LANCA® – INTRODUCTION AND STATUS

Findings and development plan from H2020-project ORIENTING and Cepi-funded "land use in EF"

- Intro on LANCA[®]
- Main findings from recent projects
- Development status and plan



Current Land Use framework in LCA

- Current land use frameworks build on findings of UNEP setacs LULCIA project
 - Land use is specified in elementary flow name for "occupation" [m²a] and "transformation from/to" [m²]
 - Land use impacts are calculated using characterization factors on country level for various land use types
- Land use impact assessment (Soil Quality index based on LANCA®) is required for environmental footprint studies and optional for environmental product declarations
- No biodiversity method recommended yet

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Implementation and interpretation issues in many cases





Land use framework as applied in LANCA®

- Based on UNEP setac land use framework
- Characterization factors provided for
 - 57 land use flows (ILCD)
 - in 212 countries
 - For 5 indicators and occupation/transformation
- Normalization and aggregation to Soil Quality Index (excluding permanent transformation)



Duration of land use Restoration time $t_{\mbox{\scriptsize res}}$



LANCA[®] Calculation



Characterization



Land use in forestry and EF - Project overview

- CEPI-funded project from 2020-2021
- Focus: Land Use Impact assessment in EF for forestry systems
- Systematic investigation on methodological issues and deriving of improvement recommendations
- Exemplary application on improved approach
- Guidance section for practitioners
- Result report publically available









Land use in forestry and EF - Main project findings

several significant issues on EF/SQI application in forestry

- Flow nomenclature does not reflect the different available forestry regimes and the different silvicultural systems among countries
- Data gaps are identified for inventory, characterisation factors and weighting
- Ambiguities within the UNEP setac land use framework
- Systematic development of recommendations
 - New nomenclature based on silvicultural systems and management strategies
 - Improved modelling framework to increase comparability and transparency
 - Impact assessment (reference situation in CF calculation and regeneration time)
 - Improved and new characterization models (LANCA, HANPP and SOC)



Main project findings – case study results

- 1 m³ of softwood (Sweden/Netherlands)
- Different modelling approaches

(intensity, location, timeframe)



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CF map for Infiltration reduction. Above: whole country, below: only forest land cover





ORIENTING – project overview

The project started on the 1st November 2020 and will run for 36 months

with an overall budget of **5,997,339€**



Operational Life Cycle Sustainability Assessment Methodology Supporting Decisions Towards a Circular Economy

CORDIS orienting.eu

University for the Creative Arts

æd

ecopreneur.eu

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We create chemistry

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1.

2.

To develop a robust and operational methodology for the **life cycle sustainability assessment** (LCSA) of products. To offer a **practical approach** that considers environmental, social and economic impacts in an **integrated** way, as well as **material criticality and product circularity**. 3.

To build on **existing initiatives** (e.g., PEF, UNEP/SETAC LCSA, ISO/TC 323) and contribute to a future **Product Sustainability Footprint** tecnalia) = eirer MEMBER OF BASQUE RESEARCH a technology alliance Leiblein

Anthesis Lavola





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ORIENTING – Land use impact assessment work plan

- WP 1 (2021): identify improvement potential, investigate available approaches (D1.1 on environmental approaches soon available on <u>www.orienting.eu</u>)
- WP 2 (2021-2022): further develop LANCA[®]
 - Providing updated characterisation factors for
 - New: Biodiversity and Soil Organic Carbon
 - Improved: Biotic Production and Erosion
 - Improve overall framework and provide a calculation process for foreground and background CFs
- WP 4 (2021-2023): apply improved LANCA[®] on
 - Tomato production in Italy
 - Biobased platform chemicals in Germany
 - Forestry base products in Sweden
 - Sheep wool based clothing in Spain
 - Concrete recycling in Germany



ORIENTING – new indicator on Soil Organic Carbon

- Basis: SOC workshop in GLAM 2 context, joint publication (De Laurentiis et al., submitted)
- IPCCs SOC change factors are used to calculate CFs for climate zones and land use types
- country average CFs are available





ORIENTING – new indicator on Biodiversity

Basis: "BioMaSS" methodology by Maier (PhD thesis, in preparation)

- Single Point on Biodiversity based on a multiscale approach
 - Organisational scale
 - **Biodiversity conservation concepts**
 - Spatial scale
- GIS based approach based on management practices and land use intensity
- Mapping to LANCA[®] flows and provision of CFs



ORIENTING – new indicator on Biodiversity

Operationalization: calculation of global land use intensity indices – example pasture (Maier, submitted)



(Maier, submitted)



Land use modelling based on flow properties

- Base flows complemented by flow properties on instance level in foreground systems
- Background impact assessment (base flow CFs) directly available in LCA software
- Foreground impact assessment in GIS

Base flow		Flow properties					Impact assesment
Land use type, Sub type	Country	Land use intensity	Land use intensity value	Management parameters	Geolocation		Characterization factor
Arable, irrigated	e.g. Finland	Intense	0.8	e.g. fertilizer, mechanization, pesticides, set aside area, crop rotation	e.g. region/ XY coordinate		Local, global, regional biodiversity risks



Short term (12/2021) improvement for LANCA®

- New aggregation approach (land cover based, only calculating the impact for the areas where specific land use activities are reported, compared to calculating the whole country in the old LANCA[®] version)
- Including Soil organic carbon (generally 0 for forestry systems, no difference between management or intensity -> has to be further refined)
- Erosion model update (optimising input data and model resolution)
- Improved sealing factor (using a GIS input instead of assigning sealing factors to land use types)



Further recommended land use impact assessment developments

- New forestry (and other production system) nomenclature (can be calculated but not added to CFs as it opposes the ILCD/EF nomenclature)
- Geospatial foreground characterization process (three levels country average characterization factors)
- Including a new method for biotic resources (e.g. human appropriated net primary production, HANPP), generally 0 for forestry systems -> has to be further refined
- Including Biodiversity as indicator
- Weighting based on cause-effect-chain



Recommendations for (EF) land use framework

- Establish a process to improve the framework in cooperation with the EC/JRC
- Need for clarifying guidance for forestry in EF
 - inventory framework
 - Primary production modelling assumptions
 - Flows (nomenclature specified for management regimes and intensities) and transformation/occupation
 - Improvements in the land use framework
 - Allow for flow property based characterization (location, intensity, management practices)
 - Consider industry specific needs and requirements



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TAB – Agricultural Working Group – Milestone 5: Biodiversity

- Overall goal: characterize biodiversity impacts as impact category
- Methods (within and beyond LCA) will be identified, analysed against a set of criteria and tested
- Recommendation on biodiversity integration in February 2022
- Status 11-2021: Method evaluation ongoing

