

# Leakage

## Summary →

- Leakage is an important aspect of forest carbon projects that must be accounted for if credits are to have a demonstrable climate benefit.
- Other standards apply standardized leakage deductions in the 10-20% range.
- Results from available literature focus on only long-term harvest reduction or conservation projects and show a leakage range from 50-100%.
- There is currently little to no empirical information available to inform the discussion on leakage resulting from short-term harvest deferrals.
- We adopt a conservative 20% leakage deduction, while we work to measure empirically the true leakage value associated with our short-term harvest deferral methodology.

## Background

Every forest carbon project works by incentivizing an activity or change in behavior that avoids carbon emissions or removes carbon from the atmosphere. Carbon credits generated from these activities can be used to offset or neutralize carbon emissions elsewhere. However, for these carbon credits to have demonstrable climate benefit, it is important that the carbon emissions avoided or removed from the project don't just get shifted somewhere else on the landscape. For example, if one of these activities, like deferring a timber harvest or planting trees, is stopped in one place, but the same landowner or another landowner simply harvests more trees than they would have somewhere else to compensate, then there is no net reduction in carbon emissions. If this happens, it is known as leakage.

There are two types of leakage commonly referred to in carbon markets: *activity shifting leakage* and *market leakage*. In activity shifting leakage, an activity is reduced in one area for a carbon project and then an equivalent activity is directly replaced in another area. Market leakage occurs when a carbon project reduces supply of a market good in one area, but the aggregate market demand is not reduced. Instead, market demand causes supply to increase in another area. In the delayed timber harvest example, if a mill requires a certain amount of raw timber supply and one landowner won't supply it, the mill may find it from another landowner either in the same area or possibly a different region. Market leakage can happen across geographic scales, making it challenging to track. Activity shifting leakage is easier to study and quantify since it usually involves participants directly related to the carbon project. Market leakage, on the other hand, is much more difficult to quantify since markets can be very complex, sometimes global, and reactive to other external forces.

The first forest carbon harvest deferral methodology submitted by NCX to Verra proposed a 10% leakage deduction based on Verra's own published default guidelines. During the public consultation on our methodology, many commenters expressed that 10% was not conservative enough.

## Review of Current Approaches and Literature

Most of the improved forest management (IFM) methodologies approved by the well known standards<sup>1</sup> use a standardized approach of deducting 10-20% from total sequestered carbon for leakage. While this has been an accepted approach for a decade or more, there is little evidence in the scientific literature to support any particular deduction.

What literature there is focuses on leakage caused by multi-decade IFM projects, and while estimates vary greatly depending on unique project circumstances, it indicates that longer term projects cause leakage between 50-100% because timber supply in the project area is permanently reduced, requiring the market to substitute that supply somewhere else<sup>2, 3, 4, 5, 6</sup>. We are not aware of any studies that examined the leakage effects of short-term harvest deferrals.

## NCX Leakage Approach

Since the intent of short-term harvest deferrals is not to permanently reduce timber supply, but rather to shift it forward year by year, it is reasonable to assume that leakage estimates of 50-100% derived for long-term projects do not apply to short-term projects. However, since it is not known how much leakage is caused by short-term harvest deferrals, NCX conservatively applies a 20% deduction for its harvest deferral projects.

## Ongoing Work

Given the lack of satisfactory and current academic work in this area, we believe there is a strong need to empirically measure the true value of both activity shifting and market leakage. In the coming years, the NCX team plans to work with academic and other partners to develop methods of doing so that can be implemented in future versions of the targeted, short-term harvest deferral methodology as well as other methodologies currently using coarse default heuristic deductions.

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1 Verra, Gold Standard, CAR, ACR

2 Pan et al. (2020) Carbon leakage in energy/forest sectors and climate policy implications using meta-analysis.

3 Murray et al. (2004) Estimating Leakage from Forest Carbon Sequestration Programs.

4 Kallio & Solberg (2018) Leakage of forest harvest changes in a small open economy: case Norway.

5 Sun & Sohngen (2009) Set-asides for carbon sequestration: implications for permanence and leakage.

6 Nepal et al. (2013) Forest Carbon benefits, costs and leakage effects of carbon reserve scenarios in the United States.