VCA4D - ENVIRONMENTAL ANALYSIS

Framing Question 4 the revised methodology

Is the value chain environmentally sustainable?

for

Presentation to EU Delegations

24 June 2026

Summary

Previous organisation of the environmental chapter

Objectives and process of the revisions

General approach

Data collection

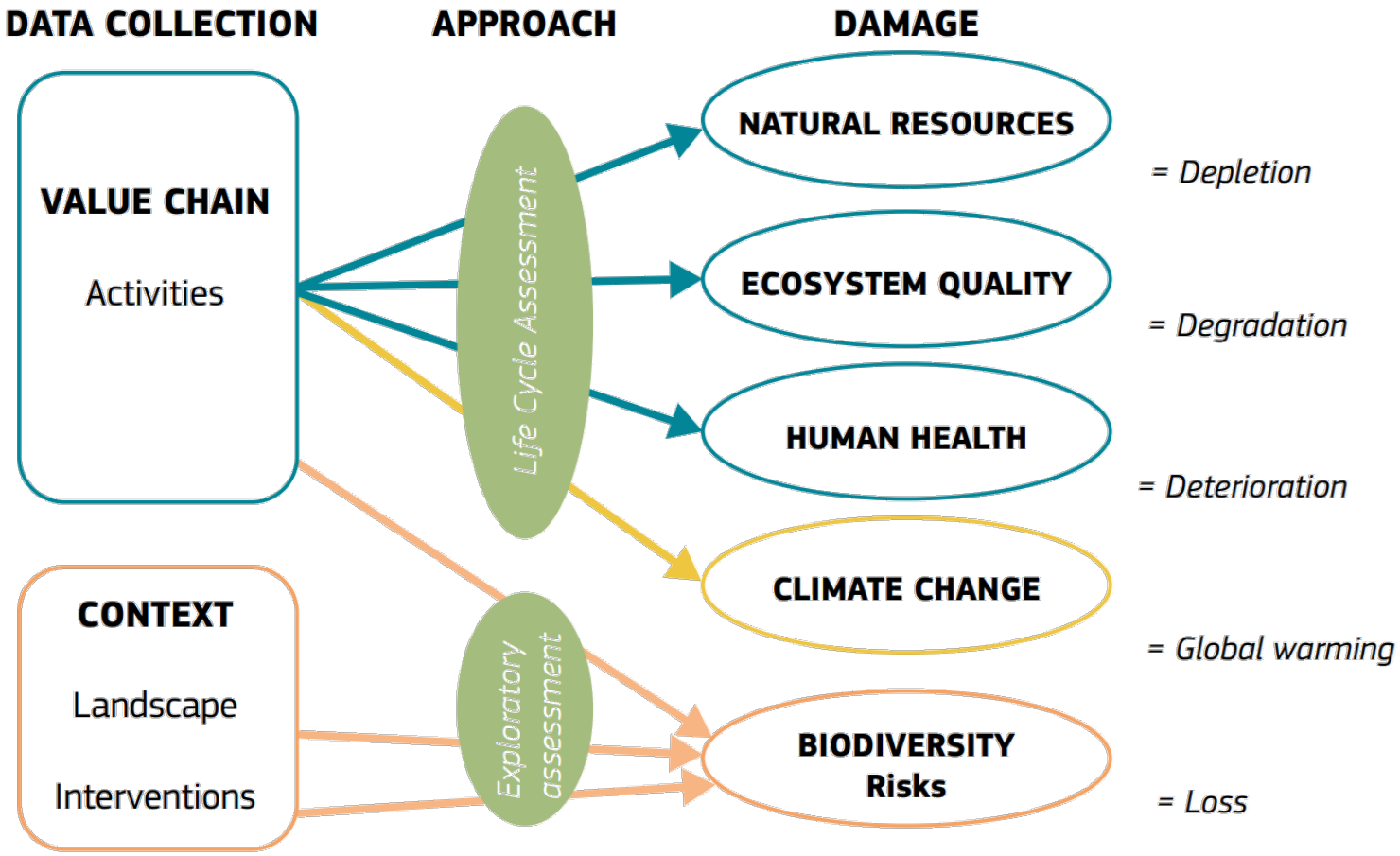
Data aggregation and visualisation

Synthesis and limitation

Previous organisation of the environmental chapter

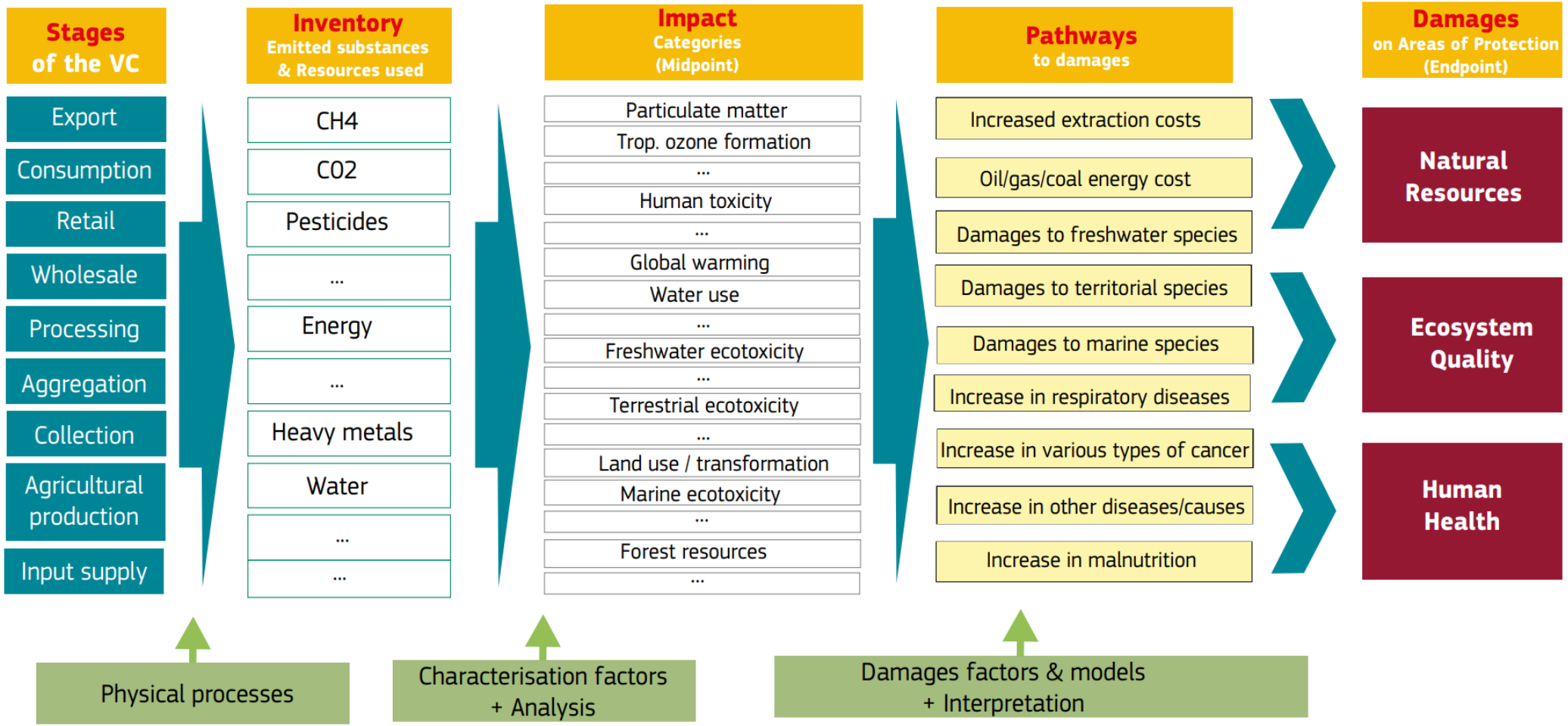
Framing Question 4: Is the VC environmentally sustainable?	
CQ4.1	**What is the potential damage of the VC on resource depletion?** *Resource uses (water, fuel, ...); Mineral extraction; Energy cost; **Increased extraction cost**; Hotspots identification*
CQ4.2	**What is the potential damage of the VC on ecosystem quality?** *Emissions of substance (CO_2, NH_3, ...); Resource use; Potential deterioration of land quality; Damage to terrestrial, freshwater and marine species; **Potentially Disappeared Fraction of species (PDF)**; Hotspots identification*
CQ4.3	**What is the potential damage of the VC on human health?** *Emissions of harmful substance; Potential deterioration of safety (potable water, working conditions, etc.); Potential increase in diseases; **Disability Adjusted Loss of Life Years (DALY)**; Hotspots identification*
CQ4.4	**What is the potential impact of the VC on climate change?** *Emission of greenhouse gases (CO_2, N_2O, CH_4, CFC, ...); **Carbon footprint (kg of CO_2eq)**; Hotspots identification*
CQ4.5	**Does the potential impact of the VC on biodiversity deserve specific studies?** *Potentially Disappeared Fraction of species; Carrying capacity; Compliance to area protection; **Existence of Key Biodiversity Areas**; Connectivity of terrestrial protected areas; Endangered, Threatened or Protected species; Water stress; Crop diversification, rotations and intercropping; Crop varietal diversity; Livestock breeds diversity; Area affected by land degradation; Soil conservation; **Presence of targeted projects***

Previous organisation of the environmental chapter



- ✓ Most Central Questions (CQs) are to be answered to through a **Life Cycle Assessment** (LCA)
- ✓ **Biodiversity** (CQ5) is integrated through an "exploratory assessment"
- ✓ It is advised to include a **comparative analysis** for VC subsystems (e.g. defined by different production systems or targeted markets)

Broad outline of LCA steps



Context and objectives

General objective

Update the environmental chapter of the VCA4D methodology to integrate the feedback of involved VCA experts and final users (EUD/INTPA)

Scoping and focusing issues

Territorial focus

- ✓ Focus **on direct and local effects** at landscape level, focus on in-country impacts
- ✓ Provide spatialised data (GIS)

Thematic focus

- ✓ Target **priority areas** or VC links (hotspots), specific to the value chain
- ✓ Focus on **significant impacts** for quantification
- ✓ Link with the **functional analysis**

Results presentation and visualisation issues

- ✓ **Avoid complex combined indicators**, favour simpler “transparent” ones
- ✓ Provide a **simple dashboard** with reference points for VC comparisons
- ✓ **Display uncertainty** and data availability issues

Feasibility constraints

- ✓ **Time** and **budget** limitations, **data** availability
- ✓ Strong **variability** between VCs, puts a strong constraint on harmonisation

The revision process

16-17 March 20026

Brussels workshop

- Agree on the objectives
- Benefit from practitioners' experience
- Reframing of central questions

April to May 20026

Methodological development

- Criteria and indicators development
- Identification of data sources
- Building of a companion table to guide data collection

June 20026

Review and consolidation

- Harmonisation of criteria and indicators
- Refinement of CQ boundaries
- Building of a scoring and visualization tool

Upcoming...

Real-life testing

- Evaluate the methodology in phase III studies
- Improve the tools with experts' feedback

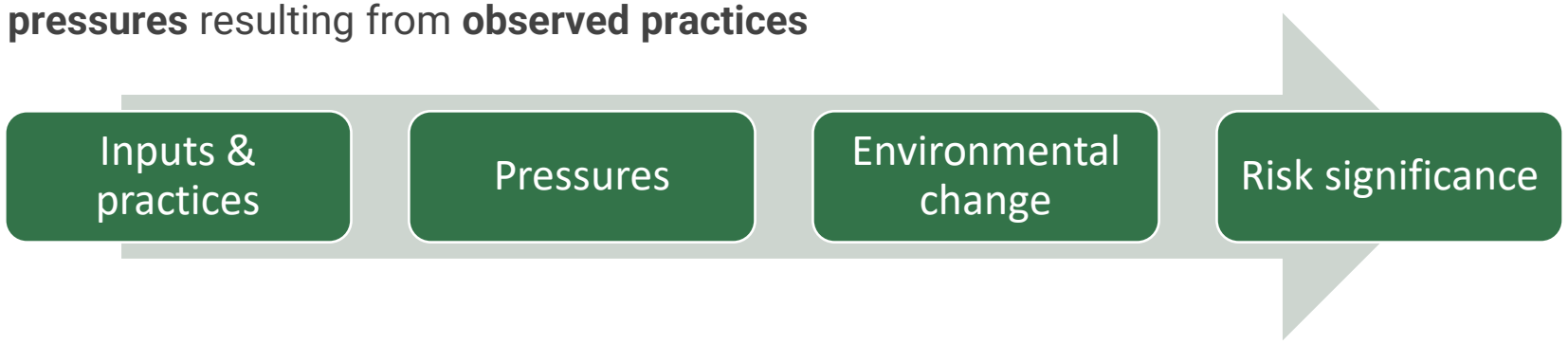
Revised scope

Framing Question 4: Is the VC environmentally sustainable?	
CQ4.1	**How does the VC contribute to non-renewable resource depletion?** *Land, mineral resources, fossil fuels (transport, transformation, plastics...), fossil water*
CQ4.2	**How does the VC affect renewable resource availability?** *Renewable water, NTFP, fish and other wild aquatic resources, wild terrestrial fauna and apicultural products, fuelwood and other biomass for energy, timber and other construction materials of biological origin, fodder and other renewable feed biomass.*
CQ4.3	**How does the VC affect environmental integrity?** *Targets all biophysical alteration and pollutions on environmental compartments : continental water, marine water, soil, air, other disturbances (the list is too long to be displayed here)*
CQ4.4	**How does the value chain contribute to national GHG emissions?** *Land-use change, fertilizers, pesticides, embodied emissions of purchased feed, enteric fermentation and manure management emissions in livestock systems, methane emissions from flooded or anaerobic production systems, direct energy use in farming, processing, storage and transport, waste and residue management, changes in soil carbon*
CQ4.5	**How does the value chain affect biodiversity?** *Degradation, conversion, or fragmentation of habitats, Pressures on wild species (incl. ecological functions), Effects on legally protected and internationally recognised areas, Erosion of the genetic diversity of produced species, Simplification of the productive mosaic (plot to landscape)*

The general approach

A focus on inputs and practices to document pressures

The identification of **risks** is carried out by comparing the components of the receiving environment with the **pressures** resulting from **observed practices**



Time and budget constraints (~45 days of expertise) ➔ Importance of the **scoping phase** to refine the boundaries and focus areas of the analysis.

Data availability can vary drastically between contexts ➔ Introduction of **methodological tiers**

- **Tier 1**: Qualitative assessment with quantitative reference values
- **Tier 2**: Contextualised quantitative assessment
- **Tier 3**: Statistically representative quantitative assessment (usually out of reach)

The general approach

A normalised risk analysis

Environmental risk is the combination of likelihood and severity of environmental changes across each subsystem of each Value Chain

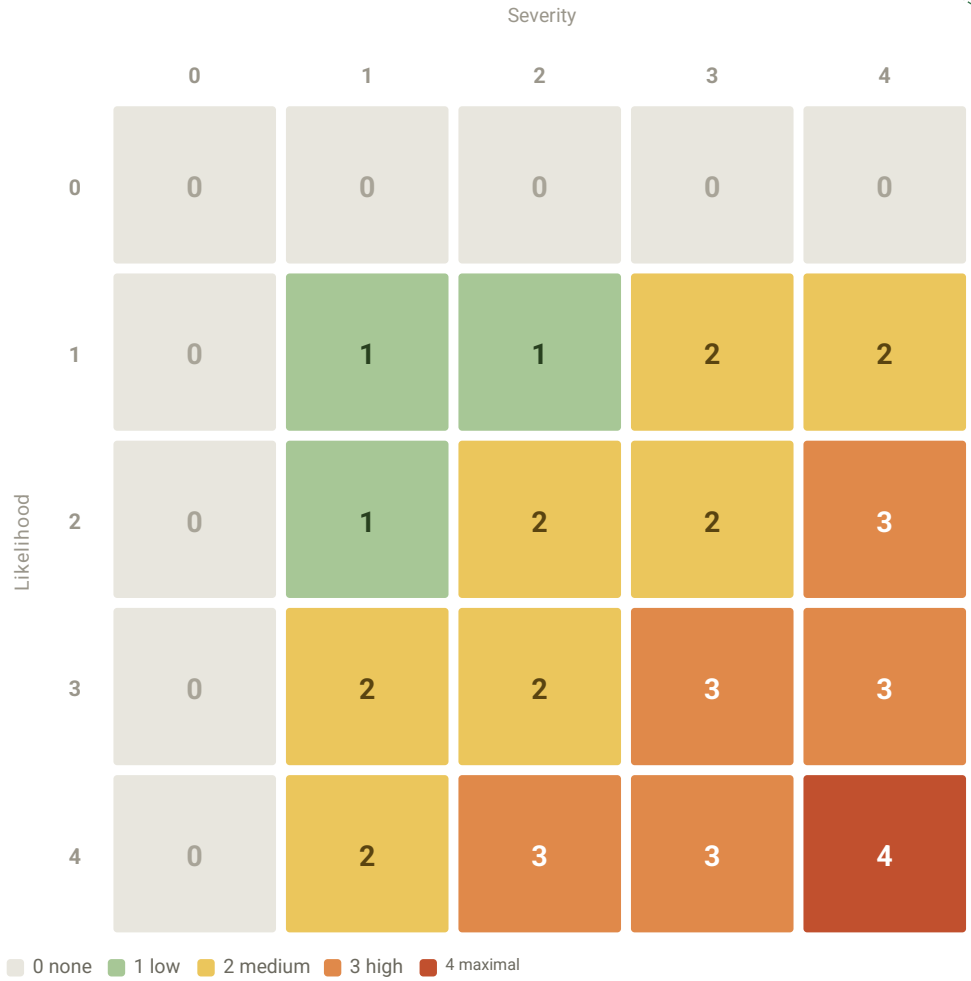
Likelihood is the weaker of two criteria :

- ✓ **P1: Prevalence** of the practice within the VC
- ✓ **P2: Plausibility** of the pressure-to-change linkage in the local context

Severity is the stronger of four criteria

- ✓ **S1: Intensity** of the change
- ✓ **S2: Extent** of the change
- ✓ **S3: Duration** of the change
- ✓ **S4 Reversibility** of the change

The six criteria are rated on a uniform 0-4 scale with criterion-specific anchors



The companion table: a guide to data collection

Targeted element	Practice(s) generating the pressure	Criteria & indicators (P1, P2, S1-S4)	Tier 1, collection methods and evidence base	Tier 2, contextualised quantitative refinements	Reference databases and tools
Non-timber forest products (NTFP)	VC harvesting or collection of NTFPs (wild fruits, nuts, seeds, gums, resins, medicinal plants, fungi, fibres) as main products or inputs.	**P1**: diffusion of NTFP-collecting practices among VC actors; collection seasons and frequency; spatial coverage of harvest areas; gear and techniques (absent / rare / occasional / moderate / widespread). **P2**: likelihood that VC harvesting affects regeneration capacity, given species biology (slow- vs fast-renewing) and harvesting techniques (destructive vs non-destructive). **S1**: share of standing stock or annual production harvested by the VC, complemented by per-plant harvesting intensity where destructive techniques are used (low / medium / high). **S2**: local to national (where commercial NTFP value chains aggregate harvest across landscapes). **S3**: medium- to long-term. **S4**: reversible but slow recovery for slow-growing species; potentially irreversible for endemics under high pressure.	Stakeholder interviews (collectors, traders, traditional authorities, forestry services); on-site observation of harvesting practices; forestry inventories; literature on species biology and population trends.	Stock or population surveys for harvested species refine S1; comparison of authorised quotas with actual harvest refines P1; documented yield trends; spatial mapping of harvest pressure.	National forest inventories; FAO Forestry Yearbook; FAO non-wood forest products database; IUCN Red List; CITES (where relevant); FAOSTAT (forestry production); TRAFFIC (wildlife trade monitoring); UN-WCMC.

Two methodological twists

FAO's EX-ACT web application is the primary tool for GHG emissions assessments

Two accounting logics are combined:

- ✓ **Emission sources** (fertilizers, energy, residue management, etc.) are estimated as **activity data (AD) x emission factor (EF)** (e.g. tonnes of N x emission factor)
- ✓ **Land-use change** and land/soil carbon are estimated as carbon-stock changes annualised over EX-ACT's default 20-year dynamic.

The targeted elements map to EX-ACT modules: each VC subsystem is entered as a separate scenario under a common boundary to allow comparison.

Severity is commanded by S1 (intensity) expressed as GHG per unit of final product or hectare

Biodiversity is aligned with the World Bank's ESS 6 *inter alia*

- ✓ Central notions of **natural and critical habitats as per the ESS6**,
- ✓ **IUCN red list + national protection status** at species level
- ✓ **Severity is commanded by S4** (reversibility)

Data aggregation and visualization: the scoring tool

- ✓ **One workbook per (sub-) value chain**: the expert fills a single scoring sheet.
- ✓ **Scoping** (relevance) and methodological **tiers** are recorded.
- ✓ Likelihood, severity and risk are **computed automatically.**

Illustrative · invented data

CQ	Targeted element	Scoping	Production										
#	(title)	relevance	P1	P2	S1	S2	S3	S4	Comments	Tier	Prob	Sev	Risk
CQ 4.1	Land	relevant - to assess	3	3	2	2	3	2	Smallholder expansion into highland slopes; competition with food crops	Tier 1	3	3	**3**
CQ 4.1	Mineral resources	low relevance - optional	2	1	1	1	2	1	Imported P/K fertilisers; indirect upstream pressure, qualitative	Tier 1	1	2	**1**
CQ 4.1	Fossil fuels - Transport	relevant - to assess	2	2	1	1	2	1	Road haulage to washing/curing	Tier 1	2	2	**2**
CQ 4.1	Fossil fuels - Synthetic inputs (N-fertilizers, pesticides, others)	relevant - to assess	3	2	2	2	2	1	Embodied fossil energy in mineral N; high-input estates	Tier 1	2	2	**2**
CQ 4.1	Fossil water	irrelevant - out of scope											
CQ 4.2	Renewable water (surface and renewable groundwater)	relevant - to assess	1	2	1	2	2	1	Mostly rainfed; limited irrigation	Tier 1	1	2	**1**

Data aggregation and visualization: heatmap

Illustrative · invented data

CQ	Targeted element	Production	1st transf.	Processing	Packaging
CQ 4.1	Land	3	2		
CQ 4.1	Mineral resources	1			
CQ 4.1	Fossil fuels - Transport	2			2
CQ 4.1	Fossil fuels - Transformation			2	
CQ 4.2	Renewable water (surface and renewable groundwater)	1	2		
CQ 4.2	Fuelwood and other biomass for energy			3	
CQ 4.3	Eutrophication (nutrient runoff and infiltration)	2	2		
CQ 4.3	Toxic substances (pesticides, ecotoxic compounds)	2			
CQ 4.3	Solid waste discharge or accumulation in water bodies		2		
CQ 4.3	Water abstraction		2		
CQ 4.3	Texture, structure, compaction	2			
CQ 4.3	Fuel combustion (PM, NOx, SOx, VOCs)			2	
CQ 4.3	Open burning of biomass	1			
CQ 4.5	Degradation, conversion, or fragmentation of habitats	3			
CQ 4.5	Pressures on wild species (incl. ecological functions)	2			
CQ 4.5	Erosion of the genetic diversity of produced species	3			
CQ 4.5	Simplification of the productive mosaic (plot to landscape)	3			

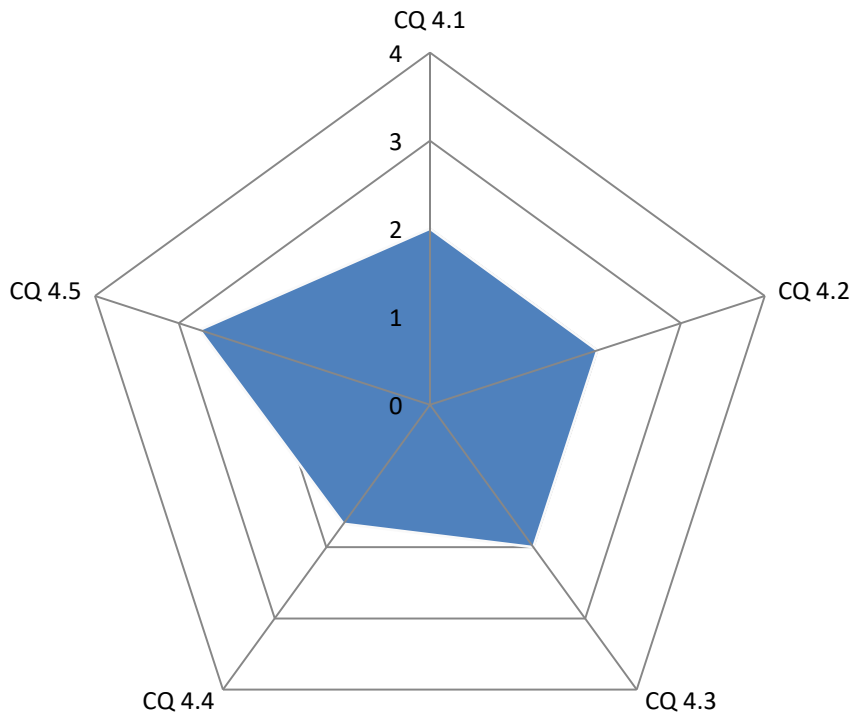
Data aggregation and visualization: uncertainties

Illustrative · invented data

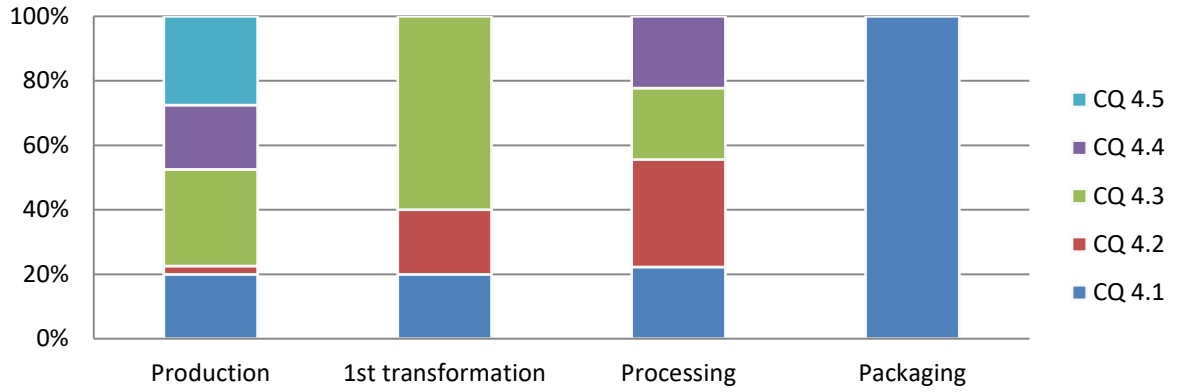
CQ	Targeted element	Production	1st transformation	Processing	Packaging
CQ 4.1	Land	3	1,3		
CQ 4.1	Mineral resources	1			
CQ 4.1	Fossil fuels - Transport	2			2
CQ 4.1	Fossil fuels - Transformation			2	
CQ 4.1	Fossil fuels - Synthetic inputs (N-fertilizers, pesticides, others)	2			
CQ 4.2	Renewable water (surface and renewable groundwater)	1	1,3		
CQ 4.2	Fuelwood and other biomass for energy			3	
CQ 4.3	Eutrophication (nutrient runoff and infiltration)	2	1,3		
CQ 4.3	Toxic substances (pesticides, ecotoxic compounds)	1,3			
CQ 4.3	Solid waste discharge or accumulation in water bodies		2		
CQ 4.3	Water abstraction		2		
CQ 4.3	Texture, structure, compaction	2			
CQ 4.3	Soil organic matter	2			
CQ 4.3	Erosion (soil)	2			
CQ 4.3	Fuel combustion (PM, NOx, SOx, VOCs)			2	

Data aggregation and visualization: example graphics

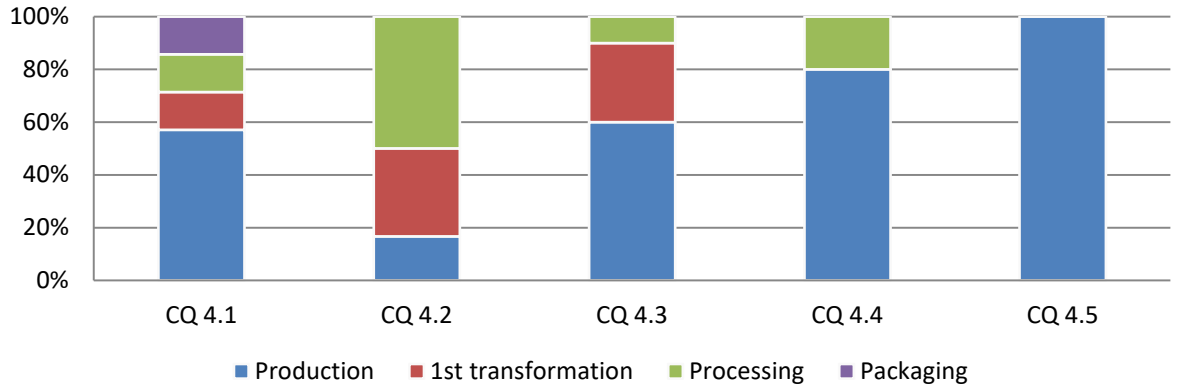
Risk profile by CQ (mean 0-4)



Within each subsystem: decomposition by CQ (100%)



Within each CQ: decomposition by subsystem (100%)



Illustrative · invented data

Scope and limits

What the environmental analysis does:

- ✓ A relative, precautionary screening of environmental risks
- ✓ A mapping of research priorities, based on data availability and environmental stakes
- ✓ One input into the overall conclusion of the value chain analysis, alongside the economic and social assessments.
- ✓ Describes the current situation; not a forward-looking (consequential) analysis.

What is weighed in the overall conclusion (not in the environmental chapter):

- ✓ Trade-offs across dimensions (e. g., economic vs. environmental)
- ✓ The vulnerability of the VC to environmental pressures

Comparison across different value chains within the same country, or across the same value chain in different countries, is not expected.

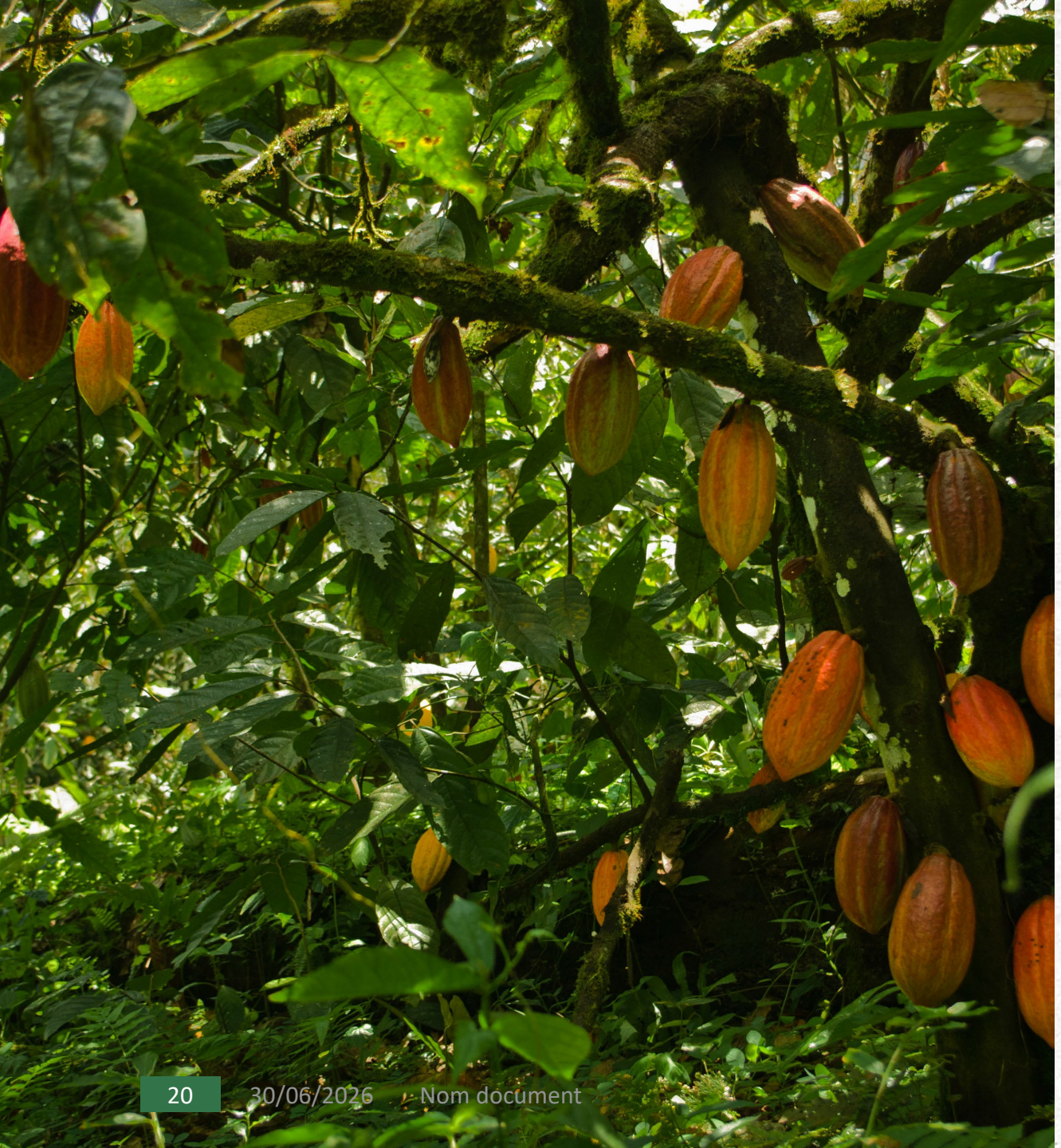
GHG emission evaluations CAN NOT inform NDCs, unless the EXACT SAME assumptions ant calculation methodologies are used.

Inputs from Delegations

Where Delegation input strengthens the analysis

Pre-mission access to data has a direct effect on the quality of the assessment, particularly where access requires institutional support.

- ✓ Framing the scoping: locally material issues and known sensitivities.
- ✓ Access to national and regional data before the field mission, assigned to the national expert.



3 Rue Théophraste Renaudot
34000 MONTPELLIER - France
+336 88 13 66 35
info@salvaterra.fr
www.salvaterra.fr