



# EX-Ante Carbon-balance Value Chain (VC) Tool v.1.1

## EX-ACT VC : providing co-benefit appraisal of Value Chain on GHG emissions, climate resilience and income

### Background

Agriculture, forestry production and land use change (overwhelmingly related to agriculture) represent one quarter of greenhouse gas emissions (GHG) (IPCC, 2014).

Three quarters of the world's poor population live in rural areas (where 80% of revenue comes from agriculture) and an increase in GDP contributes four times more effectively in reducing poverty when such increase comes from agriculture, than another sector (WB 2007).

In this context, small farmers are especially vulnerable to the effects of climate change. If these effects are highly visible on agricultural production, they also impact the rural infrastructure, market access and the different sectors present in value chain.

The development and improvement of sustainable food value chains can offer important pathways out of poverty for the millions of poor households in developing countries. Food value chains are complex systems. The real causes for their observed underperformance may not always be obvious. Typically, multiple challenges have to be tackled simultaneously in order to truly break poverty cycles.

Improvement to the value chain must be economically, environmentally and socially sustainable, thus playing an important role in terms of mitigation and adaptation.

Analysing value chain can help identifying strategic options for improving their resilience while generating co-benefits for every sector of the production.

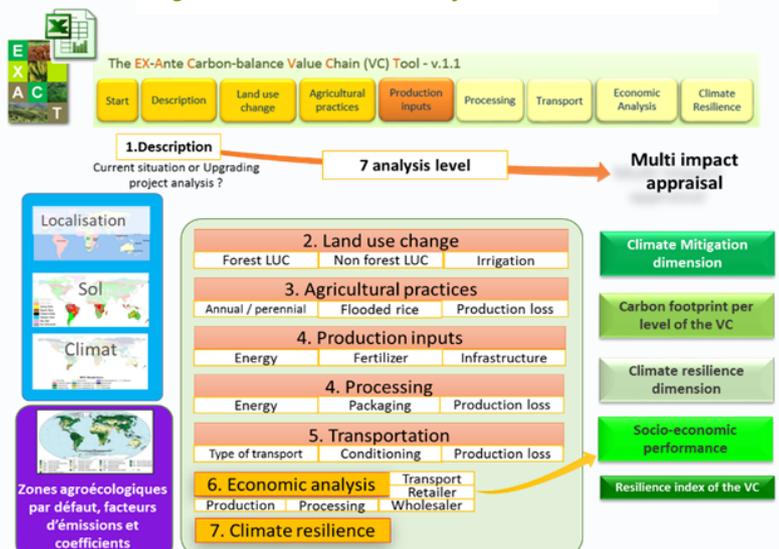
**Value chain upgrading can play an important role in terms of climate change resilience, poverty reduction and food security.**

### Objectives of the tool :

The EX-ACT Value Chain tool is a tool developed from the EX-ACT Tool for agricultural project and is aimed at providing multi-impact appraisal either for current situation or an upgrading project scenario of a value chain.

Estimations of GHG emissions (Tco2 eq), climate resilience and socio-economic performances such as income

Figure 1 : Modular structure of the EX-ACT VC tool



generated are analyzed for both situation in order to analyze adaptation and mitigation options on every levels of the value chain from production to retailers.

### Basic contents of EX-ACT VC and main outputs

EX-ACT has been developed based on the Guidelines for National Green-house Gas Inventories completed with other existing methodologies. The default values for mitigation options in the agriculture sector are mostly from IPCC (2007). Other coefficients such as embodied GHG emissions for farm operations, inputs transportation, and irrigation systems implementation are from Lal (2004). For processing and transportation coefficient factors have been collected from Berners-Lee et al (2012).

EX-ACT VC consists of a set of linked Microsoft Excel sheets in which users insert basic data on agricultural management practices, processing and transportation.

EX-ACT VC adopts a modular approach – each “module” describes a specific level of the value chain– and following a value chain framework :

1. A general description of the current situation of the value chain (*geographic area, climate and soil characteristics*) and, if any, a description of the upgrading project (*duration of the project, number of beneficiaries...*);
2. Identification of changes and technologies foreseen value chain upgrading using specific “modules” (*Land use change – forest, non-forest, Agricultural practices – annual/perennial crop, rice cultivation, irrigated systems, Production inputs, Processing and Transportation inputs*);
3. Economic analysis using previous data for every level of the value chain
4. For an upgrading project scenario, a qualitative identification for climate resilience analysis

The main output of the tool consists of the C-balance and carbon footprint of the value chain, climate resilience dimension, resilience index of the value chain upgraded and socio-economic analysis (value added and gross income per ton of product and beneficiaries).

**Value chain upgrading does require to cover several co-benefit linking with green house gases, climate resilience and poverty reduction**

### Carbon footprint and climate change mitigation :

This tool allow to only focus on the current situation of the VC or to do both analysis. Thus it is possible to identify the main source of GHG emission, and the best

The environmental services (Carbon) supplied by the value chain estimated through the Carbon footprint, is then priced, valued and incorporated in the economic analysis of projects, examining how the discounted measures of value chain worth, will change when taking into account C sequestration benefits, thus assessing the climate change mitigation.

### Socio economic analysis

Few action plan are possible at processing and transportation level for reducing GHG except with reduction of production loss, but the economic analysis illustrate how important those sectors are in term of value added, gross income or employment for both situation and up-

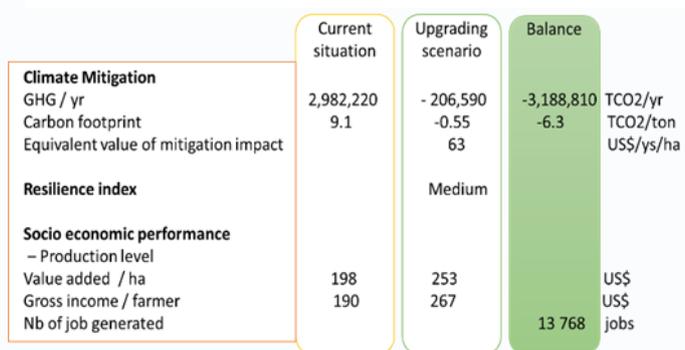
Figure 2 : structure of the EX-ACT VC tool results



grading scenario in order to analyse the potential of poverty reduction. Therefore it allows to raise different possible option to upgrade value chain. This tool could possibly promote carbon labels on all or part of the VC and implement payment for environmental services.

Also, a set of indicators complement the economic analysis providing useful information about the efficiency of the project in providing environmental services or the potential contribution of such services to farm incomes.

Figure 3 : Example of a case study : Improvement of mountain rice in Madagascar



The main output of the tool consists of a multi-impact appraisal of the Value Chain