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Focali Brief: 2012:01

Accounting for carbon leakage from REDD+ are current quantification methods suitable?

"Carbon leakage" refers to the displacement of greenhouse gas emissions from one place to another due to emission reduction activities. It is caused by a direct or indirect shift of emission-intense activities from within to outside an emissions accounting system.

LEAKAGE IS likely to happen when the scale of intervention is smaller than the scale of the problem, e.g. when not all countries participate in an international effort to reduce emissions, or when emission reduction activities are carried out in locally limited areas. Emissions or carbon leakage is one of the methodological hurdles for emission reduction activities in all sectors affected by greenhouse gas (GHG) mitigation. Leakage needs to be addressed in the context of Reducing Emissions from Deforestation and Forest Degradation, plus forest conservation, sustainable forest management and enhancement of forest carbon stocks (REDD+). If unrestricted and unaccounted for, leakage has the potential to significantly undermine or even nullify the net climate benefits of GHG mitigation action, thus jeopardizing its effectiveness and environmental integrity. In terms of REDD+, the risk for leakage can be minimised by effectively addressing the factors and forces promoting deforestation. However, those are complex and at present insufficiently understood, which is why one of the main challenges for the success of REDD+ will be to devise strategies that focus on both local deforestation agents and the regional and global driving forces behind land conversion. If the latter are not sufficiently taken into account, the risk for a mere displacement of deforestation activities to other regions instead of a reduction arises. One way to reduce the risk for leakage in REDD+ is the use of a national accounting scope as intended by the United Nation Framework Convention on Climate Change (UNFCCC) (2010), which would describe all leakage within a country and include all emissions from displacement into the accounting system. However, even though leakage emissions could be mapped in this way, the underlying leakage processes as such are not prevented. Displacement of deforestation activities could still occur and undermine the overall efficiency of emission reduction activities; thus increasing the cost of REDD+ implementation. For that reason quantification methods can be useful. Their focus is on displacement effects and is aimed to help detect and quantify carbon leakage, in order to enhance effectiveness and efficiency of REDD+ activities. At present, the most detailed technical specifications of how leakage effects can be quantified are contained in leakage quantification methods that have been developed in the carbon markets under different carbon accounting standards, and in the scientific literature.

Characteristic	Description
1) **Leakage type**	Leakage can be distinguished by the nature of the processes that motivate displacement: • ***Primary leakage*** (or 'activity shifting'): direct displacement of activities from one area to another. E.g: local communities using forest for subsistence, or logging/ agribusiness companies. • ***Secondary leakage*** (or 'market effects'): when forest conservation in one place indirectly creates incentives to deforest in other places. E.g. Reduction in supply of commercial products (e.g. timber) causes price increase that makes logging more attractive to others.
2) **Geographical leakage scale**	Leakage processes can occur on different geographical scales: The process can be ***local***- e.g. when subsistence activities such as small-scale agriculture are affected, or it can be a further reaching- e.g. when the production of market commodities is affected on ***national or international level***. International leakage describes displacement from one country to another; e.g. when a country introduces emission reduction policies and companies relocate to countries without those restrictions.
3) **Quantification tool**	Quantification of leakage effects can vary greatly in the type and quality of data required and the accuracy of estimates. Primary leakage often uses direct measurements in the field, e.g. remote sensing or ground measurements, interviews and household surveys. As secondary leakage cannot be measured directly, tools used for quantification are often economic models or default discount factors.

About this brief

Focali provides knowledge to Swedish ministries, government agencies and other relevant actors for effective forest management to achieve climate-poverty targets. This Brief is based on the article: Forest Carbon Leakage Quantification Methods and Their Suitability for Assessing Leakage in REDD by Sabine Henders and Madelene Ostwald published in the journal Forests (Vol. 3, issue 1, 2012). The article is available through open access on www.focali.se

Analysing leakage quantification methods

This brief is based on a scientific paper that analyses 34 leakage quantification methods currently available in the carbon markets

and in scientific literature for their suitability to address leakage from REDD (Henders and Ostwald 2012). Those methods were taken from four prominent carbon accounting standards that allow for forestry activities; the Clean Development Mechanism (CDM), the Verified Carbon Standard (VCS), the Climate Action Registry (CAR), and the Carbon Fix Standard (CFS). In addition, eight leakage quantification methods or case studies presented in scientific literature were analysed. First, we assessed how the methods address different leakage characteristics such as geographic scale and nature of leakage effects, as well as the tools they use for detecting, measuring and quantifying leakage emissions. Based on this assessment, we then formulated three key criteria that constitute basic characteristics that REDD leakage accounting would need to meet and tested the existing methods against those criteria to see whether they are suitable for leakage quantification in a REDD+ mechanism. Those basic characteristics of leakage are summarized in the table on the first page. Based on these three main characteristics, we formulated criteria that leakage accounting in REDD+ should satisfy; these are presented in the REDD+ requirement table to the right.

REDD+ requirements in terms of quantifying leakage

Characteristic	Recommended criteria
1) Leakage type	REDD leakage methods should address all relevant types of leakage, primary and secondary
2) Georgaphical leakage scale	REDD leakage methods should capture leakage effects on at least national scale
3) Quantification tool	Leakage methods for REDD should cover a range of appropriate assessment tools, which are: ***For primary leakage:*** based on measurements or interviews in control areas or direct monitoring where possible; all estimates should be conservative, subsequent monitoring of leakage effects is required at least in the project surrounding ***For secondary leakage:*** market indicators used in modelling should be monitored and adjusted when necessary; discount factors should be dynamic rather than generic and depend on project conditions

In that context it is essential that comprehensive leakage accounting addresses both primary and secondary leakage and that it at least covers the national scale. The tools used to quantify leakage at different geographical scales can vary significantly in the quality of data required and the accuracy of estimates produced; therefore it is important that they are appropriate for accurate leakage accounting.

How is carbon leakage addressed by carbon market standards?

The results, presented in the first table on the next page, show that the assessed carbon accounting standards vary in their approaches to quantifying leakage. All standards address primary leakage, while only two require quantification of secondary leakage; the geographical scale is national and thus covers the entire country in all standards. Quantification tools used differ, only the VCS applies a full range of tools while CDM and CFS use a combination of area measurements and interviews. The CAR uses only one tool and quantifies all leakage through generic discount factors.

Are the assessed methods suitable for leakage accounting in REDD?

It appears that none of the 34 stand-alone, single methods are suitable to fulfil the recommended criteria for leakage accounting in

Photo: Sabine Henders

How carbon leakage is addressed by different carbon market standards

Leakage characteristic		CDM	VCS	CAR	CFS *
1) Leakage type	*Primary*	X	X	X	X
	Secondary		X	X	
2) Geographical scale	*International*				
	National	X	X	X	X
	Regional	X	X	X	X
3) Quantification tool	*Direct monitoring*		X		
	Area measurements	X	X		X
	PRA, Interviews, Surveys	X	X		X
	Leakage factor	X	X	X	
	Modeling		X		

** CDM: Clean Development Mechanism, VCS: The Verified Carbon Standard, CAR: the Climate Action Registry, CFS: Carbon Fix Standard*

REDD+, mainly because the methods usually address either primary or secondary leakage and rarely both types together. A combination of selected methods could however allow meeting the identified requirements: All methods addressing secondary leakage cover the national scale and apply appropriate tools. When looking at carbon standards, the VCS seems best equipped to meet all three criteria, mainly because the standard combines primary and secondary leakage assessments if needed, while all other standards focus on either one type of leakage or are restricted to primary leakage. CDM and VCS include the most appropriate quantification tools, whereas the use of generic default discounts as only tool in the CAR is considered less appropriate. Therefore, the VCS comes out as the only standard that addresses all three requirements, as shown in the table below.

While all standards fulfil the criteria to account for leakage at least at national scale, it is remarkable that all the carbon accounting standards and most of the peer-reviewed scientific methods work under the assumption that "a country's responsibility for carbon leakage stops at its border" and thus do not account for international leakage. This is in line with the accounting rules in current international emission accounting frameworks that refrain from assigning responsibility for international displacement processes in all emission sectors. However international leakage has the potential to seriously undermine the effectiveness of climate action, both in REDD and other sectors. The lack of methods to quantify international leakage is therefore an important finding from this assessment, which should be addressed further.

This brief

This brief can be cited as: Henders, S. 2012. *Accounting for carbon leakage from REDD+ are current quantification methods suitable?*, Focali Brief No 2012:01 Gothenburg

REDD method features	CDM	VCS	CAR	CFS *
1)Leakage type *Addressing all relevant leakage types*		X	X	
2) Quantification tool *Range of appropriate assessment methods*	X	X		
3) Leakage scale *Accounting of leakage effects on national scale*	X	X	X	X

** CDM: Clean Development Mechanism, VCS: The Verified Carbon Standard, CAR: the Climate Action Registry, CFS: Carbon Fix Standard*

Photo: Sabine Henders

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This document has been financed through the Forest Initiative and does not necessarily reflect the views of the three main partners of the Initiative. Responsibility for its contents rests entirely with the author(s).

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