LAND-use based MitigAtion for Resilient Climate pathways

Visions and Pathways for CDR in the EU

Results overview & highlights

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LANDMARC | This project has received funding from the European Union's Horizon2020 research and innovation program under grant agreement No 869367

About LANDMARC

Focus on:

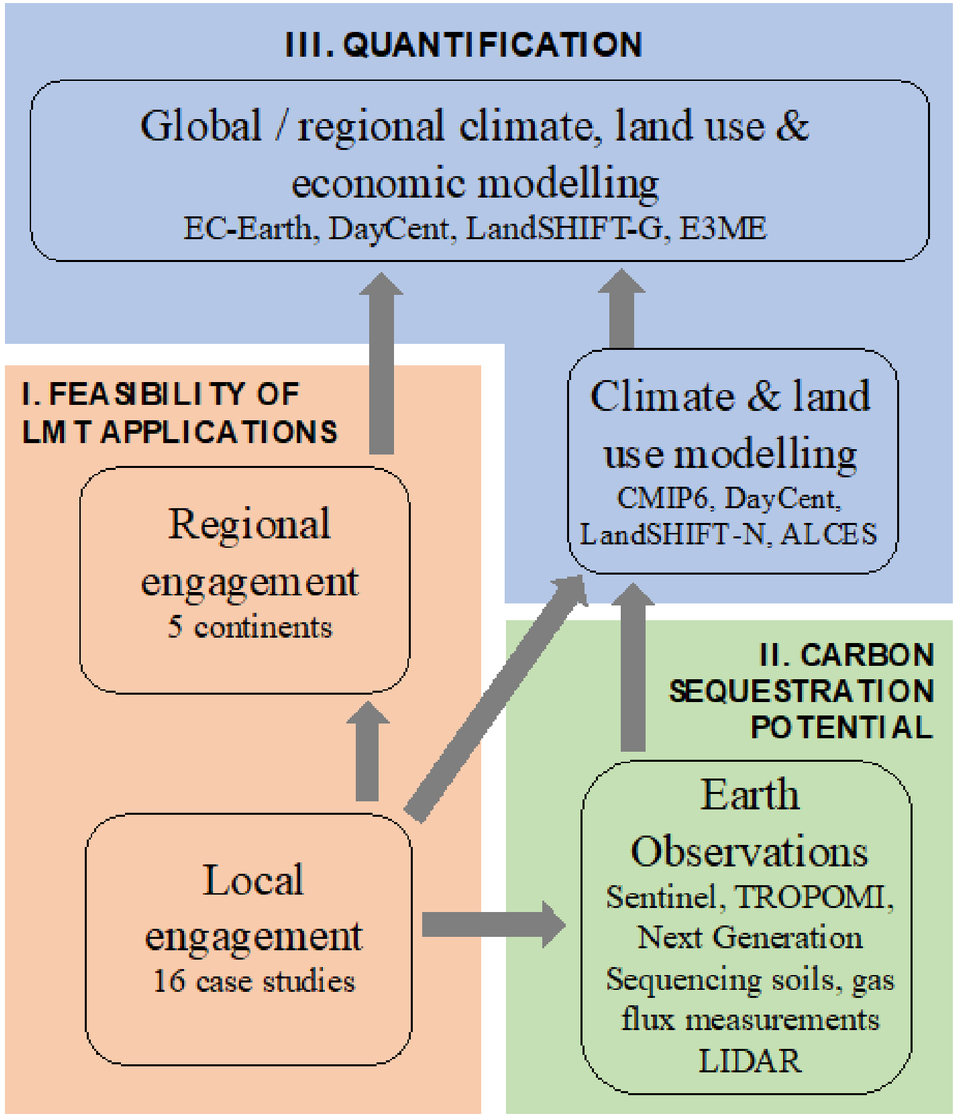
- Land-based mitigation technologies & practices (LMTs)
  - Nature-based solutions with some CDRs
  - Carbon farming, biochar, afforestation, BECCS

Three research pillars

I. Stakeholder engagement

II. Earth observations

III. Simulation modelling



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Pillar I – The stakeholders

Focus of work

- Co-design
- Bottom-up
- LMT portfolios
- Scaling scenarios
- Context-specific

Canada

Earth observation
Wetland management, afforestation, reforestation

National portfolio
Wetland management, afforestation, reforestation

Partner: *Innolab Space*

The Netherlands

Earth observation
Agroforestry & paludiculture

National portfolio
Peatland rewetting, afforestation, agroforestry, BECCS (biogas)

Partners: *Bioclear Earth & Joint Implementation Network*

Germany

Earth observation
Forest management

National portfolio
Forest management

Partner: *Okö Institut*

Sweden

Earth observation
N.A.

National portfolio
Biochar, BECCS, forest management

Partner: *Stockholm Environment Institute*

Switzerland

Earth observation
N.A.

National portfolio
Reduced tillage, organic agriculture, agroforestry, biochar

Partner: *ETH Zürich*

Nepal

Earth observation
Rice management (dry-seeded, wet direct-seeded, transplanted)

National portfolio
Rice management, agroforestry, forest management, organic farming

Partner: *University of Sussex*

Vietnam

Earth observation
Agroforestry (coffee)

National portfolio
Agroforestry, forest management, biochar

Partner: *International Centre for Tropical Agriculture*

Portugal

Earth observation
Pastures (Montados)

National portfolio
Pastures (Montados), agroforestry, forestry, agriculture

Partner: *Agroinsider*

Spain

Earth observation
Pastures (Dehesas), forest management

National portfolio
Pastures (Dehesas), forest management, grassland management, agroforestry, afforestation / reforestation

Partner: *Ambienta*

Indonesia

Earth observation
Agroforestry, biogas & compost

National portfolio
Forest management, peatland management, agroforestry, organic fertilizers

Partner: *Sustainability & Resilience Company*

Kenya

Earth observation
Integrated soil fertility management (ISFM)

National portfolio
ISFM, agroforestry, afforestation

Partner: *ETH Zürich*

Burkina Faso

Earth observation
Agroforestry, cropland management

National portfolio
Agroforestry, cropland management, forest management, afforestation/reforestation

Partner: *eLEAF*

Venezuela

Earth observation
N.A.

National portfolio
Forest management (indigenous fire management), agroforestry

Partner: *Cobra Collective*

Ukraine

Earth observation
Organic farming

National portfolio
Organic farming and reduced tillage

Partner: *TU Delft*

Regional Platforms

Five regional clusters for scenario development, knowledge exchange in:
- Europe
- Americas
- Asia
- Africa

Partner: *Stockholm Environment Institute*

South Africa

Earth observation
Estimate the role of vegetation in carbon sequestration

National portfolio
N.A.

Partner: *eLEAF*

Pillar II – Earth observations

Development and testing of Carbon & Biodiversity Mapping Tools in LANDMARC

Experiments and field testing with different:

- Combinations of earth observation techniques
- Spatial scales / resolutions
- Land-based mitigation technologies and practices
- Countries
- Five ‘carbon mapping’ tools
  1. **eLEAF**: ET Look model, Eddy Covariance, DayCent
  2. **Ambienta**: Field-map Forest Inventory-LiDAR Model
  3. **AgroInsider**: Sentinel 1-2, LST, MSG, SIF
  4. **KNMI**: SIF-GPP-C-Seq. Model (Tropomi - SIF, Eddy Covariance, DayCent)
  5. **Bioclear Earth**: Soil Microbial-Molecular and Physicochemical Analysis

Peatland rewetting:

- Current VCM monitoring:
  - Indirect: ground/ditch water level correlated to CO2/CH4 fluxes
  - 0-20 ha ≥ 6 wells (1 parcel & 1 reference area)
  - 20-100 ha ≥ 8 wells (2 parcels & 1 reference area)
  - >100 ha ≥ 10 wells (3 parcels & 1 reference area)
- LANDMARC experiments:
  - Combination of remote sensing, gas flux (Eddy Covariance), soil analysis, monitoring wells
  - Interest in water balance measurements (*evapotranspiration, water stress*) – appears good alternative monitoring route.
  - Next step: check and compare for cost-competitiveness and robustness of novel monitoring route.

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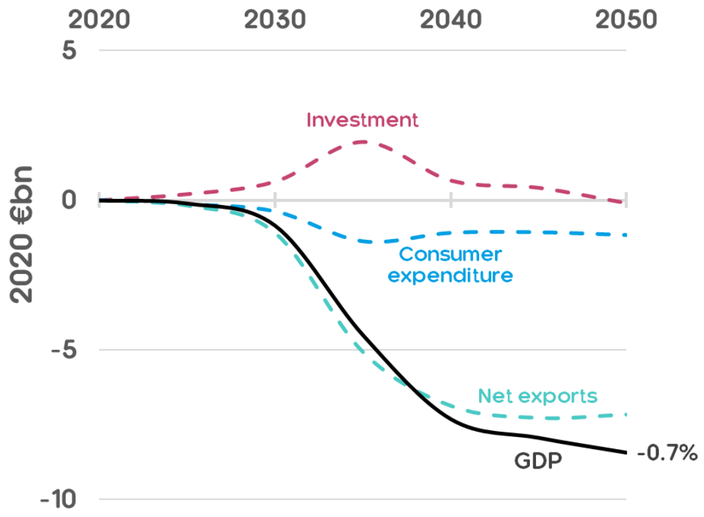
Pillar III – Simulation modelling

Asses & quantify impact of scaling up land-based mitigation technologies and practices

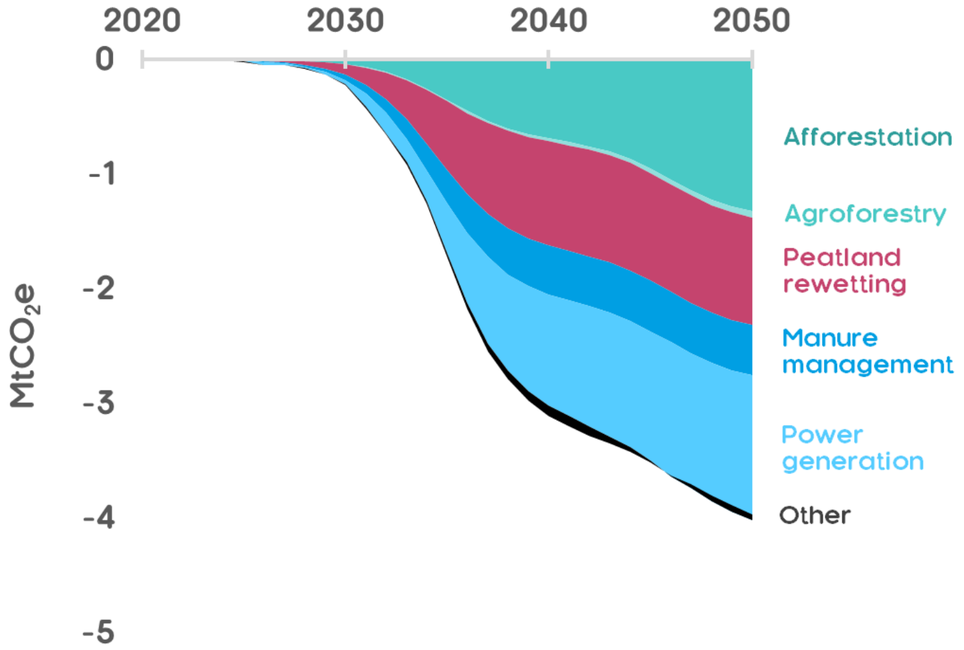
Simulation runs:

- In different options portfolios, countries, regions
- LANDMARC model suite
  1. **ALCES** – land use change
  2. **LandSHIFT** – land use change
  3. **E3ME** – macro-econometric
  4. **DayCent** – biochemical model C/N fluxes
  5. **CMIP6/EC Earth** – climate extremes projections



Portfolio approach: (size of livestock sector in NL)

- Peatland rewetting
- Agroforestry / afforestation
- BECCS – based on manure AD



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LANDMARC partners

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https://www.landmarc2020.eu/

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