VALUE CHAIN ANALYSIS FOR DEVELOPMENT

agrinatura for European Commission

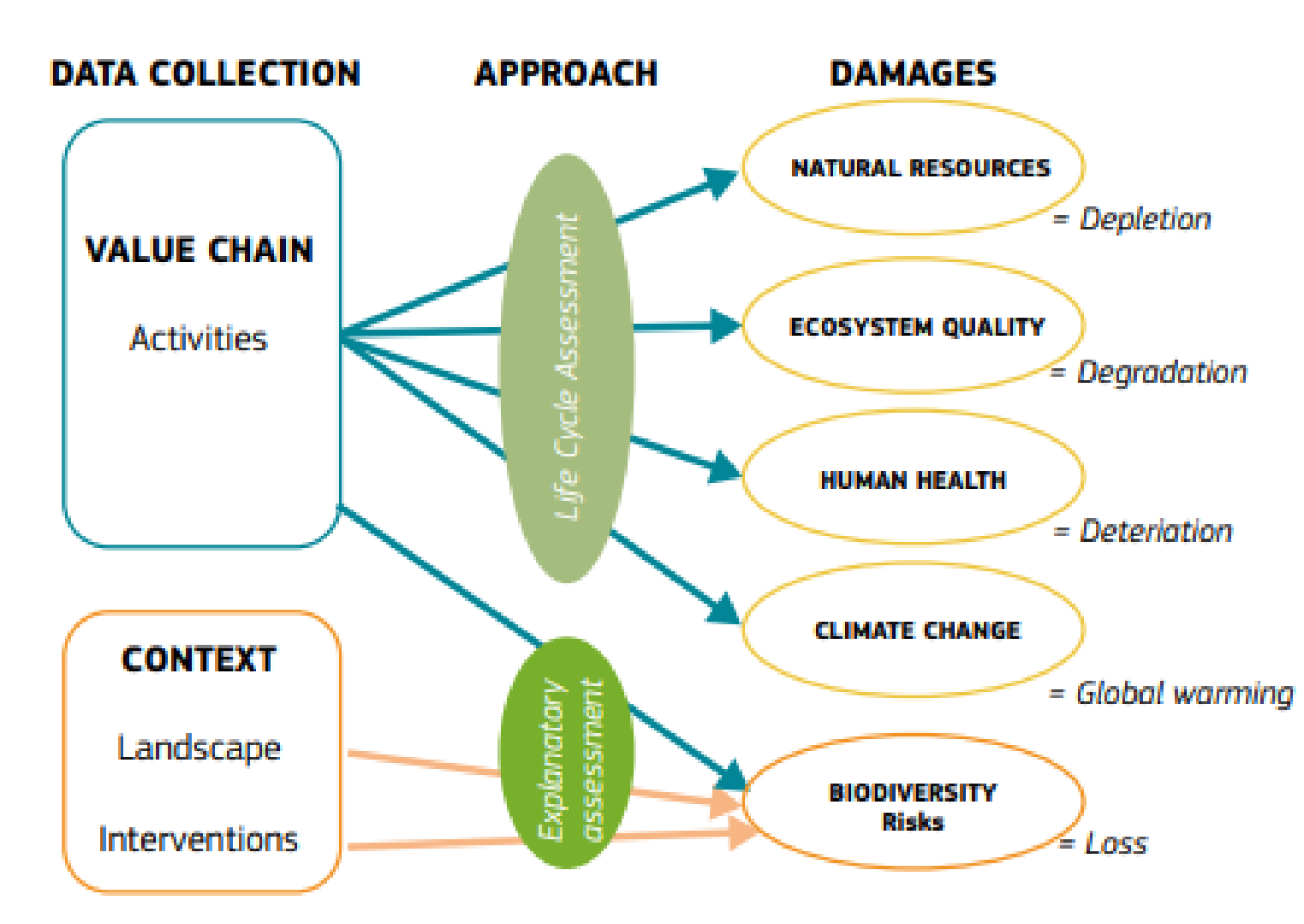
Framing Question 4:

IS THE VALUE CHAIN ENVIRONMENTALLY SUSTAINABLE?

Objective

Conducting a quantitative and qualitative appraisal of the environmental sustainability of the value chain

A twofold approach to evaluate environmental sustainability



The Environmental analysis will address **5 Core Questions**:

CQ4.1. What is the potential impact of the VC on **resources depletion**?

CQ4.2. What is the potential impact of the VC on **ecosystem quality**?

CQ4.3. What is the potential impact of the VC on **human health**?

New !

CQ4.4. What is the potential impact of the VC on **climate change**?

CQ4.5. Does the New ! ial impact of the VC on **biodiversity** deserves specific studies?

NATURAL RESOURCES, ECOSYSTEMS, HEALTH

3 areas of protection

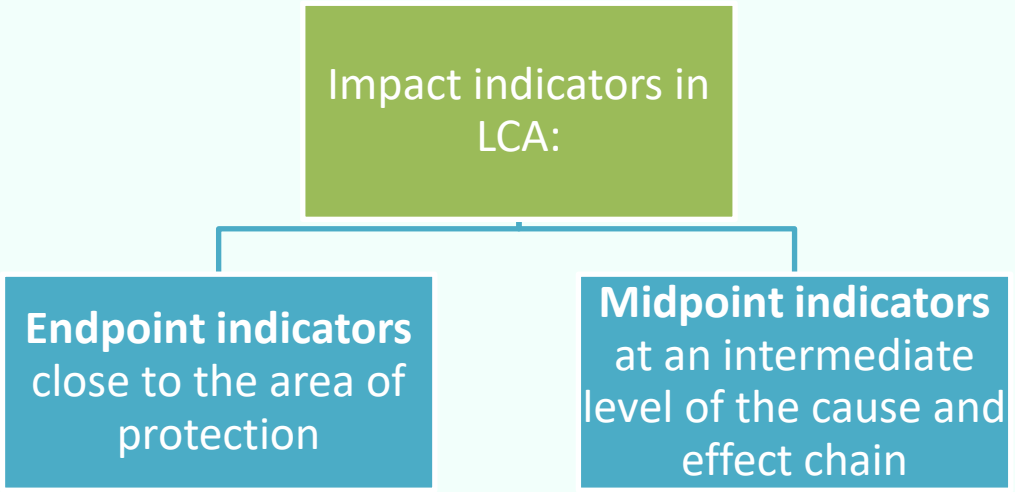
Damages* to	Aim at capturing	Usual indicator **
Natural Resources	Depletion of resources: • Non-renewable exhaustion of stocks • Renewable: rate of use higher than replacement	Increased cost to continue extractions *Unit= US $*
Ecosystem Quality	Impairement in the functions and structure of natural ecosystems through a variety of damages to all kinds of local wildlife species leading to loss integrated overtime	Potentiqlly Disqppeqred Frqction of species (PDF) during one year *Unit = species.yr*
Human Health	Negative effects on: • quality of life (morbidity) • life expectancy (morality)	Disability Adjusted Loss of Life Years (DALY) *Unit = DALY*

➔ Life Cycle Assessment (LCA) is applied

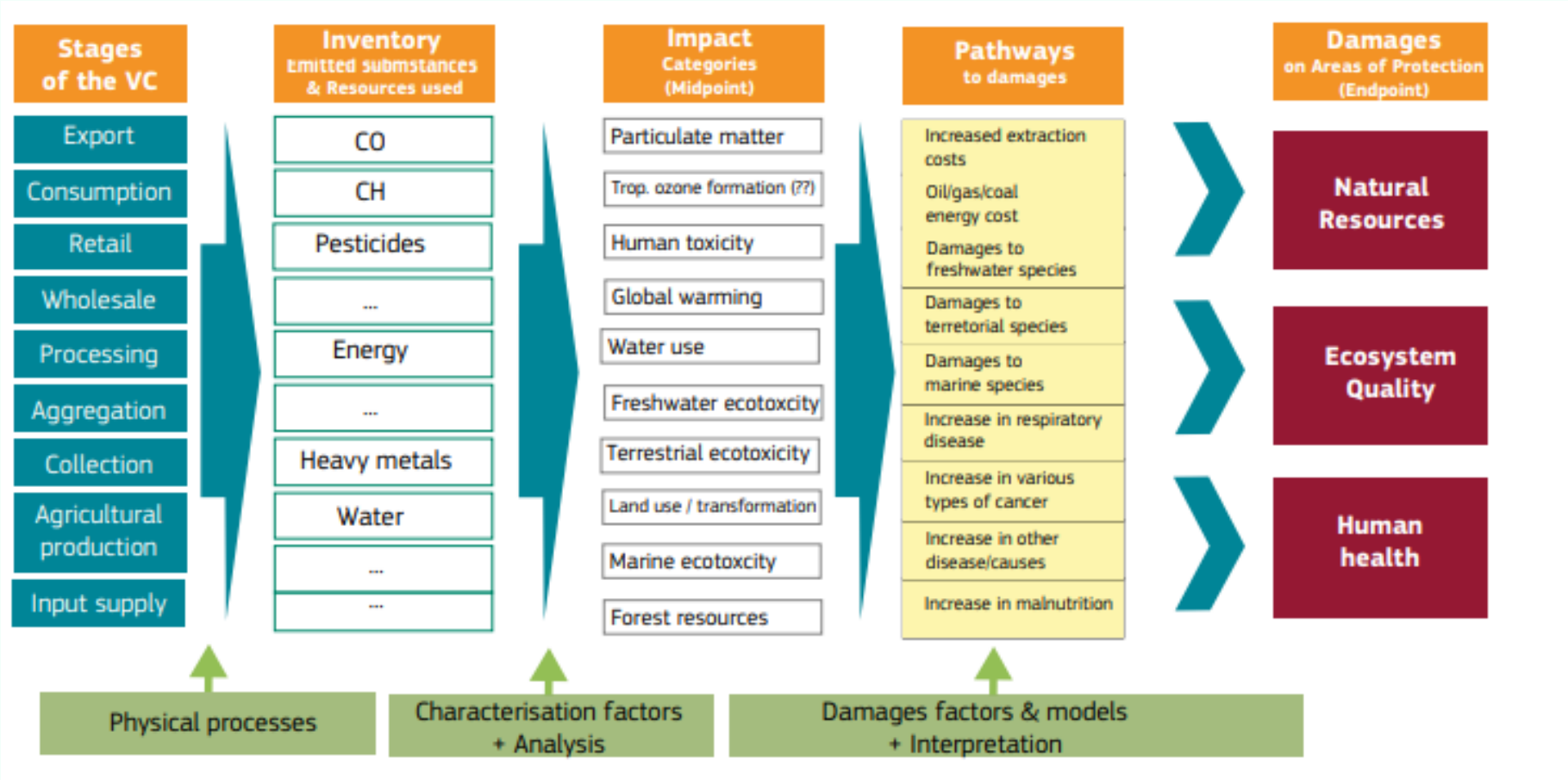
LCA inventories the material and energy flows used, produced or released by the activities of the VC.

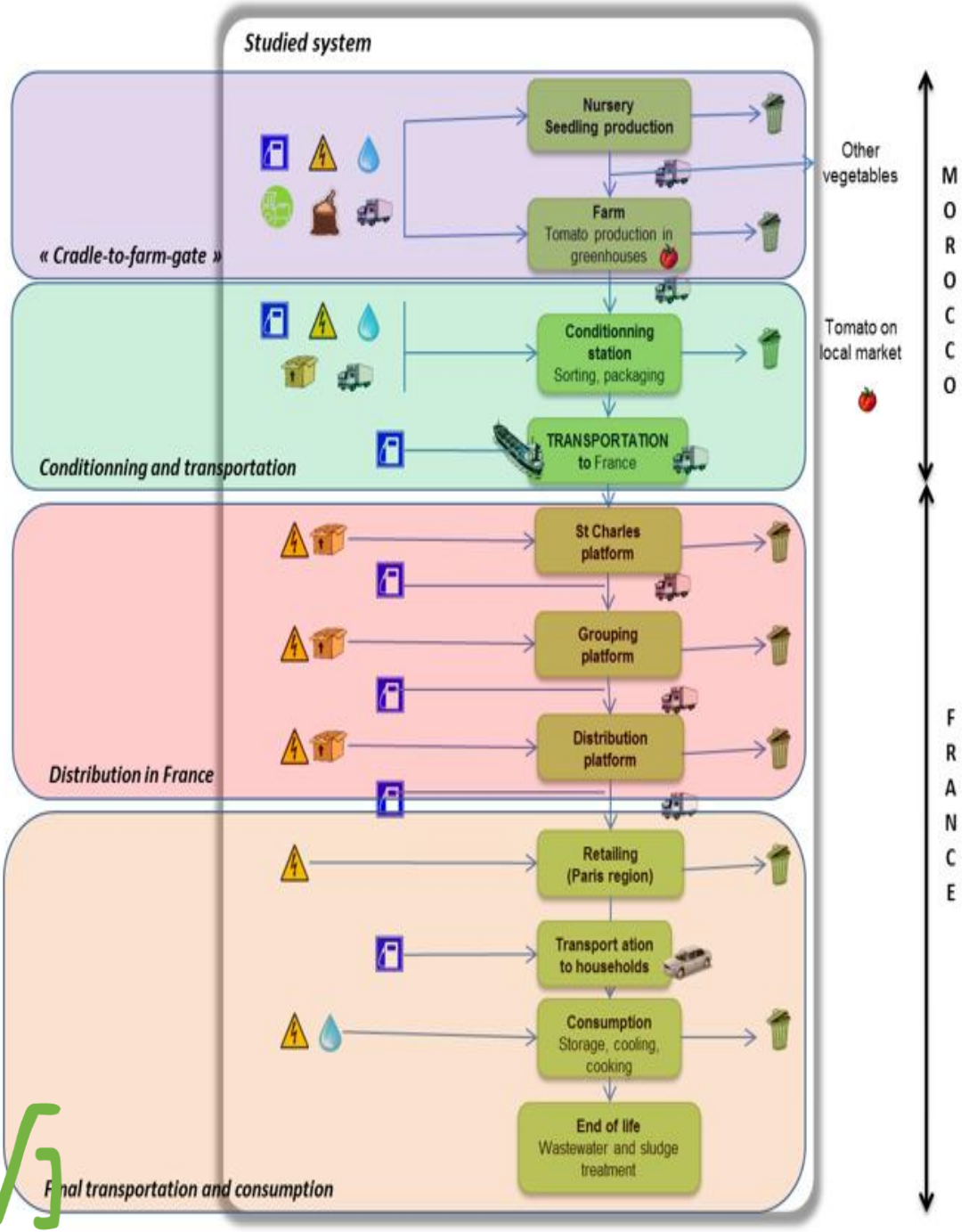
The substances emitted or consumed along the VC activate cause-and-effect chains that induce changes in the environment. These changes cause (or, on the contrary, counteract) specific environmental problems such as terrestrial acidification, freshwater deprivation or ecotoxicity.

LCA measures these effects (negative or positive) refers to them as "**impacts**".



Main steps of the LCA framework

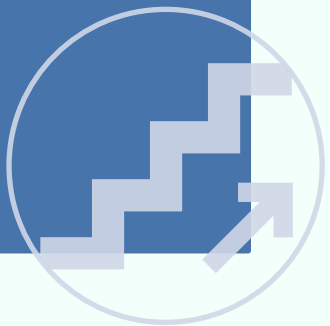




Example of agri-food value chain system "from cradle-to-grave": Fresh tomato produced in Morocco for the French market

Main steps

- Selection of the functional unit
- Inventory of resource used and emissions
- Data management and processing, with selection of the most appropriate databases
- Interpretation and analysis of environmental impacts and damages at midpoint and endpoint levels
- Conclusion and identification of hot spots
- Possible analysis of variability with Monte-Carlo treatment of uncertainty

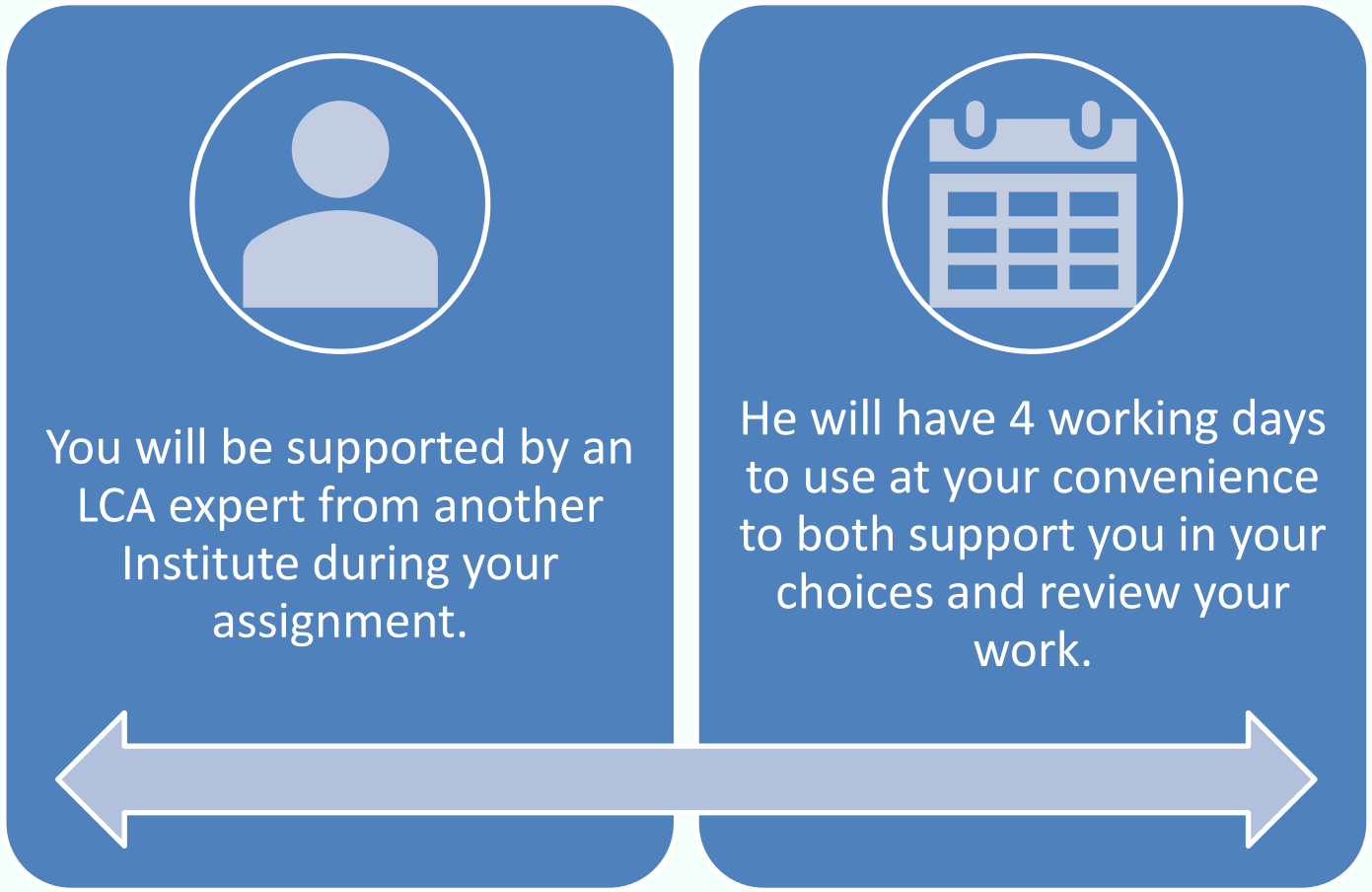


Important points concerning LCA

- Analysis of the environmental impacts and damages due to the activities **inside the country**
- An LCA on Simapro or similar that will feed into the information system

Important point concerning LCA:

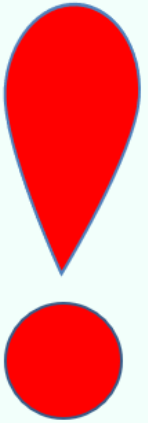
The LCA Reviewer



Inquiring on specific hazards

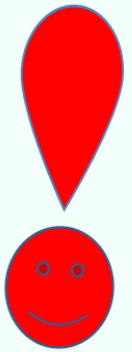
New !

Particular attention to the impact of "**agriculture**" and "**processing**" stage on Human Health



Common responsability of both **environmental** and **social expert** while detecting risks on Human Health

Presenting the results (in an understandable way)



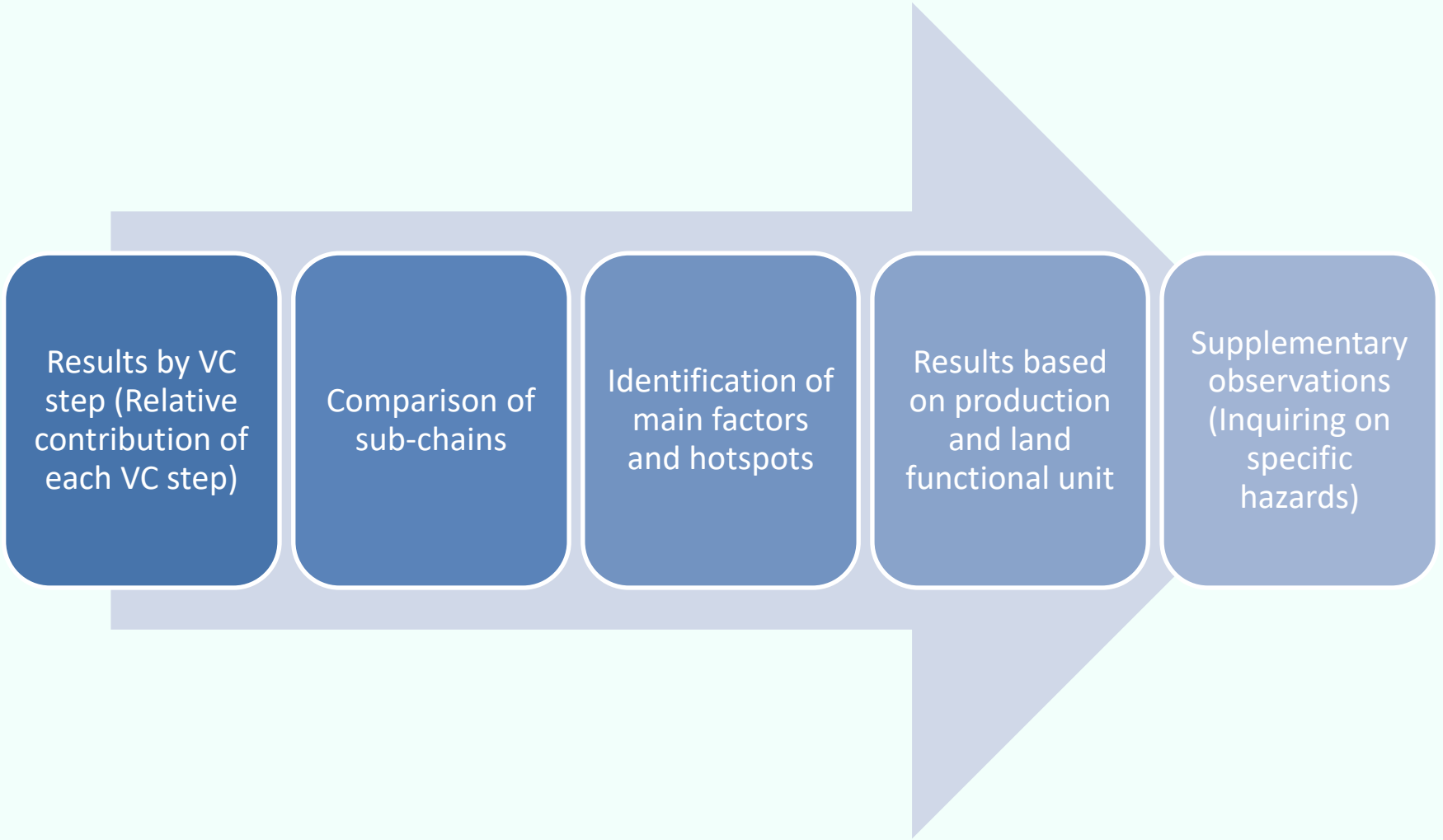
Use of standard graphics and simple words to explain clearly the consequences on the three areas

The sources of damage ("contribution analysis") ➔ Which activity has the strongest influence? What are the sub-chains and actors to focus on?

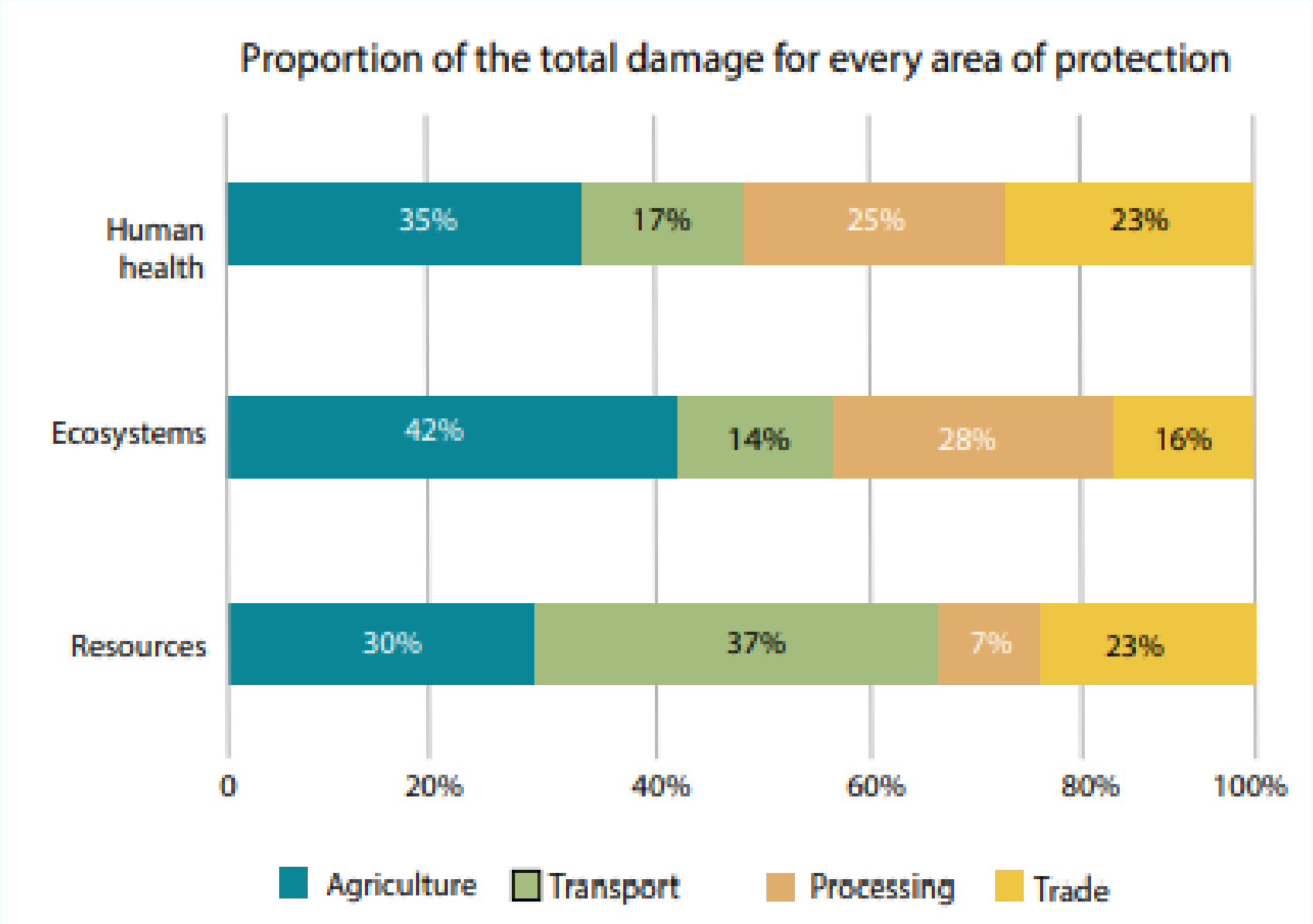
Comparison of the results by sub-chains, production techniques and/or VC stages

Benchmark with similar VC in other countries (when possible)

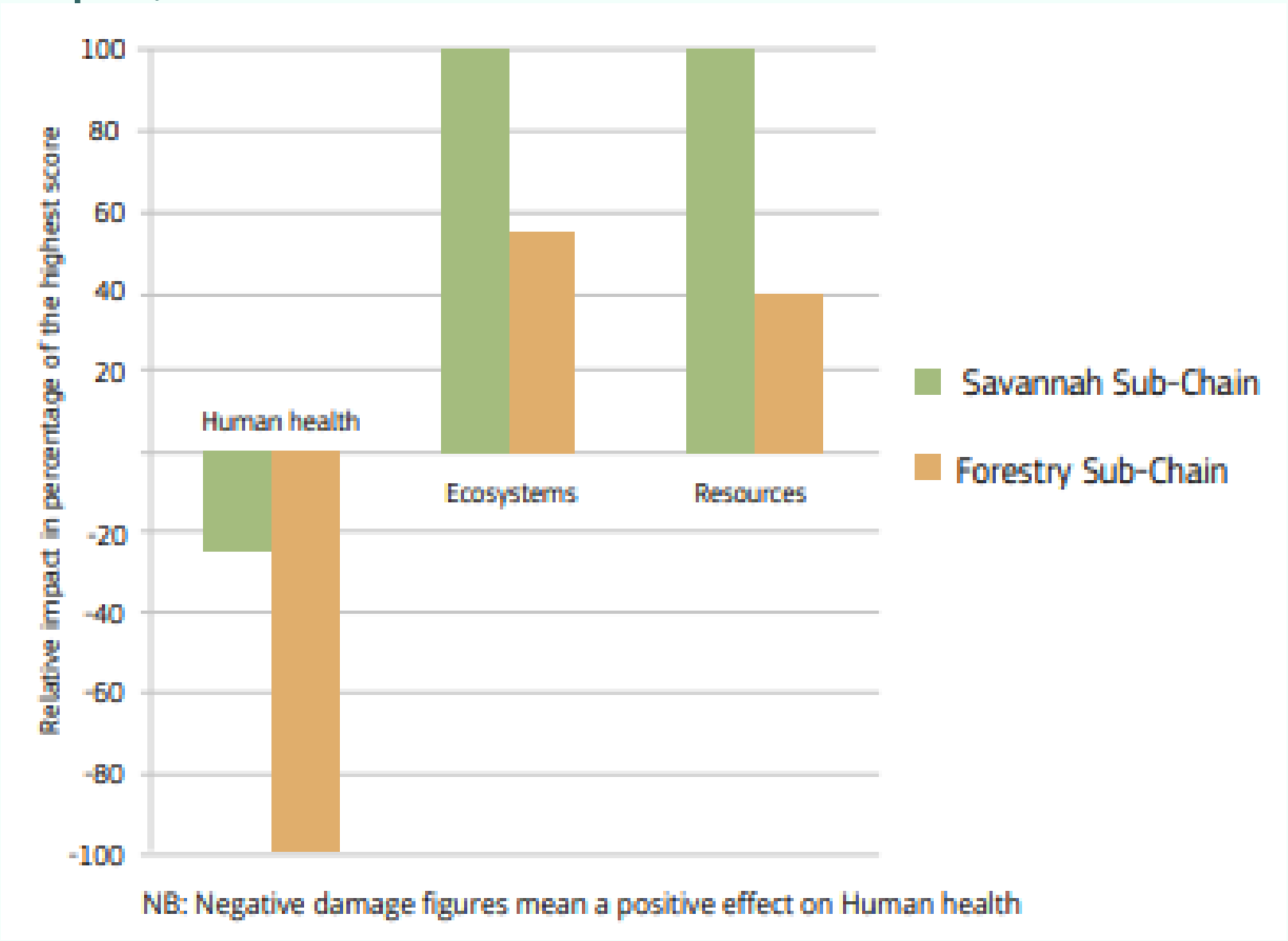
Presenting the results in many ways



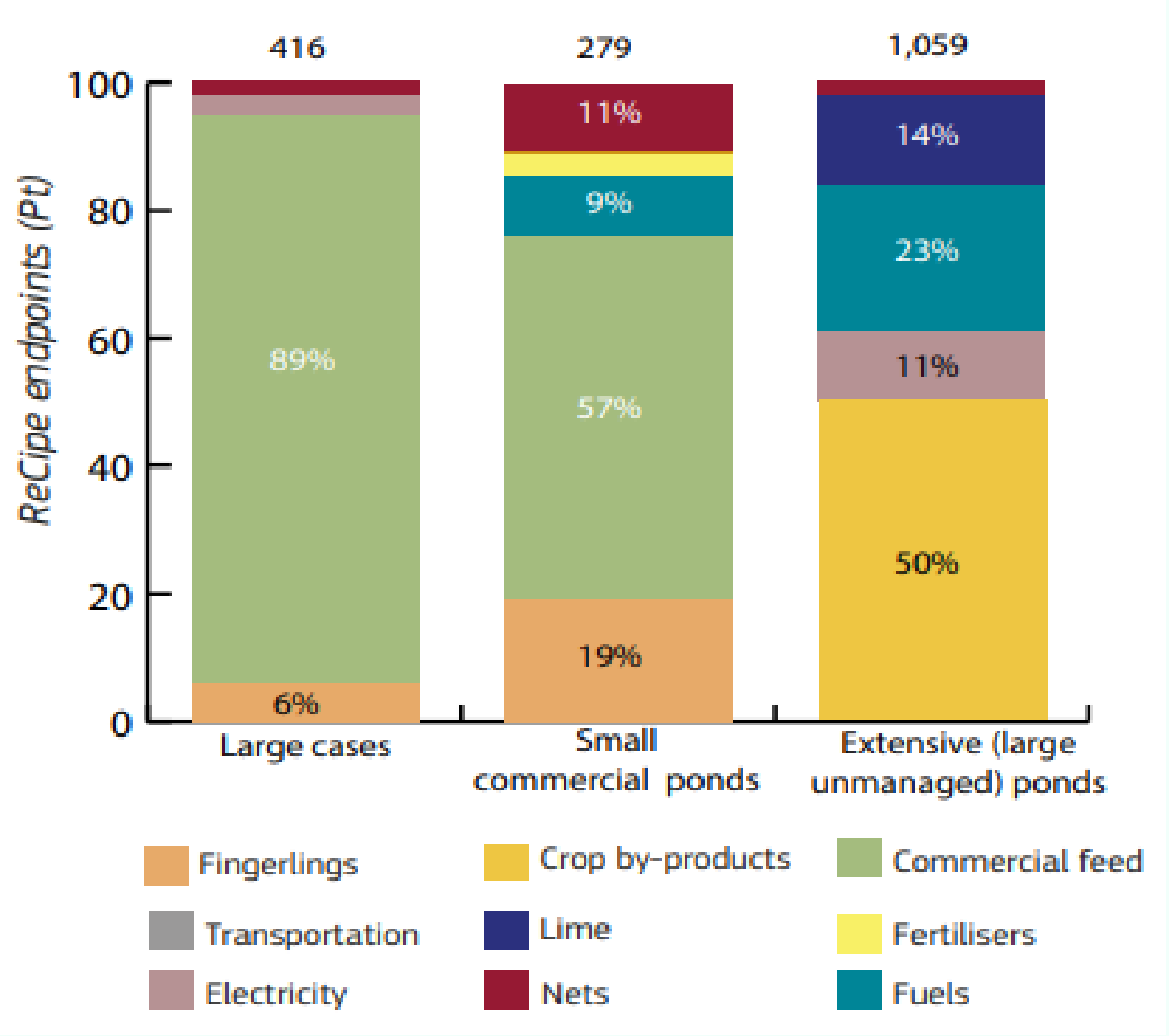
Presentation of the results by VC step



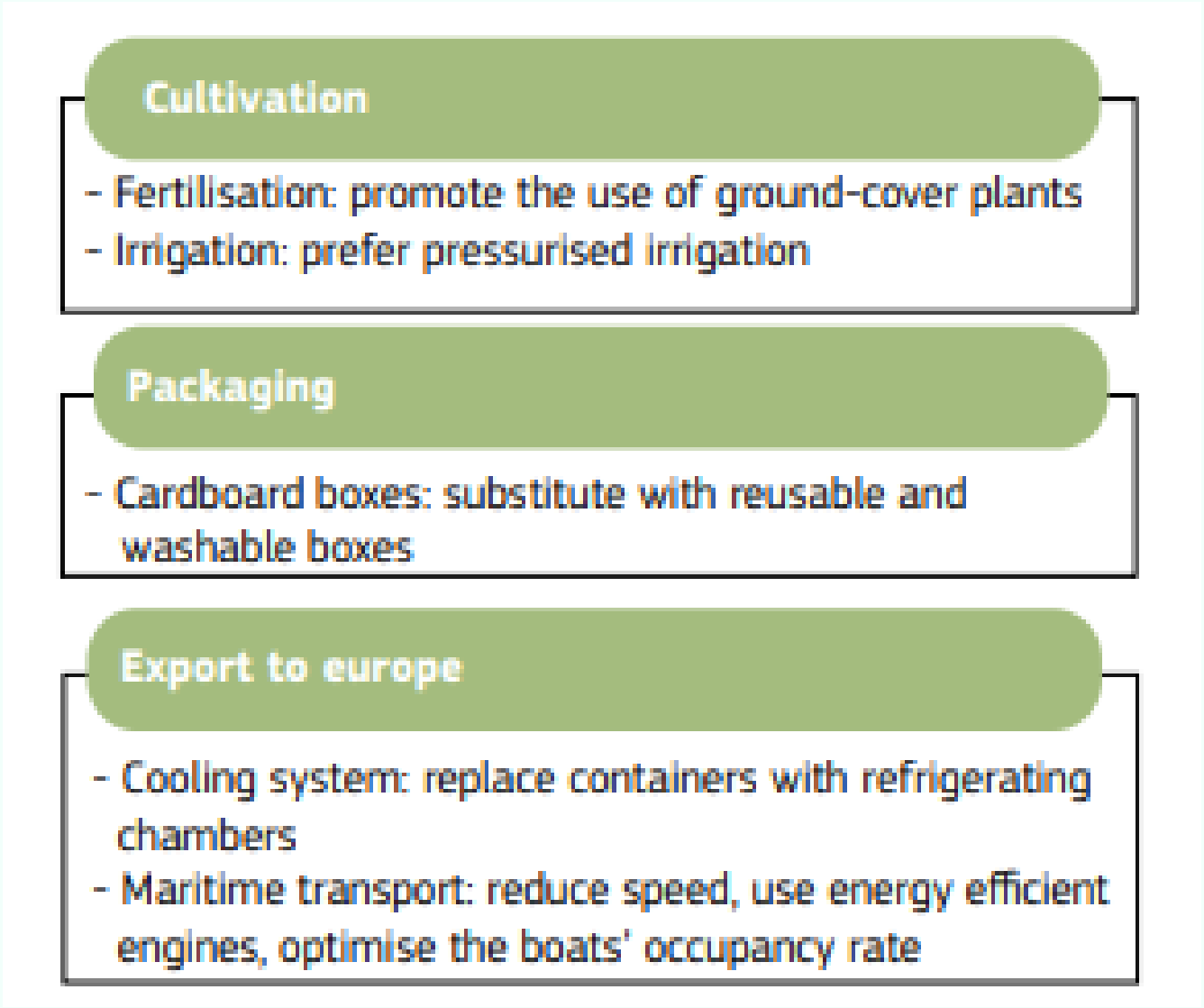
Presentation of the results by sub-



Identification of the main factors and hotspots

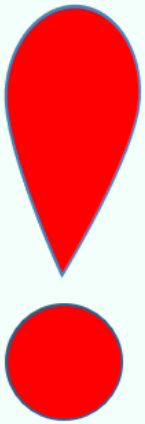


Hotspots (Example of a banana VC)



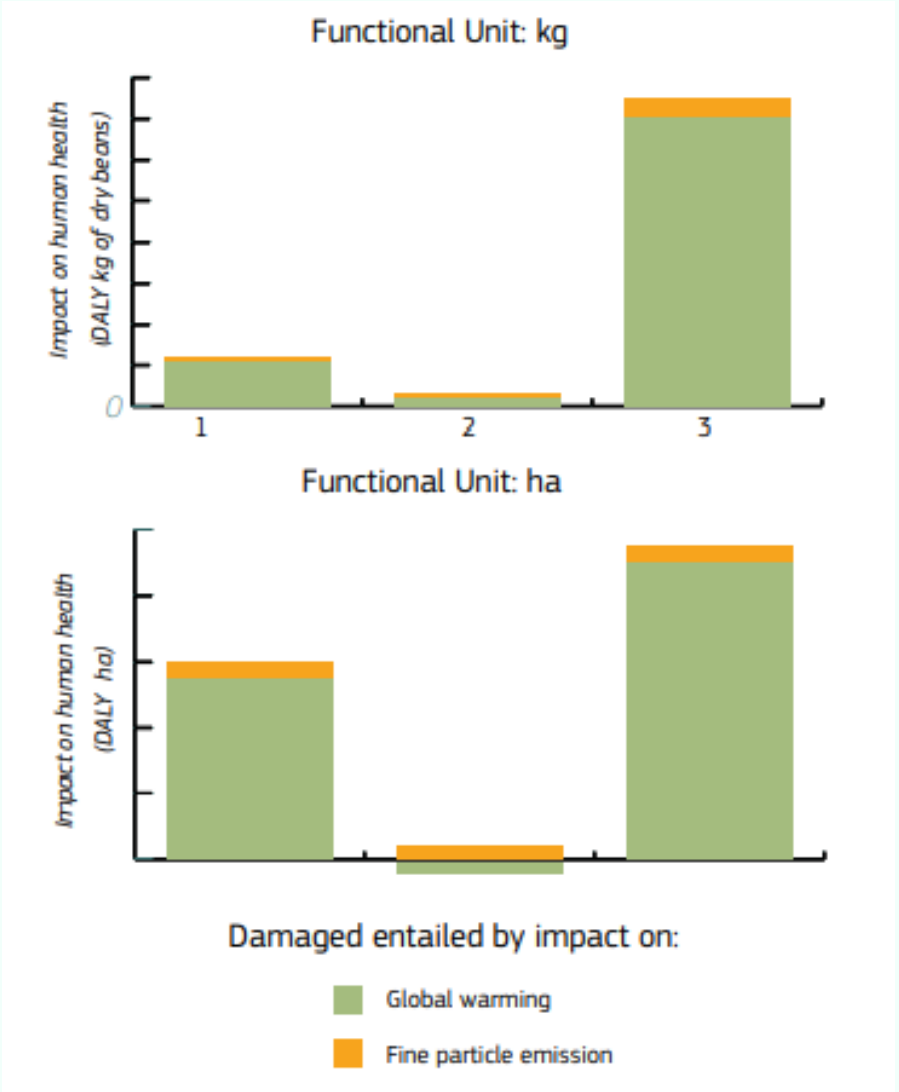
Complexity of cropping systems

When important agronomic outcomes that would broaden the direct LCA results are suspected, the environmental expert may recommend specific studies



Presentation of the results by production and land functional unit

New !



Supplementary observations (Inquiring on specific hazards)

New !

Some detrimental effects of production practices detected empirically may not be reflected in the LCA calculations and results. In such a case, these potential damages must supplement customary LCA graphs.

Core Questions and Indicators for LCA

CQ4.1	**What is the potential impact of the VC on resource depletion?** Indicators: Resource uses (water, fuel…); Mineral extraction; Energy cost; **Increased extraction cost**; Hotspots identification
CQ4.2	**What is the potential impact of the VC on ecosystem quality?** Indicators: 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 impact of the VC on human health?** Indicators: 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

CLIMATE CHANGE

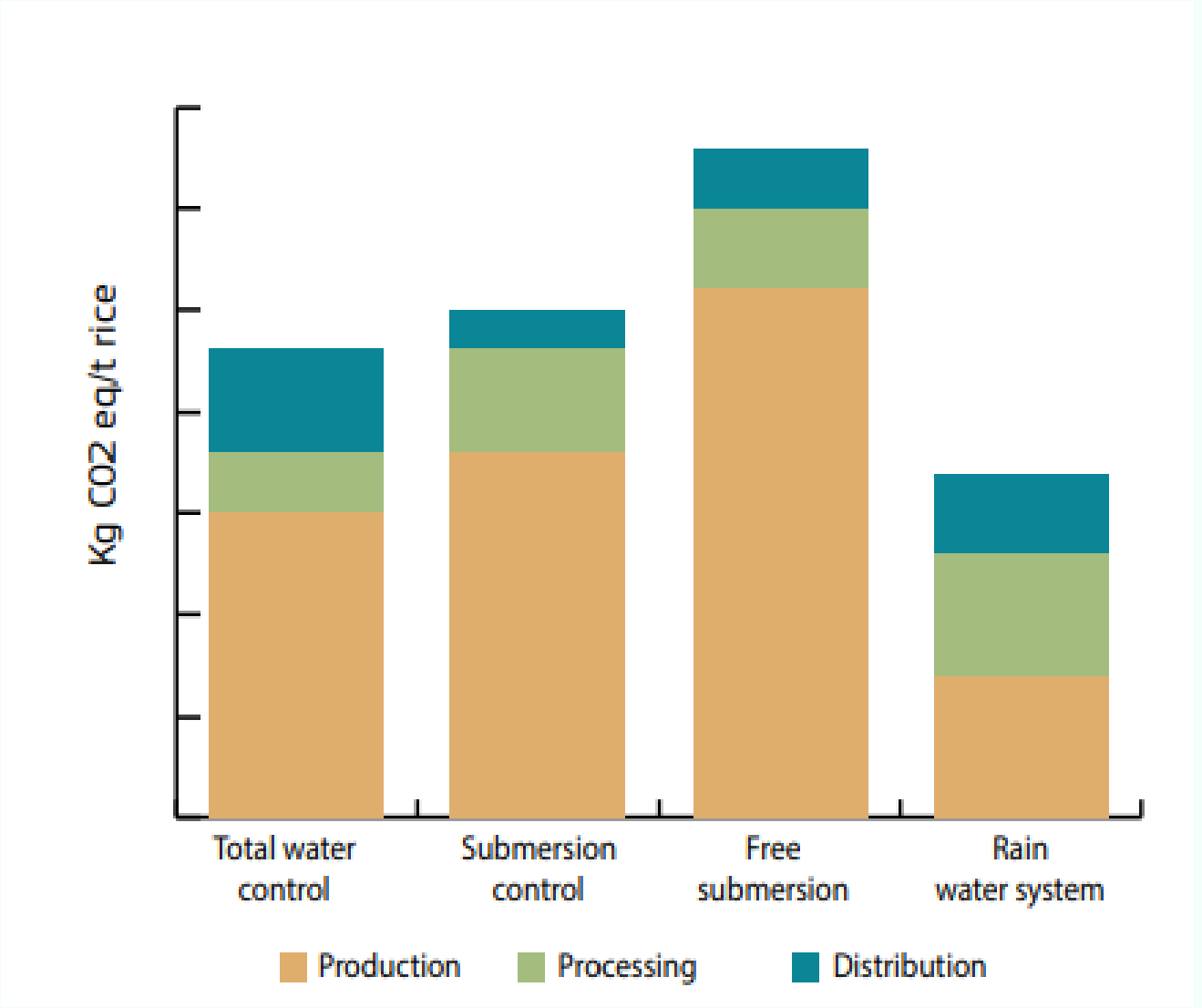
New !

Core Question and Indicators

CQ4.4 **What is the potential impact of the VC on climate change?**

Indicators: Emission of greenhouse gases (CO_2, N_2O, CH_4, CFC…); **Carbon footprint (kg of CO_2eq.)**; Hotspots identification

Comparison of sub-chains' carbon footprints at all stages



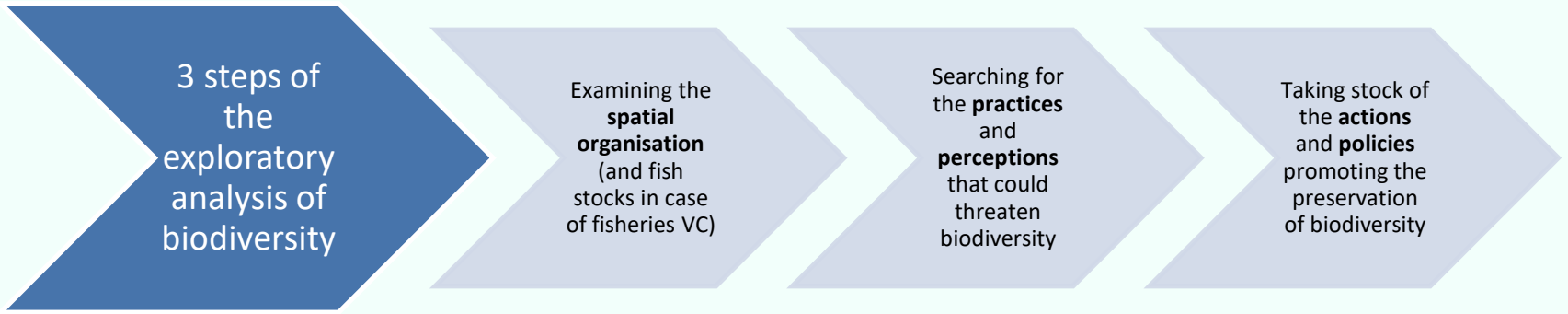
BIODIVERSITY

New !

Core Question and Indicators

CQ4.5 **Does the potential impact of the VC on biodiversity deserves specific studies?**

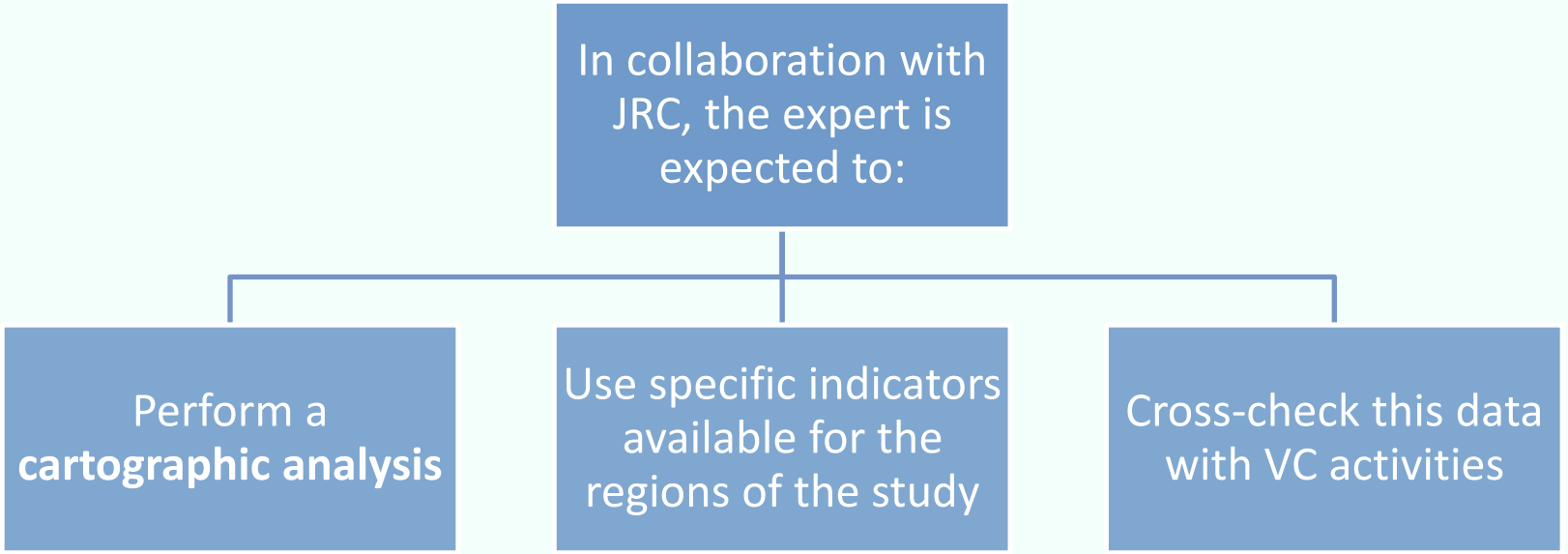
Indicators: Potentially Disappeared Fraction of species; Carrying capacity; Compliance to area protection; **Existence of Key Biodiversity Areas**; Connectivity of terrestrial protected areas; Endangered, Threatened or Protected species; Water stress; Crop diversification, rotations and intercropping; Crop varietal diversity; Livestock breeds diversity; Area affected by land degradation; Soil conservation; **Presence of targeted projects**.


3 steps of the exploratory analysis of biodiversity
Examining the **spatial organisation** (and fish stocks in case of fisheries VC)
Searching for the **practices** and **perceptions** that could threaten biodiversity
Taking stock of the **actions** and **policies** promoting the preservation of biodiversity

The study of spatial organisation

To what extent the VC agricultural production areas encroach on areas important for the preservation of biodiversity ?

The study of spatial organisation



Support of the expert to the calculation of the potential impact of the crops on biodiversity by JRC

To calculate the DOPA indicators (see methodo brief) and prepare the corresponding maps in support to the LCA expert, JRC needs a map where the crop is grown.

To get the more relevant biodiversity indicators by overlapping the map of the location of crops and maps of the location of biodiversity (for example threatened species) and calculate the indicators (for example the number of species threatened by a specific crop), the JRC needs the more accurate map, in order of preference:

- A map of location of the crops in a GIS format (raster, shapefile)
- A map of location of the main areas of crops in a PNG image format → uncertainty on location of crops
- A map of location of the main agricultural areas in the country → no specific to the crop but useful if the crop is substantial in the country…

The study of spatial organisation

Biodiversity

	INDICATOR
Threatend species	Number of threatend species.
Land	Terrestrial Protected Area; Marine Protected Areas; Proportion of the KBA* under protection; Area affected by land degredation; Area of protected connected lands.
Forests	Forest Area Net Change rate; Forest Area under sustainable management.
Water	Change of permanenet surface water bodies; Total freshwater utilised. Wastewater undergoing treatment.
Other services	Total carbon stock in the soil; Population living around protected areas.

** KBA: Key Biodiversity Areas are sites contributing significantly to the global persistence of biodiversity, in terrestrial, freshwater and marine ecosystems.*

Identification of practices and perceptions

What are the agricultural **practices** that pose a risk to biodiversity? ➔ simple description of “impact pathways”

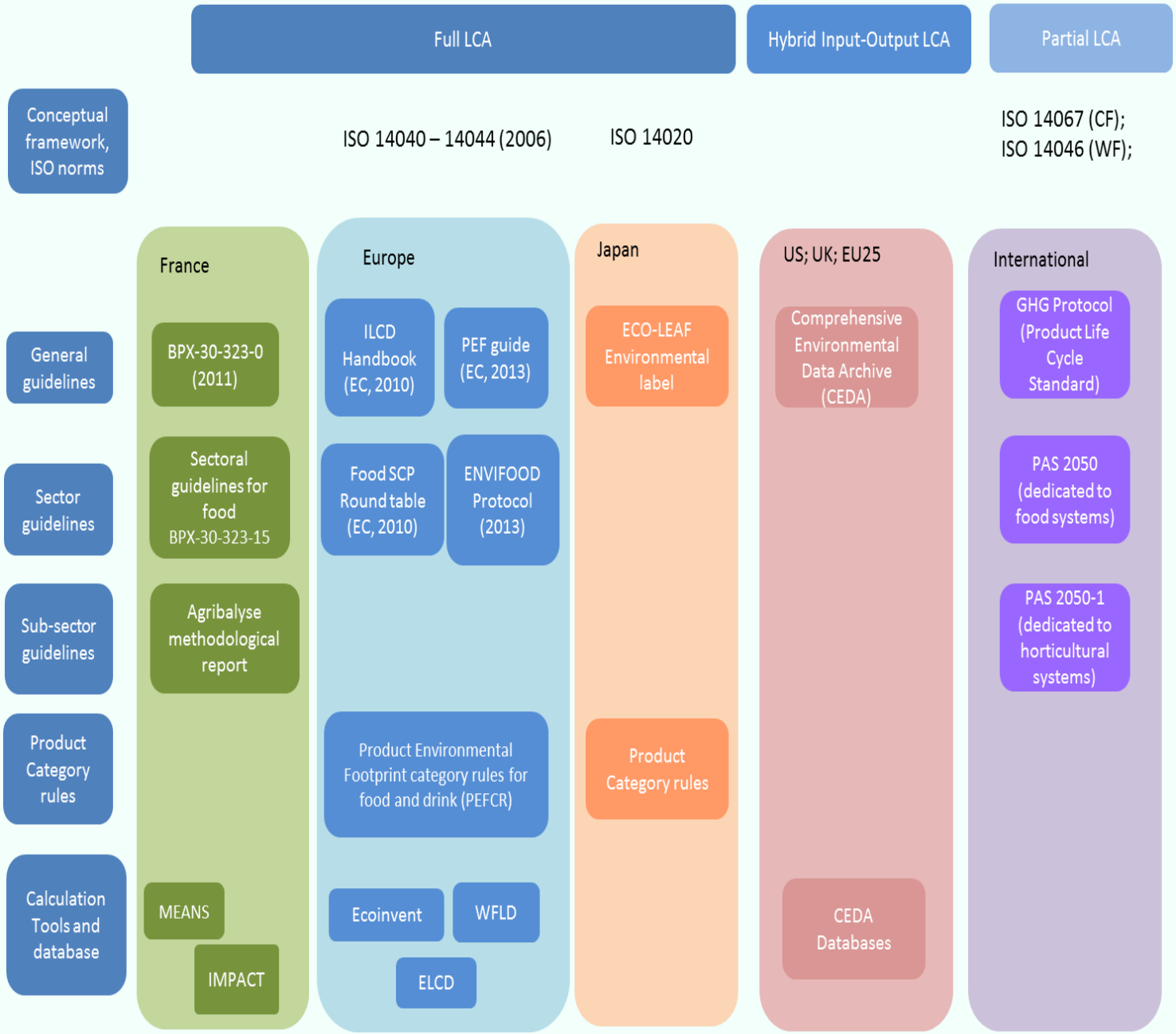
How sensitive are the producers to biodiversity issues? What are the observations of the producers on ongoing changes?

Inventory of actions and policies

What are the **public** and **private interventions** in favour of the maintenance of biodiversity in the territories concerned by the VC?

What are the development projects and investment programs based on the principles of **ecosystem management** and/or development of **sustainable agricultural and processing practices**?

The LCA family...



Methodology and reference documents