopers.
- Samridhhi. *Commercialization of Agriculture in Nepal. Discussion Paper*. The Prosperity Foundation. Kathmandu, Nepal. At: <http://samridhhi.org/userfiles/research%20and%20publication/discussion%20paper/commercialization%20discussion-english.pdf>.
- Sapkota M. 2012. *Trend Analysis of Nepalese Banks from 2005-2010*. University of New Orleans.
- Stenek V., Amado J.P., Greenall D. 2013. *Enabling Environment for Private Sector Adaptation. An Index Assessment Framework*. International Finance Corporation, Washington D.C.
- Sugaronline. 2013. NEPAL: Shree Ram Sugar Mills shuts down on cane shortage. 8th April 2013. Retrieved from http://www.sugaronline.com/website_contents/view/1211495
- Rai N. 2013. *Climate Investment Funds: Understanding the PPCR in Bangladesh and Nepal*. IIED Briefing. April 2013. At: <http://pubs.iied.org/pdfs/17151IIED.pdf>.
- Regmi H. R., 2007. *Effect of Unusual Weather on Cereal Crops Production and Household Food Security*. The Journal of Agriculture and Environment, MoAC, GoN, June2007, Kathmandu, Nepal.

The Global Agriculture & Food Security Program (Gafspfund). 2010. *Nepal Agriculture and Food Security Country Investment Plan*. At: <http://www.gafspfund.org/sites/gafspfund.org/files/Documents/Nepal%20of%209%20Country%20Investment%20Plan.pdf>.

The World Bank. 2009. *Connecting Nepal's Rural Poor to Markets*. Washington D.C. World Bank. At: <http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/0,,contentMDK:22421682~menuPK:64282138~pagePK:41367~piPK:279616~theSitePK:40941,00.html>.

The World Bank. 2011. *Nepal: Priorities for Agriculture and Rural Development*. [Web page last accessed on October 2013]. At: <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/EXTSAREGTOPAGR/0,,contentMDK:20273771~menuPK:548215~pagePK:34004173~piPK:34003707~theSitePK:452766,00.html>

The World Bank. 2012. *Turn Down the Heat – Why a 4°C Warmer World Should be Avoided*, Washington, D.C. At: http://climatechange.worldbank.org/sites/default/files/Turn_Down_the_heat_Why_a_4_degree_centri_grade_warmer_world_must_be_avoided.pdf.

The World Bank Group. 2012a. *Nepal's Investment Climate. Leveraging the Private Sector for Job Creation and Growth*. Afram G.G and Salvi Del Pero A., International Bank for Reconstruction and Development / International Development, Washington DC 20433.

The World Bank. 2012b. *Project Appraisal Document on a Proposed Loan in the Amount of US\$15.0 million and a Proposed Grant in the Amount of US\$16.0 million from the Pilot Program for Climate Resilience (PPCR) of the Strategic Climate Fund (SCF) to Nepal for a Building Resilience to Climate-Related Hazards*, December 6, 2012. Washington DC: World Bank. Sustainable Development Department Nepal Country Management Unit South Asia Region. Report No: 73185-NP

World Bank. 2012. *The Little Data Book on Private Sector Development* [online] The International Bank for Reconstruction and Development/The World Bank, Washington. At: <http://data.worldbank.org/sites/default/files/little-data-book-on-private-sector-dvlpmnt-2012.pdf>

The World Bank. 2013a. World Bank Data. *Indicators*. Washington D.C. World Bank. Accessed on June, 3 2013. At: <http://data.worldbank.org/indicator>.

The World Bank. 2013b. *Kenya Agricultural Productivity and Agribusiness Project*. Results. Washington DC: World Bank. Retrieved May 14th, 2013. At: <http://www.worldbank.org/projects/P109683/kenya-agricultural-productivity-agribusiness-project?lang=en>.

The World Bank. 2013 World Development Report 2013 Jobs [online] The International Bank for Reconstruction and Development/The World Bank, Washington D.C. At: http://siteresources.worldbank.org/EXTNWDR2013/Resources/8258024-1320950747192/8260293-1322665883147/WDR_2013_Report.pdf

UNISDR. 2013. *Global Assessment Report on Disaster Risk Reduction 2013*. At: <http://go.nature.com/LBJ4xL>.

Others document consulted

Adaptation Fund web site, Funded Projects, at: https://www.adaptation-fund.org/funded_projects.

Carbon Disclosure Project (CDP). 2012. *Business Resilience in an Uncertain, Resource-Constrained World*. CDP Global 500 Climate Change Report 2012 on behalf of 655 investors with assets of US\$ 78 trillion. London, U.K.

Climate Investment Funds (CIF). 2012 *Creating the Climate for Change, 2012 Annual Report*. Washington D.C. At: <https://www.climateinvestmentfunds.org/cifnet/?q=country/nepal>.

Climate Investment Funds (CIF). 2013. *Proposal Related to The Use of Local Currency Loans Under the SCF Trust Fund (January 2013) and related Approval (February 2013)*. Washington D.C.

ESCAP CSAM – Center for Sustainable Agriculture Mechanization. Online Resources At: <http://un-csam.org/ppt/np200910-01-p2.htm>.

Global Environmental Facility (GEF). 2013. *Progress Report on the Least Developed Countries Fund and the Special Climate Change Fund*. GEF/LDCF.SCCF.14/03. Washington D.C.

Government of Nepal (GoN). 2010. *Climate Change Vulnerability Mapping for Nepal*, Ministry of the Environment, September 2010. Nepal.

Government of Nepal (GoN). 2013. National Planning Commission Secretariat, Central Bureau of Statistics web site, accessed in March-May 2013, available at:

<http://www.npc.gov.np/new/eng/index.php>.

International Finance Corporation. 2013. *IFC Advisory Services in Sustainable Business. 2012 Annual Review*. Washington D.C. International Finance Corporation. At: http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_report_sba-donor-report2012.

International Finance Corporation. 2013. *Niger Climate Information Platform. Final Report*. IFC and Dalberg. At: https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/PPCR_IFC_Niger_Mobile_Phone_Platform_Public_Report_Feb_2013%5B1%5D.pdf.

Joshi, K. D.; Conroy, C.; Witcombe, J. R. 2012. *Agriculture, Seed, and Innovation in Nepal*. Policy Paper. Washington D.C. International Food Policy Research Institute (IFPRI).

http://www.ifpri.org/sites/default/files/publications/Agriculture_seed_and_innovation_in_Nepal.pdf.

Least Developed Countries Fund (LDCF) web site <http://www.thegef.org/gef/LDCF>.

Myrepubblica 2013 <http://kaflebishal.blogspot.it/2013/01/agriculture-and-livestock-insurance-in.html> or link to Nepalese paper see report.

Meyer J.H., Rein P., Turner P., Mathias K., 2011. *Good Management Manual for the Cane Sugar Industry (Final)*. Produced for the International Finance Corporation (IFC), Washington D.C.

Ndambiri H.K., et al. 2012. *Assessment of Farmers' Adaptation to the Effect of Climate Change in Kenya: the Case of Kyuso District*. Journal of Economics and Sustainable Development www.iiste.org ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online).

Organisation for Economic Co-operation and Development (OECD). 2013. *Private Sector Engagement in Adaptation to Climate Change: Approaches to Managing Climate Risks*. Paris, France.

Pauw P and Pegels A. 2013. – *Private Sector Engagement in Climate Change Adaptation in Least Developed Countries: an Exploration*. Research Article. Climate and Development, 2013.

Poudel K., Sharma S. 2012. *Small Irrigation Systems in Nepal: An Analytical Preview from Irrigated Agricultural Development Perspective of Batch I Irrigation Sub- projects under Community Managed Irrigated Agriculture Sector Project*. Directorate of Agriculture Extension (DAE), Community Managed Irrigated Agriculture Sector Project (CMIASP), Harihar Bhawan, Lalitpur, Nepal.

Special Climate Change Fund (SCCF) web site <http://www.thegef.org/gef/SCCF>.

Tiger Capital Partners.2010. *A Strategy to Engage the Private Sector in Bangladesh*. Prepared By Asian tiger Capital Partners. Prepared for the International Finance Corporation At: http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/IFC_pres_CC_PS_V8_Sep12010-IFC_%20sk.pdf.

ESCAP CSAM – Center for Sustainable Agriculture Mechanization. Online Resources At: <http://un-csam.org/ppt/np200910-01-p2.htm>.

United Nations Framework Convention on Climate Change (UNFCCC). 2002. *Annotated Guidelines for the Preparation of National Adaptation Programmes of Action - Least Developed Countries Expert Group* July 2002. UNFCCC. At: http://unfccc.int/resource/docs/publications/annguid_e.pdf.

Appendixes

Appendix A – PPCR private sector-oriented projects in the PPCR portfolio

Sixteen out of 71 projects and programs in the PPCR portfolio – amounting to about USD 112 million out of the total USD 1.1 billion in PPCR funding (including 6 private sector set-aside projects) – provide direct funding to private sector clients (CIF, 2014a). These interventions are mainly focused in the agriculture, infrastructure (energy and housing), and financial sectors (CIF, 2014a; CIF, 2013a). Interventions range from building capacity in climate-adaptive practices, and facilitating and/or strengthening market linkages between different actors in agricultural value chains, through to expanding access to finance and to risk management tools such as weather index-based insurance products or weather information to farmers. 81% of these resources are provided as loans at concessional terms, while the remaining are grants (see Table 9).

Table 9 presents an overview of the various private sector projects contained in the SPCR endorsed and their status as of August 2013. Table 10 presents the six project concepts selected for funding under the USD 70 million PPCR private sector set-aside established in November 2012. In November 2013 the PPCR governing body endorsed USD 40.85 million in concessional loan resources for advancing the development of these projects (CIF, 2013g). Interventions range from the infrastructure to the agriculture and forestry sectors in Haiti, Jamaica, Mozambique, Saint Lucia, and Tajikistan. See CIF (2013g) for further details.

The private sector competitive set-aside was established in November 2012 in an attempt to stimulate the development of projects that engage the private sector in activities associated with reducing countries' exposure to climate risks (CIF, 2013a; CIF, 2013c; CIF, 2013e and CIF 2011c). The decision was driven by the limited number of projects with private participation in the PPCR portfolio. Considering the interest raised among MDBs, which submitted 11 proposals in total, it can be said that the private sector competitive reserve encouraged MDBs to experiment.

A second call for project concepts for the competitive allocation of the remaining USD 30 million in concessional funds, took place with revised procedures between December 2013 and April 2014 (see CIF [web site: CIF, 2014b](#)). The experience developed through the first round highlighted a number of areas for improvement in the “call for project concept” spanning from the scoring criteria for projects selection, advertisement of the funding opportunity, and availability of grant resources to support the creation of enabling environments (CIF, 2013h; CIF, 2013m).

Learning from the early experience developed across PPCR pilot countries¹²⁴

The development of the private sector-oriented project included in the SPCR endorsed during the first phase of country's programming (listed in Table 9) has highlighted that piloting approaches to private sector engagement in Least Developed Countries (LDCs) is a challenging undertaking. CIF (2013a) and interviews with IFC (2013b) noted the following challenges:

- Unfavorable business climates and underdeveloped private sectors can limit the opportunities for engagement. IFC experience in Mozambique has demonstrated that policy and regulatory barriers such as land tenure restrictions, and weak infrastructures, can make it hard to find viable investment opportunities. Identifying suitable private sector partners for investments or for channeling PPCR funds can also be difficult. In LDCs it may be that few private companies meet IFC's social and environmental standards, or have the characteristics needed to ensure the reach and scale required to achieve projects' objectives. This was for instance experienced in Zambia and Bangladesh.¹²⁵
- Limited awareness of the role of the private sector in climate-resilient development at the private and public levels can create obstacles. Insufficient public-private cooperation, as shown in Bangladesh, can bring further difficulties. Private actors' knowledge gaps about the risk that may arise from changing weather patterns and exposure of their businesses to climate impacts can make it difficult to raise their interest (IFC, 2013b).
- Governments' reluctance to share PPCR funds with private entities.¹²⁶ This is due to their tendency to prioritize public sector projects, difficulties in visualizing the role and relevance of private players in strengthening countries' resilience, as well as unfamiliarity with private sector funding projects, which go beyond standard practices.
- Lack of data, information, and technical skills can hinder the ability of private actors to evaluate climate-risks, or develop products or services that could help to mitigate climate-related impacts. This was the case both in Niger and Zambia where two PPCR projects that aimed to develop weather index-based insurance products for the

¹²⁴ Sources consulted: CIF (2013a); IFC (2013b); EBRD and IFC (2013); RAI (2013); ECIAfrica/DAI (2012).

¹²⁵ In Bangladesh, where the PPCR project focuses on low-lying areas (polders), identifying and working with suitable business partners has proved challenging. The number of financial institutions that could be engaged to channel PPCR funds to farmers is small, as highly risk-averse local banks rarely have branches in these areas. This can limit the opportunities of identifying adequate partners, can enhance implementation risks, and/or limit the likelihood of success of the project (IFC, 2013b).

¹²⁶ Governments' reluctance can be particularly high in sectors where public intervention has been significant, and where it is unclear how best to involve private players. In Bangladesh, for instance, limited government support to private sector activities has created barriers to private investment, deterring the involvement of private actors in the development of seed varieties (Rai 2013).

agricultural sector, have been constrained by, among other things, insufficient long-term weather data and poor financial skillsets (CIF, 2013a).

- Uncertainties about the possible returns on climate-resilient investments and/or mismatch with investors' time horizons. Proving the business case can be difficult or lengthy given the limited evidence on the short-term benefits stemming from adaptation investment and the complexities in evaluating successful outcomes. Moreover, as for instance noted in Zambia, returns can be attractive on paper, but proposed measures may face significant implementation risks. Finally, the benefits of climate resilience generally manifest over longer time frames, while private actors are often only interested in investments that pay back within a few years. IFC's experience within the PPCR suggests within 5 years (IFC, 2013b), so there is a mismatch between project's potential returns and investors' time horizons.

Table 9. Private sector projects per country and sectors.

Country	MDB	Project Title	Project main objectives	Financing (USD million)		Co-financing (USD million)	Status
				Grants	Loans		
Bangladesh	IFC	<i>Promoting climate-resilient agriculture and food security</i>	<p>Pilot climate adaptive agricultural practices, products and technologies by:</p> <ul style="list-style-type: none"> Engaging agribusiness companies through capacity development, to train farmers, strengthening farm-to-market linkages Engaging banks via technical assistance to facilitate access to finance 	3.1	10		<ul style="list-style-type: none"> Endorsed in November 2010 USD 3.1 million in PPCR grants approved in August 2013 to support the advisory component of the project. The submission for approval of the investment component – supported with USD10 million in loans – is expected 12-18 months upon the commencement of the advisory component.
Nepal		<i>Public and private sector collaboration to enhance food security through promoting climate-resilient agriculture</i>	<p>Pilot climate-adaptive agricultural practices, products and technologies to enhance farmers' climate resilience and agricultural productivity by:</p> <ul style="list-style-type: none"> Engaging and developing the capacity of private agribusiness companies and other relevant private actors to train farmers Involving local banks in the provision of climate-resilient agri-lending Creating a commercial mobile phone platform for the dissemination of climate and market information and agro-practice suggestion to farmers through the engagement of relevant public and private partners 	2.1* (+ 0.3 project preparation grant)	3.6*	<ul style="list-style-type: none"> IFC: 8.3* Others : 0.3* 	<ul style="list-style-type: none"> Endorsed in June 2011 Advisory project approved in January 2013 and under implementation Investment component under appraisal with potential clients The potential for creating a commercial mobile phone platform will be explored once the hydro-meteorological system will be up and running
Mozambique	IFC	<i>Developing climate resilience in the agricultural and peri-urban water sectors through provision of credit lines from Mozambican banks</i>	<ul style="list-style-type: none"> Engage local banks in the provision of credit lines for climate-resilient investment in the agriculture and peri-urban water sectors 	0.2^	5.4	IFC: 5	<ul style="list-style-type: none"> Endorsed in June 2011 Market study of potential for climate-resilient credit lines completed IFC is liaising with banks and microfinance institutions to evaluate their business plans for the development of these credit lines.

							IFC may discuss a possible update of its program under the SPCR if by 31 December 2013 no viable business plans are developed
		<i>Developing community climate resilience through private sector engagement in forest management, sustainable timber harvesting and/or eco-tourism</i>	<ul style="list-style-type: none"> Engage private agribusiness in natural resource management activities such as sustainable harvesting measures and in watershed management Encourage private sector tourism companies to adapt through adaptation needs assessment. 	0.3^	5.2	IFC: 5 Private actors: 14	<ul style="list-style-type: none"> Endorsed in June 2011 Market study to identify potential investment completed IFC is engaging with the private sector companies that expressed interest to developing business plans for investment where potential interventions have been identified. <p>IFC may discuss a possible update of its program under the SPCR if by 31 December 2013 any viable investments projects will emerge</p>
Niger	IFC	<i>Improvement of climate forecasting systems and operationalization of early warning systems</i>	Develop a commercial mobile phone platform to enable the dissemination of climate and weather information to agricultural producers and other stakeholders	0.5	1.5		<ul style="list-style-type: none"> Endorsed in November 2010 Market study completed IFC is currently liaising with a local mobile communication company to develop this platform
		<i>Sustainable management and control of water resources</i>	Enhance agricultural productivity and irrigation-fed agriculture through the engagement of relevant private actors in improved/resilient irrigation techniques, and piloting of stress-resistant seeds	0.5	2.5		<ul style="list-style-type: none"> Endorsed in November 2010 IFC is currently liaising with irrigation companies and exploring investment opportunities
		<i>Private sector investment to build climate resilience in Niger's agricultural sector</i>	Develop a weather index-based insurance product for the agricultural sector, in support of farmers	1.0	6.0		<ul style="list-style-type: none"> Endorsed in November 2010 Market and feasibility study completed As a result of the analysis undertaken, IFC does not foresee short-term investment opportunities in this area, and is exploring the possibility of re-allocating funds endorsed

							to this component to the other two.
Zambia	IFC	<i>Private sector support to climate resilience</i>	<p>a) Create of a mobile phone platform for the dissemination of climate, market and technical information to farmers; determine the feasibility and developed appropriate public-private partnerships for its establishment</p> <p>b) Develop a weather index-based insurance product in support of the agricultural sector</p> <p>c) Engage the private sector in building climate resilience in the agricultural sector and in the natural capital</p>	1.5 (+ 0.4 as project preparation grant)	13.5	13.5	<ul style="list-style-type: none"> • Endorsed in June 2011 • Feasibility/market studies completed <p>a) IFC is seeking to engage private partners to explore investment opportunities</p> <p>b) In the short-term, there is not a business case for the development of a weather insurance-based product (but piloting through the use of grants could be explored)</p> <p>c) Identified potential interventions including soya farming and the set-up of credit lines in local banks for financing climate-resilient technologies. IFC is liaising with some banks to assess their establishment.</p> <p>IFC may discuss a possible update of its program if by 31 December 2013 no viable projects will emerge. By then, IFC will also propose a reallocation of the PPCR resources allocated to the weather index-based insurance to investments deemed viable.</p>
Infrastructure (energy and housing)							
Bangladesh	IFC	<i>Feasibility study for a pilot program of climate-resilient</i>	Build market understanding on low-cost storm and cyclone-proof housing, assessing the potential and establishing the housing and finance needs and	0.4			<ul style="list-style-type: none"> • Endorsed in November 2010 • PPCR funding approved in August 2013

		<i>housing in the coastal region</i>	affordability Develop and pilot a business model for the private sector, engaging housing development companies and financiers interested in entering into this market				
Nepal	IFC	<i>Climate proofing vulnerable private infrastructure (hydropower)</i> <i>Feasibility study for low cost climate-resilient housing</i>	Enhance the climate risk management capacity of private hydropower operators by promoting the adoption of climate-resilient measures (e.g., landslide protection and technology upgrades) and facilitating access to finance at affordable terms Build market understanding to assess those technical and financial barriers that prevent the private sector from playing a role in building climate-resilient housing	0.1	3*		<ul style="list-style-type: none"> • Endorsed in June 2011 • IFC identified the hydropower companies that will invest in erosion-resistant turbines. • The feasibility study started in July/August 2013
Tajikistan	EBRD	<i>Enhancing the climate resilience of the energy sector</i>	Pilot the integration of climate change risk analysis and resilience measures into hydropower investments Pave the way to subsequent private sector investments by demonstrating the investment model for climate-resilient upgrades of hydropower plants	11.0		EBRD: 47.6	<ul style="list-style-type: none"> • Endorsed in November 2010 • Feasibility studies completed • PPCR funding approved in August 2013

Sources: author's elaboration based on CIF (2013a); CIF web site (see country plans and projects); EBRD (2013).

Note: (*) Expected / projected. (^) Include project preparation grant for USD 0.425. The EBRD project in Tajikistan has the character of both a private and public sector project. EBRD counterpart, the state energy company Barki Tojik, is mainly government-owned, but operates on quasi-commercial lines and also has non-government minority shareholders.

Table 10. Projects endorsed for funding under the competitive private sector set-aside.

Pilot Country	Multilateral Development Bank	Project Title	Project Objective	Loans (USD mln)
Tajikistan	EBRD	Enhancing the climate resilience of the energy sector	Strengthen the country's enabling environment and institutional capacities, and upgrade a major hydropower plant with climate-resilient technologies, demonstrating the investment model	10
Tajikistan	EBRD	Small business climate resilience financing facility	Facilitate access to finance at affordable rates for energy and water-efficient technologies to enhance the resilience of enterprises and households. The facility seeks to engage local finance institutions as vehicles for channeling target credit lines.	5
Mozambique	AfDB	Lurio Green Resources Forestry Project	Support the development of forest plantations of small and medium holder out-grower. The project seeks to promote the management of natural resources and the increase of farmers' incomes.	11
Jamaica	IDB	Financing water adaptation in Jamaica's new urban housing sector	Support private housing developers and construction companies to deliver water-secure and climate-resilient housing	5.75
Saint Lucia	IDB	Supporting climate-resilient investments in the agricultural sector	Support the private sector – from farmers to processing companies – to adopt climate resilient technologies and practices through the	6.1

			provision of loans The project seeks to enhance awareness of the relevance of climate resilience practices, support the production of high-value, climate-resilient agricultural products, and enhance the country's food security.	
Haiti	IDB	Support for the building of a climate-resilient sorghum supply chain	Promote climate-resilient post-harvesting measures among farmers by strengthening the linkages between a local company and farmers operating in its supply chain.	3

Sources: CIF 2013h; CIF web site.

Appendix B – Details on the Strategic Program of Climate Resilience in Nepal.

The Nepalese Strategic Program for Climate Resilience (SPCR) endorsed in June 2011 outlines a set of measures aimed to tackle key priority risks challenging the country’s climate-resilient development.

Table 11 shows the main climate-related risks and key affected sectors, as well as the type of interventions supported with PPCR funds, and implemented by the Asian Development Bank, and the World Bank Group (IBRD and IFC) in cooperation with the Nepalese government (CIF, 2011a).¹

The identification of the country’s adaptation priorities and the development of interventions to address them resulted from an extensive participatory process that lasted about 21 months (May 2009-February 2011) and involved consultations with a variety of stakeholders – from government agencies and civil society representatives, to development partners, the private sector, and technical experts (ADB, 2013b; CIF, 2011a). The process, built on the National Adaptation Program for Action (NAPA) that began a few months ahead of the PPCR (CIF, 2011a).

Specifically, Nepal’s SPCR has five components: (i) building climate resilience of watersheds in mountain eco-systems, (ii) building resilience to climate-related hazards (iii) mainstreaming climate change risk management in development, (iv) building climate-resilient communities through private sector participation, and (iv) enhancing the climate resilience of endangered species CIF (2011a).

Table 11. Nepal’s main risks, adaptation needs, and PPCR measures.

Climate-related risks	Area of intervention	SPCR measures to build resilience
Temperature increase Erratic rainfall and changes in monsoon patterns	Agriculture and food security	Address key constraints to agricultural productivity and reduce the vulnerability of farmers and of private companies’ operations
Changes in hydrological cycles	Water security	Watershed management and planning
Increased frequency of extreme weather events	Climate-induced disasters	Creation/upgrade of hydro-meteorological observatory and forecasting systems
	Urban settlements and infrastructure	Climate proof selected vulnerable infrastructure, housing, and hydropower plants
Shifting of ecological belts and vegetation	Ecosystem health	Enhance capacity, knowledge, and incentives to protect endangered species
All of the above	Country’s institutional and policy framework Public and private actors’ capacity in managing climate- related risks Access to finance	All areas: strenghten the country’s institutional and policy framework and public and private actors’ capacity to manage climate-related risks; enhance access to finance.

Source: CIF (2011a), GoN (2010a), Poshan (2010).

¹ These include e.g., the Department of Soil Conservation and Watershed Management, Department of Hydrology and Meteorology, and the Ministry of Science, Technology and Environment.

Figure 16. Strategic Program for Climate Resilience and projects timeline – key milestones.

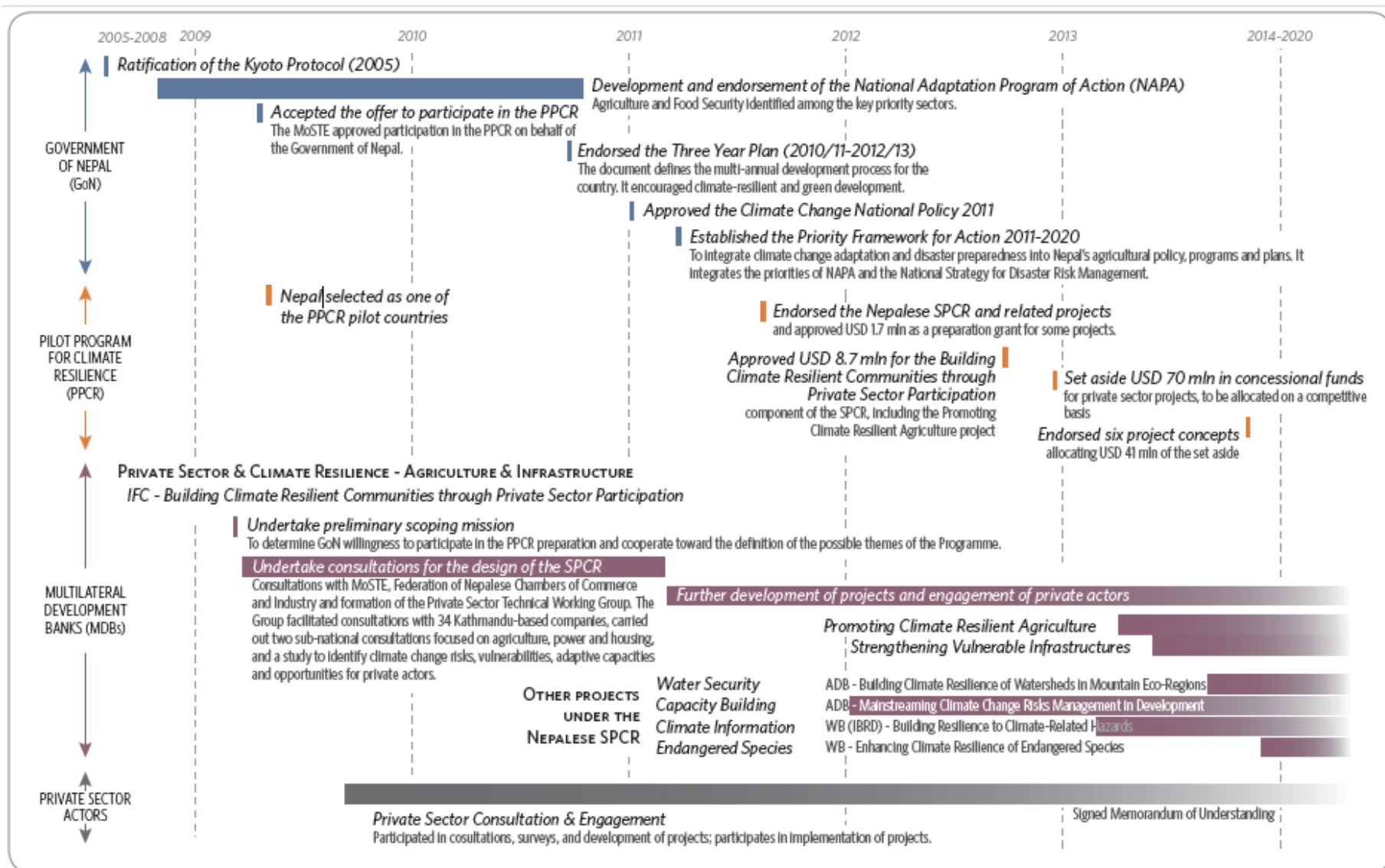
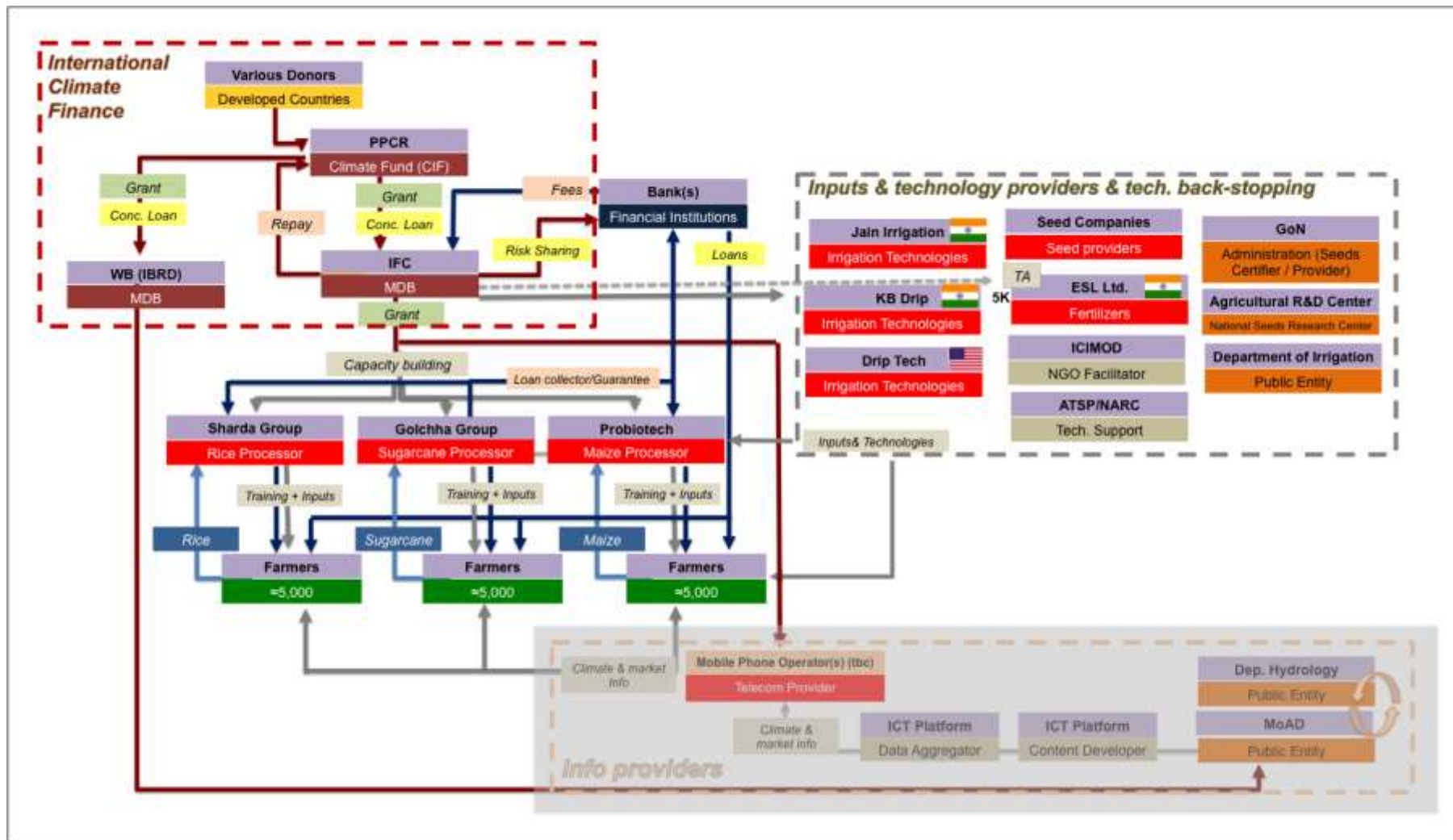


Figure 17. Key project stakeholders map.



Source: author's elaboration based on IFC (2013b), IFC (2013d), IFC (2013e) and IFC (2013f).

Note: Displayed technology providers are the ones identified during the project preparation – actual stakeholders may vary during implementation of the project; the dotted arrow refers to a planned investment of about USD 5,000 to cover technical assistance measures aimed to increase the availability of fertilizers.

Appendix D – Model inputs/assumptions for sugarcane farmers training

Input	Description	Source
Sugar mill crushing capacity	3000 tonnes of sugarcane per day, for each of two mills	Golchha (2013)
Operating time of sugar mills	150 days per year	Derived from Sugaronline (2013), Sugar Mill Association (2013)
Capacity factor of sugar mills	75-80% (Golchha 2013) (80% is also the ratio of the 120 days per year sugar mills in Nepal are actually running (MoAD 2013) divided by the 150 days the Nepalese Sugar Mill Association assumes the sugar mills can run)	Golchha (2013) MoAD (2013)
Procurement of sugarcane as a share of total operating costs	75% This is the average observed in a number of Pakistan sugar mills, and here used as a proxy	Fatima (2011), Mirpurkhas (2012), Mehran (2012)
Net profit margin of sugar mills / producers	6%, median derived from analyzing yearly net profit rates for the years 2008-2012 for three sugar mills in Pakistan and eight sugarcane producers in India.	Fatima (2011), Mirpurkhas (2012), Mehran (2012), Moneycontrol.com (2013)
Sugarcane price 2013	54.4 USD per tonne, calculated by multiplying 481 Nepalese rupees per quintal, including VAT (Ekantipur 2013) with 100 and an exchange rate of 0.0113 USD per Nepalese rupee, average of 1 st June 2012- 1 st June 2013 (Oanda 2013)	Ekantipur (2013), Oanda (2013)
Productivity increase	Standard scenario: 20% improvement, project goal Lower scenario: 10% improvement, lower-end of achievements as reported by the literature and implementing organizations (see Appendix E) Upper scenario: 30% improvement, optimistic scenario, considering that the 52-56% achievement in a similar sugarcane project in India (DSCL) may be too optimistic in this case as the project does not only target productivity but also climate resilience.	IFC (2013d). See Appendix E for past achievements Based on IFC (2013g)
PPRC grant for farmer's training	USD 1 million over 4 years. We assume that 70% will be spent in the pilot phase (first 2 years), as start-up costs for e.g. hiring experts and developing training tools will mainly occur in the first years.	IFC (2013b) IFC (2013c)
Net revenue	Assumed to be additional revenues from sugar production due to farmer's training multiplied by the net profit margin. This assumes that the net profit margin overall does not change when the company produces additional sugar, which can be justified as, in general, sugar mills spend only around 2.5% of their income on fixed plants costs (incl. operation and maintenance), while the rest (particularly 70-80% sugarcane procurement costs) can be assumed to be variable.	Fatima (2011) Mirpurkhas (2012), Mehran (2012) for the cost break-down of sugar mills operating in Pakistan used as a proxy.
Farmers	Trained in first 4 years: 15,000, equally split between maize, rice and sugarcane. "Adopters" increasing their production: 9000 equally split between the three crops	IFC (2013b) IFC (2013d) IFC (2013f)

Farmers trained per year	Targeted farmers trained per year, project goal Year 1 (pilot phase): 600 farmers (4%) Year 2 (pilot phase) 1100 farmers (7%) Year 3 (2 nd phase): 8100 farmers (50%) Year 4 (2 nd phase) 4800 farmers (39%)	IFC (2013f)
Time lag between training and effects on productivity	1 year, resulting from original goal to reach all farmers by 2016, and productivity goal in 2017	Based on IFC (2013f) goals
Baseline production of sugarcane	46.5 t sugarcane per ha, average over the two targeted districts (Sarlahi, Morang) close to planned sugar mills, from years 2006/2007 to 2011/2012.	MoAD (2012) CEAPRED (2013)
Average farm size	0.83 hectare per farmer	NPC-WFP-NDRI (2010)
Future production changes in the baseline	No change. This assumes that future productivity increases are approximately balanced out by losses due to climate change, which are projected to be 4-8% in case of sugarcane in Nepal by 2030.	World Bank (2013a), PwC (2012) for changes in crops productivity
% of additional production supplied to training sugar company	100%. This is likely because there is only one mill per district, and transporting sugarcane is very expensive, given the substantial weight of sugarcane (sugar only weighs around 10% of the raw material, see Fatima, 2011, Mirpurkhas 2012, Mehran 2012) and the low quality of roads in rural Nepal (World Bank 2009). No sugarcane has been exported from Nepal to India in the last 10 years (FAO 2013), even when the border to India is very close for most sugarcane production areas.	Based on, Fatima (2011), Mirpurkhas (2012), Mehran (2012), World Bank (2009), FAO (2013) IFC (2013b) PwC (2012) Nimbus (21013a)
In-kind and cash contribution of / costs for agribusiness companies	Lower estimate: USD 32,000, assuming, two additional employees over 2 years with a wage of USD 8,000 per year. Does not include costs related to facilities and demonstration plots. Trainers employed are assumed to be paid by IFC. Higher estimate: USD 95,000, recent IFC (2013b) estimation for 2-year pilot period	Wage and number of employees: Nimbus (2013b); Duration of the project: IFC (2012b, 2013d)
Annual inflation (USD)	All calculations were conducted with constant 2013 USD. For transformation to 2013 USD, annual inflation of 2.3% assumed (average of years 2003-2012), using data from OECD (2013).	OECD (2013)

Appendix E - Outcome of training measures: literature review

Country	Project developer	Product	Measure for outcome	Observed increase	Source
Nepal	ADB	Maize / rice (irrigation)	Agricultural production	12-13% overall	ADB (2012b)
Nepal	Various	Crops in general	Households income	16% overall	Dillon et al. (2011)
Uganda	Various	Crops in general	Agricultural production	13-19% overall	Pender et al. (2004)
Nepal	IFC	Poultry	Feed-conversion rate	20% overall	Nimbus (2013)
India	IFC	Sugarcane	Agricultural production	52-56% overall (compared to control group)	Derived from IFC (2013g)
Kenya	World Bank	Crops in general	Agricultural production	3% to 7% per year (target)	World Bank (2013b)

CHAPTER 4.

ENGAGING THE PRIVATE SECTOR IN CLIMATE RESILIENCE: THE ROLE OF PRIVATE SECTOR DEVELOPMENT FINANCE INSTITUTIONS

1. Introduction and background

The IPCC's Fifth Assessment Report notes that current trends of warming are increasing the "*likelihood of severe, pervasive and irreversible impacts*" (IPCC WGII AR5 SPM, 2014). Considering that current efforts to mitigate greenhouse gas emissions remain insufficient to limit global temperature rise to 2 °C above pre-industrial levels (OECD, 2012), ambitious adaptation measures are essential to tackle those climate change impacts that cannot be avoided (Parry et al., 2007).

Adapting to climate change will require additional resources and investments (see e.g. WB, 2010), which public financing alone will not be able to meet. Private finance is an essential complement and, in many instances, it should be the dominant source (Biagini and Miller, 2013).

The private sector has the potential to significantly contribute to climate change adaptation efforts supporting not only its "*internal resilience*" – which is critical given the range of risks that may affect its own operations, competitiveness and profits (Agrawala, 2011) – but also "*wide-reaching multi-stakeholder resilience*" (UNFCCC, 2014).

At the global level, the private sector is responsible for 70–85% of total investment in new buildings, industry and critical infrastructures (UNISDR, 2013), and constitutes up to 86% of total investment and financial flows (UNFCCC, 2009). Thus, it is expected to cover part of the adaptation costs in sectors dependent on privately owned physical assets (e.g. agriculture, forestry and infrastructure) (UNFCCC, 2007). It is in its own economic interest to engage in adapting to climate risks. Particularly so when considering that over the past years the financial impacts associated to climate-related disasters have risen steadily due to climate change (Biagini and Miller, 2013).

While the private sector is likely investing in adaptation measures, due to a number of market failures it may underinvest relative to the social optimum. Activity-specific and country-specific barriers may unfavorably affect the attractiveness of adaptation investments, either in terms of the adequacy of returns or unmanageable risks (AGF, 2010). Moreover, market-driven financial flows will not necessarily respond to the

impacts of climate change in ways that achieve policy (or political) goals, or will not do so at the speed required by the pressing need of building countries' resilience to projected climate impacts. "*A paradigm shift is required for business to fully integrate the value associated with managing climate risks*" (Biagini and Miller, 2013).

The question is, how to stimulate private sector involvement at scale, and what course of action can best enable this?

Agrawala and Fankhauser (2008) discussed the potential of economic and policy instruments such as, for instance, insurance schemes, price signals/markets and regulatory incentives. Stenek et al. (2013) underscored the role of enabling environment to creating the market conditions favorable to private adaptation (e.g., availability of information about climate risks, policies and institutional arrangements). Others have emphasized the relevance of companies' disclosure of climate change risks in their annual reports and accounts (see e.g., Carbon Disclosure Project, 2012; CERES, 2009). Investors' expectations and legal requirements have in fact begun to promote, and sometimes mandate, the public disclosure of climate risks based on their possible financial impacts (Biagini and Miller, 2013; see also Crown, 2013).¹²⁸ Bloomberg (2013) also notes that stakeholders of "sustainable investors groups" are increasingly filing resolutions asking companies to disclose their climate risks. These disclosure requirements, however, are of limited relevance for companies mainly operating in developing countries (Biagini and Miller, 2013).

Moreover, while disclosure has contributed to raise organizations' awareness, particularly in those sectors where there had been limited consideration (Crown, 2013), yet there remains a gap between risk assessments and the implementation of adaptation actions (Crawford et al., 2013; NRTEE, 2012; Acclimatise, 2012; Agrawala, 2011).

The absence of baseline and/or downscaled information, as well as tools and know-how, has made it difficult to relate climate concerns and risks to business operations (C2ES, 2013; IFC no date). This, in turn, has hindered actors' ability to integrating such risks into investment decision-making, thereby resulting in possible over-exposure to risks (C2ES, 2013 and IFC no date).

¹²⁸ The Climate Change Act 2008 introduced the Adaptation Reporting Power (initially mandatory now voluntary) giving the UK Government the power to require public authorities and some businesses such as utilities and transport operators to report how they are assessing and managing the risks of climate change. It was introduced with the objective of helping ensure essential public services and infrastructures such as energy, transport and water are climate resilient (Crown, 2013). In response to investors' pressures, the US Securities & Exchange Commission and the Canadian Securities Administrators, the agencies responsible for regulation of securities trading, issued guidance on climate change risk disclosure in the filings of publicly traded companies (CERES, 2011; SEC, 2010).

International Development Finance Institutions (IFIs) can play a role in engaging the private sector in identifying climate change risks and response measures. Over the past decade these institutions have quadrupled their private sector financing activities in developing countries to more than USD 44 billion per year in 2011 (IFC, 2013a), and aim to further scale these up (ADB, 2013a; IDB, 2013a). IFIs have also increased the level and range of financial and advisory services offered to companies (Perry, 2011; Nelson, 2010). In some cases, they also advise governments in order to support the creation of environment more favorable to the growth of private enterprise and to attract foreign investment (see e.g. IFC, 2013a).

As key provider of finance and technical advice, these institutions have a unique opportunity and responsibility to take a leading role in adaptation (Stenek et al., 2010a)¹²⁹. They could do so by systematically integrating climate risk management approaches in their private sector operations, and by supporting the private sector to understand and manage the risks and opportunities climate change presents. It is in IFIs' interest to do so, not only to fulfill their mandate, meeting shareholders' and stakeholders' objectives, but also because:

- i. Failing to take climate change risks into account may affect the financial and developmental performance of IFI's investments, oftentimes in climate-sensitive sectors and in long-lived assets, thereby ultimately undermining their strategic objectives;
- ii. Engaging private sector clients to identify, assess and manage the climate risks threatening their own assets and operations – particularly when linked to strategic sectors of countries' economies (e.g., infrastructure, agriculture, energy) – can enhance the effectiveness of IFIs' investments, ensuring the long-term economic viability of projects.

Against this background, this research aims to explore the following key questions:

- How and to what extent have IFIs integrated climate risk management approaches in their private sector-oriented investment appraisal procedures and standards?
- How are IFIs engaging the private sector in identifying climate change risks and supporting them in defining and implementing response measures?
- What types of constraints are hindering their action?

¹²⁹ Stenek et al. (2010a) discusses the challenges and opportunities associated to climate risks faced by financial institutions in general, it does not specifically refer to IFIs.

The study aims to advance the still limited knowledge on these aspects. Literature, in fact, has so far focused on IFIs' activities in support of countries' development through the private sector (e.g. IFC, 2011a; Perry, 2011), or discussed the initial experiences of some IFIs in managing climate risks (see Iqbal and Suding, 2011; Van Aalst, 2011). However, to the best knowledge of the author, evidence on how IFIs are managing climate risks *in* and *through* their private sector operations has been barely discussed by scholars.

This research does not aim to offer final answers, or to make a comparative assessment across institutions, but it rather aims to take stock of current experiences to stimulate debate and learning. By highlighting those constraints dependent on governments' action, it has also the ambition to provide insights to policy and decision-makers on how they could best support IFIs in achieving climate-resilient development objectives through their private sector operations. This is relevant in the context of the impending Green Climate Fund established and the operationalization of its Private Sector Facility (see UNFCCC, 2010, 1/CP.16; UNFCCC, 2011; GCF/B.04/07, 2013).

This research is timely in light of the international pressure to enhance lending towards adaptation measures in developing countries by catalyzing private capital toward the UNFCCC USD 100 billion climate finance goal, and to mainstream adaptation in development co-operation activities.

The next section presents the methodology and scope of the research, including the dimensions assessed across institutions, which are then discussed in subsequent paragraphs. Finally, section 6 concludes summarizing main findings and discussing policy and research implications.

2. Methodology and scope

Information for this paper was gathered through documentary analyses and a series of semi-structured interviews undertaken by telephone and/or in written form with a group of 21 professionals, mostly experts from IFIs' representatives (see References section).¹³⁰ The results are used to provide:

- i. A conceptual framework describing the relevance of climate risk management approaches in IFIs' private sector operations;

¹³⁰ Note: Some of the information presented in this research has not yet been verified by the experts of some IFIs, as interviews could not be undertaken with all of the IFIs covered in this research.

- ii. Empirical evidence on IFIs' approaches to manage climate change risks in private sector operations, and to engage businesses in activities with adaptation objectives;
- iii. An overview of IFIs' main constraints to private sector involvement in climate change adaptation;
- iv. Initial recommendations.

The study focuses on the so-called "private sector arms" (non-sovereign guaranteed operations) of Multilateral Development Banks (MDBs)¹³¹ and on three Bilateral private sector Development Finance Institutions (BFIs), which were selected based on the relative relevance of their private sector operations, namely:

- MDBs: European Bank for Reconstruction and Development (EBRD), International Finance Corporation (IFC), the Inter-American Development Bank (IDB), the Asian Development Bank (ADB), the African Development Bank (AfDB), and the European Investment Bank (EIB);
- BFIs: Deutsche Investitions-und Entwicklungsgesellschaft (DEG); the Netherlands Development Finance Company (FMO), and Proparco (a subsidiary of the French Development Agency).

The share of private sector operations on total commitments varies among institutions, ranging from 18% of group's activities at IDB, to practically 100% at IFC and FMO.¹³² The organizational structures, sectoral and geographical focus also varies. The type and spectrum of private actors targeted is also different. These may influence their level of involvement in the context of adaptation.

2.1 Key definitions and conceptual framework

In this paper the term private sector refers to privately-owned international or domestic businesses (large, medium, small and micro enterprises), financial institutions (e.g. commercial banks, microfinance institutions and insurance companies), as well as mixed capital entities.

Climate change could translate into a range of new or increasing risks to these actors' assets and operations, affecting their operational, financial, economic and strategic performance (see e.g. UKCIP, 2010; Stenek et al., 2010a). Climate impacts can affect

¹³¹ MDBs' private sector operations refer to non-sovereign operations transactions, which can include activities with commercial state enterprises.

¹³² Shares vary if the private sector operations of these institutions are compared to Groups' total operation. When confronted with the overall commitments of the World Bank Group, for instance, the share of IFC private operation is around 50% (MIGA 2013). Sources: IFIs' Annual and Financial Reports and web sites.

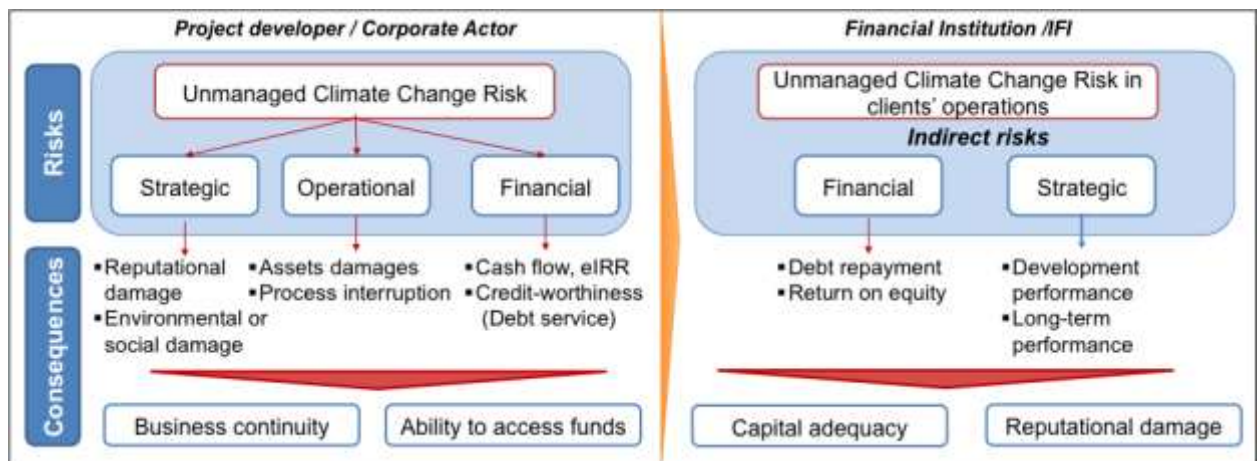
one or many elements of these actors' value chains, from inputs (e.g. availability and/or quality of raw materials) through to output markets by e.g. changing users/consumers' choices.

This, in turn, can indirectly impact IFIs' financial and strategic performances (Stenek et al., 2010a)¹³³ when involved in financing their operations. This is because unmanaged risks can affect IFIs' clients/projects' debt-servicing capacity, creditworthiness, as well as their ability to pay dividends to shareholders.

Furthermore, possible environmental and social damage resulting from unmanaged climate-related risks in clients' operations may have consequences on the developmental, environmental and social performance of IFIs' investments, thereby affecting IFIs' long-term performances and development impact. These strategic risks to IFIs' performance may ultimately result in reputational damage, which could consequently affect their ability to raise funds on capital markets.

Figure 18 below shows the possible consequences associated with unmanaged climate change-related risks to both IFIs' clients and, indirectly, to IFIs. This figure does not feature the risk of missing production or market opportunities, which are however implicit in the other risks portrayed.

Figure 18. Main climate-related risks to investees/clients and effects on IFIs.



Sources: author's elaboration based on Acclimatise (2012), Stenek et al. (2010a) and Gatti (2008).

In a typical risk management approach (see e.g. Gatti, 2008), climate risks should be addressed by both businesses and IFIs during projects preparation, and considered in investment strategies and decision making in similar ways as other risks.

¹³³ Stenek et al. (2010a) discusses the challenges and opportunities associated to climate risks faced by financial institutions in general, it does not specifically refer to IFIs.

This study looks at IFIs' actions on both sides of the diagram shown in Figure 18. It seeks to bring evidence on both IFIs practices to *managing climate risks to projects* and their *adaptation projects*. Albeit with converging results, following and elaborating on Iqbal and Suding (2011) and McGray et al. (2007), the former refers to IFIs adoption of climate risk management approaches within existing decision-making processes to ensure development operations can proceed unharmed by climate change impacts. The latter refers to stand-alone activities, specifically conceived to engage and support private actors to address climate change vulnerabilities.

To evaluate the extent to which IFIs have integrated climate risk management in their private sector-oriented investment procedures, this research focuses on key elements of IFIs' project cycles i.e. Environmental and Social Safeguards and climate risks screening approaches, which can reside within or outside standard safeguards procedures. To bring empirical evidence on the approaches so far taken in adaptation projects, this research draws on publicly available information on IFIs' private sector-oriented adaptation projects (i.e. IFIs' annual reports, IFIs web sites and online project databases – when available, official documents from adaptation focused Climate Funds).

Hence, the main dimensions systematically assessed across institution include:

- IFIs' climate risk screening tools & assessment approaches in due diligence processes;
- Environmental and Social Safeguards standards/policies, to ascertain the integration of climate change risks;
- IFIs private sector-oriented adaptation projects, covering how adaptation is operationalized, in which sectors and countries, as well as with what type of financial and/or non-financial mechanism;
- Key constraints to the engagement of private actors in adaptation.

The following section further explains the rationale behind the focus on IFIs' climate risk screening and Safeguards, while the next ones present insights on the assessment of the dimensions outlined above. Section 4 concludes.

2.2 IFIs' approaches to managing climate risks: an opportunity to scale up private involvement in climate risk management?

The project cycle has been recognized by many development banks as well as development agencies as a critical step to identify opportunities for incorporating climate change risk management considerations into projects (see e.g. Iqbal and Suding, 2011; Hammill and Tanner, 2011; van Aalst, 2007; Klein et al., 2007). This is what is oftentimes referred to as 'mainstreaming' (see OECD, 2009; Gigli and Agrawala, 2007).

To this end, a number of tools geared at project preparation have been developed or started to be developed, either with a safeguards perspective or in a more opportunity-driven mode (see Hammil and Tanner, 2011 and Klein et al., 2007). The availability of tools to systematically screen projects for climate risks is a prerequisite to the design of adaptation measures (UNDP, et al., 2011). It is an important first step in the project cycle.

Environmental and Social Safeguards standards are also a useful 'entry point' for the integration of climate risks management in the project cycle (Iqbal and Suding, 2011). They are a set of mandatory policies, principles and procedures which enable to consider climate risks among a whole range of other risks to projects. Climate change risks, in fact, are usually an additional concern to consider among a whole range of other issues associated to the development of projects (Iqbal and Suding, 2011).

As noted by Persson et al. (2009), Environmental and Social Safeguards standards can represent a platform on which to build considerations of climate risks management practices in private sector investment decisions. On one hand, because borrowers are required to meet Safeguards standard throughout the life of an investment, hence, prompting them to address project's climate vulnerabilities. On the other hand, because IFIs' Environmental and Social Safeguards could signal the relevance of climate risks management to private actors, and serve as a model for those applied by commercial financial institutions. Therefore, possibly promoting to the scaling up of climate risks management practices.

This, for instance, could happen with the "Equator Banks" i.e. the banks signatories of the Equator Principles.¹³⁴ These Principles, which are a financial industry benchmark

¹³⁴ The Equator Banks commit no to provide project finance or project-related corporate loans to projects where the client will not, or is unable to comply with the Equator Principles. The Equator Principles apply to four financial products: i) project finance advisory services; ii) project finance with total project capital costs are equal to or higher than USD 10 million; iii) project-related corporate loans; iv) bridge loans (see Equator-Principles.com and Equator Principles, 2013).

for determining, assessing and managing environmental and social risk in projects (EP, 2013), are in fact based on the socio-environmental safeguards of the International Finance Corporation (IFC). In line with IFC's ones, the Equator Principles have recently adopted requirements on project's greenhouse gas emissions (see EP, 2013). This signals their 'followers' behavior and the standard setting role of IFIs.

The potential for scaled up climate risks management could be significant, particularly when taking as a proxy the fact that the "Equator Principles" have been adopted by 80 of the world's leading investment banks in developed and developing countries. These banks cover approximately 70% of international project finance debt in emerging markets (Equator-Principles.com), and they are also increasingly using the Principles as benchmark for equity financing (Norton Rose, 2011).

BOX 1. Environmental and Social Safeguards

Environmental and Social Safeguards are a set of mandatory policies, principles and procedures used to identify and manage impacts and risks of IFIs' supported projects and programs during the various stages of the project cycle. They provide a framework for consultation and disclosure, they can be externally monitored and IFIs can be held accountable to compliance (Horta, 2012).

They outline IFIs' strategic objectives and commitments as well as the requirements borrowers/projects are expected to meet (Standards) to avoid or minimize risks. For IFIs, they also represent a tool to strengthen project sponsors' capacity to manage environmental and social risks (ADB.org).

Safeguards involve the screening of projects' risks at the earliest stage of project preparation, and their subsequent categorization according to the likely magnitude of environmental and social impacts. This process identifies the assessment requirements necessary to respond to the identified risks and impacts, which then inform possible adjustments to project design. Screening and categorizing projects according to their vulnerability to the risks of climate change would enable to examine options for incorporating climate resilience measures within projects design and implementation.

The climate risk management add-ons for these projects could be addressed through the use of external resources specifically sought and/or deployed toward this end.

3. Results and discussions

3.1 Climate risk screening tools

The status of development and application of climate risks screening tools, as well as compulsoriness, varies across IFIs. Many MDBs are still in the process of developing

and/or fine tuning the climate change-relevant risk screening and assessment tools that would enable them to systematically incorporate climate risks management practices in investment and lending decisions. Thus, MDBs' use of climate risks screening approaches in private sector operations varies.

With regard to BFIs, the three ones considered in this research do not yet have in place climate risk screening approaches to use in their project cycles (Proparco, 2014; DEG, 2014a; FMO, 2014). As far as DEG and Proparco are concerned, specific tools are currently used or recently developed by their public sector-oriented counterparts (the German Development Bank KfW Entwicklungsbank and the technical agency GIZ, and the French Development Bank - AFD) (Proparco, 2014; AFD, 2014; KfW, 2014).¹³⁵ At Proparco there are initial reflections regarding the inclusion of climate risks analysis in the project preparation cycle, but projects typically enter in the bank's cycle at an advanced stage of development, thus too late to modify their design. DEG is advising clients operating in the agricultural sector to use a Water Risk Filter free online toolkit it developed with WWF.¹³⁶ This risk screening and assessment instrument enables companies to identify, assess and quantify water-related risks in supply chains and investment portfolios, also suggesting steps on how to mitigate such risks (DEG, 2014a; The Global Compact, 2014). DEG can support clients in mitigating identified risks (DEG, 2014a).

At IFC climate risk screening is not yet systematically applied in the project cycle, as the related tool is still under development. It is expected that the tool will be ready and internally piloted in climate-sensitive sectors (e.g., infrastructure, energy, agriculture, water) and geographies from next year (2015) (IFC, 2014; IEG, 2012). This tool is being developed with the aim of addressing multiple climate-induced vulnerabilities (IFC, 2014). It develops from experience IFC gained through a number of pilot case studies specifically undertaken to develop climate risks assessment methodologies for private sector projects, and to identify adaptation strategies and needs (see Stenek et al., 2010b). In these analytical studies IFC also evaluated the effects of climate shocks

¹³⁵ KfW Entwicklungsbank and GIZ have been undertaking climate risks assessment analysis in its project cycle since 2011, as mandated by the German government (Kfwentwicklungsbank.de, see also Hahn and Fröde, 2011). It is a politically driven approach rather than economically driven, and for this reason not used in commercially-oriented operations by DEG and the other entities of KfW Group (KfW, 2014). AFD recently developed a methodology aimed at determining the level of risk for projects in terms of climate, and according to AFD (2014) it was applied to project 2013 into the appraisal cycle of projects. Proparco (2014) noted that these are a work in progress in terms of methodology and implementation, and that once fully operational it will likely be used also by Proparco.

¹³⁶ According to DEG [web site](#), about 50,000 individual facilities have been screened for water risks since its release in 2012. Over 1,500 organizations from different sectors have used the tool.

on projects' returns – a component of IFC's development outcome – and on the ability of the borrowers to service debt (IEG, 2012).

Also EIB is still developing systematic screening tool to assess projects for climate risks, and has planned to initially apply it to those sectors identified as being most at risk from future climate change impacts (EIB, 2013).

At EBRD the assessment of companies' sensitivities to climate risks is routinely incorporated in feasibility studies during the environmental and social audit undertaken in water-intensive industries. This so-called "climate resilience audit" takes the form of water and energy audits, and represent the starting point for identifying and suggesting possible investment and action for strengthening climate resilience (EBRD, no date). This screening approach is not part of the bank's Safeguards policy, so it is 'opportunity-driven' rather than compliance-led.

IDB applies an integrated climate change and disaster risk screening approach within the standard safeguard filter; since the fourth quarter of 2013, when it was introduced, it has screened projects' to exposure to natural hazards risk, including slow onset natural hazards and climate change threats (IDB, 2014a,b). IDB's approach underscores the links existing between climate risk management and disaster risk management efforts. The overlap between both hazards is particularly evident in some of the regions in which IDB operates such as the small Caribbean islands.

The AfDB climate risk screening tool became operational beginning of July 2014, and it is currently being used in key areas of strategic relevance for the bank i.e., transport, water, agriculture and energy (AfDB, 2014a; AfDB, no date). While mandatory in public sector projects, it is not in private sector ones as projects enter into the bank's project cycle at various stage of development. Where the project is developed at the AfDB, the screening tool is applied (AfDB, 2014a).

ADB has institutionalized a climate risk management framework to identify projects that may be affected by climate change and to ensure appropriate measures are integrated in the project design from inception. All projects are screened for climate risks through an initial "rapid environmental" risk screening checklist at the safeguards screening and categorization stage. If projects are identified at medium or high risk, an online risk screening tool "AWARE for Projects" is used to provide more context-sensitive screening (ADB, 2014a; see also Idle, 2014). This type of assessment is being done for all projects because since 2013 climate change risks are to be explicitly stated in the Report and Recommendations of the President (RRP) presented to the

Board prior to project approval (ADB, 2014a). As of April 2014, when ADB’s representatives were last interviewed, it was applied to one private sector projects only.

Table 12 below presents a summary of IFIs’ availability and use of climate risks screening approaches while Appendix A offers a more detailed overview.

Table 12. Overview of IFIs’ climate risks screening approaches in private sector operations.

	ADB	AfDB	EIB	EBRD	IDB	IFC	DEG	FMO	Proparco
Climate Risk screening tool	Yes	Yes	No Tool under development	Yes	Yes	No Tool under development	No	No	No
Application	Ongoing for all projects and all sectors	In use since July 2014	To be piloted in most climate-sensitive sectors	Water intensive & energy sectors	Kicked-off learning phase All sectors	To be piloted in climate-sensitive sectors	Advise the use of water risk screening	No	No
Mandatory	Yes	No	Yes	No	Yes	Yes	No	No	No

Source: author’s elaboration based on interviews with IFIs’ representatives, IFIs’ web sites, and IFIs’ Safeguards Policy and Standards (details in Annex A).

3.2 Environmental and Social Safeguards

The assessment of IFIs’ Environmental and Social Safeguards Policies and interviews with IFIs’ representatives revealed that many MDBs have integrated climate change risk considerations in their recently revised Safeguards policies and standards. Others are considering doing so.¹³⁷ The three BFIs considered in this research, instead, typically apply IFC Performance Standards – particularly for high-risk projects – but have not yet begun to take practical approaches to systematically manage the risks possibly faced by projects due to a changing environment. These BFIs apply also the “Principles for Responsible Financing”, a set of standards on Environment, Social

¹³⁷ The EBRD released its revised Environmental and Social Policy in May 2014, AfDB in 2013 while, in the same year, EIB revised and published its Environmental and Social Handbook which is an operational translation of the related policies, principles and standards. IFC revised its Performance Standards and Policy on Environmental and Social Sustainability in 2011 (effective from 2012). IDB reviewed the practice of addressing disaster risk and climate change risks, updating the risk screening filters (2013) and preparing procedural clarifications (2014) (IDB, 2014a,b). At ADB the revision/update of existing safeguard policies is presently under evaluation (ADB, 2014a).

Matters and Governance adopted by European Development Finance Institutions, which however do not feature climate risks management considerations.

MDBs' and clients' requirements vary across institutions' safeguard systems. In particular, MDBs' Environmental and Social Safeguards highlight Banks' commitments to:

- Identify, evaluate and address climate change impacts and risks to projects (ADB, AfDB, EIB and IDB);
- Support clients in “*developing adaptation measures that promote climate resilient*” (EBRD, 2014a) / “*sustainable investments*” (IFC, 2012a);
- “*Engage, whenever appropriate, in innovative investments and technical assistance to support [...] climate adaptation opportunities*” (EBRD, 2014a);
- “*Produce instruments and develop practices that allow [...] clients to consider climate-related risks and opportunities in their investment decisions*” (IFC, 2012a).

The environmental policies of EBRD and EIB, who mostly operate in European territories, are also directly governed by EU standards and legislations. This is particularly relevant when considering the climate change provisions recently (May 2014) introduced in the revised EU Environmental Impact Assessment (ESIA) Directive (EU, 2014). For projects undertaken in the EU, the Directive now mandates to assess both the impacts of project on climate in terms of GHGs emissions, but also their vulnerabilities to climate change. According to EBRD (2014b), the EU ESIA more ambitious than any existing IFIs' environmental policy.

With regard to clients' commitments, MDBs' safeguards systems have different requirements, with varying degree of strictness. In particular, regarding the Environmental and Social risks and impacts:

- IFC's clients are requested to *consider the “relevant risks associated with a changing climate and the adaptation opportunities”* (IFC, 2012b);
- IDB requests borrowers to provide assessment of disaster and climate change risks associated with projects classified “moderate and high risk” (IDB, 2014a; IDB, 2014b).
- EBRD's borrowers, instead, are advised to – if appropriate – “*complement the environmental and social assessment with further studies focusing on specific risks and impacts, such as climate change [...]*” (EBRD, 2014a);

- EIB requests borrowers to “provide information on the climate change risks the projects face, including those of the systems within which projects operate” being e.g. supply chain or surrounding infrastructure (EIB, 2013a);

IFC, EIB and EBRD safeguards provisions are not limited to a projects’ vulnerability to climate change, but also consider projects’ potential consequences on the climate change vulnerability of natural ecosystems and communities (IFC, 2012b; EIB, 2013a), biodiversity and living natural resources (EBRD, 2014).

At IDB borrowers are required to perform disaster risk assessment during the project preparation through e.g., feasibility studies, engineering studies, environmental impact assessments (IDB, 2014a,b). In principle, the climate risk assessment and management procedures apply to private sector (non-sovereign guaranteed) operations. However, given the recent development of the screening approach and its revision at the beginning of 2014, they have so far received limited usage, only for projects entering the project preparation cycle since the end of 2013. The Bank is still exploring how to support borrowers to best manage the identified additional risks of climate change in its operations (IDB, 2014a).

ADB’s safeguards do not have explicit climate resilience-related requirements (ADB, 2009). However, according to current practices, for projects classified as “medium or high risk” based on the results of the AWARE screening tool, project teams discuss with projects’ sponsors the results of the screening, and may propose more detailed climate impact assessment (ADB, 2014a). The results of the initial climate risk screening are appended to the rapid environmental assessment checklist to encourage project teams to assess climate risks at concept stage, or at the early phase of project preparation and, if necessary, modify project’s design to mitigate such risks (ADB, 2014a).

Table 13. IFIs’ Safeguards: borrowers requirements for climate risk screening / assessment.

	ADB	AfDB	EIB	EBRD	IDB	IFC	DEG	FMO	Proparco
Mandatory	Clients are advised to assess climate change risks	No	Yes	No in Environment Assessment. Yes in case of biodiversity & sustainable management of living natural resources	Yes	Yes	No	No	No

Source: author’s elaboration based on IFIs’ Safeguards Policy and Standards; IFIs’ web sites and interviews (further details in Annex A and references section).

3.3 Insights on IFIs' approaches to engage private actors in climate resilience

The assessment of existing initiatives and interviews with IFIs' representatives revealed that to engage private sector clients in identifying, assessing and managing climate risks, IFIs have adopted what could be defined an "evolutionary approach", building on and leveraging their comparative advantages and approaches in specific sectors.

IFC, which along with EBRD is the entity relatively most experienced in private sector involvement in climate resilience, has for instance leveraged its expertise and the lessons learned through its Sustainable Business Advisory program on sustainable supply chains (see e.g. IFC 2012c and IFC, 2013) developing initiatives in the agricultural sector. EBRD has built on the business model of its Sustainable Energy Initiative and its long standing experience in energy efficiency, operationalizing climate resilience from a resource (water and energy) efficiency angle (EBRD, 2013). Water management is also the focus of EIB's activities and, according to Kovatas and Valentini (2014), a key priority for European countries given their vulnerabilities to water shortages and flooding.

As far as the BFIs are concerned, Proparco and FMO have not yet developed specific approaches, albeit FMO – within its sustainability agenda – is engaged in activities with relevance for climate resilience e.g., by promoting a more efficient use of natural resources (see FMO, 2013). DEG, instead, which has set adaptation as a strategic goal, has undertaken some early steps in water-intensive sectors (e.g. agribusiness) (DEG, 2014a,b).

Existing experiences are targeting business actors operating in highly climate-sensitive sectors: agribusiness, pulp and paper, hydropower and coastal infrastructure. These are sectors where today's investments in climate resilience have relatively short-term payback period, or where the investment horizon is sufficiently long term to prompt climate risk management, hence justify today's expenditure.

To generate awareness and demand for climate resilience investment, overcoming those constraints typically associated with the pre-investment and investment phases, assessed IFIs have undertaken a number of initiatives, targeting both the demand and supply sides for adaptation finance. In particular, to engaging businesses and build project portfolios, assessed IFIs have:

- Carried out tailored pilot studies, involving existing and/or prospect clients and, in certain cases, business associations, chamber of commerce and relevant government's representatives (e.g. Stenek et al., 2010b; IFC and EBRD, 2013);
- Organized targeted outreach seminars (e.g., AfDB, 2014a,b) or consultations during the development of countries' adaptation programs (see ADB, 2013; Trabacchi and Stadelmann, 2013).

To support clients identify and evaluate climate risks, while testing and developing relevant methodologies or gaining experience, assessed IFIs have:

- Undertaken business tailored 'climate resilience' audits (EBRD, no date) or pilot studies (Stenek et al., 2010b);
- Developed and promoted the use of climate risks screening and assessment tools (DEG, 2014b; The Global Compact, 2012);
- Tried to identify opportunities for integrating "adaptation components" to "business-as-usual" private sector projects already in the pipeline (AfDB, 2014a; IDB, 2014a; IDB, 2013b); or to identify projects contributing to climate resilience because they target drivers of vulnerability (see e.g. AfDB, 2014c; AfDB, 2014a).

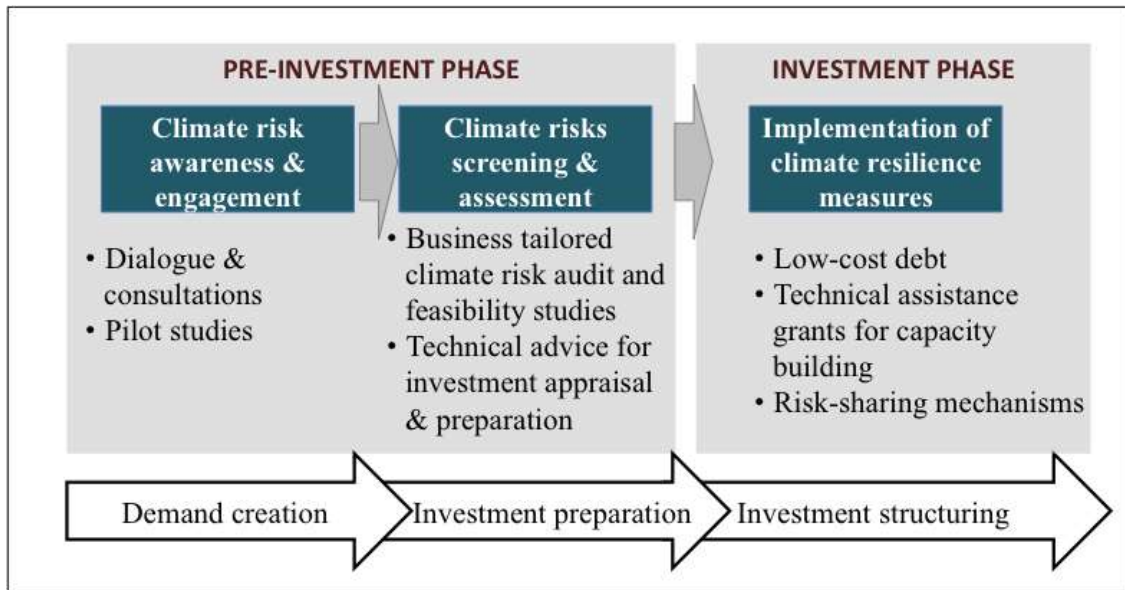
To support the implementation of climate resilience measures, assessed IFIs have:

- Designed and/or provided technical advisory services and capacity building measures to support preparation and implementation of investments (see e.g., EBRD, no date; IFC, 2012c,d);
- Promoted the adoption of relevant technologies and practices, and offered tailored financial support (see e.g. EBRD, 2014; IFC, 2012d,e; IDB, 2013b)

EBRD has also engaged in policy dialogues to prompt regulatory reforms (e.g. regarding water pricing) improving the business environment for investments (EBRD, 2014b).

Figure 19 below presents an overview of the main approaches taken so far by some of the IFIs assessed in the study to involve private actors in climate resilience activities; Appendix B presents further details on specific projects.

Figure 19. IFIs' operational approaches to engaging private actors in climate resilience



Sources: author's elaboration; see details in Appendix B and references section. Note. Some of the approaches outlined in the figure are still at a project concept stage.

3.3.1 Empirical evidence on IFIs' financing modalities to engage private actors in climate resilience

The availability of adaptation finance instruments tailored to the needs of the pre-investment and investment phases can play a critical role in incentivizing and enabling private sector engagement in pilot climate risks management measures.

This is because i) performing the additional analysis required to identify and evaluate climate risks, brings additional costs; ii) adaptation measures can have higher costs or higher risks than their non-climate resilient traditional alternatives. Iqbal and Suding (2011), for instance, noted that these analyses can add 25% to the average costs of an environmental and impact assessment. Private borrowers are often not convinced to integrating climate risk management considerations in their investment decisions, and typically not willing to borrow toward these ends (Iqbal and Suding, 2011).

Pre-investment phase

To overcome such constraints, supporting the demonstration, piloting and uptake of climate resilience initiatives, some MDBs have designed instruments in support of the pre-investment phase. Specifically:

- EBRD has financed climate resilience audits (EBRD, 2013) under its multi-donor funded Sustainable Energy Initiative. Most recently, leveraging the experience gained with the Energy Audits Program, it is fine-tuning a *climate resilience audit*

facility where an upfront-free consultancy and audit service is associated to financing in support of potential investment (EBRD, 2014c);¹³⁸

- ADB established a dedicated cost center to finance projects' climate risk and vulnerability assessments, although this has not yet been used for private sector projects (ADB, 2014);
- IFC has covered the cost of pilot feasibility studies with own and donor's resources (e.g. Pilot Program for Climate Resilience) (see IFC, 2012b,d and Stenek et al., 2010b).

Investment phase

To support the investment stage phase, reaching widespread and numerous micro and small businesses, which IFIs would not typically be able to directly finance due to the disproportion between diligence costs and the value of the transactions, a number of MDBs (AfDB, ADB, EBRD, IDB and IFC) are developing special purpose intermediated financing structures. Mainly still at the concept stage, intermediaries involved to on-lend via targeted credit lines include: local financial institutions (EBRD, 2014b; IFC, 2012d; CIF, 2014a) and/or other non-bank entities such as microfinance institutions (EBRD, 2014b), or Industry Trust (IDB, 2013b). Some IFIs also seek to reach end-beneficiaries through agricultural value chain financing mechanisms that lever the incentives existing between buyer and suppliers (e.g., IFC, 2013; IDB, 2014c).

Intermediated financing structures typically incorporate financial capacity building measures aimed at:

- Raising intermediaries' awareness about the opportunities associated with the financing of adaptation measures;
- Strengthening intermediaries' ability to perform credit risks analysis (IFC, 2012);
- Develop tailored financial products while lowering their risk aversion through first-loss mechanisms (IFC, 2012; GEF-IDB, 2014);

From the interviews undertaken and existing literature emerges clearly that access to third party non-refundable or concessional resources is critical to support IFIs' technical assistance services during both the pre- and investment stages.¹³⁹ They are

¹³⁸ The Facility aims to making climate-resilient, energy-efficient and water-efficient technologies accessible and affordable to businesses, farmers and households.

¹³⁹ Advisory services are critical to stimulate demand for investment, supporting the creation of those preconditions necessary to make investments happen given that in some of the countries/sectors targeted by IFIs' interventions (e.g. Niger, Zambia) market circumstances do not yet allow the promotion of investments on a commercial basis.

also important to enable MDBs or private actors to invest in projects they would otherwise be unable or unwilling to finance because of the relatively higher risks (IFC, 2012; IDB, 2014a).

Donor-backed funding opportunities can in fact enable MDBs to e.g.:

- Provide risk sharing mechanisms such as first-loss guarantees to financial intermediaries (IFC, 2012), or
- Lower the risks of ‘first movers’ and the additional costs associated with climate-resilient technologies, thereby incentivizing uptake and lowering outcome risks with concessional financing (see e.g. Chapter 3).

MDBs access to the resources of multilateral Climate Funds, but also to other program/project- specific donors’ resources.¹⁴⁰ Private sector BFIs do not typically have access to multilateral funds.

Among the multilateral Climate Funds the USD 1.2 billion Pilot Program for Climate Resilience (PPCR) stands out. This is because with its private sector ‘set aside’ (CIF, 2012; CIF, 2013b) is the multilateral program most targeted toward private sector involvement. Interviewees noted that the more flexible financing modalities of the ‘set aside’, as compared to the standard ones of the PPCR program, have represented a key value added in the development of private sector-oriented adaptation projects (AfDB, 2014; IDB, 2014a).

3.4 Constraints

The IFIs’ representatives interviewed highlighted a number of difficulties associated with the operationalization of adaptation in their private operations and the integration of climate risks in investments. Table 14 below presents the constraints that emerged during the interviews as well as relevant literature (see Stenek et al., 2013), trying to underscore the influence of enabling environment gaps on IFIs’ action and private sector adaptation.

In addition to the constraints highlighted in Table 14, also the following obstacles emerged:

- IFIs’ internal cultural/readiness barriers,¹⁴¹ as well as discount rates of adaptation investments and loan tenor.¹⁴²

¹⁴⁰ MDBs are the implementing agencies of the Pilot Program for Climate Resilience – the adaptation window of the Climate Investment Funds; the Global Environmental Facility (LDCF and SCCF); the Adaptation Fund. MDBs also manage donors’ resources in pursuit of specific mandates e.g. the multi-donor Sustainable Energy Initiative managed by EBRD.

- Trade-offs between IFIs' own strategic targets and respective comparative advantages;
- Mismatch between the financial products offered by IFIs, and/or their risk tolerance, and project's financing need (e.g. venture capital);
- Lack of clarity on what qualifies as adaptation in private sector operations has also represented an obstacle to the operationalization of adaptation in private sector-oriented projects.

Table 14. IFIs' main constraints to private sector engagement

Gaps	Gaps calling for policy-makers' actions	IFIs' constraints
Data, information & knowledge	<ul style="list-style-type: none"> • Lack of sound and business-relevant data and information, including <ul style="list-style-type: none"> - detailed and reliable series data about the historical climate - scenarios of future climate for the project location. • Weak information and communication technology infrastructure and knowledge 	<ul style="list-style-type: none"> • Methodological issues on how to embed climate resilience considerations in projects. • Low in-country technical capacities for project's implementation
Institutions, policies & economic incentives	<ul style="list-style-type: none"> • Weak policy and regulatory frameworks in countries of operations, including mispricing of natural resources.¹⁴³ • Underdevelopment of the private sectors in the countries of operation, or targeted by dedicated initiatives such as the PPCR.¹⁴⁴ • Weak or incomplete domestic capital markets 	<ul style="list-style-type: none"> • Difficulties in identifying/developing commercially viable investments. • IFIs' structures versus project size, mostly small-scale, which call for IFIs' financial intermediation given that, otherwise, due diligence costs would be disproportionate relative to the value of the transaction. • Companies' capacity constraints to develop projects or to secure the adequate amount of equity to enable co-financing.¹⁴⁵

Source: author's elaboration based on interviews and Stenek et al. (2013).

Finally, constraints to extend loans in local currency, a key issue in the financing of mitigation projects in developing countries (see e.g. CIF, 2012b), was noted as a

¹⁴¹ In some cases investment officers were not inclined to include uncertain climate change risks into financial models as lacking tools and understanding on how to best do so in a streamlined manner.

¹⁴² A loan with a maturity of 5-10 years does not induce investment officers to evaluate and manage the climate sensitivity of projects during their operational life. This was for instance the case at IFC prior to the revision of its Performance Standards which require risk assessment over the entire life cycle for projects in climate-sensitive areas (IEG, 2012). Outstanding questions remain regarding the true Net Present Value of adaptation investment which oftentimes amounts to disaster protection insurance (IFC, 2014).

¹⁴³ IFC and EBRD (2013) highlights that, for instance, investment in measures aimed at increasing water efficiency in the processes of businesses operating in an increasingly water-stressed country (Turkey), would have a positive Net Present Value only above certain water prices.

¹⁴⁴ In June 2014 the governing bodies of the PPCR decided to extend private sector activities to low and lower middle income part of the Climate Investment Fund activities (CIF, 2014).

¹⁴⁵ IFIs, but also initiative financed with third parties resources (see e.g. CIF, 2013b), typically operate with co-financing rules so project sponsors must have own financial resources or resources of third parties to contribute to the costs of the project.

possible future issue. At present, it may not have yet emerged as a major constraint because most private sector projects are at early stages, or currently focusing on filling “advisory gaps”.

4. Concluding remarks

The international climate community has been increasingly calling for the involvement of the private sector to advance the climate adaptation agenda because critical to catalyze greater investment in climate vulnerability reduction.

Private companies should integrate climate risks management procedures into their investment decision-making processes and strategies, to strengthen their “*internal resilience*”, but also the resilience of the countries in which operate.

The issue is that the lack of awareness, and/or “investment-relevant” data and information about climate risks (and opportunities), and know-how, has made them difficult to relate climate concerns and risks to business operations. Moreover, managing climate risks may require investments that can have higher upfront costs, longer payback periods and higher perceived risk, which can discourage them from undertaking these projects. Information and capacity barriers can also lower the risk tolerance of investors.

Market conditions are often unfavorable to climate change adaptations due to lack of adequate data, information, policies and economic incentives, which are critical elements of an enabling business environment for climate risk management.

Against this background, this research has sought to bring evidence on the role that IFIs could play to address such obstacles, supporting and stimulating the private sector to identify climate change risks and response measures. Given their increasing involvement in the financing of private sector activities, and provision of tailored advisory services, these institutions have a unique opportunity to promote and enable the involvement of private actors in climate resilience.

This study has at first focused on IFIs’ approaches to *managing climate risks to projects* then, at their *adaptation projects*.

IFIs’ approaches to managing climate risks to projects

With regard to *managing climate risks to projects*, it focused on IFIs’ project cycle as a critical step to identify opportunities for incorporating climate change risk management considerations into all projects, and not only those specifically focused on adaptation.

At first it assessed IFIs' availability and use of climate risks screening approaches in private sector operations, then reviewed IFIs' Environmental and Social Safeguards requirements to ascertain the integration of climate change risks considerations, and the related IFIs and borrowers' requirements.

The research unveils that IFIs are at different stages of 'readiness' in incorporating climate risks management in the project cycle, either adopting safeguard-based or opportunity-driven approaches.

Most IFIs have recently introduced or are testing various approaches to integrating climate resilience in their private (but also public) sector operations, others are still in the process of understanding if and how to operationalize climate risks management. With the exception of EBRD, whose "resource efficiency" approach has been operational for several years, and the interesting preliminary steps made by DEG in water risks screening, dedicated approaches have been recently (2013/2014) introduced by some IFIs (ADB, IDB). EIB and IFC are still developing or fine-tuning them, while BFIs' (FMO and Proparco) approaches are mainly at a conceptual stage. The IFC's tool is the final step of a process that started years ago with a series of case studies undertaken to pilot and testing various approaches and methodologies, thereby developing the needed know-how.

The level of compulsoriness of climate risk screening varies across institutions, as projects may enter into banks' project cycles at an advance stage of development, when it is too late to intervene on project design.

With regard to Environmental Safeguards, most MDBs have integrated climate change risk considerations in their recently revised safeguards policies and standards and, even if not yet done so formally, climate change risks considerations during project preparation is a current practice.

MDBs' and clients' requirements vary across institutions' safeguard systems.

Clients are *requested* or *advised* to consider the "*relevant risks associated with a changing climate and the adaptation opportunities*". But, clients' availability of climate risks screening tools, approaches and know-how is a prerequisite to ensure they properly take climate risks into account. That is why it is relevant that IFIs "*[...] produce instruments and develop practices that allow [...] clients to consider climate-related risks and opportunities in their investment decisions*" (IFC, 2012a).

IFIs' adaptation projects

In terms of *adaptation projects*, evidence suggest that IFIs are building on and leveraging their comparative advantages and approaches in specific sectors to manage projects vulnerability to climate risks.

Existing experiences are targeting business actors operating in highly climate-sensitive sectors (e.g. agribusiness and infrastructure). These are sectors where today's investments in climate risk management have relatively short-term payback period, or where the investment horizon is sufficiently long term to prompt today's expenditure.

The approaches identified through the research are targeting both pre-investment and investment needs, stimulating the demand and supply sides for adaptation finance.

At the pre-investment phase, EBRD and IFC are supporting climate resilience audits or feasibility studies to enable the identification of risks, and subsequently devise management strategies. These approaches are important to devise bankable projects and generate a deal flow.

To support the investment stage phase, reaching widespread and numerous micro and small businesses in developing and emerging countries, a number of MDBs (AfDB, ADB, EBRD, IDB and IFC) are developing special purpose intermediated financing structures. The involvement of local financial and/or non-financial institutions is critical to enable climate risk management at the local level.

IFIs' roles in engaging the private sector in managing climate risks

First, IFIs can have a standard setting role with relevance to both financiers and investors.

The integration of climate change risk considerations in IFI' safeguards standards is an important steps towards scaled-up climate risk management across the finance value chain. This is because:

- For financiers, IFIs' Environmental and Social Safeguards represent industry benchmarks. The engagement of commercial financial institutions in the application of climate risk management principles in project and/or corporate finance is important to prompt climate resilience financing because IFIs cover a relatively limited share (5%)¹⁴⁶ of investments in developing countries. The Equator

¹⁴⁶ IFIs private sector commitments to the private sector in developing countries as a percentage of gross global long-term flows (2009) (IFC, 2011).

Principles, who align with IFC's investments Performance Standards, can represent a vehicle for spreading practices across the financial industry.

- For investors, who have to meet IFIs' safeguards standards when borrowing for projects, IFIs' Environmental and Social Safeguards can promote climate risk management throughout the life of investments. IFIs, however, should strive to ensure that climate risks management becomes the new "good international industry practice" because now the level of compliance typically requested to borrowers is the so-called "good international industry practice".

Second, IFIs can have a projects structurer role, demonstrating the viability of non-traditional business models

Through advisory services, including audits and feasibility studies, IFIs can, in some instances, stimulate demand for investment and enhance projects' bankability. They can assist companies' decision-making by providing business-relevant information on climate risks, and guidance on management strategies. They can then shape financing packages tailored to local project developers' needs and the higher costs and risks of some climate-resilient technologies and practices. Grant or highly concessional co-financing from donors are supporting these activities.

Third, IFIs have a role to play in strengthening the enabling environment.

IFIs can help to improve the business climate for investments through policy dialogues, by suggesting/supporting regulatory reforms that would enhance projects' viability, and by working in partnership with their public sector financing counterparts (e.g. World Bank).

Ultimately, the creation of policy, regulation and markets that adequately incorporate climate change considerations can create national enabling environment that promote autonomous investment in climate risk management.

5. References

- Acclimatise. 2012. *Guidelines for Project Managers: Making vulnerable investments climate resilient. Report for the European Commission.* September 2012.
- ADB web site at: <http://www.adb.org/site/safeguards/main>.
- ADB. 2009. *Safeguard Policy Statement.* June 2009. Manila.
- ADB. 2012. *Environment Safeguards. A Good Practice Sourcebook Draft Working Document.* Manila.
- ADB. 2013. *Financial Report 2013a. Management's Discussion and Analysis and Annual Financial Statements, Manila. 2013.*
- ADB. 2013b. *Establishing the Canadian Climate Fund for the Private Sector in Asia under the Clean Energy Financing Partnership Facility. Asian Development Bank, Manila.*
- ADB. 2013c. *Safeguard Policy Statement. Operation Manual Bank Policies (BP). OM Section F1/BP Issued on 1 October 2013.*
- ADB. 2014a. Discussions with ADB staff (Micheal Rattinger), written questionnaire and paper for review submitted to the Non-Sovereign Department; CIF Department and Safeguard Department), March-July 2014.
- ADB 2014b. *Rainwater Harvesting and Drip Irrigation for High-Value Crop Production in Cambodia.* PPCR Private Sector Set Aside Project Document.
- ADB 2014c. *Cambodia: Integrated Climate Resilient Rice Value Chain Community Project.*
- AfDB [no date]. *Climate Safeguard System (CSS). Climate Screening and Adaptation Review & Evaluation Procedures.* Booklet. Compliance and Safeguard Division (ORQR.3). African Development Bank Group, Tunis. At: http://www.climateadaptation.cc/files/7213/5602/5312/CSS_Basics-En.pdf.
- AfDB 2013. *African Development Bank Group's Integrated Safeguards System. Policy Statement and Operational Safeguards.* Safeguards and Sustainability Series Volume 1 - Issue 1 (Dec. 2013), African Development Bank Group, Tunis.
- AfDB, 2011. *Climate Change Action Plan 2011-2015.* African Development Bank Group, Tunis. At: <http://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/Climate%20Change%20Action%20Plan%20%28CCAP%29%202011-2015.pdf>
- AfDB. 2014a. Discussions with AfDB staff (Mafalda Duarte, Nyong Anthony Okon, and Sergio Santos), March-July 2014. At: <http://www.adb.org/sites/default/files/pub/2009/Safeguard-Policy-Statement-June2009.pdf>.
- AfDB. 2014b. AfDB *Facilitates Private Sector Finance For Climate-Readiness in Niger, Mozambique and Zambia. Web Article, 26/02/2014.* And AfDB. 2014. *Pilot Program for Climate Resilience (PPCR). 2nd Round of Financing Calls: 04/2014.* Seminar Presentation. Lusaka, Zambia 13/03/2014.
- AfDB. 2014c. *PPCR Private Sector Set Aside. Lurio Sustainable Forestry Project.* Project Document. Final Concept Note May 2014.
- Agrawala S. and Fankhauser S. 2008. *Economic Aspects of Adaptation to Climate Change. Costs, Benefits and Policy Instruments.* Organization for Economic Co-operation and Development, Paris.
- Agrawala S., Matus Kramer A., Prudent-Richard G., and Sainsbury M. 2010. *Incorporating Climate Change Impacts and Adaptation In Environmental Impact Assessments: Opportunities and Challenges*, OECD Environmental Working Paper No. 24, OECD Publishing, OECD.doi: 10.1787/5km959r3jcmw-en.
- Agrawala, S. et al. 2011. *Private Sector Engagement in Adaptation to Climate Change: Approaches to Managing Climate Risks.* OECD Environment Working Papers, No. 39, OECD Publishing. <http://dx.doi.org/10.1787/5kg221jkf1g7-en>.

Arndt M. 2013. *Environmental, Climate and Social Standards*. Presentation. Luxemburg.

Biagini B. and Miller A. 2013. *Engaging the Private Sector in Adaptation to Climate Change in Developing Countries: Importance, Status, and Challenges*. Climate and Development, Vol. 5, Issue 3, 2013 Pages 242-252.

Bloomberg. 2013. *Investors Demand Climate-Risk Disclosure in 2013 Proxies*. Feb 25, 2013 At: <http://www.bloomberg.com/news/2013-02-25/investors-demand-climate-risk-disclosure-in-2013-proxies.html>.

C2ES. 2013. *Weathering the Storm: Building Business Resilience to Climate Change*. Center for Climate and Energy Solutions. At: <http://www.c2es.org/publications/weathering-storm-building-business-resilience-climate-change>.

Carbon Disclosure Project, 2012. *Insights into Climate Change Adaptation by UK Companies*. A report prepared for Defra by the Carbon Disclosure Project. London, UK.

CERES. 2009. *Water Scarcity & Climate Change: Growing Risks for Business & Investors*. At: <http://www.ceres.org/resources/reports/water-scarcity-climate-change-risks-for-investors-2009/view>.

CERES. 2011. *Disclosing Climate Risks & Opportunities in SEC Filings. A Guide for Corporate Executives, Attorneys & Directors*. Authored by Coburn J., Donahue S.H., Jayanti S. Boston, MA. At: <http://www.ceres.org/resources/reports/disclosing-climate-risks-2011>

CIF. 2012. *Decision Agenda Item 7, Allocation of PPCR Resources*. PPCR/SC.11/CRP.5. November, 2012. At: https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/PPCR_CRP_5_Decision_on_allocation_of_PPCR_resources.pdf.

CIF. 2012b. *Use of Local Currencies in CIF Projects. Joint Meeting of the CTF and SCF Trust Fund Committees*. Agenda Item 3. CTF-SCF/TFC.9/7. Istanbul, Turkey.

CIF. 2013b. *Procedures for Allocating PPCR Resources on a Competitive Basis from an Agreed Set Aside of Resources*. February 2013. Washington D.C. At: https://climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Procedures_for_Allocating_PPCR_Resources_on_a_Competitive_Basis_from_a_Set_Aside_0.pdf.

CIF. 2013c. *Review and Selection of Concepts to be Financed from the PPCR Private Sector Set Aside*. Meeting of the PPCR Sub-Committee. PPCR/SC.13/4/Rev.1. Washington D.C. November 1, 2013

Climate Investment Funds (CIF). 2013a. *PPCR Semi-Annual Operational Report*. Meeting of the PPCR Sub-Committee, Washington D.C. PPCR/SC.13/3/Rev.1 At: https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/PPCR_SC.13_3_semi_annual_operational_report_rev1.pdf.

Climate Investment Funds (CIF). 2014. Discussions with CIF staff, (Martha Steinsochas), February 2014.

Climate Investment Funds (CIF). 2014a. *PPCR Private Sector Set Aside (Second Round): Review and Selection of Proposals. Meeting of the PPCR Sub-Committee*, Agenda Item 7. Montego Bay, Jamaica. June 6, 2014. PPCR/SC.14/5/Rev.1

Climate Investment Funds (CIF). 2014b. *PPCR Semi-Annual Operational Report*. Meeting of the PPCR Sub-Committee, Montego Bay, Jamaica. June 27, 2014. PPCR/SC.14/3.

Crown 2013. *Adapting to Climate Change: Ensuring Progress in Key Sectors. 2013 Strategy for Exercising the Adaptation Reporting Power and List of Priority Reporting Authorities*. HM Government. London At: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209875/pb13945-arp-climate-change-20130701.pdf.

Crown. 2008. *Climate Change Act 2008*. Chapter 27. At: <http://www.opsi.gov.uk/acts/acts2008/pdf/ukpga20080027en.pdf>.

DEG - Deutsche Investitions- und Entwicklungsgesellschaft mbH (DEG). 2014b. *Annual Report 2013. Financial Statements and Management Report* DEG - Deutsche Investitions- und Entwicklungsgesellschaft mbH April 2013 Cologne.

DEG. 2009. *Addressing Climate Risks Financial Institutions in Emerging Markets. A Best practice Report*. September 2009. DEG and Risk Metrics Group and Ceres. Cologne.

DEG. 2013. *Annual Report 2012. Financial Statements and Management Report* DEG - Deutsche Investitions- und Entwicklungsgesellschaft mbH April 2013 Cologne.

DEG. 2014a. Discussion with DEG staff (Christopher Cosack), February 2014.

EBRD 2012 [latest updated]. *Climate Change in the EBRD Region. Web site at: <http://www.ebrd.com/pages/sector/energyefficiency/climate.shtml>*.

EBRD. 2010. *Agribusiness Sector Strategy*, As approved by the Board of Directors at its meeting on 6 July 2010. London, UK. At: <http://www.ebrd.com/downloads/policies/sector/agri.pdf>.

EBRD. 2011. *Sustainability Report*. 2011. London, UK.

EBRD. 2012b. *Sustainability Report*. 2012. London, UK.

EBRD. 2013. *Building Resilience to Climate Change: Investing in Adaptation*. Sustainable Energy Initiative. At: <http://www.ebrd.com/downloads/sector/eccc/sei-adaptation.pdf>.

EBRD. 2014a. *Environmental and Social Policy as approved by the Board of Directors at its Meeting* on 7 May 2014. London, United Kingdom.

EBRD. 2014b. *Email exchange with EBRD staff (Craig Davies), July 2014*.

EBRD. 2014b. *PPCR Private Sector Set Aside. Tajikistan: Small Business Climate Resilience Financing Facility. Project Document*. At: <https://www.climateinvestmentfunds.org/cif/docs>

EBRD. 2014c. *Resource Efficiency & Climate Resilience Audits*. Presentation prepared for Global Lab of Climate Finance call for ideas. May-June 2014.

EBRD, 2014x. *Tajikistan: Small Business Climate Resilience Financing Facility*. At: <https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/2014-02-14%20EBRD%20Tajikistan%20Small%20Business%20Climate%20Resilience%20Financing%20Facility.pdf>.

EIB. 2009. *The EIB Statement of Environmental and Social Principles and Standards*. Luxembourg.

EIB. 2013a. *European Investment Bank Environmental and Social Handbook*. Version 9.0 of 02/12/2013. Luxembourg.

EIB. 2013b. *Climate Action Signatories 2012. Internal Document*. European Investment Bank. Luxembourg.

Equator Principles web sites at: <http://www.equator-principles.com/index.php/about-ep/about-ep>.

Equator Principles. 2013. *The Equator Principles. Financial Industry Benchmark for Determining, Assessing and Managing Environmental and Social Risk in Project*. June 2013. At: <http://www.equator-principles.com/index.php/ep3/ep3>.

EU, 2014. *Directive 2014/52/EU of the European Parliament and of the Council*. April 2014. Amending Directive 2011/92/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment. At: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0052&from=EN>.

Fankhauser A. et al. 2013. *An Independent National Adaptation Programme for England*. Grantham Research Institute on Climate Change and the Environment and Centre for Climate Change Economics and Policy (CCCEP). At:

<http://www.lse.ac.uk/GranthamInstitute/publications/Policy/docs/PB-independent-national-adaptation-programme-for-england.pdf>.

FMO 2014. Discussions with FMO staff (Wilfred van den Bos and Bernhard van Meeteren) April 2014.

FMO Environmental and Social Policy at <http://www.fmo.nl/esg-policy>.

FMO. 2013. *Strategies for Sustainable Business Looking Back, The Lenders' Environmental And Social Requirements Have Been A Blessing In Disguise*. JK Paper Mills management At: <http://www.fmo.nl/sustainability>

Gatti S. 2008. *Project Finance in Theory and Practice. Designing, Structuring and Financing Private and Public Projects*. Elsevier Inc. California, USA.

GCF/B.04/07. *Business Model Framework: Private Sector Facility*. GCF/B.04/07. Meeting of the Board 26-28 June 2013 Songdo, Republic of Korea. Agenda item 4(e). At: http://www.gcfund.net/fileadmin/00_customer/documents/pdf/B-04_07_BMF_PSF_12Jun13_1745s.pdf.

GEF-IDB. 2014. *IDB-GEF Climate-Smart Agriculture Fund for the Americas. Program Framework Document. Global Environmental Facility*.

Gigli S. and Agrawala S. 2007. *Stocktaking of Progress On Integrating Adaptation To Climate Change Into Development Co-Operation Activities*. OECD, Paris.

Hammill A. and Tanner T. 2011. *Harmonising Climate Risk Management: Adaptation Screening and Assessment Tools for Development Co-operation, OECD Environment Working Papers*, No. 36, OECD Publishing. <http://dx.doi.org/10.1787/5kg706918zvl-en>

Horta K. 2012. *The Pitfalls and Potential of the World Bank's Safeguard Review*. Presentation Delivered at Global Safeguard Strategy Meeting. April 21, 2012. World Resource Institute. Washington D.C. At: http://urgewald.org/sites/default/files/safeguards_-_wri_strategy_mtg.ppt.pdf.

<http://www.oecd.org/dataoecd/11/18/39575695.pdf>

IDB 2008. *Disaster Risk Management Policy Guidelines*. March 2008. Washington D.C. At: <http://publications.iadb.org/bitstream/handle/11319/1701/Disaster%20Risk%20Management.pdf?sequence=1>.

IDB web site at: <http://www.iadb.org/en/insitutional-reforms/better-environmental-and-social-safeguards,1830.html>.

IDB web site web site at: <http://www.iadb.org/en/topics/sustainability/sustainability-and-safeguards,8621.html>.

IDB, 2014a. Discussions with IDB staff (Gloria Visconti, Patrick Doyle, Gerard Alleng, Paul Suding) January-June 2014.

IDB 2014b. *Implementing Directive A-2 of the DRM Policy OP-704: Addressing Disaster and Climate Change Risk in IDB Projects Procedural Clarification*, Guidance note, PHS/ESG Draft May 17, 2014. Internal Document, Washington D.C.

IDB, 2014c. PPCR Project Documents: *PPCR Private Sector Set-Aside: Round Two: Bolivia: Microfinance and Climate Resilience for Smallholder Farmers in Bolivia*; *PPCR private sector set aside, Support for The Building of A Climate Resilient Sorghum Supply Chain in Haiti* (IDB). At: <https://www.climateinvestmentfunds.org/cif/docs>

IDB. 2013a. *The Year in Review. Inter-America Development Bank. 2012 Annual Report*. Washington D.C. March 2013.

IDB. 2013b. PPCR Project Documents: *PPCR Private Sector Set-Aside: St. Lucia: Supporting Climate Resilient Investments in The Agricultural Sector*, *PPCR Private Sector Set-Aside: Jamaica: Financing Water Adaptation in Jamaica's New Urban Housing Sector*. At: <https://www.climateinvestmentfunds.org/cif/docs>.

IDB. 2012. *Inter-American Development Bank Climate Change Action Plan (2012-2015)*. Washington D.C. At: <http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=38200998>.

IDB. 2007. *Implementation Guidelines for the Environment and Safeguards Compliance Policy*. Washington, D.C. At: <http://publications.iadb.org/bitstream/handle/11319/6302/Implementation%20Guidelines%20for%20the%20Environment%20and%20Safeguards%20Policy%20.pdf?sequence=2>.

Idle T. 2014. *Online Climate Risk Platform by Acclimatise Puts Users in Control*. Web Article. February 24, 2014. At: <https://www.2degreesnetwork.com/groups/2degrees-community/resources/online-climate-risk-platform-by-acclimatise-puts-users-control/>.

IFC. 2014. Discussions with IFC staff (Vladimir Stenek, Alan Miller and John Graham) February-June, 2014.

Independent Evaluation Group (IEG). 2012. *Adapting to Climate Change: Assessing the World Bank Group Experience Phase III*. Washington D.C.

International Finance Corporation (IFC) and European Bank for Reconstruction and Development (EBRD). 2013. *Climate Risk Case Study. Pilot Climate Change Adaptation Market Study: Turkey*.

International Finance Corporation (IFC). 2013a. Annual Report 2013. *We Can End Extreme Poverty in a Generation and Boost Shared Prosperity. The Power of Partnerships*. Washington, D.C.

IFC no date. [Internet]. Climate Risk and Adaptation. At: http://www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/CB_Home/Climate+Risks_Adaptation/.

IFC. 2010a. *A Strategy to Engage the Private Sector in Climate Change Adaptation in Bangladesh*. Prepared by Asian Tiger Capital Partners for the International Finance Corporation, September 2010. At: http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/IFC_pres_CC_PS_V8_Sep12010-IFC_%20sk.pdf.

International Finance Corporation (IFC). 2011a. *International Finance Institutions and Development through the Private Sector*. Washington, D.C

International Finance Corporation (IFC). 2012a. *International Finance Corporation's Policy on Environmental and Social Sustainability*. January 1, 2012. Washington D.C.

International Finance Corporation (IFC). 2012b. *International Finance Corporation's Guidance Notes: Performance Standards on Environmental and Social Sustainability*- Washington D.C. http://www.ifc.org/wps/wcm/connect/e280ef804a0256609709ffd1a5d13d27/GN_English_2012_Full-Documents.pdf?MOD=AJPERES.

International Finance Corporation (IFC). 2012b. *Performance Standards on Environmental and Social Sustainability. And Guidance Notes*. January 1, 2012. Washington D.C.

IFC. 2011b. *Climate Resilient Agricultural Program Bangladesh*. PPCR Project Document. At: <https://www.climateinvestmentfunds.org/cifnet/?q=country/bangladesh>.

IFC. 2012. *Building Climate Resilient Communities through Private Sector Participation. Nepal*. PPCR Project Document. At: <https://www.climateinvestmentfunds.org/cifnet/?q=country/nepal>.

IFC. 2012. *Private Sector Investment to Build Climate Resilience in Niger's Agricultural Sector*. At: <https://www.climateinvestmentfunds.org/cifnet/?q=country/niger>.

IFC. 2012. *Private Sector Support to Climate Resilience in Zambia*. At: <https://www.climateinvestmentfunds.org/cifnet/?q=country/zambia>

International Finance Corporation (IFC). 2012c. *Sugar, a Sweet Spot for IFC Advisory Services*. IFC Advisory Services in South Asia. Project brief. At: http://www.commddev.org/userfiles/SBA_PC%20-%20DSCCL%20Sugar%20-%20Sept%202012.pdf.

- IFC. 2012d. *PPCR Private Sector Investment to Build Climate Resilience in Mozambique: Project Document* at: <https://www.climateinvestmentfunds.org/cifnet/?q=country/mozambique>
- IFC, 2012e. Summary of Proposed Investment. *CPLF-ModernKarto*. At: <http://ifcextapps.ifc.org/ifcext/spiwebsite1.nsf/78e3b305216fcd8a85257a8b0075079d/49b3bdd16df5525985257a670068116c?opendocument>.
- IFC. 2013b. *Climate Change IFC's Response*. Washington D.C. At: <http://www.ifc.org/wps/wcm/connect/af213a004d91fdc6b232b748b49f4568/Climate+Change-+IFC%27s+Response.pdf?MOD=AJPERES>.
- IPCC. 2014. *Summary for Policymakers*. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability*. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1-32.
- Iqbal F.Y. and Suding P. 2011. *Options Paper: Reducing Climate Risk in IDB Operations*. Technical Note. No. IDB – TN – 488. Inter-American Development Bank, Washington, D.C.
- KfW. 2014. Discussions with KfW staff (Jochen Harnish), March, 2014.
- Klein, R.J.T., Eriksen, S.E.H, Naess, L.O., Hammill, A., Tanner, T.M., Robledo, C. & O'Brien, K.L. 2007. *Portfolio Screening to Support The Mainstreaming of Adaptation to Climate Change Into Development Assistance*. Climatic Change, 84:2344.
- Kovats, R.S., R. Valentini, L.M. Bouwer, E. Georgopoulou, D. Jacob, E. Martin, M. Rounsevell, and J.-F. Soussana, 2014: Europe. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Barros, V.R., C.B. Field, D.J. Dokken, M.D. Mastrandrea, K.J. Mach, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. XXX-YYY.
- McGray H., Bradley R., Hammil A., Schipper L., Parry JE. 2007. *Weathering the Storm Options for Framing Adaptation and Development*. World Resource Institute, Washington D.C. At: <http://www.wri.org/publication/weathering-storm>.
- Mendelsohn R. 2012. *The Economics of Adaptation to Climate Change in Developing Countries*. Yale University.
- MIGA 2013. *Annual Report 2013. Insuring Investment. Ensuring Opportunities*. Washington D.C. At: http://www.miga.org/documents/AR13_Highlights.pdf.
- National Round Table on the Environment and the Economy (NRTEE). 2012. *Climate Prosperity. Facing the Elements: Building Business Resilience in a Changing Climate*. A Canadian Initiative. Report 05. Ontario, Canada.
- Nelson J. 2010. *The Private Sector and Aid Effectiveness: Toward New Models of Engagement*. The 2010 Brookings Blum Roundtable Policy Briefs. Washington D.C.
- Norton Rose. 2011. *Environmental & Social Performance Standards for Project Finance*. Briefing 2011-2012. Norton Rose in Collaboration with Norton Rose. At: <http://www.nortonrosefulbright.com/files/environmental-and-social-performance-standards-for-project-finance-pdf-3140kb-60364.pdf>.
- OECD. 2009. *Policy Guidance on Integrating Climate Change Adaptation into Development Cooperation*. Organisation for Economic Co-operation and Development, Paris.
- OECD. 2012. *OECD Environmental Outlook 2050. The Consequences of Inaction*. Paris, OECD Publishin.

- Parry M.L., Canziani O.F., J.P. Palutikof and Co-authors. 2007. *Technical Summary. Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 23-78.
- Perry G. 2011. *Growing Business or Development Priority? Multilateral Development Banks' Direct Support to Private Firms*. Center for Global Development, Washington D.C.
- Persson A., Klein R.J.T., Kehler Siebert C., Atteridge A., Müller B, Hoffmaister J., Lazarus M., Takama T. 2009. *Adaptation Finance under a Copenhagen Agreed Outcome*. Stockholm Environment Institute, Stockholm, Sweden.
- Proparco. 2014. Discussions with Proparco staff (Emmanuelle Matz and Odile Conchou), February-April, 2014.
- Saich N. 2014. *The European Investment Bank Providing Finance and Expertise For Sound And Sustainable Investment Projects. Presentation at Standing Committee of Finance, Session Mobilising public finance for adaptation around the world - with particular focus on EIB's cooperation with regional development banks. June, 21, 2014, Montego Bay, Jamaica*.
- Securities and Exchange Commission (SEC). 2010. *Commission Guidance Regarding Disclosure Related to Climate Change*. 17 CFR PARTS 211, 231 and 241. At: <http://www.sec.gov/rules/interp/2010/33-9106.pdf>.
- Stenek V., Amado J.C., Greenall D. 2013. *Enabling Environment for Private Sector Adaptation. An Index Assessment Framework*. International Finance Corporation. Washington D.C.
- Stenek V., Connel R., Firth J., Colley M., 2010b. *Climate Risks and Business, Practical Methods for Assessing Risk*. International Finance Corporation, Washington DC.
- Stenek, V., J.C. Amado, and R. Connell, 2010a: *Climate Risk and Financial Institutions. Challenges and Opportunities*. [Kamins, R., Hidalgo, A., Stenek, V. and Connell, R. (eds.)]. International Finance Corporation -World Bank Group; Washington, D.C., pp. 1-120.
- The Global Compact 2012. *WWF/DEG Water Risk Filter*. At: <http://ceowatermandate.org/water-assessment-tools-methods/what-tools-are-available/wwfdeg-water-risk-filter/>.
- The World Bank Group et al. 2011 [cited as WBG, 2011]. *Mobilizing Climate Finance a Paper prepared at the request of G20 Finance Ministers*. Washington D.C. At: <http://www.imf.org/external/np/g20/pdf/110411c.pdf>.
- The World Bank. *Economics of Adaptation to Climate Change. A Synthesis Report Final Consultation Draft*. August 2010. Washington, D.C. At: http://siteresources.worldbank.org/EXTTCC/Resources/EACC_FinalSynthesisReport0803_2010.pdf
- UKCPI. 2010. *A Changing Climate for Business. UK Climate Impacts Programme (UKCIP)*.
- UNISDR. 2013. *Global Assessment Report on Disaster Risk Reduction 2013*. At: <http://go.nature.com/LBJ4xL>
- United Nations Framework Convention for Climate Change. (UNFCCC). 2014. *Background Paper on Technologies for Adaptation. Background Paper for the UNFCCC Technology Executive Committee (TEC) Workshop on Technologies for Adaptation. Bonn, Germany, 4 March 2014*.
- United Nations Framework Convention for Climate Change. (UNFCCC). 2008. *Investment and Financial Flows to Address Climate Change: An Update. Technical Paper*. FCCC/TP/2008/7. Geneva, Switzerland.
- United Nations Framework Convention on Climate Change (UNFCCC). 2010. *Report of the Conference of the Parties on its Sixteenth Session, held in Cancun from 29 November to 10 December 2010*. Decision 1/CP.16, Paragraph 18. <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf>.

United Nations Framework Convention on Climate Change (UNFCCC).2009. *Fact Sheet: Financing Climate Change Action. Investment and Financial Flows for a Strengthened Response to Climate Change*. Bonn.

Van Aalst M. 2011. *Addressing Climate Risk Management in IDB Operations. Options for Project Screening and Analysis, Based on Emerging International Guidance and Practice*. Inter-American Development Bank, Washington, D.C.

Appendix

Appendix A – Environmental safeguards and climate risk screening

Table 15. Overview of IFIs' climate risks screening approaches.

Dimensions	ADB	AFDB	EIB	EBRD	IDB	IFC
Climate change risk screening tools/approaches	Yes <i>Since March 2014</i>	Yes <i>Since July 2014</i>	Tool under development.	Yes	Integrated environmental and social safeguard, disaster and climate change risk screening tool	Tool under development. It should be ready in 2015.
Description	<p>The Climate Change and Disaster Risk Questions in the Rapid Environment Assessment Checklist is used at the Concept Review stage to screen project's vulnerability to climate change risks.</p> <p>It is supplemented by AWARE, software tool for climate risk-screening of projects, which allows to identifying specific climate risks, rates them according to their severity, and suggests ways to increase the resilience of projects. AWARE allows ADB to identify main climatic</p>	<p>The Climate Safeguards System is an online platform, a set of decision-making tools and guides that enable to categorize projects according to their vulnerability to climate change risks, as well as to identify and evaluate adaption and risk mitigation measures – so called Adaptation Review and Evaluation procedures:</p> <p>Screening is undertaken at the project concept stage; the adaptation review and evaluation procedures are instead undertaken at the project design /</p>	<p>The vulnerability assessment screens projects prior to the due diligence process to highlight relevant risks and impacts in the Project Identification Note.</p> <p>It consists of a checklist with a set of questions evaluating:</p> <ul style="list-style-type: none"> - if the outcome of the project and/or impact of the project on environment, communities or ecosystems will be significantly affected by climate change projections; - If climate change will significantly increase these risks during 	<p>The Climate resilient audit undertaken in the context of the Sustainable Energy Initiative; it is a step-wise approach including:</p> <ul style="list-style-type: none"> - Assessment of company's sensitivity to climate change including site visit(s) - Data collection via a written questionnaire and checklist - In-depth review of climate change vulnerability and resilience options, including benchmarking against international best practice 	<p>During project preparation stage, project teams identify whether a given project have high exposure to natural hazards.</p> <p>The list of natural hazards considered includes climate change related ones, specifically, storm surge, coastal flood; hurricane and tropical storm; riverine flood; landslide; area flooding; drought; heat wave; cold wave; wild fire, as well as slow onset hazards: from glacier retreat; coastal erosion; groundwater salinization; change in average temperatures</p>	<p>Pilot studies undertaken in the past years to inform the development of the tool, used a step-wise risk-based approach including:</p> <ul style="list-style-type: none"> - Assessment of company's /project sensitivity to climate change including site visit(s) - Data collection - Quantitative assessment of impacts <p>To highlight the financial vulnerability of businesses operating in specific location and sectors, studies translated the technical / operational,</p>

	and lending risks and, subsequently, to work with the project sponsor to adapt the project in order to minimize the impacts of climate change.	implementation level and to be integrated in related plans. Climate change experts are involved in this phase of the process.	the lifetime of the project.	<ul style="list-style-type: none"> - Tech and economic assessment of recommended climate resilience opportunities - Prioritization of investment and actions for climate resilience - Recommend climate resilience investments and actions - Development of financial plan. 	<p>or insolation, in moisture and precipitation; change in pattern of rainy seasons.</p> <p>The disaster risk profile of the project is outlined in the Safeguard Filter Report, which is annexed to the Environmental and Social Strategy of each project</p>	<p>environmental, and social risks to client's project performance into financial risks (e.g. changes in income due to changes in output and efficiency, changes in operating costs).</p>
Mandatory	Yes Since 2013 as climate change risks are to be explicitly stated in the Report and Recommendations of the President (RRP) to the Board prior to project approval.	Yes, from July 2014 when the Integrated Safeguard System become effective.	Yes	No	Yes	Yes
Application	<p>Embedded in project cycle</p> <p>The Private Sector Operation Department has undertaken this assessment for one hydro project. Similar projects in the pipeline will follow suit.</p>	<p>The system is currently piloted in projects in the key strategic sectors i.e. transport, water, agriculture and energy.</p> <p>It will be subsequently operationalized and streamlined in the project cycle.</p>	<p>Not clear.</p> <p>To be implemented in high risk projects, typically projects in risk-sensitive sectors (e.g. agriculture, water, and hydropower) or located in high risk areas (e.g. coastal areas).</p>	<p>Climate risk assessment and adaptation integrated in the project cycle, routinely incorporated in feasibility studies, during the audit in environmental and social impact.</p> <p>Applied in risk-sensitive sectors i.e. water and energy.</p>	<p>Embedded in project cycle but recently introduced, and applied to projects under preparation since 4th quarter of 2013.</p>	<p>At present climate risk screening and assessment is not yet systematically applied.</p> <p>Implementation is planned to be piloted in climate-sensitive sectors / long-lived, inflexible projects (e.g. infrastructure, energy, agriculture, water).</p>

Who pays?	Clients	Clients	Clients	EBRD funds the water and energy climate resilience audit.	Client	Clients IFC self-funded pioneering pilot studies IFC adaptation specialists consider financing options
References	Acclimatise (2012); ADB (2014) ; Idle (2014)	AfDB (2013) ; AfDB (2014a) AfDB (no date).	EIB (2013)	EBRD (2014a); EBRD (2014b)	IDB (2014a); IDB (2014b) IDB (2008); IDB web site; Van Aalst (2011);	IFC (2014); IFC (2012b); Stenek et al., (2010); IEG (2012).

Table 16. Overview of IFIs' Environmental and Social standards

DIMENSIONS	ADB	AFDB	EIB	EBRD	IDB	IFC
Environmental and Social Safeguards	<p>Safeguard Policy Statement (2009) <i>Effective since Jan 2010</i></p> <p>Environment Safeguards A Good Practice Sourcebook (Draft Working Document) (2012)</p>	<p>Integrated Safeguards System (2013) <i>Effective from July 2014</i></p>	<p>Statement of Environmental and Social Principles and Standards (2009)</p> <p>Environmental and Social Handbook (2013)</p>	<p>Environmental and Social Policy (May 2014)</p>	<p>Sustainability & Safeguards via</p> <ul style="list-style-type: none"> - Environment and Safeguards Compliance Policy (OP 703, 2006) and implementation guidelines (2007). - Disaster Risk Management Policy (OP 704, 2007). <p>In 2013 IDB updated the screening filters, and in 2014 introduced procedural clarifications.</p>	<ul style="list-style-type: none"> • Sustainability Framework - Policy on Environmental and Social Sustainability (2012) • Performance Standards (2012) and associated Guidance Notes (2012)
Performance Requirements with Relevance for Climate Resilience	<ul style="list-style-type: none"> • Environmental Safeguards Policy Principles 	<ul style="list-style-type: none"> • Operational Safeguard 1: Environmental and Social Assessment 	<ul style="list-style-type: none"> • Statement and Standard 4: Climate-Related Standards 	<ul style="list-style-type: none"> • Performance Requirement 1: Assessment and Management of Environmental and Social Impacts and Issues. • Performance Requirement 6: Biodiversity Conservation & Sustainable Management of Living Natural Resources. 	<p>Safeguard policies and directives and related implementation guidelines</p> <ul style="list-style-type: none"> • OP 703, Directive B.4. Other Risk Factor • OP 703, Directive B.6. Assessing Environmental Risks and Opportunities • OP 704, Directive A.2. Disaster Risk Management Policy 	<p>Climate change is a crosscutting topic, addressed across multiple Performance Standards, in particular:</p> <ul style="list-style-type: none"> • Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts • Performance Standard 3: Resource efficiency and pollution prevention • Performance Standard 4: Community Health,

						Safety, and Security
<p>Banks' climate-related commitments</p>	<p>ADB commits to evaluate the potential risks to global impacts, including climate change, during due diligence of projects and included in the conduct of the environmental assessment of proposed projects when those projects are identified to be potentially at risk.</p>	<p>AfDB commits to:</p> <ul style="list-style-type: none"> • Undertake systematic assessment of climate change impacts and risks to ensuring projects are screened and categorized according to their vulnerability to climate change; • Provide effective audit monitoring and supervision of agreed environmental and social management measures during implementation. 	<p>EIB commits to:</p> <ul style="list-style-type: none"> • Integrate climate risk considerations generally into the project cycle, and to promote adaptation projects and measures, in the interests of long term sustainability; • Carry out climate change vulnerability assessment – during pre-appraisal and appraisal stage – prioritizing those sectors which it identified as being the most at risk from future climate change impacts; • Encourage promoters to identify and manage those climate change risks projects may be exposed to during their economic life. 	<p>EBRD commits to:</p> <ul style="list-style-type: none"> • Engage, whenever appropriate, in innovative investments and technical assistance to support climate adaptation opportunities. • Support its clients in developing adaptation measures that promote climate resilient investments. 	<p>IDB commits to:</p> <ul style="list-style-type: none"> • Identify and manage <i>other risk</i> factors that may affect the environmental sustainability of its operations [...] including [...] the vulnerability to climate change. • Depending on the nature and severity of the risk, the Bank will engage with the borrower [...] to develop appropriate measure for managing such risks. <p>Disaster Risk Management Policy During project preparation process project teams are requested to:</p> <ul style="list-style-type: none"> • Screen and classify projects considering their exposure to natural hazards – including those associated to climate change • Review the risk assessment and the plans that decrease the risk and prepare people and environment for 	<p>IFC commits to</p> <ul style="list-style-type: none"> • Work with clients to address climate change, supporting adaptation measures that promote sustainable investments. • Produce instruments and develop practices that allow its clients to consider climate-related risks and opportunities in their investment decisions.

					remaining risk.	
Clients' Commitments		<p>Operational Safeguard 1</p> <p>Borrowers or clients are responsible for screening the project for environmental and social impacts – including vulnerability to climate change effects and potential adaptation and mitigation measures.</p>	<p>Climate-related standards</p> <p>Project promoters are requested to</p> <ul style="list-style-type: none"> • Provide information on the climate change risks the projects face, including those of the system within which they operate, e.g. vulnerability in the supply chain or surrounding infrastructure [...]. • Identify and apply the necessary physical or soft measures at planning, design and implementation stage to reduce the significant risks identified during the assessment process, as well as to establish appropriate monitoring systems to ensure the sustainability of the project. <p>If necessary, these activities can be supported by technical assistance.</p>	<p>Performance Requirement 1:</p> <p>Clients are advised to complement the environmental and social assessment process with further studies focusing on specific risks and impacts such as climate change.</p> <p>Performance Requirement 6: to ensure conservation of Biodiversity, during the assessment of issues and impacts clients are requested to consider, inter alia, the impacts relevant to climate change and adaptation.</p>	<p>For moderate & high risk clients are requested to:</p> <ul style="list-style-type: none"> - Assess disaster and climate change risks associated with the project. - Present a plan on measures to manage identified risks. <p>Disaster risk assessment may be asked at the project submission stage.</p>	<p>Performance Standard 1:</p> <p>During the risks and impacts identification process, [...] consider the relevant risks associated with a changing climate and the adaptation opportunities, and potential trans-boundary effects [...]</p> <p>Performance Standard 4:</p> <p>[...] Minimize the risks and impacts that may arise from project related-activities when accelerating or intensifying the impacts of communities to climate change. [...] and the risks and impacts that on priority ecosystem services that may be exacerbated by climate change.</p>
References	ADB (2013c). ADB (2009); ADB (2012) ADB (2014a)	AfDB (2013); AfDB (2014a)	EIB (2009); EIB (2013); Arndt (2013).	EBRD (2014a)	IDB (2014a); IDB (2007); IDB (2008); IDB web site	IFC (2014a); IFC (2012a); IFC (2012b)

Appendix B – IFIs Climate resilience projects / Climate resilience through the private sector

Table 17. Overview of IFIs' approaches to climate resilience¹⁴⁷

IFIs	Approach to enhanced climate resilience	Type of project	Sector	Country	Main Concessional 3 rd party resources	Link to existing activities
AfDB	Supporting a Norwegian project developer to generate new income opportunities for rural households.	Investment	Forestry (afforestation)	Mozambique	PPCR Private Sector Set Aside	Project in pipeline
ADB	Build resilience by promoting crop diversification; reducing post-harvest losses; strengthened production skills & technologies by: <ul style="list-style-type: none"> Engaging agribusiness companies to introduce & demonstrate new technologies; extend credit lines to farmers to procure improved inputs & equipment; introduce post-harvest & biomass facilities. 	Investment (technical support provided by projects sponsors)	Agribusiness	Cambodia	PPCR Private Sector Set Aside	Projects build on ADB's existing programs (e.g., id. 44321-013), and are implemented in parallel to other planned investments.
EBRD	Tackle vulnerabilities to increased water scarcity and seasonal/ climate-driven shocks energy supply by: <ul style="list-style-type: none"> Engaging local financial institutions to finance the uptake of water- and energy- efficient technologies by small businesses; Incorporating climate change analysis into plants investment planning and operations, & upgrade of plants Improving water and energy use in production processes Strengthening supply chains through e.g. improved equipment & facilities; Developing risk management skills to tackle coastal zone vulnerabilities. 	Advisory and investment	Energy Manufacturing (water-intensive industries) Agribusinesses Residential Banking	Tajikistan Bosnia and Herzegovina Turkey	<ul style="list-style-type: none"> PPCR PPCR Private Sector Set Aside EBRD-Western Balkans Fund SEI 	Some initiatives build on existing interventions e.g. Tajikistan
EIB	Improve water supply and management by strengthening infrastructure to reduce exposure to climate impacts	Investment	Infrastructure	United Kingdom	<ul style="list-style-type: none"> Typically EU grant funding 	Climate resilience component added to ongoing project (e.g., id.

¹⁴⁷ This overview may not represent an exhaustive list of projects, but it reflects information made publicly available.

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IDB	<p>Secure agricultural production and increase incomes by:</p> <ul style="list-style-type: none"> Engaging Micro Finance Institutions in the provision of training & finance to smallholder farmers to invest in adaptation; Involving an agribusiness company to train farmers on post-harvest techniques and support financing for storage facilities; Involving an Industry Trust to on-lend to farmers, distribution and processing companies in support of investments identified climate-resilient (e.g. upgrade of storage facilities); <p>Strengthen human settlements to climate variability and change by:</p> <ul style="list-style-type: none"> Involving infrastructure developers (housing) to introduce standards and technologies for increasing water efficiency into new building; supporting uptake via low-cost financing. 	Advisory and investment	Banking Agribusiness Infrastructure	Bolivia Jamaica Saint Lucia Haiti	PPCR Private Sector Set Aside	Projects blend/will complement other initiatives of the IDB Group.
IFC	<p>Increase/secure agricultural production and incomes by:</p> <ul style="list-style-type: none"> Engaging local private actors (agribusinesses and banks) to improve farmers' practices; promote access and adoption to technologies; engaged in improved management of natural resources (forest management; sustainable harvesting); Developing public-private sector partnerships to enhance farmer access to weather and climate information; Engaging insurance companies to enhance SMEs risk management. Improve water supply and management by strengthening infrastructure to reduce their exposure to climate risks 	Advisory and investment	Banking Agribusiness Forestry Manufacturing	Nepal Bangladesh Mozambique Niger Zambia Turkey	<ul style="list-style-type: none"> PPCR Own 	<ul style="list-style-type: none"> Some of the projects engage existing clients / scale up existing operations while including climate resilient components; build upon other MDBs' investments (e.g. Niger and Nepal); some n.a.

Sources: ADB (2014b,c); AfDB (2014c); CIF(2014a); CIF (2013c); EBRD (2013); EBRD (2014b); EBRD (2012b); EBRD (2011); EIB (2013b); IEG (2012); IFC and EBRD (2013); DEG (2014b); IDB (2014c); IDB (2013c); IFC (2012d); IFC (2011b); Stenek et al., (2010b); CIF web sites for project documents; IFIs web sites.

Abstract

Estratto per riassunto della tesi di dottorato

Studente: Maria Chiara Trabacchi

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Dottorato: Science and Management of Climate Change

Ciclo: 26

Titolo della tesi : Driving Private Investments in Climate-Resilient Development

Abstract (English)

Significant investments are required to set developing countries on climate-resilient development pathways. Private sector action towards this end is critical and increasingly emphasized in international political debates. Yet, empirical evidence on current levels of international investments in adaptation measures – “adaptation finance” – and on private engagement is lacking.

To advance knowledge on these topics this thesis uses a multi-method approach to:

- Map and characterize relevant investment flows, identifying possible avenues through which public intervention can encourage private investments (Chapter 1)
- Quantify and evaluate international adaptation finance (Chapter 2)
- Provide empirical evidence on the funding strategies that the public sector can use to stimulate private action (Chapter 3 & 4)
- Assess the role of Development Finance Institutions in supporting the private sector to identify climate change risks and response measures.

The thesis' overarching conclusion is that while public finance institutions can have a catalyzing role, national enabling environment are key to create the market conditions for private adaptation.

Abstract (Italian)

Investimenti significativi sono necessari per permettere ai paesi in via di sviluppo di intraprendere percorsi di crescita economica compatibili con i cambiamenti climatici in corso. Il settore privato ha un ruolo critico a tale fine, riconosciuto ed enfatizzato in maniera crescente nell'attuale dibattito politico. Tuttavia, l'attuale livello di conoscenza empirica sui flussi di investimento a supporto di misure di adattamento e sul livello di azione privata è carente.

Per accrescere la conoscenza accademica su tali tematiche questa tesi:

- Mappa e caratterizza i relevanti flussi di investimento (Capitolo 1);
- Quantifica e valuta l'attuale livello di investimenti in adattamento (Capitolo 2);
- Analizza un caso di studio per fornire evidenza empirica sulle strategie che il settore pubblico può adottare per stimolare investimenti privati (Chapter 3 and 4);
- Analizza il ruolo delle banche di sviluppo nel promuovere strategie di gestione del rischio climatico a sostegno degli investimenti privati.

Firma dello studente

