



VCS Module

VMD0044

Estimation of emissions from ecological
leakage (LK-ECO)

Version 1.1

08 September 2020

Sectoral Scope 14

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Version 1.1 revision to include tidal wetland restoration and conservation activities prepared by Silvestrum Climate Associates and Restore America's Estuaries.



Table of Contents

1	Sources.....	4
2	Summary Description of the Module.....	4
3	Definitions	4
4	Applicability Conditions.....	4
5	Procedures.....	4
6	Data and Parameters.....	5
6.1	Data and Parameters Available at Validation.....	5
6.2	Data and Parameters Monitored	6
6.3	Procedures for Monitoring	6
7	References.....	7

1 SOURCES

This module is one of numerous modules that constitute VCS methodology *VM0007 REDD+ Methodology Framework (REDD-MF)*.

2 SUMMARY DESCRIPTION OF THE MODULE

This module provides procedures for the estimation of ecological leakage in WRC project activities.

3 DEFINITIONS

Definitions are set out in the VCS Program document *Program Definitions*, and VCS methodology *VM0007 REDD+ MF*. This module does not set out any further definitions.

4 APPLICABILITY CONDITIONS

This module is applicable under the following condition:

- Leakage caused by hydrological connectivity is avoided by project design and site selection, as set out in Section 5 below.

5 PROCEDURES

It may be assumed that ecological leakage does not occur in projects meeting the applicability conditions of this methodology, because projects must be designed in a manner which ensures that their hydrological connectivity with adjacent areas does not lead to a significant increase in GHG emissions outside the project area. This may be achieved by a project design which causes no alteration of mean annual water table depths or flooding frequency or duration in adjacent areas, or limiting such alteration to levels that do not influence GHG emissions. Where, at the design stage, hydrological changes are expected to impact GHG emissions in areas outside the project area, the project design must be adjusted to include such areas in the project area.

In peatlands, this can be achieved either by an appropriate design (e.g., by establishing an impermeable dam, by rewetting peatland surrounded by undrained peatland or by rivers) or by a buffer zone within the project boundary. This buffer zone, if employed, must be mapped (see Module *X-STR*). The width of the buffer zone must be determined on the basis of quantitative hydrological modeling, or expert judgment.

The project proponent must demonstrate that their project design meets these requirements through expert judgment, hydrologic modeling or monitoring of alterations of water table depth at the project area. In tidal wetland restoration projects, de-watering downstream wetlands is not expected if project areas are set sufficiently large to include areas with expected changed hydrology.

Hydrologic models must consider water displacement from project activities and the hydrologic connection or blockage of inlets that would change the wetland boundary. Procedures for monitoring alterations of water table depth at the project boundary are provided in Section 6.3.

The tidal range and sediment delivery experienced by tidal wetlands outside the project area must remain within the system tolerance, which is defined by the high and low tides and regional sediment budget, and assessed using hydrological models (and/or empirical analysis) and expert judgment.

To guide this assessment, Table 5.1 outlines ecological leakage-avoidance criteria related to a variety of processes that may occur outside the project area due to an inappropriate project design. The conditions outside the project boundary as described must be monitored.

Table 5.1 Processes Associated with Ecological Leakage Outside Project Boundary and Related Criteria for their Avoidance

Ecological leakage process outside project boundary	Avoidance criterion (pertaining to conditions outside the project boundary)
Lowering water table that causes increased soil carbon oxidation	Maintain wetland conditions (e.g., converting from impounded water to a wetland does not cause soil oxidation)
Lowering water table that causes increased N ₂ O emissions	No conversion of open water to non-seagrass wetland
Raising water table that causes increased CH ₄ emissions	No conversion of non-wetland to wetland
Raising water table that causes decreased vegetation production that causes decreased new soil carbon sequestration	No causation of vegetated to non-vegetated (or poorly vegetated) conditions

Projects meeting the requirements of this module may assume that:

$$GHG_{LK-ECO} = 0 \quad (1)$$

6 DATA AND PARAMETERS

6.1 Data and Parameters Available at Validation

Data / Parameter	GHG_{LK-ECO}
Data unit	t CO ₂ -e

Description	Net GHG emissions due to ecological leakage from the WRC project activity up to year t^*
Equations	1
Source of data	N/A
Value applied	0
Justification of choice of data or description of measurement methods and procedures applied	Under the applicability conditions of this methodology, ecological leakage affecting the soil (peat) carbon pool does not occur, by ensuring that the effect of hydrological connectivity with adjacent areas is insignificant, as outlined in Section 5.
Purpose of Data	Calculation of leakage emissions
Comments	N/A

6.2 Data and Parameters Monitored

Data / Parameter	Ecological leakage process as described in Table 5.1
Data unit	N/A
Description	N/A
Equations	N/A
Source of data	N/A
Description of measurement methods and procedures to be applied	Section 6.3
Frequency of monitoring/recording	At each monitoring event
QA/QC procedures to be applied	See <i>REDD+ MF</i>
Purpose of data	Assessing avoidance of leakage emissions
Calculation method	N/A
Comments	N/A

6.3 Procedures for Monitoring

Water leakage to adjacent areas may cause changes in water table depths outside the project area (compared with the situation without the project intervention) and cause ecological leakage. Where the project proponent chooses to monitor alterations of water table depth in the project area to demonstrate no alteration of mean annual water table depths in adjacent areas, or that such alteration is limited to levels that do not influence GHG emissions, the project proponent must use water level gauges or vegetation assessments, or a combination of these. If a buffer zone has been established, these gauges shall be installed in the project area. Readings shall be

compared with the hydrological assessment on which the establishment of the buffer zone was based. The number and spacing of water level gauges shall be based on hydrological modeling and/or expert judgment.

In the case of an impermeable dam, to demonstrate its effectiveness, water level gauges shall be located outside the dam, which may require agreements with adjacent landowners if the dam is located in the project area. Significant water leakage, if occurring, is limited to accidents that can be repaired (eg, the breaching of a dam). Such accidents and their remediation must be monitored. The repair must occur within 1 year, in which case ecological leakage may be assumed to be insignificant. If the proponent cannot demonstrate adherence to the criteria, the project fails.

7 REFERENCES

None.

DOCUMENT HISTORY

Version	Date	Comment
v1.0	9 March 2015	Initial version
v1.1	8 Sep 2020	The module was updated to include activities on tidal wetlands.