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# Three Tools to Unlock Finance for Land-Use Mitigation and Adaptation

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## About Climate Focus

Climate Focus is a pioneering international advisory company committed to the development of policies, methodologies, programmes and projects that mitigate and adapt to the impacts of climate change. Our international and multidisciplinary team works closely with the private sector, governments, non-governmental and multilateral organizations, across a range of sectors including renewable energy, forestry, agriculture, waste, transport, and energy efficiency.

We provide independent advice that is relevant for today's decision-makers, ranging from the development of climate-resilient agricultural policies to the implementation of smart phone technologies to monitor emissions reductions in the energy sector. Our advice is rooted in a profound knowledge of climate change policies, methodologies, finance, and project development.

## About the EU REDD Facility

The EU REDD Facility is a program of the European Union hosted by the European Forest Institute (EFI) in Barcelona. The Facility provides flexible and demand-based expertise to support partner countries in improving land use governance as part of their effort to slow, halt and reverse deforestation. The Facility also supports the overall EU effort to reduce its impact on deforestation in developing countries.

The EU REDD Facility is funded by the European Union, France, Germany, Ireland, Spain and the United Kingdom.

## About CPI

Climate Policy Initiative is a team of analysts and advisors that works to improve the most important energy and land use policies around the world, with a particular focus on finance. An independent organization supported in part by a grant from the Open Society Foundations, CPI works in places that provide the most potential for policy impact including Brazil, China, Europe, India, Indonesia, and the United States.

Our work helps nations grow while addressing increasingly scarce resources and climate risk. This is a complex challenge in which policy plays a crucial role.

# Executive Summary

*Agriculture, forestry and other forms of land use[1] generate around a quarter of global greenhouse gas (GHG) emissions, and in many countries, the proportion of emissions from land use is far higher.[2] At the same time, these sectors are highly vulnerable to the impacts of climate change. There are opportunities to redirect the hundreds of billions spent annually on land use around the world toward green activities without sacrificing either productivity or economic development. Low and middle-income countries and their development partners, as well as businesses and investors, urgently need to identify the changes in public support that can help to drive scaled-up private sector investment in land use mitigation and adaptation. This study has developed three tools to help governments and their partners achieve this.*

Moving to more productive and resilient forms of land use is a complex challenge. Low and middle-income countries have committed to reduce land use emissions and are preparing to adapt to the impacts of climate change, but given the crosscutting nature of land-use activities, there are often apparent trade-offs between mitigation, adaptation and development objectives. For governments and their partners finding solutions that correctly balance these priorities is crucial. Land and its resources are essential to meet the growing global demand for food, fuel, and fiber and directly support the livelihoods of over 2.6 billion people engaged in agriculture worldwide, many of whom live in the world's poorest regions on severely degraded land.[3]

It will be essential to significantly increase finance for green[4] land use activities to mitigate land-use emissions and adapt to the impacts of climate change at the levels required. Developed countries have committed to mobilize USD 100 billion in climate finance annually by 2020 to help developing countries address their low-carbon and climate-resilient needs. However, the international financing mechanisms that were envisaged to deliver land-use investments, including REDD+,[5] are not yet doing so at the necessary scale. There is an urgent need for new approaches to finance land-use mitigation and adaptation.

Annual flows of finance for land-use mitigation and adaptation constitute only a small portion of total land-use investments, with estimates ranging widely from USD 1.3 billion to 51.8 billion. Total financial flows to agriculture and forestry activities in developing countries alone are in the hundreds of billions of dollars, but these investments are predominantly business-as-usual (BAU) in nature, that is, they do not mitigate or adapt to the effects of climate change, and in some cases may increase emissions or climate vulnerability. The majority of land use finance originates from domestic private actors supported heavily by public subsidies and incentives.

## Three tools to help governments and their partners to redirect land use finance

Limited understanding of investments in land use mitigation and adaptation inhibits the design of efficient and effective public interventions. In many cases, we do not know how much finance is being channeled to the land-use sector, how it is being delivered, what is being paid for and by whom. Nor do we fully understand the proportion of finance going towards green versus BAU activities or the opportunities that may exist to address barriers, or create incentives to shift land use activities towards greener outcomes. This study has developed three tools that address these issues. Governments and their partners can use them to:

- Inform the design of land use mitigation and adaptation strategies supported by multilateral and bilateral programs;
- Identify domestic and international financial instruments to redirect public and private finance towards greener land-use practices; and
- Encourage coordination between public instruments across land-use sectors.

The tools cover national and international, public and private finance, across a full range of land-use activities. Table ES-1 summarizes their scope and potential benefit to governments, development partners and private investors.

1 Hereafter referred to as land use.
2 Land-use emissions represent over 50% of national GHG emissions in more than 60 (mostly developing) countries (WRI 2015)
3 52% of the land used for agriculture is moderately or severely affected by soil degradation (UN 2015)
4 We use the term green to describe instruments that support lower emitting alternatives to business-as-usual activities.
5 Reducing Emissions from Deforestation and forest Degradation, the green management and conservation of forests, and the enhancement of carbon stocks.

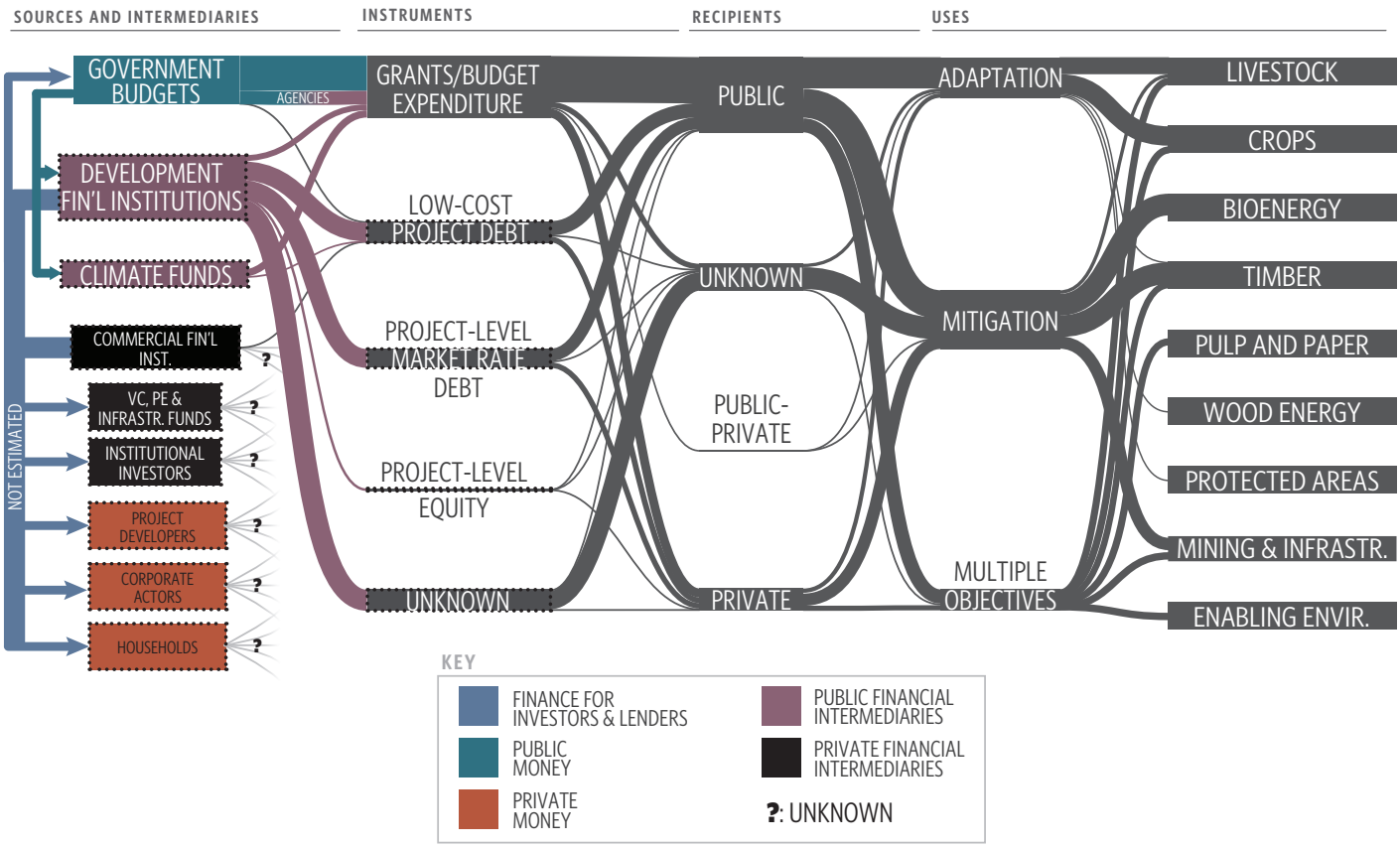
Table ES-1: Tools to support the development and implementation of financing strategies for land use mitigation and adaptation

| | *What does the tool tell us?* | *How can this tool support land use mitigation efforts?* |
|---|---|---|
| **LANDSCAPE OF LAND USE FINANCE** | • Maps both public and/or private investments and expenditures in green and potentially BAU land-use activities<br>• Provides quantitative estimates of current flows<br>• Identifies key actors and intermediaries, investment instruments and recipients | • Provides a comprehensive qualitative and quantitative picture of finance flowing to land-use sectors<br>• Provides a baseline against which to measure progress<br>• Identifies where the biggest barriers, financial gaps and opportunities lie<br>• Informs the design of land-use mitigation and adaptation plans that align bilateral and multilateral support with domestic efforts and needs |
| **FINANCIAL VIABILITY GAP ANALYSIS TOOL** | • Assesses land use mitigation and adaptation activity costs and revenues<br>• Identifies potential gaps threatening project viability<br>• Identifies entry points for public financial support and incentives | • Clarifies the specific needs of private investors<br>• Supports the design of tailored public incentives<br>• Identifies exposure to investment risks |
| **PUBLIC FINANCE MAPPING TOOL** | • Maps flows of public financial support to BAU and green land-use activities<br>• Provides quantitative estimates of incentive flows<br>• Identifies potential incoherence between policy incentives | • Clarifies the relative scale of BAU and green land-use finance<br>• Encourages prioritization and coherence across sectors<br>• Provides a rationale for cross-sectoral coordination, both at the level of government, but also amongst donors<br>• Identifies entry points for external support that maximize domestic/private sources of investment<br>• Clarifies options for climate-proofing supply chains and investments |

## Landscape of Land Use Finance

The Landscape of Land Use Finance tool provides a snapshot of public and private land use finance going to green and potentially BAU activities. It can help countries and development partners to understand how much and what type of finance is flowing, among which key actors, and to which activities. It helps by identifying channels, gaps, and blockages in the flow of finance. Governments could track public or private expenditures / investments as a first step to obtain an initial overview of core land-use financial flows, rather than comprehensively including all flows. As capacity and data availability increases, they could expand the scope to include all actors to enable a more detailed understanding of how different sources of finance interact. This analysis can also inform the design of multi-sectoral strategies to address climate-compatible development challenges (such as REDD+ programs). The diagram below shows a typical landscape of land use finance landscape diagram (known as a Sankey) where the width of flows represents the volume of finance flowing.

Tool 1: Landscape of Land Use Finance




## Financial Viability-Gap Analysis

The Financial Viability-Gap Analysis tool explores whether climate change mitigation and adaptation activities are viable from a financial perspective. Some green land use activities are more expensive than BAU ones, resulting in a viability gap. Here activities need to be publically[6] funded or supported. Other green land use activities are not intrinsically more expensive but face risks or information gaps that can increase costs and discourage investors. Here public financial instruments can help overcome those barriers.

By highlighting potential barriers to the deployment of green activities (risk, information and capacity, or financial gaps), as well as the entry points for public and private finance, this tool can inform the design of tailored public incentives to unlock investment in mitigation and adaptation activities. Governments can increase the financial viability of green land use investments by:

1. **Reducing costs** – through e.g. low cost loans and guarantees, tax breaks, and project preparation grants;
2. **Increasing revenues** – using e.g. price premiums, price floors, and pay-for-performance grants to improve investors' returns
3. **Improving the enabling environment** – by e.g. legal / regulatory standards, land allocation and management systems, certification standards, and implementation of monitoring and enforcement systems.

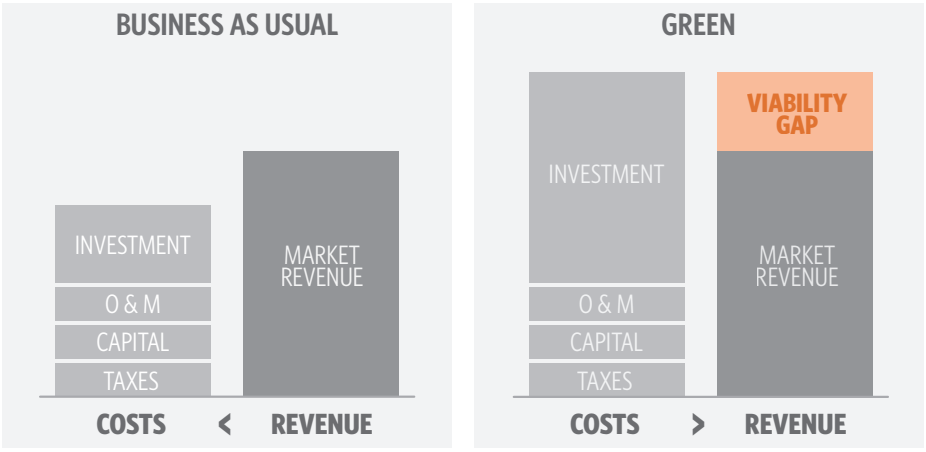
The financial viability gap analysis tool can be carried out as part of a detailed sectoral assessment or at the activity level.

6 Including philanthropic and international public funding.

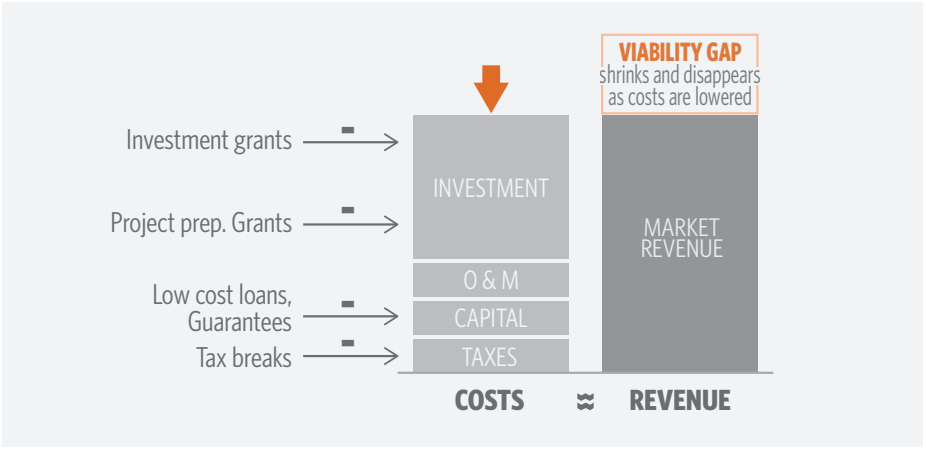
Tool 2: Financial Viability Gap Analysis tool

***Viability gaps*** *arise where costs of an activity are greater than available revenues*

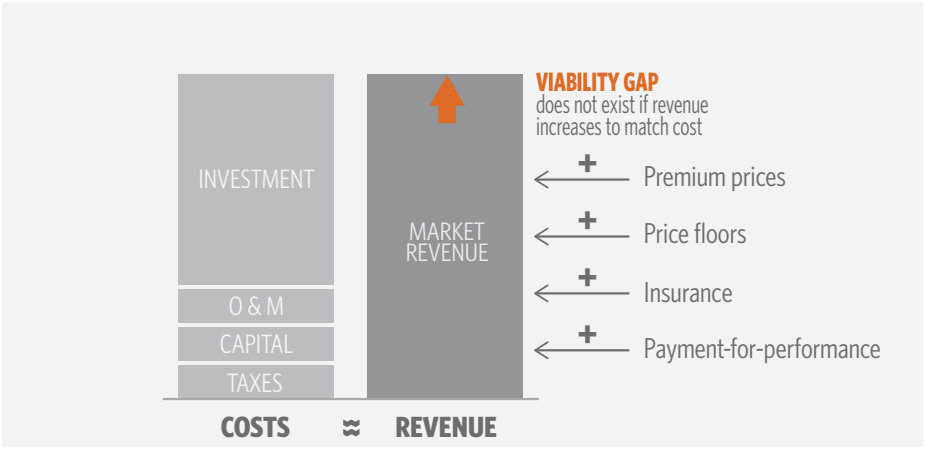
*Public and private finance can help tackle the viability gap by:*



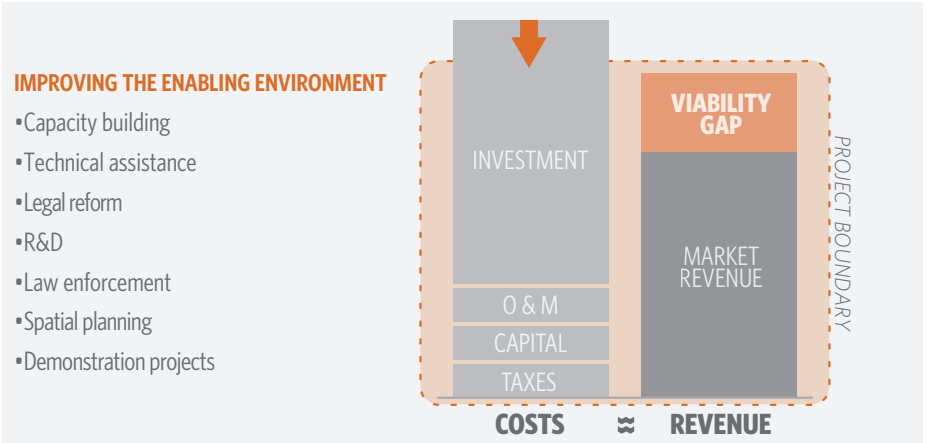

**1.** *Reducing costs*



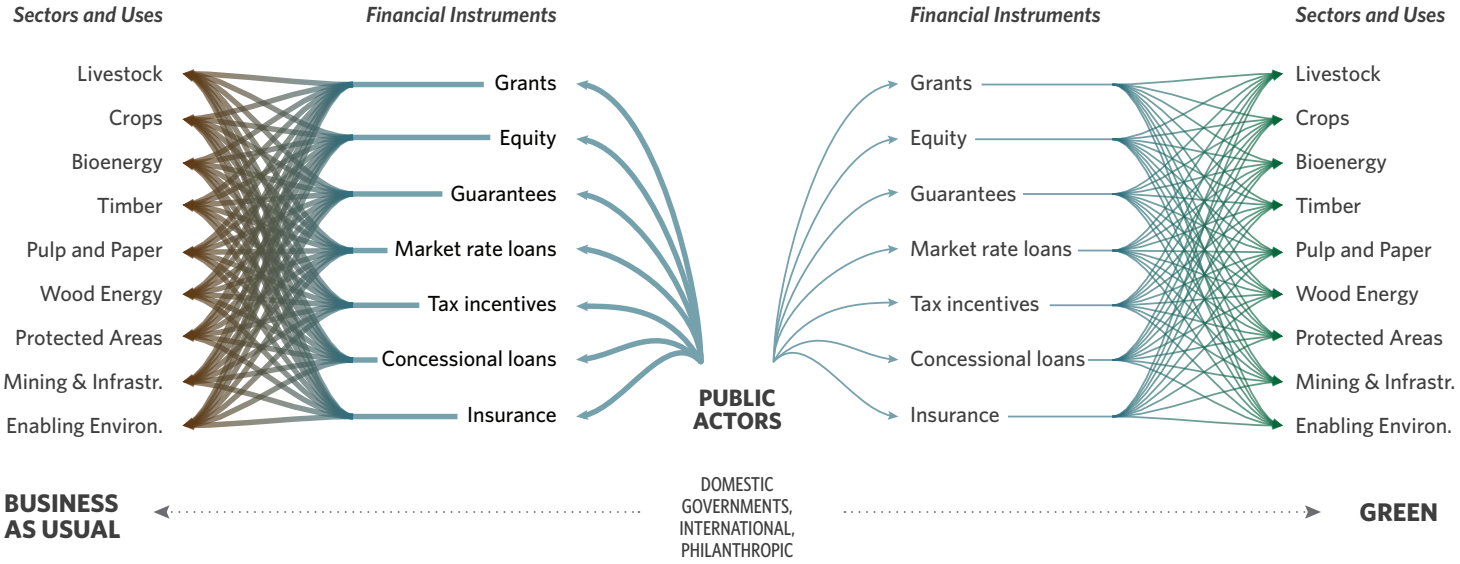

**2.** *Increasing / creating revenues*




**3.** *Improving the investment climate – tackling risk, return and information barriers*



Tool 3: Public finance mapping tool showing incentives for land use activities




## Public Finance Mapping

The public finance mapping tool provides a framework to track key public financial instruments for climate change mitigation and adaptation in any given country, jurisdiction or sector. It can identify whether instruments target BAU or green land-use activities. This tool enables governments to assess whether their overarching financial policies and instruments, including those supported by development partners, are coherent, and consistent and to what extent they provide support for green production. This tool can provide insights to enable greater coordination across sectors, technologies and geographies, among governments and donors, by identifying entry points for donors to deliver finance in ways that maximize domestic and private sources of investment. As a first step, governments could focus on mapping incentives for BAU and green activities. In time it could also be useful to map disincentives arising from, for example, taxes and fees imposed upon land use activities.

Land use encompasses a diverse and crosscutting range of political, economic, environmental and social interests. Getting the right combination of policies and financial instruments in place to unlock green investment at scale is politically challenging and often subject to long-standing vested interests. Improving the ability of governments to assess empirically how finance is flowing across land-use sectors, which viability, cost and risk gaps need to be addressed, and whether public or domestic instruments are helpful and coherent, is essential. Success will also depend on whether governments have the capacity to define, test, and verify, green activities in ways that delivers developmental and environmental outcomes. The frameworks, approaches and tools presented in the paper seek above all to help lower and middle-income countries and their development partners to identify opportunities to work together with businesses and to jointly finance green land-use transitions.

# Contents

# 1. The need for tools to better understand land use finance

*Forests and agriculture support the livelihoods of 2.6 billion people worldwide and account for 20 - 60% of the gross domestic product of many developing countries (Hoffman 2011). Terrestrial ecosystems also provide a wide variety of key environmental and social benefits. However, land use, including agriculture and forestry, is responsible for around a quarter of global greenhouse gas (GHG) emissions (Tubiello et al. 2013). At the same time, these sectors are highly vulnerable to the impacts of climate change. Growing global demand for food and fuel, increasingly scarce resources and climate risk, mean that unlocking investments in highly productive and climate-resilient agriculture and forestry is a pre-condition for delivering global food security and human development.*

In 2009, developing countries committed to a goal to mobilize USD 100 billion per year by 2020 from public and private sources of finance to support climate change mitigation and adaptation in developing countries (UNFCCC 2010). Slow multilateral progress on delivering the financial mechanisms that were intended to underpin REDD+[7] under the UNFCCC, such as carbon markets and payment for performance mechanisms, mean that new approaches are urgently needed to unlock shifts in investment patterns across entire economies, to preserve valuable natural capital assets and deliver benefits to communities. Alongside regulatory measures, finance and financial incentives can play a central role in overcoming viability, risk and information gaps that prevent the adoption of green production and land use models. However, our understanding of the scale and nature of finance actually available for land use mitigation and adaptation within specific contexts remains uncertain, incomplete and inconsistent. For example, estimates for the annual scale of climate finance for land use mitigation and adaptation in developing countries vary from USD 1.3 billion (Buchner et al. 2012) to over USD 20 billion (Parker et al. 2012) depending on how broadly or narrowly boundaries are defined and data availability.

In short, we do not know how much finance is being channeled to the land-use sector, how it is being delivered, what is being paid for and by whom. Nor do we fully understand the proportion of finance that is going to green versus BAU activities and the opportunities that may exist to address barriers, or create incentives to shift land use activities towards greener outcomes.

*We do not know how much finance is being channeled to the land-use sector, how it is being delivered, what is being paid for and by whom. Nor do we fully understand the proportion of finance that is being channeled towards green versus BAU activities and the opportunities that may exist to address barriers, or create incentives to shift land use activities towards greener outcomes. Our tools address this.*

Several factors contribute to our limited understanding of investments in land use mitigation and adaptation. Firstly, compared to other sectors such as energy and transportation, land use mitigation activities remain poorly defined and often unlinked to potential or real impact on natural resources. Instead of focusing on a "*positive list*" of green activities, e.g. solar PV, wind turbines, hydropower, energy efficient light bulbs etc., definitions for land use mitigation and adaptation often focus on a "*negative list*" of activities that should not be done, e.g. stopping agricultural expansion, or halting illegal logging, without clearly defining the activities that must be invested in to achieve mitigation outcomes while continuing to address underlying needs (e.g. shifting production to degraded lands, improved efficiency cook stoves etc.).

Secondly, most financial estimates omit significant sources of investment and focus instead on a limited set of public international financial instruments (e.g. Official Development Assistance [ODA] and carbon markets). Domestic budgets, and private sector finance, for example, are much harder to quantify, and are not included in most assessments of land use finance. In addition, many studies focus on land use finance that is specifically labeled as climate finance, i.e. international

7 Reducing Emissions from Deforestation and forest Degradation, the sustainable management and conservation of forests, and the enhancement of carbon stocks.

flows of REDD+ finance to developing countries (see e.g. Simula 2010; Norman and Nakhooda 2014). Other studies have included a broader range of finance that might contribute to forest conservation and green outcomes, while not being labeled as climate-specific (e.g. Streck and Parker 2012; Parker et al. 2012).

Finally, our understanding of finance for green[8] land-use activities is equally unclear. Many countries are now developing national strategies to guide the management of land and natural resources in ways consistent with economic growth and reducing emissions. In addition, growing pressure on the private sector to become more accountable is improving transparency and accountability, both for communities and farmers that are part of their supply chains. Even so, the majority of public and private finance is thought to support BAU land use. While there are good opportunities to shift investments from BAU to green practices, it is complex and challenging for donors and domestic governments to coordinate their support, and to assess the effectiveness of land use interventions.

The overall objective of this study is to **develop a framework to understand land use finance flows** in order to **identify financial instruments to redirect public and private finance from BAU** towards more green land use practices. To achieve this, we have developed a series of tools to quantify and classify land use finance, and to identify blockages and gaps in the landscape of land use finance. Our tools cover national and international, public and private finance, across a full range of defined land use activities. This paper focuses on land use mitigation and adaptation interventions and opportunities to implement public instruments in order to scale up investment in green activities. The resulting information is intended to inform domestic governments, international donors, private investors and businesses to identify opportunities for financing land use mitigation and adaptation and to coordinate their efforts.

The remainder of this paper is broken down into three sections. **Section 2** provides an overview of the current state of play of land use finance, including key actors, and entry points for public and private finance. **Section 3** presents three tools to support green land use investments. The first tool maps investments in land use finance, including both public and private sources of finance. The second financial viability gap analysis tool can be used to assess the costs and revenues for private actors to invest in green land use. The third tool compares flows of public financial support and incentives towards green versus BAU land use activities. **Section 4** concludes and outlines next steps. The **Annexes** to the report contain an overview of our approach, more detailed information on key actors, and information to help implement the tools, particularly guidance related to definitions of land use mitigation and adaptation, "BAU" and "green".

8 "Green" includes both climate resilient and low greenhouse gas emissions activities.

# 2. What we know about current land use finance flows

Our understanding of the scale and nature of land use finance is incomplete. The following section presents a summary of what we know about current flows of land use finance as well as an analysis of the key barriers to, and entry points for, scaling up finance for land use mitigation and adaptation and the role of key actors, and financial mechanisms therein. Data currently available suggests that the balance of investment in land use heavily favors BAU approaches, and that private domestic actors are dominant. Taking these potential sources of finance into account there is more than enough finance to meet the investment needs of cleaner, more productive forms of land use that can meet government's economic and environmental goals

## 2.1 Where land use finance is coming from and how is it being spent

While there are no widely accepted estimates of the amount for finance needed to mitigate and adapt to the effects of climate change [9], BAU land use finance estimates are orders of magnitude greater than estimates of green land use finance. BAU investments do not mitigate or adapt to the effects of climate change, and in some cases may actually increase emissions or climate vulnerability. As such, there is an opportunity to redirect investments and public financial support from BAU to support green activities.

Estimates of total flows of finance for land use mitigation and adaptation range from USD 1.3 billion to 51.8 billion[10] per year, but different approaches[11] used to calculate those numbers means they are neither comparable nor comprehensive. CPI's most recent Global Landscape of Climate Finance (Buchner et. al, 2014) captures USD 5.8 billion of project-level finance commitments from international public actors for land use mitigation and adaptation in 2012/2013, representing about 3.5 - 5% of total public climate finance (USD 137 billion) tracked in that year (see Figure 1).

This includes USD 2.3 billion of finance from bilateral donors and USD 3.1 billion from Development Finance Institutions (DFIs), plus an additional USD 0.4 billion from various multilateral, bilateral and national climate funds. An estimated 71% of the finance captured flows from OECD to non-OECD countries.[12] The data suggests a 40:60 ratio between adaptation and mitigation spending and a slight bias toward financing forestry as opposed to agricultural activities but there is also a significant proportion of finance flowing to multiple objectives and sectors.[13]

Bilateral donors provided finance almost wholly (99%) in the form of grants while development finance institutions (DFIs), provided finance for land use mitigation and adaptation mostly in the form of low cost (29%) and market rate debt (29%) loans, with smaller portions in the form of grants (9%) and equity (1%). As well as providing direct support, many donors provide grants through multilateral, bilateral and national climate funds. The Landscape tracks grants totaling USD 346 million for land use mitigation and adaptation in 2012/2013.

9 The Stern Review (Stern 2006) estimated opportunity costs of forest conservation at USD 5 billion per year but agricultural returns suggest opportunity costs are far greater although full opportunity costs probably don't need to be paid if regulatory improvements are made to protect natural capital (The Global Commission on the Economy and Climate 2014). Considering the potential of carbon markets to produce a 50% reduction in global deforestation by 2020, the Eliasch Review (Eliasch 2008) estimated financing needs of USD 11-19 billion per year, while Morris and Stevenson (2011) estimated needs of up to USD 60 billion per year.

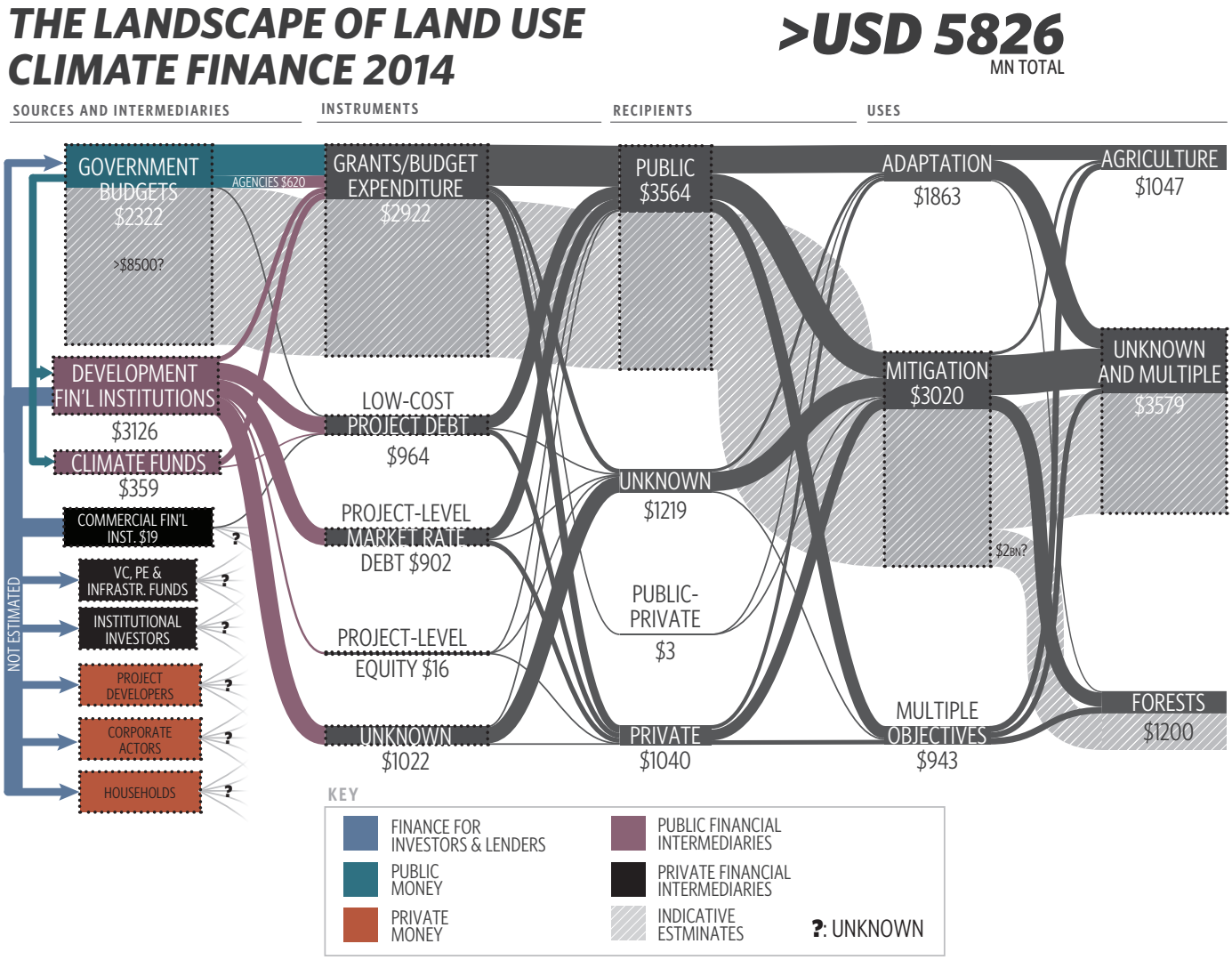
10 For instance, Norman and Nakhooda (2014) estimated cumulative public and private REDD+ finance pledges at USD 8.7 billion between 2006-2014, 90% of which came from public sector. Streck and Parker (2012) estimated USD 14.5 billion REDD+ finance in 2010, almost entirely public and mostly from domestic sources. Parker et al (2012) estimated USD 51.8 billion globally 'available for conservation', more than USD 25 billion of which is domestic public money. Finally, CPI (Buchner et al. 2012) tracked USD 1.3 -11.8 billion of REDD+ finance in 2011, most of which was bilateral commitments.

11 Sectoral scope, pledges vs commitments vs disbursements, time period, country coverage etc.

12 Just two thirds of our public land use climate finance data has geographic source and destination information. We assume that the remaining one third has a similar geographic source/destination profile.

13 It may also be the case that agriculture ODA is less often climate marked compared to forestry ODA.

Figure 1: Estimated finance for land use mitigation and adaptation in 2012/2013




Source: Buchner et al. (2014)

Figure 1 also shows a conservative estimate of domestic government budgets for adaptation and mitigation in four countries (Indonesia, Mexico, Brazil and China). It is represented in gray crosshatch since the available data is less robust It is likely to be an underestimate. Due to limited data availability, Figure 1 does not include south-south flows, philanthropy and, most importantly, private sector flows, which represents the majority of land use finance. For instance, we estimate that private sector may be investing around USD 4.2 billion annually in selected certified timber and palm oil alone.[14]

In terms of BAU land use finance estimates, the UN's Food and Agriculture Organization (FAO) estimated that annual total investments in agriculture and forestry[15] in developing countries were in the hundreds of billions, the vast majority made up of domestic private sector flows (USD 168 billion)[16]. These domestic private investments are often supported by domestic public government investment (estimated at USD 38 billion)[17], subsidies and incentives and international public financial assistance (USD 14 billion)[18] mostly delivered as Overseas Development Aid (ODA). Other sources report much higher levels of domestic public expenditures in agriculture: the International Food Policy Research Institute (IFPRI) reports domestic

14 Investment data is not available. USD 4.2 billion is a mid-point between two "back of the envelope" estimates from Streck and Parker (2012) and Parker et al (2012)

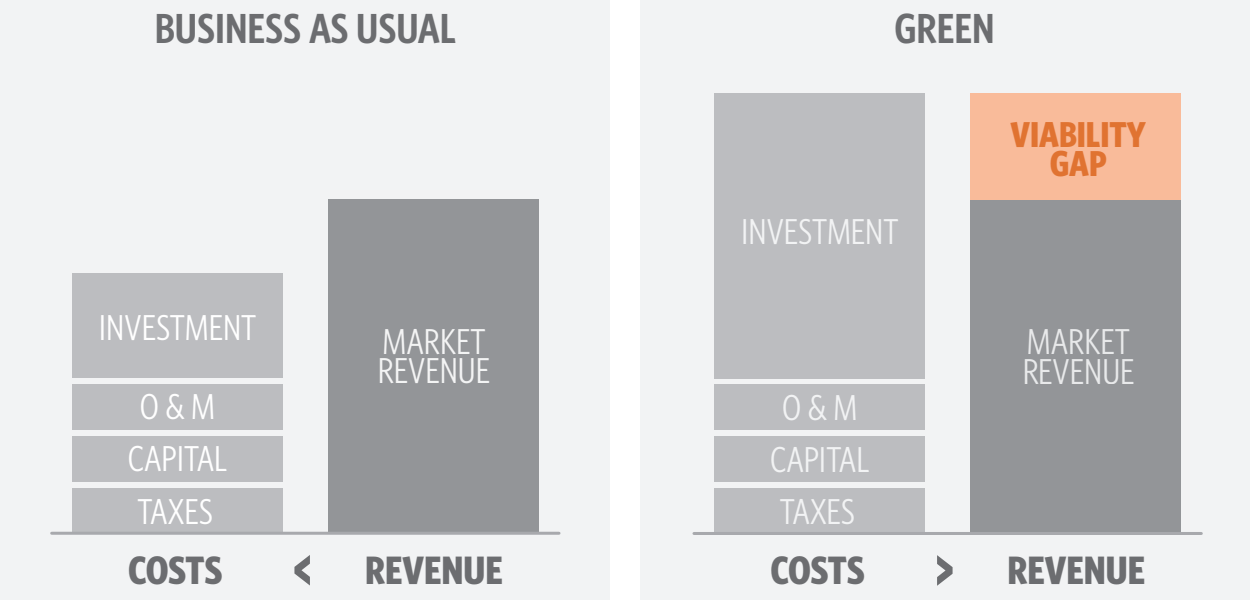
15 Forestry data is not included in domestic private and domestic public government expenditure data.

16 FAO 2012b.

17 Ibid.

18 OECD 2015.

Figure 2: Viability gaps for green land use production




*Viability gaps arise where costs of an activity are greater than available revenues*

public expenditures in the agriculture sector of USD 114 billion in 2010[19] while FAO estimated public expenditure on agriculture in developing countries in 2002 at USD 225 billion (Koohafkan 2012).[20]

## 2.2 Entry points for public and private finance

Given the limited flows of finance for land use mitigation and adaption, countries interested in increasing productivity and reducing emissions from the land use sector could benefit from analysis of the challenges and opportunities for scaling up flows of finance. There are three key barriers that impede the flow of finance to greener land use activities (e.g. Buchner et al. 2012):

- **Viability gaps.** These arise where the costs of an activity are greater than available revenues, considered on a net present value basis (see Figure 2 below). For a private investor viability gaps mean a negative return on investment; for the public sector it is the difference between the economic or political costs and benefits. Where viability gaps are not addressed, the private sector will not invest.
- **Risk gaps.** These specific investment risks prevent public and private entities from providing climate finance and include, e.g. technology risks, financial risks, political risks, market risks. While these risks have mostly been studied for private investors (see e.g. Frisari et al. 2013), they also apply to public investors and entities such as state-owned enterprises. These risks increase the cost of financing and executing land use activities. They can also put expected revenues at risk. As such, risk gaps can widen viability gaps.
- **Information gaps.** In some cases, public and private actors lack the knowledge or institutional capacity to make investments, to develop policy frameworks or to design interventions to target specific risks and costs. Kato et al., 2014, identify several possible information gaps including information on technologies, financial structures, and enabling environments.

To successfully scale up investments in green land use, governments will need to adopt policies and measures that address one or more of these gaps in different land use sectors.

19 IFPRI 2013. Data is for EAP, LAC, MENA, SA and SSA regions. The total for all regions is USD 190 billion in 2010.

20 Meanwhile OECD (2014) estimates total public support for agriculture at USD 350 billion in 2012 in OECD countries. Total Support Estimate (TSE) is defined as the annual monetary value of all gross transfers from taxpayers and consumers arising from policies that support agriculture, net of the associated budgetary receipts, regardless of their objectives and impacts on farm production and income, or consumption of farm products (OECD, 2010).

For instance, some green land use activities are more expensive than BAU ones, resulting in a viability gap. Here activities need to be publically[21] funded or supported e.g. protection and restoration of high conservation value (HCV)[22] ecosystems currently has limited sources of market revenue. Other green land use activities are not intrinsically more expensive but face risks or information gaps, which discourage investors. Here public financial instruments can help overcome those barriers.

In most regions, we expect that most public finance supports BAU land use investments rather than green investment at present. Attention is therefore needed to shift public financial instruments towards supporting greener alternatives.

We identify **three main entry points for public interventions to scale up climate finance**, to address viability, risk and information gaps that impede investments (building on Falconer and Stadelmann, 2014). The three entry points are:

1. **Targeting viability gaps by increasing /creating / protecting project revenues**, e.g. through carbon offset payments, subsidies, insurance, pay for performance and compensation payments. There may also be opportunities to create investment products whereby private investors temporarily invest capital in protecting high conservation value land (Credit Suisse et al, 2014).
2. **Targeting viability and risk gaps by reducing (public and private sector) project costs** through different measures. Traditional instruments include investment grants to reduce private investment needs, concessional loans to reduce the cost of capital, and tax breaks. For instance, that returns for installing new technologies on small farms in Africa and Asia are typically low, and access to credit is often difficult, pointing out the need for public support in the form of concessional loans and grants to scale up viable technologies (The Global Commission on the Economy and Climate 2014). More innovative instruments to reduce private sector costs are project preparation facilities to lower pre-investment costs, and a range of risk mitigation instruments (e.g. guarantees, insurance) which can also reduce lenders' cost of capital, and debt for nature funding.
3. **Targeting risk and information gaps via public framework expenditures.** Public framework expenditures include capacity building for closing public and private actors' knowledge gaps; developing, implementing and monitoring climate policies to remove technical, legal and administrative barriers to investment; R&D; law enforcement; land-use/spatial planning and mapping; building measuring, reporting and verification systems; and developing demonstration projects. Occasionally, individual project developers or businesses are willing to bear these costs if they feel that it could give them an advantage in a new market, but they are more regularly addressed by the public sector. In some cases, they can also help to reveal revenue streams and demand.

The following section identifies key actors in land use finance and the key financial instruments that public actors can use to finance or incentivize land use mitigation and adaptation.

## 2.3 Actors and financial instruments

To begin to understand ways in which land use finance can be channeled towards greener outcomes we first need to understand the various actors involved in financing BAU and green land use activities and the mechanisms at their disposal. The following table provides a brief overview of key actors in land-use financing, their roles in terms of the financial support or investments they provide, and some examples of these. Supporting information for this table is provided in Annex 6.2.

21 Including philanthropic and international public funding.

22 "The concept of High Conservation Value Forests (HCVF) was first developed by the Forest Stewardship Council (FSC) in 1999 as their 9th principle. The FSC defined HCVF as forests of outstanding and critical importance due to their environmental, socio-economic, cultural, biodiversity and landscape value." See more at: http://gftn.panda.org/practical_info/basics/sound_forest/certification/forest_certification/hcvf/#sthash.ObG01sNL.dpuf

Table 1: Key actors in land use finance, their roles and examples

| | ACTOR | ROLE | EXAMPLE INVESTMENT/SUPPORT |
|---|---|---|---|
| PUBLIC | **Domestic government agencies, Bilateral donors, Development financial institutions (DFIs)** | Governance and enabling environment | R&D, agricultural extension services, clarifying land tenure, spatial planning and mapping systems |
| | | Invest equity and debt in strategic enterprises and infrastructure | Investments in state-owned enterprises and parastatal companies |
| | | Provide incentives and penalties to drive green private investments | Grants, revenue support subsidies, tax incentives, and the purchase of offsets |
| | **State owned enterprises** | Invest own resources or access finance from above actors | Balance sheet financing |
| PRIVATE | **Banks, Private equity, Venture capital, High net worth individuals (HNWI), Households and Institutional Investors** | Provide finance to businesses | Market rate debt and equity |
| | **Impact investors** | Invest in companies and projects with social and environmental objectives | Longer term capital with possible concessional terms |
| | **Businesses and project developers** | Invest own resources or access finance from above actors | Balance sheet or debt / equity finance from investors |

Various publications have identified the instruments through which governments can provide public financial support for green land use including REDD+ investments (see e.g. Cranford and Parker, 2012; Parker et al. 2012; Oakes et al., 2012). ODA and carbon market offset mechanisms have shown limited capacity to induce large-scale shifts of finance from *BAU* to *green*, and cannot compete with the scale of public subsidies for investments that increase land use emissions. There is, however, an opportunity to redirect the hundreds of billions spent globally on agricultural input subsidies to research and development (R&D) and extension services to support adoption of green production methods (The Global Commission on the Economy and Climate 2014).

No single instrument provides a silver bullet; rather governments need to establish a combination of different financial instruments and policies to make any one project or program viable. Furthermore, in many cases, similar public financial instruments are currently underpinning BAU activities and therefore need to be reformed where possible, while ensuring that economic and social development is not compromised. Table 2 provides a summary of public financial instruments aimed at incentivizing land use activities.

Table 2: Public financial instruments available to support land use investments[1]

| INSTRUMENTS | KEY FEATURES | LAND USE EXAMPLES |
|---|---|---|
| GRANTS | Payments are often used to fund capacity gaps including R&D and extension services or can cover upfront investment costs.<br>Payments can supplement revenues and are often made on demonstration of predefined outcomes, sometimes as part of carbon reduction funds/ schemes<br>Payments can also fund price floor subsidies. | • In Peru, the Ministry of Agriculture, through the AGROIDEAS program, acts as a strategic partner of agribusiness, providing grants for small and medium agricultural, livestock and forestry producers.<br>• Multilateral donor and domestically financed Amazon Fund provides grants for numerous activities to prevent, monitor and combat deforestation, and to promote the conservation and green use of forests in the Amazon<br>• The German funded REDD Early Movers Programme supports Acre's Jurisdictional REDD program, including through ex-ante payments<br>• The FCPF Carbon Fund is currently worth USD 465 million and will provide payments for emission reductions backed by international donor contributions.[2]<br>• New Government of Indonesia CPO Supporting Fund[3] will subsidize biodiesel and fund palm oil research and development[4] |
| CONCESSIONAL LOANS | Below market interest rate loans and/or other concessional terms such as longer tenors and grace periods. Microcredit is often provided to households or small businesses without security. | • IDA contributions to China Loess Plateau Watershed Rehabilitation Project[5]<br>• Government of Indonesia pays interest rate subsidy to commercial banks who provide concessional debt to biofuel crop farmers[6] |
| EQUITY | Equity investments in state-owned or private enterprises. Involves higher risk but can also provide a higher return on investment. | • KfW Investments in Agro-silvopastoral land use systems<br>• The EU Natural Capital Financing Facility provides equity investments for bankable nature-based climate adaptation projects in the EU |
| MARKET RATE LOANS | Debt provided at market rates by public institutions usually has additional support provided alongside e.g. technical assistance and/or is provided for riskier investments that commercial capital would not normally invest in. | • The IDB and regional government funded Acre Green Development Program (PDSA-II) will expand protected areas and promote green agroforestry value chains and recovery of degraded land.[7]<br>• Backed by donor financing, AgDevCo impact investors provide seed capital to small to medium sized farmers, alongside technical and management support to improve farming operation.[8] |

1 Debt-for-Nature schemes, which cancel or reduce historic debt in return for countries investing their own funds in measures to protect natural habitats, are not included here since funds raised can be spent though any one of the instruments listed. Similarly, proceeds raised from green bond issuances can be used by public or private actors to provide grants, equity or debt (Oliver 2014) and public actors can support issuance with tax breaks, guarantees, insurance etc. CBI (2014) explain that the low volume of bonds in the agriculture and forestry sectors is a reflection of the sector more generally, which does not tend to use bonds to finance its activities.

2 See: https://www.forestcarbonpartnership.org/fcpf

3 Funds raised through a levy on Crude Palm Oil exports

4 It is noted that this example would more likely be classed as "BAU" than "green" but would depend on the definitional boundaries set.

5 See: http://www.worldbank.org/projects/P056216/second-loess-plateau-watershed-rehabilitation-project?lang=en

6 McFarland, W et al. 2015

7 http://www.iadb.org/en/projects/project-description-title,1303.html?id=BR-L1289

8 http://www.agdevco.com/portfolio.php

| | | |
|---|---|---|
| TAX INCENTIVES | Governments can provide tax incentives in the form of exemptions, credits or deferrals. They can be provided to different actors e.g. producers or input providers. | • Income tax reductions, exemptions and deferrals for soy and soy-based biofuel producers in Brazil[9]<br>• Tax breaks for commercial timber producers in Indonesia[10] |
| GUARANTEES / FIRST-LOSS PROTECTION | Protects lender (of debt or bonds) against borrower default up to a defined limit in return for a fee. Public actors can pay the fee or provide the guarantee instrument. | • MIGA US-backed EcoPlanet Bamboo supports the conversion of degraded land in Nicaragua into green bamboo plantations. MIGA's cover is for a period of up to 15 years against the risks of expropriation, war and civil disturbance.[11] |
| INSURANCE | Protects producers, developers and/or buyers against losses resulting from political, technical, financial, natural hazard, production and market risks in return for a fee.<br>Public actors can pay fee or provide the insurance instrument. | • OPIC political risk insurance for Terra Global Capital Cambodia REDD project[12] |

9 McFarland et. al, 2015.
10 Ibid.
11 https://www.miga.org/Lists/Press%20Releases/CustomDisp.aspx?ID=488
12 https://www.opic.gov/projects/terraglobal

# 3. Tools to support land use mitigation and adaptation finance

Unlocking private finance for greener business and land use models requires detailed country and sector level analysis to understand:

- The nature and volume of current land use investments, who the key actors are, and what level of BAU vs green land use finance is flowing at present
- The range of public financial instruments supporting BAU and green land use activities
- What policy approaches or instruments would be most effective at redirecting investment to greener land use practices?

This section of the paper presents three complementary tools to achieve this. They can help countries and development partners to design and implement financing strategies to raise productivity, reduce emissions and improve resilience in the land use sectors by supporting a shift from BAU to green activities. Together they provide a conceptual framework to help public actors map and understand the range of entry points and financial instruments available to support these strategies by unlocking new partnerships and new investors. National or regional efforts to map land use finance allow countries and development partners to measure progress, pinpoint blockages in the flow of climate finance, identify opportunities to profitably redirect flows, and evaluate whether their policies are delivering on their objectives.

Elements of these tools shown in Table 3 below could be combined to address specific country needs.

For each of these tools governments and their partners will need to decide on their priorities and set criteria accordingly. For instance, countries who wish to ensure the environmental integrity of 'green' activities may wish to set baselines and benchmark standards at sufficiently ambitious levels so that public financial support supporting best performers is highlighted. Ideally, performance standards should meet minimum criteria, such as being quantitatively defined in a way that is measurable, reportable and verifiable.

Table 3: Tools to support the development and implementation of financing strategies for land use mitigation and adaptation

| | *What does the tool tell us?* | *How can this tool support land use mitigation efforts?* |
|---|---|---|
| **LANDSCAPE OF LAND USE FINANCE** | • Maps both public and/or private investments and expenditures in green and potentially BAU land-use activities<br>• Provides quantitative estimates of current flows<br>• Identifies key actors and intermediaries, investment instruments and recipients | • Provides a comprehensive qualitative and quantitative picture of finance flowing to land-use sectors<br>• Provides a baseline against which to measure progress<br>• Identifies where the biggest barriers, financial gaps and opportunities lie<br>• Informs the design of land-use mitigation and adaptation plans that align bilateral and multilateral support with domestic efforts and needs |
| **FINANCIAL VIABILITY GAP ANALYSIS TOOL** | • Assesses land use mitigation and adaptation activity costs and revenues<br>• Identifies potential gaps threatening project viability<br>• Identifies entry points for public financial support and incentives | • Clarifies the specific needs of private investors<br>• Supports the design of tailored public incentives<br>• Identifies exposure to investment risks |
| **PUBLIC FINANCE MAPPING TOOL** | • Maps flows of public financial support to BAU and green land-use activities<br>• Provides quantitative estimates of incentive flows<br>• Identifies potential incoherence between policy incentives | • Clarifies the relative scale of BAU and green land-use finance<br>• Encourages prioritization and coherence across sectors<br>• Provides a rationale for cross-sectoral coordination, both at the level of government, but also amongst donors<br>• Identifies entry points for external support that maximize domestic/ private sources of investment<br>• Clarifies options for climate-proofing supply chains and investments |

Even where an activity meets a required performance standard, there are three main sustainability risks that should be addressed before it can be categorized as green: leakage risk, rebound effect, and BAU lock-in over time. Addressing leakage risk (where GHG savings are offset by increases elsewhere as BAU activities are displaced) requires that green activities maintain production levels relative to demand for agricultural or other products. Addressing the risk of a rebound effect (that greater efficiency will lead to increased production, offsetting GHG savings) requires the presence of countervailing policies, or the restriction of financial incentives. Addressing BAU lock-in (the creation of new path dependencies that are inconsistent with long term emissions reduction goals) requires policy makers to assess whether long term investments are consistent not only with 2015 performance standards, but consistent with GHG emissions goals over the decades to come. For more information on the methodology we propose to determine BAU vs green investments and public instruments, see Annexes 6.3 and 6.4.

In the following sections, we use the term BAU to describe investments and public instruments that support land use activities that result in avoidable GHG emissions (e.g., cattle production with sub-optimal manure management). We use the term green to describe investments and public instruments that support lower emitting alternatives to BAU activities (e.g., those that meet a baseline or benchmark GHG emissions standard).

## 3.1 Landscape of land use finance

CPI's annual Global Landscape of Climate Finance reports (see Buchner et. al 2011, 2012, 2013, 2014) provide the most comprehensive overview of global climate finance flows available. CPI has also produced national landscapes for Indonesia (Ampri et. al, 2014) and Germany (Juergens et. al, 2012). The landscape reports map the lifecycle of climate finance flows, to develop an understanding of who is investing in emission reduction and climate resilience efforts around the world or in a particular country, through what instruments, and what they are investing in.

By identifying what is already happening on the ground, the landscape approach provides a baseline against which to measure progress toward economic and environmental goals and plan scale up. It also reveals investment patterns that pinpoints where the biggest barriers and opportunities lie. A landscape approach can also help international partners and governments identify best ways for tailoring international support to complement domestic efforts and improve coherence across a range of actors. Some factors that governments and their partner should keep in mind when considering a landscape are:[23]

**Data sources.** A landscape approach aggregates project and budget-line level data from a variety of primary and secondary sources. For example, the key sources of data for the Indonesia Landscape of Public Climate Finance were the state budget, a survey of development partner activities and publically available data from the literature. Close cooperation with the Ministry of Finance in Indonesia, as well as consultation of other line ministries, was essential for gathering and interpreting state budget data. Aggregating data from different sources presents challenges and corrections have to be made to avoid double counting as well as to ensure that only like-for-like data is aggregated, e.g. annualized latest year commitment (or disbursement if available) data, not multi-year pledges.

**Definitions and scope.** Governments may decide to start mapping one sector or commodity as a first step, rather than the whole range of investments and expenditures in the land use sectors. As discussed in Annexes 6.3 and 6.4 of this report, for the land use sectors, it will be challenging to draw the line between "green" or "BAU" land use activities. Governments can choose to perform the mapping analysis at the regional or national level, or across sectors, according to domestic needs.

**Actor scope.** While including all actors is preferable, to enable an understanding of how different sources of finance interact, detailed data on private investment in particular may be difficult to obtain. Governments may therefore decide to start mapping by limiting data to public or private expenditures/investments as a first step, rather than comprehensively covering all actors.

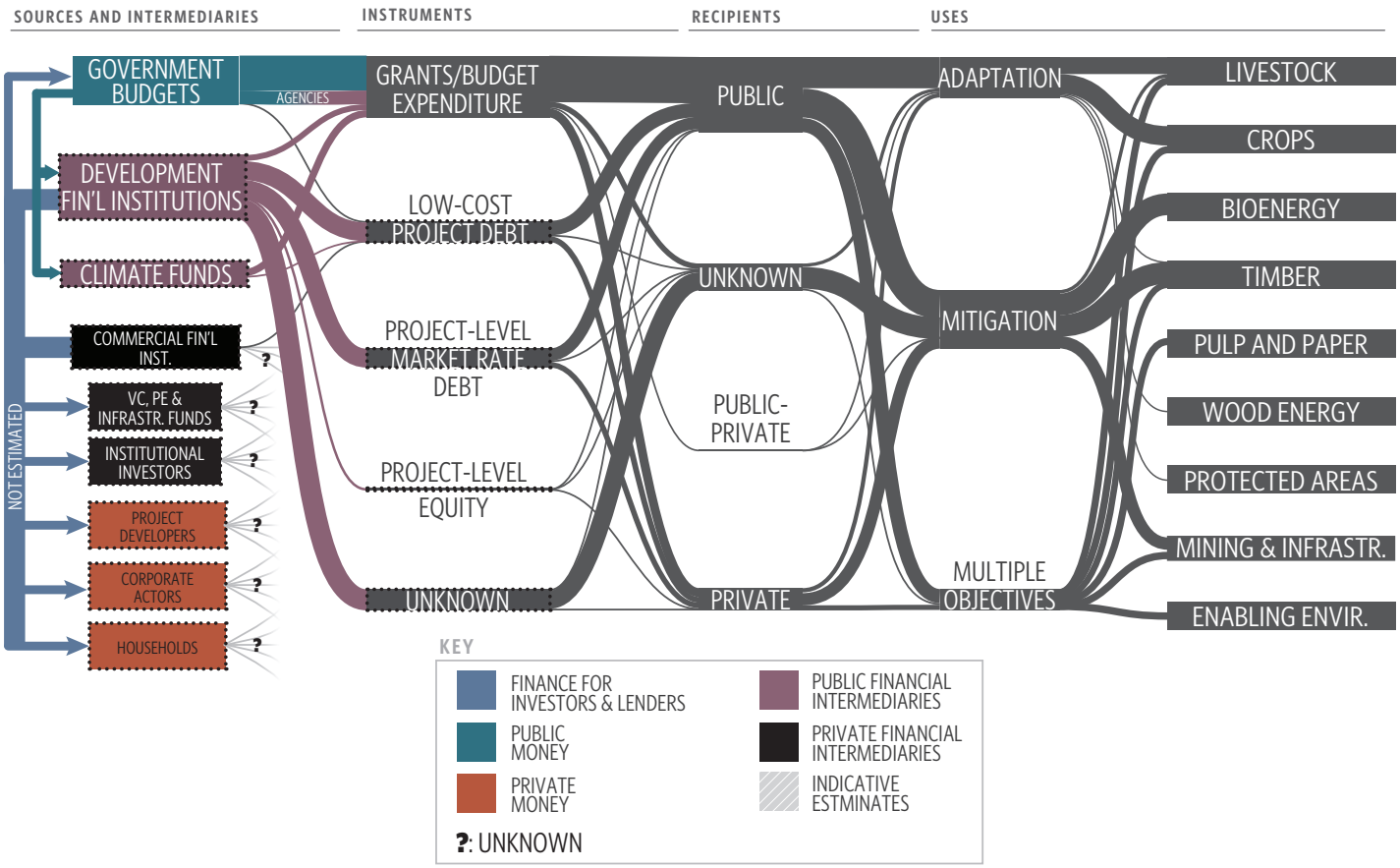
**Types of finance.** CPI's Landscapes include total investment costs plus public framework expenditures but exclude public revenue support since revenue support mechanisms pay back investment costs, and including them would result in double counting. For the same reasons private R&D is also excluded.[24]

23 Also see: http://climatepolicyinitiative.org/2015/05/21/eight-steps-to-a-better-understanding-of-climate-finance-flows-in-your-city-or-country/

24 These are investments that private actors try to recover when selling their goods and services so counting them in addition to investment costs would, once again, mean you were counting the same flows twice.

The diagram below shows a typical landscape of land use finance landscape diagram, whereby the width of flows are representative of the volume of finance flowing.

Tool 1: Landscape of Land Use Finance




**Practical example of the Landscape of Land Use tool: Key findings from the Landscape of Public Climate Finance in Indonesia**

The Landscape of Public Climate Finance in Indonesia (Ampri et al., 2014) found that USD 0.5 billion (53%) of climate finance identified was flowing the agriculture and forestry sectors in 2011. 89% of this originated from the state budget and the remainder came from international development partners. 14% flowed directly to mitigation activities and 2% directly to adaptation activities. The remainder spent on indirect enabling environment activities such as policy development (65%), R&D (9%), MRV/Inventory/ database development and capacity building (1%).

The study is informing Indonesian policymakers' efforts to develop more effective tracking systems for government climate-relevant spending to enable improved policy design in the future. It also identified several blockages in climate finance flows. Firstly, the study tracked disbursements, which were a lot lower than reported commitments, reflecting challenges for development partners operating in Indonesia and for the Government of Indonesia to absorb financial resources at scale or pace. The study also revealed blockages in the Geothermal Revolving Fund and the Reforestation Fund, with USD 3 million of loan disbursements in 2011 compared to USD 144 million transferred into the funds in the same year, along with substantial allocations in previous years. Some other blockages related to time delays in disbursing funds from donors through to final recipients also became apparent.

This study was carried out jointly with the Indonesian Ministry of Finance, which plans to regularly update and expand the analysis as part of its fiscal framework.

Findings from CPI's Global Landscape of Climate Finance related to land use are summarized in Section 2.1 above.

## 3.2 Financial viability gap analysis

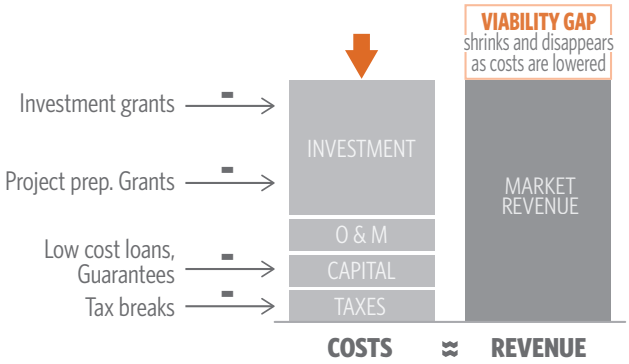
The second tool helps to identify different public and private financial entry points available to finance individual land use mitigation and adaptation activities. It takes a project/intervention level approach to identify and understand the cost and revenue barriers that may be preventing success in order to examine potential risk-sharing structures for different actors involved and expected results. Governments or their partners can use this tool to support case study analysis of a specific investment or group of similar investments already under way (ex-post) or of a group of investments yet to take place (ex-ante).

This tool focuses on the efficiency of supply side interventions to limit our scope to those activities that lower and middle income countries and their partners can support domestically. The mitigation of land use emissions can be achieved through *demand side* interventions (lowering the demand for agricultural and forest based products with an emissions profile) or through *supply side* interventions (minimizing the GHG emissions per unit of produce). However, even according to the greenest methods of supply, there will be clear limits to any country's capacity to produce goods sustainably, and we acknowledge that managing demand is a central requirement of any green land based system. For instance, the willingness of consumers to pay higher prices for more sustainable goods is one example of demand side measure that could close viability gaps.

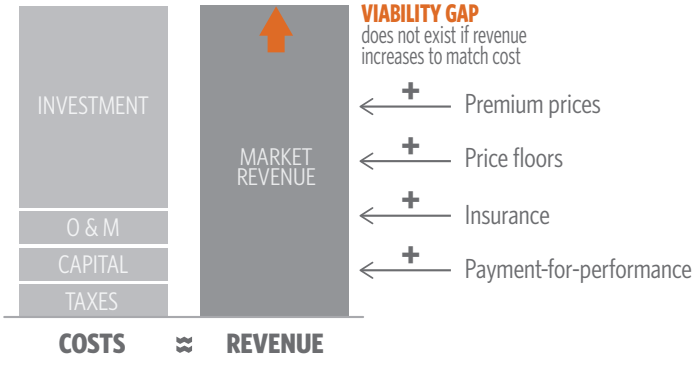
Evaluating investments using this framework helps illustrate the needs of particular investors, as well as the range of financial instruments available that might make an investment viable (or not). It also helps to explain how effective public support has been, how risks have been overcome and to what extent the project could be replicated and scaled up, potentially with alternative public support structures. There are three main entry points to scale up finance for green land use as follows:

Tool 2: Financial Viability Gap Analysis tool

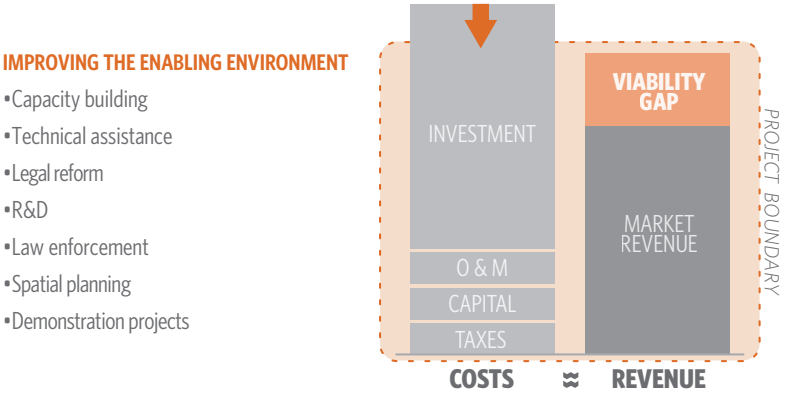
**1: Reduce costs through grants or concessional loans** to reduce the cost of capital, or tax incentives. More innovative instruments include project preparation grants to lower pre-investment costs, and a range of risk mitigation instruments (e.g. guarantees, insurance) that can also reduce lenders' cost of capital.




**2: Increase revenues through a variety of revenue support mechanisms** including carbon offset payments, price premiums for green commodities, payments for performance and compensation payments.




**3: Public framework expenditures reduce costs** by assuming some of those costs within national or regional governments through capacity building; climate policies to remove technical, legal and administrative barriers; R&D; law enforcement; land-use planning; and measuring, reporting and verification systems.



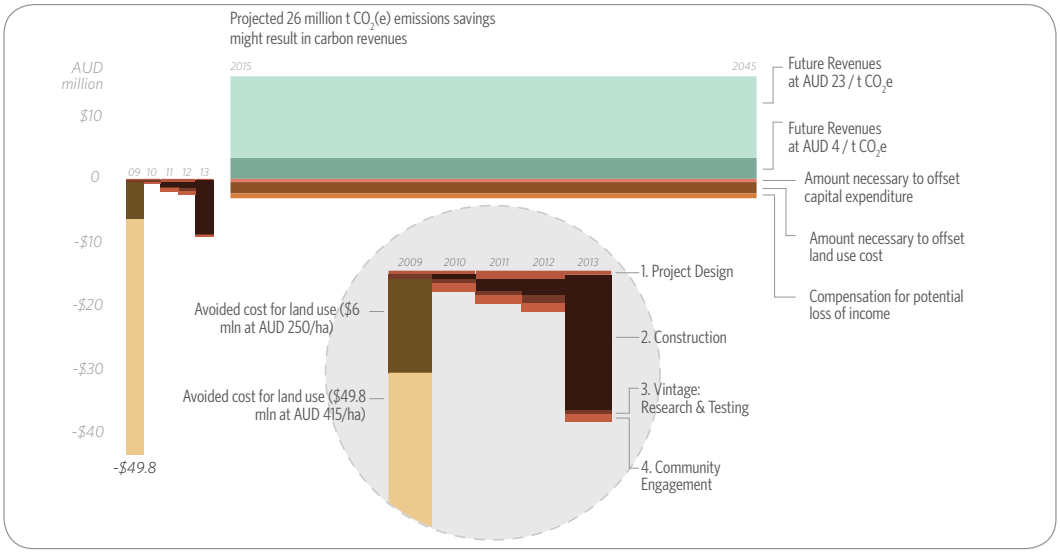
**Practical example of the Financial Viability Gap Analysis tool: Lessons from Kalimantan Forests and Climate Partnership – a case study**

Rosenberg and Wilkinson (2013) studied the costs, returns and risks involved in the Australian government-funded Kalimantan Forests and Climate Partnership (KFCP) demonstration project in Indonesia. The project aimed to test methods for rehabilitating peatland at scale and preserving threatened peat swamp areas.

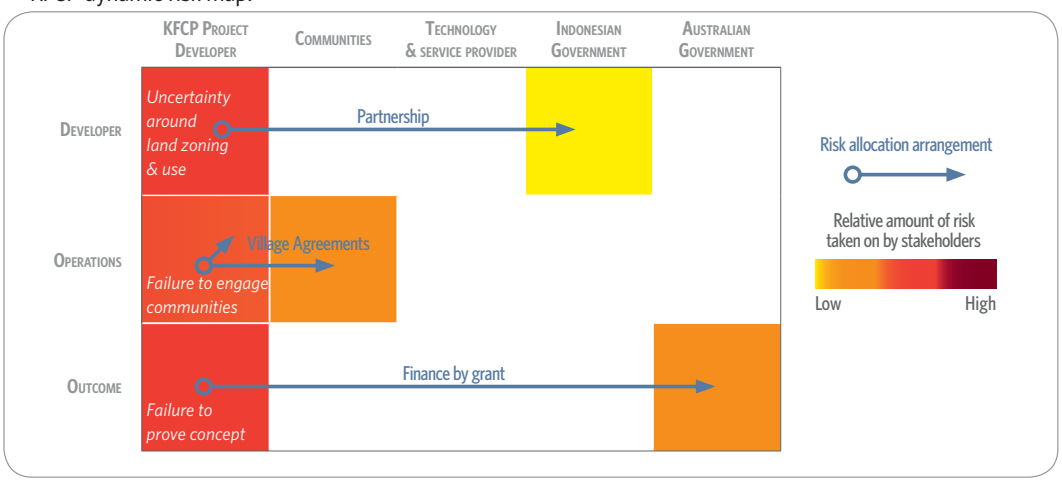
The study identified costs for designing and implementing peatland rehabilitation activities totaling AUD 14.1 million and showed that if the KFCP saved 26 million tons of verifiable carbon units over a 30-year period (as projected by experts advising the KFCP), with prevailing carbon market prices of between AUD 4 or and AUD 23 per ton, the project could generate average annual returns of between AUD 3.5 million and AUD 20 million (see figures below).

The study also identified key risks facing potential investors; including uncertainty about costs related to taxation and land tenure and therefore who would stand to share in future revenue streams (see figures below). As such, the study recommended that the Government of Indonesia adopt policies and mechanisms to minimize transaction costs for investors at the project level by developing national systems to support e.g. robust measurement and verification of emission reductions units and to implement social and environmental safeguards.

KFCP capital expenditures and potential future revenues:




KFCP dynamic risk map:



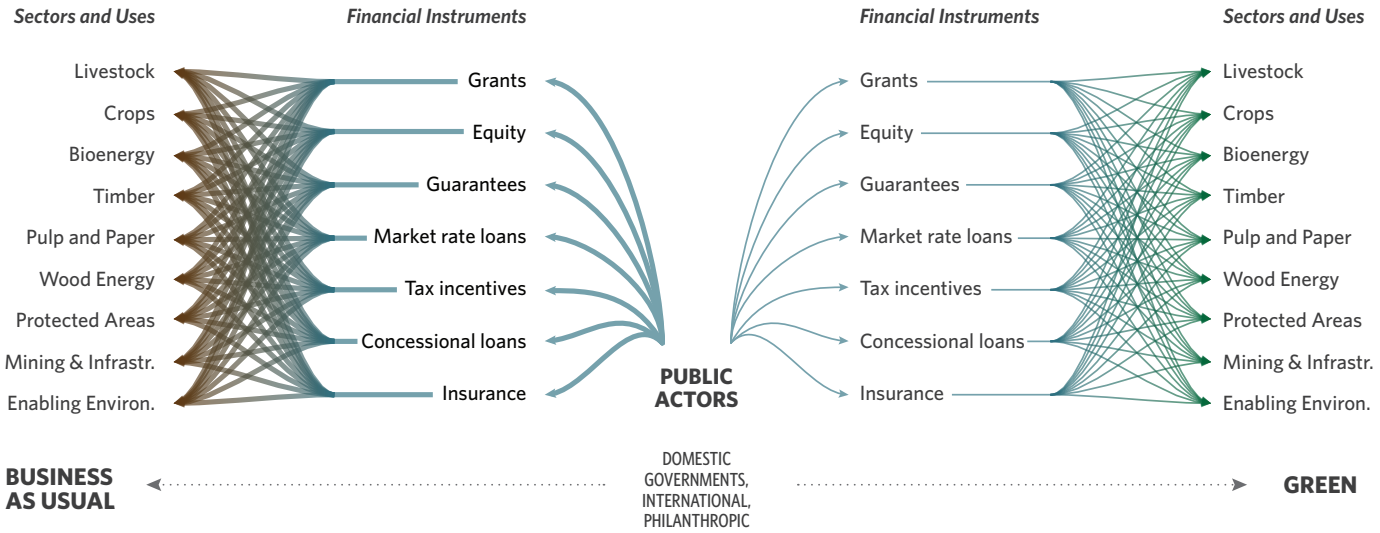
## 3.3 Public finance mapping

This tool seeks to map the main public financial instruments in operation in a given country, jurisdiction or sector that provide incentives to support land use mitigation and adaptation activities as well as BAU activities. The tool provides a framework to visualize whether individual public incentives identified in a particular country or sector are mostly supporting BAU or green land-use activities. It can also be used as a tool to understand which incentives could be shifted from incentivizing BAU to green activities.

The public finance mapping tool categorizes land use mitigation and adaptation instruments by sectors to enable countries to highlight the extent to which their public land use finance is in line with the major opportunities they have to meet their economic and environmental goals. Based on a range of recent studies we identify eight primary sources of emission reductions (see Annex 6.3 for details). While not representing direct emission reduction potential, enabling environment support is also included in the tool, in recognition of its role in providing the appropriate conditions for emission reductions to occur.

As discussed in Annexes 6.3 and 6.4 of this report, for the land use sectors, it will be challenging to draw the line between "green" and "BAU" land use activities but this presents an opportunity for governments and their partners to define levels of ambition and understand what level of trajectory of sustainability public funds are supporting. For instance, in Brazil in 2012, the government provided some USD 57 billion in traditional agricultural credit (Angelo 2012). A detailed assessment would be needed to understand what portion of this credit is supporting high productivity, low emissions or climate resilient land use activities. On the other hand, the ABC program provides credit to support carbon emission reducing agricultural practices, disbursing approx. USD 425 million in its first two years of operation since 2010 (IPAM 2012). A detailed assessment would be needed to evaluate the activities supported to date, against set definitions of "BAU" and "green".

Tool 3: Public finance instrument mapping tool showing incentives for land use activities



# 4. Conclusions

There are opportunities to redirect the hundreds of billions spent annually on land use investments and public incentives around the world toward green activities without sacrificing either productivity or economic development. Low and middle-income countries and their development partners, as well as businesses and investors, urgently need to identify the changes in public support that can help to drive scaled-up private sector investment in land use mitigation and adaptation.

Unlocking investments in highly productive and climate-resilient agriculture and forestry is essential to deliver global food security and human development. Forests and agriculture support the livelihoods of 2.6 billion people worldwide and account for 20-60 % of the gross domestic product of many developing countries (Hoffman 2011), generate around a quarter of global greenhouse gas (GHG) emissions, and are highly vulnerable to the impacts of climate change. However, our understanding of the scale and nature of land use finance is incomplete.

This study aims to **develop a framework to understand land use finance flows in order to identify financial instruments to redirect public and private finance** towards more green land use practices. We developed three tools to quantify and classify land use finance, and to identify blockages and gaps in the landscape of land use finance. Our tools cover national and international, public and private finance, across a full range of defined land use activities. The resulting information is intended to inform domestic governments, international donors, private investors and businesses to identify opportunities for financing land use mitigation and adaptation and to coordinate their efforts.

Governments and their partners can use the three tools in the following ways:

- The **Landscape of Land Use Finance** can help map t goals and plan scale up. It reveals investment patterns that pinpoint blockages and highlight barriers and opportunities. It can inform the design of land-use mitigation and adaptation plans that align bilateral and multilateral support with domestic efforts and needs.
- **Financial viability gap analysis** can help understand the key barriers and drivers of individual investments or groups of investments. It allows decision makers to identify which policy approaches or instruments would be most effective at redirecting investment to greener land use practices.
- **Public finance mapping** can help to see the range of public financial instruments supporting BAU and green land use activities to identify the best and most cost-effective opportunities to shift incentivizes from BAU to green activities. It can also ensure that overall policy and spending is coherent with the economic and environmental goals of governments and their partners.

Implementing elements of these tools can contribute to building more effective tracking systems for climate-compatible spending and enable improved policy and program design in the future. Climate Focus and Climate Policy Initiative are now actively engaging country partners interested in trialing some of these approaches with the aim to publish case studies, initially for two countries, within the next year.

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# 6. Annexes

## 6.1 Approach

The background analysis presented in this paper and prototype versions of the tools were prepared following an extensive review of the literature on REDD+, conservation and land-use finance. The analysis was presented to the Standing Committee on Finance's ninth meeting in March 2015.

The project team then presented draft versions of the tools at a workshop held in Paris on 27 April 2015 attended by leading experts from developed and developing country governments and research organizations. Using feedback gathered during the workshop, the tools were refined and further developed.

Table 4: List of workshop participants

| | |
|---|---|
| Stefan Agne | European Union (EU) |
| Inthavy Akkharath | Laos |
| Mika Bucki | European Union (EU) |
| Chris Dragisic | Government of US |
| Anna Drutschinin | OECD |
| Christiane Ehringhaus | KfW, Germany |
| Pipa Elias | The Nature Conservancy (TNC) |
| Ignacio Gavilan | Consumer Goods Forum |
| Beth Nelson | Government of UK |
| Momade Nemane | Mozambique |
| Nick Oakes | Global Canopy Programme (GCP) |
| Daniel Ole Sapit | Kenya |
| Kenneth Peralta | Government of Peru |
| Marte Sendstad | Norway |
| Marco Van der Linden | World Bank |
| Charlene Watson | Overseas Development Institute (ODI) |
| Andrew Wardell | Center for International Forestry Research (CIFOR) |
| Marcel Yao | Ivory Coast |

## 6.2 Glossary of key actors in land use finance

### 6.2.1 DOMESTIC PUBLIC ACTORS

Governments are responsible for providing public goods and services (such as regulatory environments, enforcement, some infrastructure) that private actors either cannot or unwilling to pay for. They are the primary providers of policies and incentives that can help private actors to reduce risks and costs, or to improve returns. Where risks and returns are in balance, private investment will follow.

**Domestic public budget expenditure pays to build a supportive regulatory environment and overcome knowledge barriers and risks**

Central and local governments and their agencies spend domestic budgets on many different governance and **enabling environment activities** related to land use, including:

- Research, Development and Demonstration including agricultural extension services and training programs
- Developing and implementing regulation, policies and incentives including e.g. securing tenure, development of offset or trading schemes or setting price floors (here the cost is met by the private sector and consumers but the cost of developing the policy borne by the government)
- Structural/institutional reform
- Law enforcement programs and monitoring systems e.g. for managing, restoring and / or maintaining protected areas
- Land use/spatial planning/mapping systems, or reform
- Development of national studies and strategies, systems

**Governments invest equity and debt in strategic enterprises and infrastructure**

Domestic governments sometimes also take an **ownership** stake (equity) in or provide **debt** to private companies, in which they have some kind of public strategic interest or full ownership in the case of state-owned enterprises. This finance can also be channeled

through a national financial institution or national development bank. For instance, China National Cereals, Oils and Foodstuffs Corporation (COFCO) is a food processing holding company fully administered by China's State Council, with subsidiaries operational throughout the value chain of numerous crops, fruit and livestock products, from cultivation to final distribution.

**Government incentives and penalties can help drive green private investments**

Finally, domestic governments provide public money via a suite of instruments to incentivize private investors (including consumers) to take particular actions in line with government economic development objectives. Instruments include upfront grants, revenue support subsidies, tax incentives, and the purchase of offsets. On the demand side, governments can implement procurement policies in their own operations to stimulate demand for higher standard goods e.g. certified green goods. Governments can also impose penalties for behaviors to encourage the enforcement of standards designed to protect valuable ecosystems and services.

### 6.2.2 INTERNATIONAL PUBLIC ACTORS

International public actors also act in the interest of public good and seek to support domestic public and private actors' economic development objectives as well as social and environmental objectives. They usually have zero financial return or at least lower return expectations than private actors.

International public actors include bilateral donors and development financial institutions (DFIs) including bilateral, multilateral and regional financial institutions.

Grants do not have to be repaid, and typically support the establishment of enabling environment and capacity building. Grants may also used to pay for incentives for projects and programs, through e.g. debt-for-nature schemes, purchase of carbon offsets (through bilateral, voluntary or mandatory schemes) including ex-post payment for performance –type schemes. International public actors can also adapt their own procurement policies in support of green land use.

Philanthropic actors, while associated with private individuals, families or businesses, act like public in that they provide grant support almost exclusively. Recent data on the contribution of philanthropic actors to (land use) mitigation and adaptation is not available, but grants for "environment and animals" in 2012 was estimated at USD 1.6 billion in 2012 by the Foundation Centre (Foundation Centre, accessed May 2015).

Low cost and market rate debt are instead provided for project or program development, where there are returns available to pay for the loan but where commercial capital generally would not lend due to high risks. Indeed market rate debt provided may also have some concessional lending elements or associated structures designed to share or mitigate investment risks through e.g. first-loss protection, guarantees and insurance and public-private partnerships.

### 6.2.3 INVESTORS

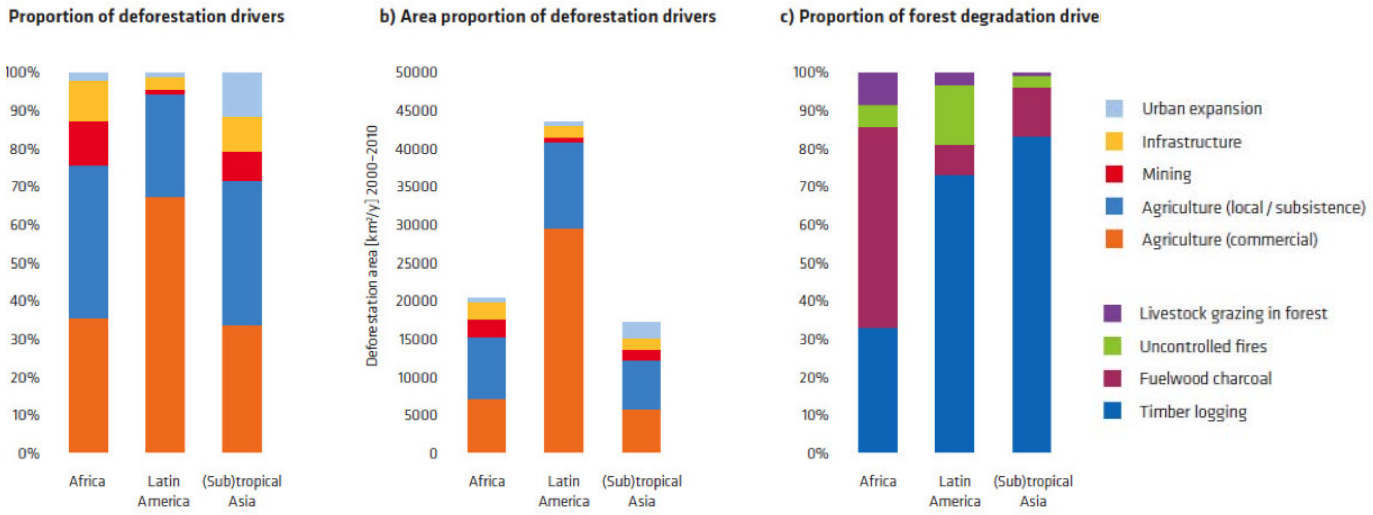
Investors are a very diverse group of actors with varying risk-return preferences. They include local/ International/regional financial institutions (may be public or private); private equity, venture capital and infrastructure funds and High Net Worth Individuals (HNWI). These actors typically provide market rate debt and equity and have a medium to high risk-return appetite. We do not see a lot of activity from these types of investors in green agriculture and forestry at present, highlighting the high level of (perceived) risk, transaction costs and viability gaps involved.

Households and institutional investors are more risk adverse but have longer time horizons than professional investors and, in some cases, social and environmental preferences. So far, investment volumes are thought to be low however. For instance, less than USD 10m of investments by institutional investors for green forest plantations in developing countries are tracked by the Global Investor Coalition (GIC, 2015).

Impact investors are more active in green agriculture and forestry. Often backed by donor finance, they invest into projects, companies, organizations or funds with social and environmental objectives while generating financial profit (GIIN, 2015). Local agricultural banks and rural credit schemes are also important and active providers of finance for agriculture and forestry but are less likely to have sustainability among their primary objectives.

Project developers invest their own capital or channel that of other investors and are very active in developing land use mitigation and adaptation projects, particularly with public support or private support through bilateral and voluntary offset programs.

Figure 3: Major drivers of emissions in forest sector




Source: Hosonuma et al (2012)

### 6.2.4 BUSINESSES

Agri-forestry businesses are another very diverse group of actors, in terms of their role in the value chain (producers, processors, traders, distributors); their size, from individual smallholder and family farmers and cooperatives through to SMEs and multi-national corporations; and in terms of their risk-return appetite.

Private businesses invest their own resources from their savings / balance sheet or raise debt/equity finance from the investors discussed above. FAO data shows that the domestic private sector is the largest investor in agriculture and forestry but we have a very limited understanding of how green any of those investments are and what we can therefore consider as mitigation and adaptation finance.

For instance, we estimate that private sector may be investing around USD 4.2 billion annually in selected certified timber and palm oil alone.[25]

## 6.3 Classifying land use mitigation activities

The three tools outlined in this report are designed to help governments and their partners to achieve their economic and environmental goals. Once those goals have been set, the tools require a robust set of definitions and effective tracking to understand what impact different approaches will have. In this section, we describe an approach to determining which land use activities help to mitigate or adapt to the effects of climate change. This is particularly challenging for land use as definitions of activities that contribute to mitigation and adaptation in this sector remain relatively unclear. This lack of clarity is in large part due to the huge variety of different actors involved in green land use and their differing individual perspectives on activities.

Priorities for action will, of course, depend on the regional and country context for particular sector. Our categorization of forest-based emissions, for instance, uses the Hosonuma et al (2012) assessment of deforestation[26] and forest degradation drivers in lower and middle-income countries as a basis for classifying

25 Investment data is not available. USD 4.2 billion is a mid-point between two "back of the envelope" estimates. The first, USD 1 billion, is an estimate of premiums generated by certified green commodities (Streck and Parker, 2012), taken as a proxy for the maximum a business would invest to gain the additional revenue stream. The second, USD 7.4 billion, is arbitrarily and conservatively assumes investment costs equal to 10% of the estimated annual certified market revenue for green commodities. This estimate is based on FSC, PEFC and RSPO standards' respective shares of the world's managed forests and global timber export values and palm oil global export volume and values total palm oil export data, resulting in estimated certified market value of USD 74 billion in 2014. Data sources: SSI 2014, PEFC 2014, The Economist 2014, RSPO, 2015.

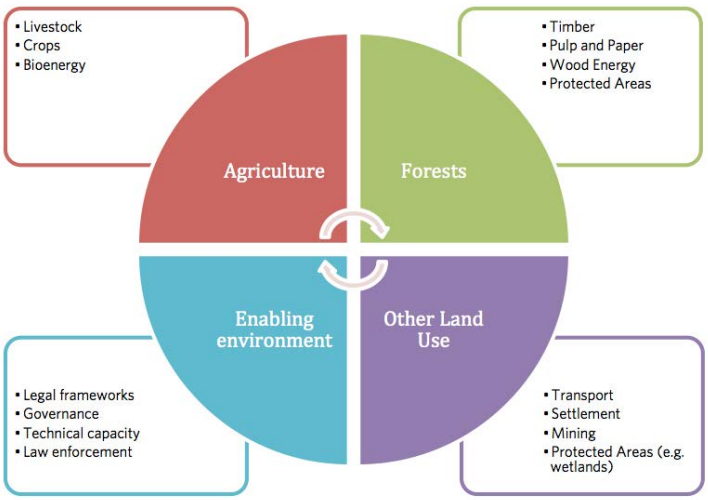
26 Several studies have attempted to qualify and quantify the various drivers of deforestation (Geist and Lambin 2002; DeFries, Rudel et al. 2010; Boucher et al. 2011). A simple way of understanding drivers uses two broad categories: the proximate and underlying drivers of deforestation (Geist and Lambin 2002). Proximate drivers include human interactions at the forest frontier that directly impact forest cover either for the land that forests occupy or for the timber that they contain. Underlying drivers of deforestation are both socioeconomic processes that shift the way in which people behave at a macro level as well underlying institutional factors such as land tenure and corruption.

emissions sources. This paper classifies drivers of deforestation into five categories and degradation into four categories (see Figure 3).

The figure shows the relative importance of various drivers of deforestation and forest degradation varies by region and indeed by country. In Latin America, countries primarily face large-scale deforestation threats from conversion of land for pasture (cattle) and crop (mostly soy) production. Significant deforestation is occurring in Brazil (cattle, soy), Argentina (soy) and Colombia, Bolivia and Peru (cattle) (Houghton 2010, Boucher et al. 2011). Brazil is also the largest consumer of industrial charcoal in the world, much of which comes from native forests (Oliveira et al 2007, in Gaudioso and Magrini 2011). Asia has the least total forest cover, but highest rate of deforestation (Hansen, Stehman et al. 2008). Much of the forest loss in Asia is being driven by large-scale crop (palm, rubber, coconut tree) and timber plantations. This is a result of land clearance for shifting cultivation as well as wood extraction for fuelwood production.

Using these two classifications (Dickie et al, for agricultural emissions, and Hosonuma et al for forest emissions) we present 15 sources of emissions grouped into three emissions sources / sinks and enabling conditions (see Figure 4 below).

Figure 4: Primary sources of emissions / sinks grouped by sector



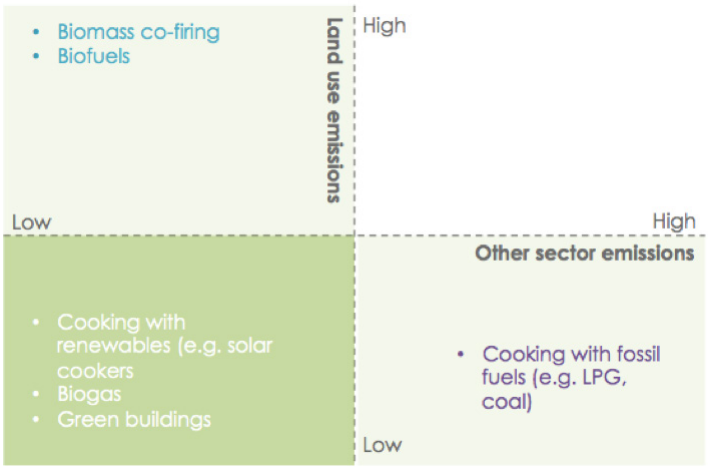

### 6.3.1 DETERMINING THE MITIGATION BENEFITS OF LAND USE ACTIVITIES

In defining the sectoral categories for our Landscape and Public Finance Mapping tools (see sections 3.1 and 3.3) we examined definitions of land use mitigation activities developed by three main groups of actors:

- **Development aid organizations** play a major role in international finance for green land use activities. They include bilateral and multilateral finance organizations and their disbursements are mostly tracked through the OECD DAC database. OECD DAC classifies agriculture into two groups (Agriculture, Forestry) and has 24 categories of interventions (e.g. agrarian reform, agricultural extension, forestry research, etc). Development aid organizations use a scoring system of three values to determine whether finance is climate-related or not, in which development co-operation activities are "marked" as targeting the environment using the Rio Conventions as the "principal" objective or a "significant" objective, or as not targeting the objective.[27] These definitions or 'Rio markers' cover a range of activities that are both climate and non-climate related and are therefore inappropriate for defining land use mitigation activities.
- **Intergovernmental Panel on Climate Change (IPCC)** provides a framework for emissions reporting and a consistent system for categorizing land use emissions. The IPCC Fifth Assessment Report (AR5), for example, categorizes land use into five major groups (forestry, land-based agriculture, livestock, integrated systems, bioenergy) and underneath that has 26 categories of intervention (e.g. reducing deforestation, re-vegetation, manure management, etc.). While these reports provide a useful background for categorizing and grouping land use sources, little information is provided about mitigation options and activities to reduce land use emissions.
- **Governments** also typically provide categories for finance they are targeting for the land use sector in their budgets. The United Nations Development Programme's (UNDP) Climate Public Expenditure and Institutional Reviews (CPEIRs) provide an example of budgetary categories in countries that are implementing green land use policies and measures. The Government of Nepal for example groups budgetary expenditures by ministry (e.g. Environment, Energy, Irrigation, Forests & Soil Conservation, Industry) and within that has more than 30 programs that impact land use activities (e.g. Biogas Production Program,

27 http://www.oecd.org/environment/environment-development/rioconventions.htm

Figure 5: Land use emissions and relationship with emissions from other sectors




National Forest Development and Management Program). These groups may or may not be relevant in a different country as they are often highly context specific.

A recent review of REDD+ readiness plans categorized REDD+ interventions according to twelve main categories and suggested 34 interventions under these categories (Salvini et al 2014). While being very climate relevant, many of these categories are still at a level that would make it difficult to assess if there were climate impacts on a policy-by-policy basis (e.g. harmonization of policies, or financial incentives in the agriculture sector).

Any definition of green interventions also has to consider the cross-sectoral impacts of land use activities. As shown in Figure 5, activities considered low emissions in the land use sector (e.g. cooking with LPG instead of woodfuel) may be considered a higher emitting activity in the energy sector. Conversely, activities that might have high land-use emissions might be considered mitigation activities in other sectors (e.g. biomass and biofuels). Equally, there are activities that could be climate positive across sectors, e.g. green buildings, or cooking with biogas.

### 6.3.2 FRAMEWORK

Building on existing definitions and reporting processes, we propose a three-tiered framework to define land use mitigation activities. The framework is based on a bottom up analysis of mitigation activities in the forest and agriculture sectors globally and is grouped by sector, and then arranged by major sources of emissions / drivers, and practice (see Figure 6).

#### Sector

Firstly, land use emissions can be categorized into three broad sectors with varying emissions profiles (see Table 5).

#### Emission source / sink

In this framework, we categorize land use mitigation practices by emission sources / sinks to better enable countries to prioritize mitigation interventions and land use finance strategies in line with country-specific emissions reduction opportunities. Our categorization of agricultural practices is based on a recent assessment of mitigation opportunities undertaken in a joint study by Climate Focus and California Environmental Associates (Dickie et al, 2014). This study aggregates agricultural mitigation activities into six categories:

- Beef Cattle
- Dairy Cattle
- Other Livestock
- Rice
- Other crops
- Demand Side Measures

Figure 6: Three-tiered framework to define land use mitigation activities

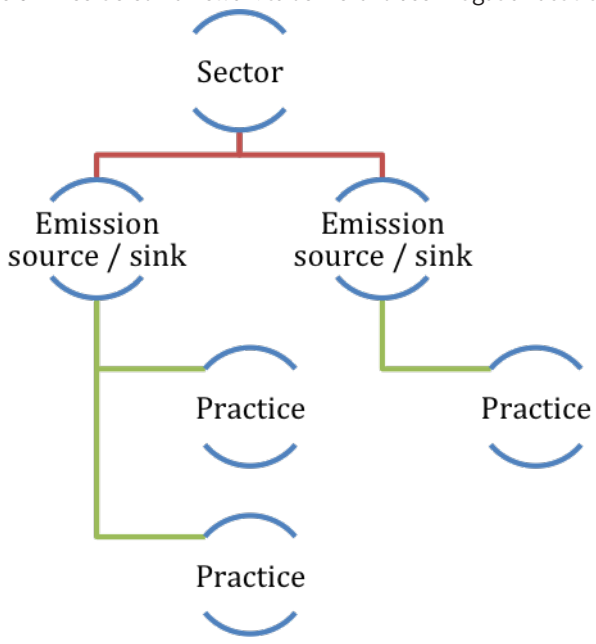


Table 5: Three categories of land use emissions and associated emissions profiles

| SECTOR | EMISSIONS PROFILE |
|---|---|
| AGRICULTURE | Usually an emissions source. Can range from high emissions (e.g. cattle) to low emissions, or even a net sink (e.g. plantations on degraded lands). |
| FORESTRY | Can be either a source or a sink. Forests can range from natural forests to plantation forests. Forests can be managed sustainably or unsustainably. Emissions can rise when a forest is converted to agriculture or other land uses, of fall when land is converted from other uses to forests. |
| OTHER LAND USES | Can be both a source and a sink. In the case of infrastructure (e.g. settlements, roads) can be a direct and indirect driver of deforestation. Peatlands are massive sinks of soil carbon that can become a source of emissions if drained for agriculture or other uses. |

### Mitigation practices

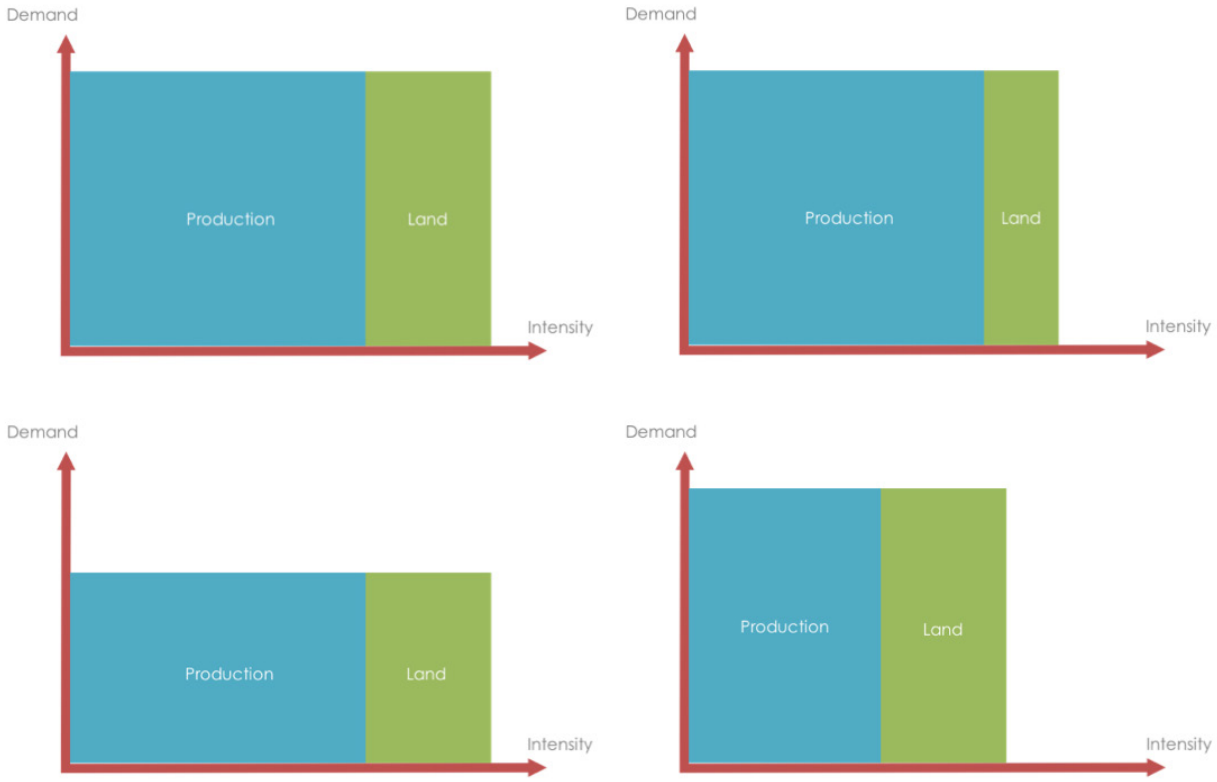
The final level in our land use mitigation framework corresponds to land use mitigation practices. These practices can be grouped into three overarching categories as described in Table 6.

Given the complex and interlinking nature of land use activities, achieving mitigation outcomes is often not a linear process, and combinations of activities in the above typology may be needed. For example, intensification of cattle production to improve land intensity may not directly result in emissions reductions (see Sections 6.3 and 6.4 and the rebound effect), but a combination of cattle intensification with afforestation of degraded lands, would yield a net mitigation (see Figure 7).

Table 6: Three categories of land use mitigation activities and associated mitigation practices

| | DESCRIPTION | ACTION |
|---|---|---|
| Production efficiency | Mitigation can be achieved by changing practices that reduce the emissions intensity of production. This could either be through less emissions or more sequestration per unit output through increased productivity. | • Improved fertilizer use<br>• Manure management<br>• Soil conservation practices<br>• Nutrient and water management<br>• Improved feeding practices<br>• Green forest management<br>• Improved charcoal production techniques |
| Land efficiency | Mitigation can also be the result of a more efficient use of land. Using land more efficiently will place less pressure on forests and other high carbon value land uses through direct and indirect land use change. | • Any of the above practices that increase yield per hectare<br>• Increased cattle stocking densities<br>• Improved palm oil yields per hectare<br>• Shifting to degraded (i.e. non-forested) land<br>• Afforestation / reforestation |
| Changes in demand | Finally, mitigation can be achieved through changes in demand for a given commodity. Decreasing demand for high emissions commodities and increasing demand for high sequestration commodities can result in positive mitigation outcomes. | • Reduced demand for BAU commodities<br>• Increased demand for green commodities<br>• Switching from wood fuel to alternative energy sources<br>• Increased demand for green buildings<br>• Changing dietary habits by eating less beef<br>• Improved efficiency in consumption (e.g. clean cook stoves) |

Figure 7: Visualization of mitigation strategies from a business as usual practice (top left) based on an improvement in land intensity (top right), improvement in production intensity (bottom right) and reduction in demand (bottom left)




### 6.3.3 DEFINING LAND-USE MITIGATION ACTIVITIES AS GREEN, BROWN OR GRAY

In this section, we propose a methodology to help governments and development partners to determine whether financial flows and instruments target business-as-usual (BAU) land-use activities or green land-use activities by first defining these terms and then determining under which category an activity falls.

Getting these distinctions right matters for three main reasons

- There is limited availability of public climate finance and it is important to maximize impact
- Unclear boundaries between BAU and green activities mean there is a risk of using public finance to support ostensibly green activities that do not meet climate change mitigation and adaptation goals
- Because there is little room for error, given the multiple pressures placed on the land in meeting food production, social, economic and environmental goals

In addition, defining boundaries between green and BAU land-use activities is a key step in devising and planning coherent national or sub-national strategies to reduce emissions. This exercise represents an opportunity for multi-stakeholder dialogue and participation to define sectoral visions and priorities.

We propose three categories of land use activity (brown, green and gray). Categories are defined below.

**Green:** We use the term green to describe land-use activities that are lower emitting alternatives to BAU activities. An activity is classified as green if it has a GHG emissions profile below a defined baseline or benchmark measure, where those baselines and benchmarks are defined with sufficient environmental integrity, and where sustainability risks are addressed.

*Example 1:* A wood fuel plantation on degraded land, harvested according to green forest management practices, which replaces the supply of unsustainably harvested wood fuel from primary forests and does not displace other land uses (e.g. agriculture).

**Brown:** We use the term brown to describe land use activities that result in avoidable GHG emissions. An activity is classified as brown if it is a land use activity that has a higher than necessary emissions profile for that type of activity, or is substitutable by another less emissions intense activity.

*Example:* Cattle production with sub-optimal manure management and low stocking densities

**Gray:** We use the term gray to describe: 1) Activities do not have a clear GHG emissions impact; or 2) ostensibly green activities that do not pass sustainability criteria.

*Example 1:* Investment in distribution networks to enable small farmers to access larger markets.

*Example 2:* An activity that reduces GHG emissions in one geographic area, but may displace GHG intense activities to another geographic area.

Governments and practitioners can decide if they would like to group gray and brown activities together to show a comparison of green versus all other land use finance, they can equally choose only to focus on brown activities (i.e. those that have a negative impact on land use).[28] The decision-making flow chart below can be used to determine which category to apply to each land use activity. The individual steps in this chart are explained in the text following this chart.

### 6.3.4 FLOW CHART TO DETERMINE MITIGATION BENEFITS OF LAND USE ACTIVITIES

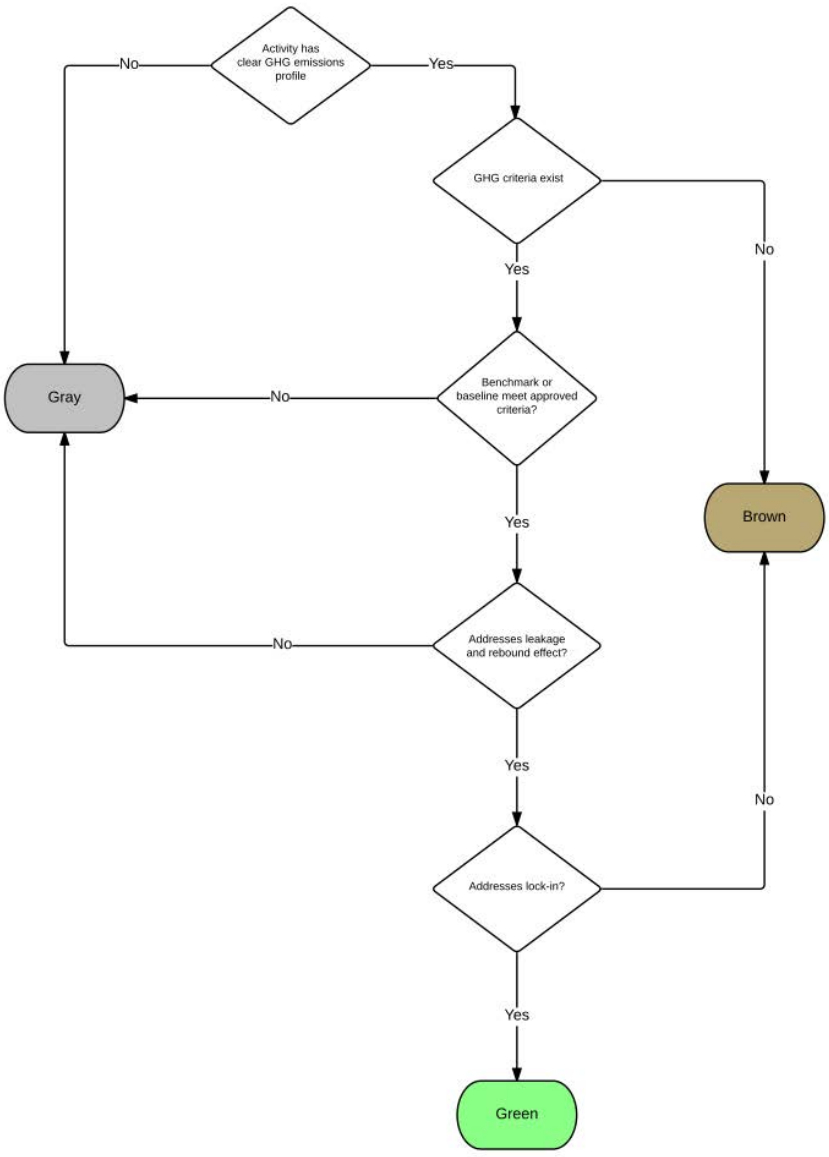
**Does the activitiy have a clear GHG emissions profile?**

If an activity does not have a clear GHG emissions profile it is automatically defined as gray. (e.g. it is difficult to argue whether farm infrastructure and agricultural extension services impact either positively or negatively on emissions).

**Do GHG criteria exist for this activity?**

A baseline determines environmental performance in a context specific manner. It can be understood as the counterfactual emissions profile of a land use activity i.e. the level of GHG emissions that would have been emitted in the absence of the green project. Baselines can be set according to historical GHG emissions levels observed over time (e.g., the observed emissions intensity of a certain agricultural practice), or according to future projections based on adjusted historical emissions (e.g., projected emissions intensity given assumed increases in fertilizer use). Typically, all performance below the baseline is counted as a GHG emissions reduction.

Flow chart to determine mitigation benefits of land use activities




28 In this report, we define BAU as a combination of brown and gray activities.

A benchmark is a GHG emissions standard for an activity type set according to the best available standard or an agreed standard and can range from 'zero emissions' requirements to 'best in class' performance to other, less stringent standards. They set absolute performance values that activities must meet in order to qualify as green. Although benchmarks may be adjusted according to a performance class (e.g. different benchmarks for smallholders and large agribusinesses), benchmarks are universally applied within a performance class.

If an activity does not specify either a baseline or benchmark, then it is not the most emissions efficient per output for that activity class (e.g., crop production with overuse of nitrogen based fertilizers) and is categorized as brown.

**Does the benchmark or baseline meet approved criteria?**

To ensure environmental integrity, activities should only be categorized as green where benchmarks and baselines are sufficiently ambitious. Benchmarks and baselines will normally be set for each activity type on a case-by-case basis, and will likely involve negotiations between public institutions and private actors. However, to ensure a minimum level of environmental integrity, performance standards should:

1. Be quantitatively defined, in a way that is measurable, reportable and verifiable;
2. Represent an improvement on business-as-usual practices;
3. Be applied consistently within each activity type;
4. Aim to achieve the highest possible mitigation potential with available finance (i.e. with standards high enough to reward only the best performers, but not so high that the financial incentive is not sufficient for actors to meet that standard)

Where benchmarks and baselines do not meet these criteria, an activity should be categorized as gray.

Even where an activity meets a required performance standard, there are three main sustainability risks to address before it can be categorized as green. They are covered in the following two questions.

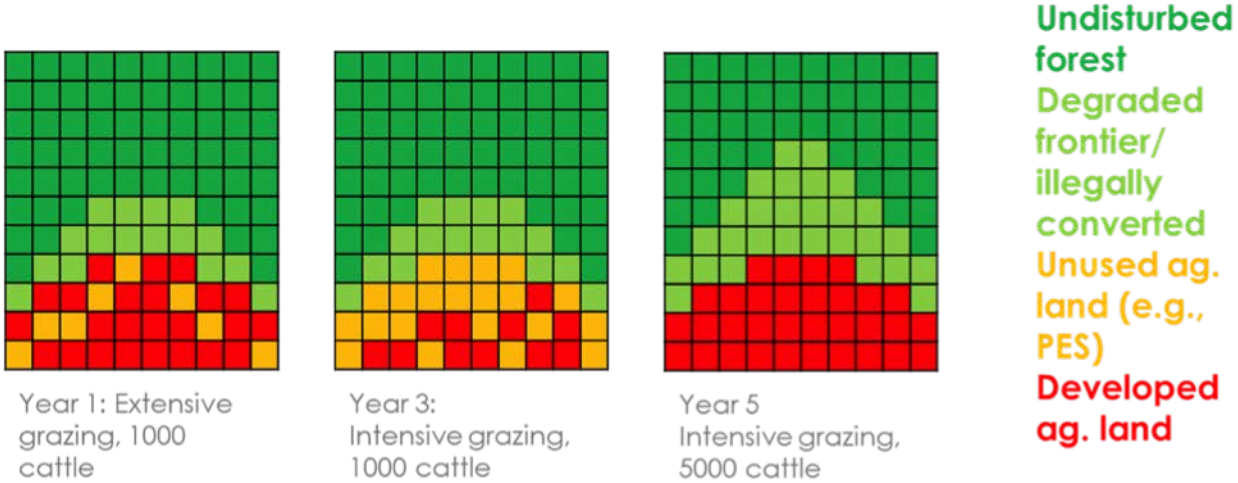
**Does it address leakage and the rebound effect?**

Land use activities that reduce per hectare output of farms or plantations in regions where available non-forest land is scarce, cannot be counted as green interventions in the absence of a simultaneous reduction in demand. Where demand for a commodity is constant, reducing production of that commodity on one parcel of land will very likely displace production to another parcel of land. This 'leakage' means GHG savings from reducing the intensity of production in any one area are offset by increases elsewhere.[29] Where leakage risks are not addressed, an activity is categorized as gray.

The 'rebound effect' occurs when more cost-efficient production methods reduce input costs and increase rents and returns, encouraging farmers to expand land use to further increase production (see Figure 8). It also increases the opportunity cost of environmental protection through e.g. payments for ecosystem

29 Referred to as carbon leakage by IPCC – reallocation of emissions from countries subject to emissions targets to those which are not: https://www.ipcc.ch/publications_and_data/ar4/wg3/en/ch11s11-7-2.html

Figure 8: The potential 'rebound effect' of moving to more intensive forms of cattle grazing



services. Thus activities with a high risk of rebound effect cannot be categorized as green interventions in the absence of additional measures (e.g. the restriction of financial incentives to certain geographic areas, or the enforcement of zoning laws), and are categorized as gray.

In this example, adoption of intensive cattle grazing in year 1 reduces the land needed for pasture, increasing unused land for environmental services in year 3. However, increased returns on cattle production mean that by year 5, numbers of cattle produced has increased, using all available land, and increasing deforestation pressures on illegally converted frontier land

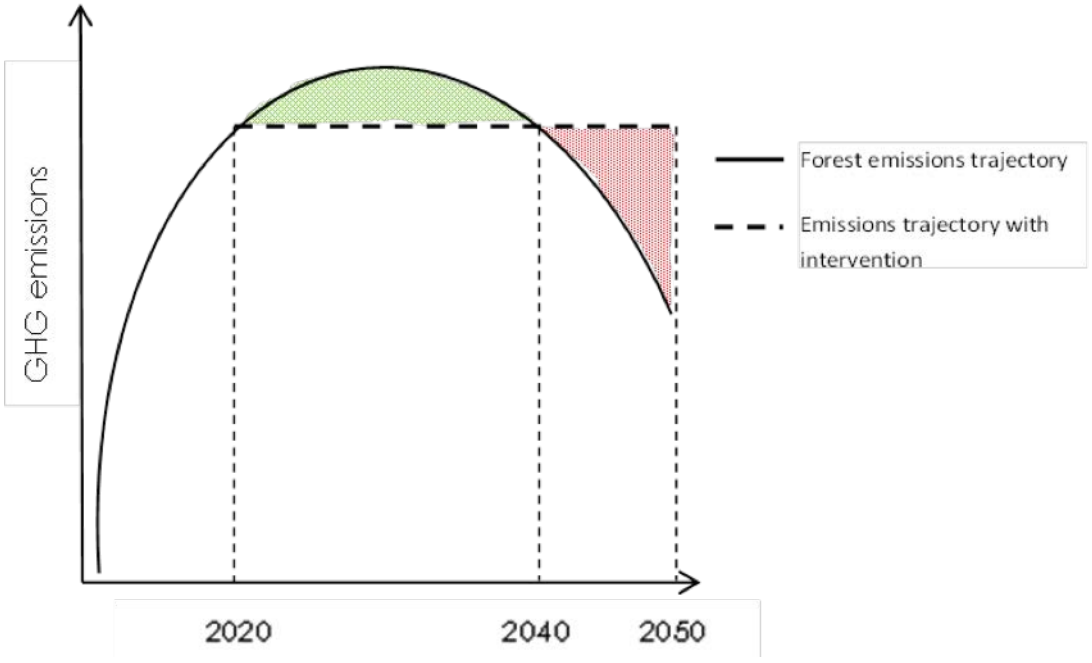
**Does it address lock-in over time?**

Global emissions will have to fall decade on decade to 2100 in order to avoid dangerous climate change. This means that with time, baselines must be adjusted downward, and benchmarks progressively reset at more ambitious levels. However, certain large investments may lock production practices in place for a number of decades. While production practices may be green compared to business-as-usual practices in 2015, they may not be consistent with emissions targets by 2050. Where activities create lock-in they are classified as brown.

For example, the Roundtable on Sustainable Palm Oil (RSPO) industry group requires its members to minimize GHG emissions by ensuring that new plantings do not replace primary forest. While this means that RSPO-certified production has a lower emissions profile than production based on the clearance of primary forest, more ambitious criteria would require that new plantations should not replace primary *and* secondary forest.30 Decisions taken on new plantations now with reference to 2015 benchmarks may not be compatible with the level of ambition of future emissions targets. This could have long-term consequences as concessions are granted for decades, and plantations remain productive for 25 -30 years after planting.

In this example, national policy goals project an increase in forest GHG emissions to 2030. A long- term intervention at 2020 lowers total emissions between 2020 and 2040 but between 2040 and 2050, the same intervention results in emissions levels greater than those in the projection (see Figure 9). These emissions are 'locked in' due to the long-term nature of the investment in 2020.

Figure 9: The emissions lock-in effect of a long-term forestry investment




30 Or, alternatively, concrete GHG emissions rules expressed in a tCO2e basis.

Table 7: Climate change adaptation stressors for land use

| STRESSOR | DEFINITION |
|---|---|
| HEAT STRESS | Stress from rise in average seasonal ambient thermal temperatures, heat waves and periods of abnormally warm weather |
| WATER STRESS | Stress that refers to ability, or lack thereof, to meet human and ecological demand for water; it includes water scarcity and also water quality |
| PESTS, DISEASE, INVASIVE SPECIES | The spread and increase of pests, diseases, and invasive species as a result of other climate stressors that damage the environment and/or human health |
| EXTREME WEATHER EVENTS | Stress from the increasing existence of unusual, severe or unseasonal weather at the extremes of the historical distribution of weather for a given location |
| SOIL LOSS | Loss of soil due to erosion, heat, water and extreme weather events (e.g. flooding) |
| TEMPORAL/GEOGRAPHIC SHIFTS IN WEATHER PATTERNS | Changes in weather patterns, including rainfall, that induce shifts in types, quality or locations of agriculture, forestry, and human settlement |

## 6.4 Classifying land use adaptation activities

Lower and middle-income countries are disproportionately vulnerable to the impacts of climate change, both because of the geographical distribution of these impacts and their limited capacity to adapt. Within lower and middle-income countries land use activities are particularly vulnerable given their sensitivity to extreme weather events and their reliance on fixed temperature ranges, predictable seasonal weather patterns, and the availability of water and other natural resources. Improving adaptive capacity is critical in light of the role of land use activities in meeting fundamental nutritional, economic and social needs.[31]

Definitions of climate change adaptation activities vary widely, from the maintenance and improvement of human and natural systems in response to climate change, to the limitation of damage in the face of these changes. For our purposes, we use the IPCC'S broad definition of adaptation as 'the process of adjustment to actual or expected climate and its effects', moderating harm or exploiting beneficial opportunities in human systems and facilitating the adjustment of natural systems.[32]

### 6.4.1 FRAMEWORK

As above, we propose a three-tiered framework to define and classify adaptation activities within the land use sector. According to this framework, adaptation activities respond to environmental 'stressors' arising because of climate change. We identify six key 'stressors' (see Table 7), which are then classified under sectors. Categorizing adaptation practices and therefore adaptation finance by stressors will better enable countries to prioritize their interventions based on the primary stressors in their differing national contexts and conditions.

#### Adaptation Practices

We identify four types of practices for land use adaptation activities to improve adaptive capacity or reduce exposure or sensitivity to these climate stressors:

- **Integrated planning:** Coordinated, cross sectoral planning at the national and sub-national level to anticipate and respond to climate impacts; and
- **Natural resource management:** Green management of resources at the landscape level, including soils, water, flora and fauna, to ensure the maintenance of their ecological functions and long-term productive potential
- **Information and technology:** Availability of accurate information and appropriate technologies to enable actors to anticipate and respond to climate impacts
- **On farm/forestry practices:** Adoption of agricultural practices and tools at the farm/plot level that improve climate resilience.

Based on a review of 50 National Adaptation Programs of Actions completed by Least Developed Countries, we compiled a (non-exhaustive) list of example practices under each intervention category (See table 8).

31 Agriculture alone employs one billion people globally, and commonly represents over 50% of the workforce in developing countries. See FAO 2012b.

32 IPCC 2012.

Table 8: Land use adaptation practices

| INTERVENTION | EXAMPLE PRACTICES |
|---|---|
| INTEGRATED PLANNING | • Better watershed management and water distribution optimization |
| NATURAL RESOURCE MANAGEMENT | • Afforestation, reforestation and other vegetative cover to increase water retention, reduce flooding risk and reduce soil loss<br>• Protection and expansion of biodiversity rich areas to increase resilience broader of ecosystems<br>• Increase drainage capacity of land to reduce flooding risk<br>• Improve coastal defenses (e.g., strengthening of sea walls, planting of mangroves)<br>• Restoration/creation of wetlands<br>• Flood protection dikes<br>• River bank erosion control<br>• Construction of multipurpose reservoirs<br>• Construction of green dams |
| INFORMATION AND TECHNOLOGY | • R&D on more heat, drought, pest and pathogen tolerant varieties<br>• Better seasonal forecasting and decision support tools<br>• Improved access to early warning systems for weather hazards<br>• Research on pests and pathogens (pathology and epidemiology)<br>• Pest and pathogen control technologies available<br>• Breeding and development of locally adapted crops<br>• Agricultural extension services/farmer training |
| ON FARM/ FORESTRY PRACTICES | • Switch to more heat, drought, pest and pathogen tolerant varieties<br>• Improving on farm water storage, irrigation and efficiency of use<br>• Weather protection systems for crops and livestock to reduce heat exposure<br>• Improved crop storage facilities to reduce post-harvest waste from weather and climate events<br>• Adaptation of fish/aquaculture techniques to increased flood risk<br>• Farm level soil conservation practices (no till, mulch, alternative cropping)<br>• Soil conservation structures (e.g., terraces, grassed waterways)<br>• Farmland set-asides for soil conservation<br>• Use of windbreaks<br>• Pest management through targeted herbicide and pesticide application<br>• Switch to livestock with greater heat and drought tolerance<br>• Optimizing herd size and grazing patterns |

### 6.4.2 DEFINING LAND-USE ADAPTATION ACTIVITIES AS GREEN, BROWN OR GRAY

To determine whether financial investments are flowing to activities that adapt to the effects of climate change or those that do not, it is necessary to first define and then develop a methodology to distinguish green from brown and gray. We begin with a set definitions for each.

**Green:** Activities that contribute towards increasing the climate resilience of the relevant sector, while avoiding maladaptation risks.

*Example:* See Table 7.

Brown: Activities that: (1) degrade the natural resource base (soil/water etc) making adaptation to climate change more challenging; (2) are vulnerable to climate change over their lifecycle, and; (3) adapt to short term climate stressors by increasing future vulnerabilities, creating lock-in over time.

*Example 1:* Deforestation of uplands, exacerbating lowland flood risks and soil loss, and disrupting local hydrological cycles.

*Example 2:* Development of water intensive crops in regions vulnerable to drought.

*Example 3:* Unsustainable exploitation of groundwater to adapt water intense crop production to surface water flow reduction. This locks production in to high levels of water intensity that will make entire agricultural sector highly vulnerable once groundwater resources are depleted.

**Gray:** Activities that: (1) do not have clear adaptive benefits for the relevant sector or; (2) may lead to perverse outcomes as regards the adaptive capacity of a sector.

*Example 1:* Investments to improve animal health with regard to non-climate related pathogens.

*Example 2:* The creation of climate-resilient transport networks that could expand agricultural production into highly vulnerable areas.

Governments and practitioners can decide if they would like to group gray and brown activities together to show a comparison of green versus all other land use finance, they can equally choose only to focus on brown activities (i.e. those that have a negative impact on land use).[33] The decision-making flow chart below can be used to determine which category to apply to each land use activity.

### 6.4.3 FLOW CHART TO DETERMINE WHETHER AN ACTIVITY CONTRIBUTES TO CLIMATE CHANGE ADAPTATION IN THE LAND USE SECTOR

**Does the activity have a clear impact on adaptive capacity?**

If it is unclear how an activity affects the adaptive capacity of a sector, or an activity leads to no change in adaptive capacity,[34] it is classified as gray.

**Does the activity increase the resilience of the natural resource base?**

Is the activity designed to increase the resilience to a climate stressor? If not or if it degrades the natural resource base thereby increasing the vulnerability of the sector to climate change impacts, it is classified as brown.

Even when an activity is explicitly designed for the purpose of adapting to the impacts of climate change, further consideration of maladaptive risks may reveal that it is not as green as it first appears. In this context, maladaptation refers to actions taken for adaptive purposes that may lead to an increased risk of adverse climate-related outcomes, increased vulnerability to climate change, or diminished welfare, now or in the future.35 There are two further maladaptive risks to consider before categorizing an activity as green. They are covered in the following two questions:

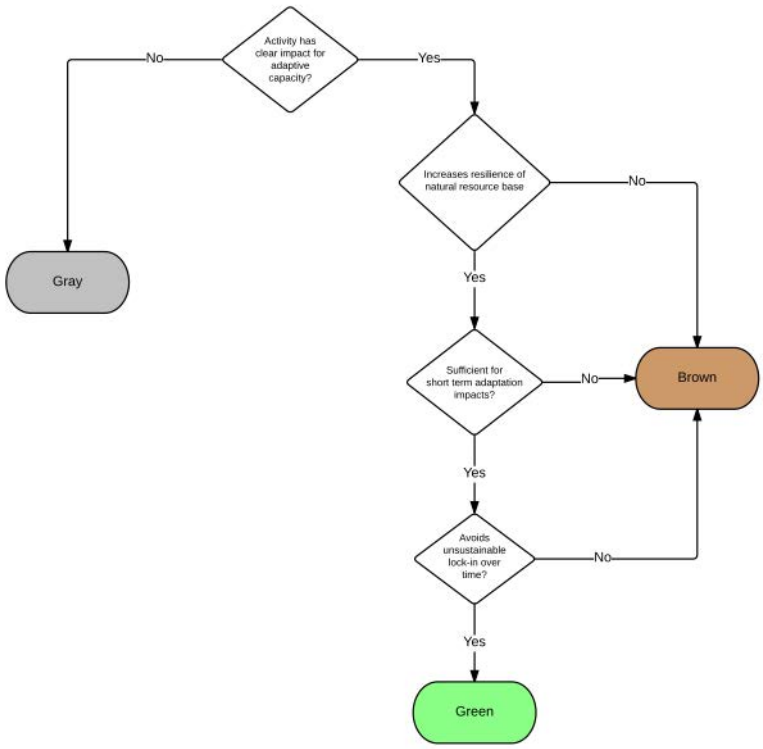
**Is it sufficient for short-term adaptation impacts?**

A straightforward example of an activity that is insufficient this would be the construction of dikes that are not stable or high enough to prevent flooding.

**Does the activity avoid unsustainable lock-in over time?**

The second risk is whether the activity 'locks in' vulnerability over time. An example of this would be a forestry plantation with a thirty-year production cycle, using a particular tree species that is resilient to current levels of climate stress, but not the levels anticipated over the next 20 to 30 years. Other forms of lock-in could be more subtle. For example, adaptive practices applied to one activity could, in the short term, mask the need to transition away from the activity, entrenching production practices which at a later date become far harder to phase out in a sustainable manner.

Flow chart to determine whether an activity contributes to climate change adaptation in the land use sector




33 In this report, we define BAU as a combination of brown and gray activities

34 This might be the result of faulty design or implementation e.g. farmers that do not uptake new farming practices.

35 Noble, I. et al. 2014.