Agro-environmental indicators. New IACS VISION in ACTION – NIVA

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AGRO-ENVIRONMENTAL INDICATORS

NEW IACS VISION in ACTION - NIVA

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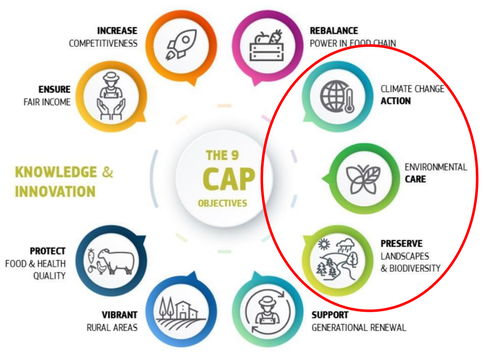
European Commission

NIVA NEW IACS VISION IN ACTION

NIVA H2020 PROJECT
www.niva4cap.eu

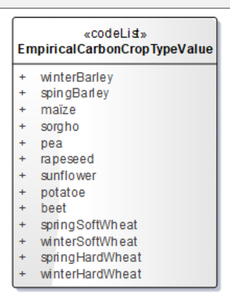
Context and objectives

- Agricultural activities have a strong impact on the environment
- UC1b has developed a set of indicators based on existing scientific methods and on data widely available in Europe (IACS, Sentinel-2 images, topographic data)
- Computation tools are open-source and available on the NIVA GitLab : **gitlab.com/nivaeu**
- These indicators may contribute to assess some of the new CAP objectives and some Sustainable Development Goals

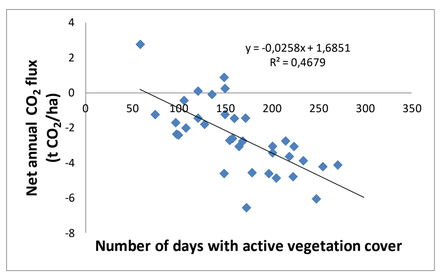


Carbon indicator: annual CO_2 flux due to crop vegetation cycle

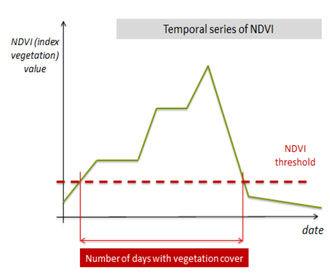
- CO_2 flux takes into the account the CO_2 emitted in the atmosphere (plants and soil respiration) and the CO_2 stored by plants due to photosynthesis.
- The computation of CO_2 flux is based on an empirical method: for main crops, annual CO2 flux depends on the number of days with active vegetation. This number of days is estimated from NDVI temporal series (from Sentinel-2 images).



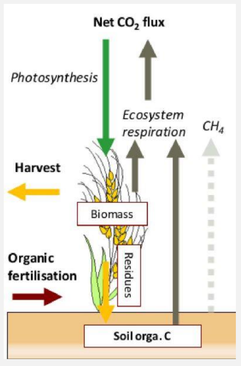
List of crops concerned by the empirical method



Relationship between CO_2 flux and the nb of days with active vegetation



The NDVI threshold corresponding to bare soil enables to derive the nb of days with active vegetation



- The computation tool has been tested on various areas in Europe (France, Denmark, Netherlands, Spain)

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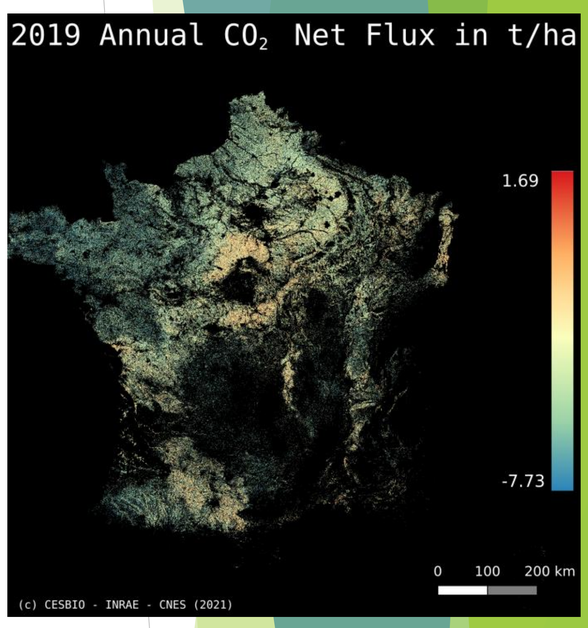
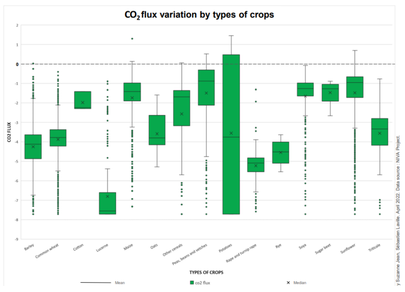
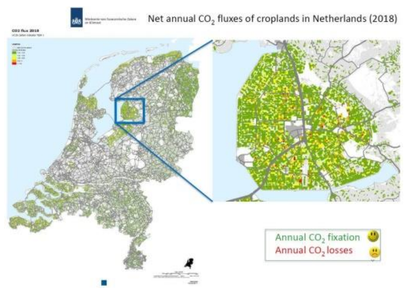


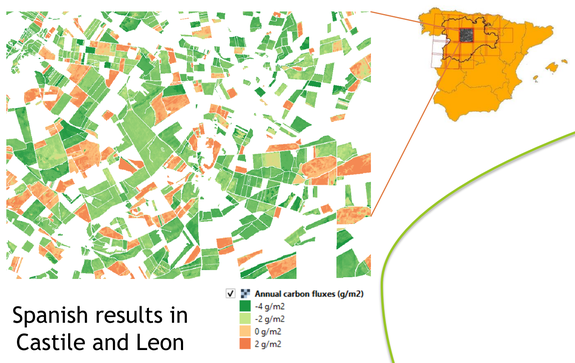
Annual CO_2 net flux computed at pixel level in whole France



Variation of CO_2 fluxes by type of crop in Ain French department



Results in the Netherlands at parcel level



Spanish results in Castile and Leon

Biodiversity indicator

- Land cover characteristics and agricultural practices influence the potential of an agricultural landscape to host a high proportion of species that occur in that region.
- The biodiversity indicator is reflecting this potential. It may be computed on each cell of a kilometric grid for each agricultural year, on most agricultural landscapes, i.e. landscape dominated by crops.
- The landscape characteristics taken into account are the quantity of semi-natural elements (woods, hedges, ponds, rocks …), mean field size and crop richness/diversity
- The biodiversity indicator corresponds to a multi-diversity index that takes into account the species richness of 7 taxonomic groups

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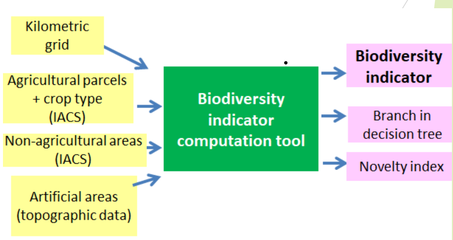
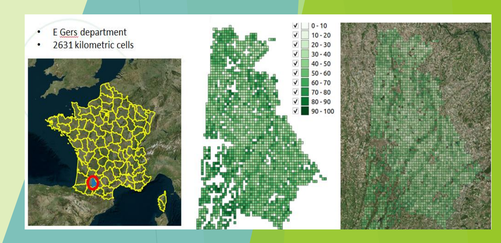


The Novelty index is a quality flag of the biodiversity indicator.



Results from testing in France

Nitrate leaching indicator

- The nitrate leaching indicator measures the risk of nitrate leaching due to crop rotation over a drainage period
- Nitrate leaching triggers a risk for water quality and a loss of nutrients
- This nitrate leaching indicator is based on the following principles:
  - After harvest, crop stubbles may release nitrate due to mineralisation effects
  - A catch crop or other intermediary cover mainly takes up nitrate for its growth
  - The new crop takes up nitrate for its growth

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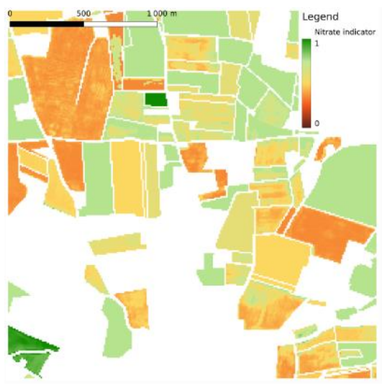
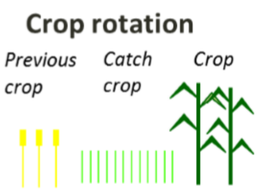
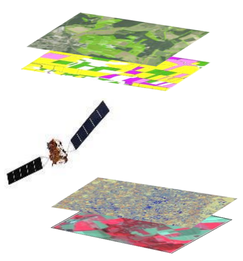


The nitrate leaching indicator is computed at pixel level and expressed on a scale between 0 (low) and 1 (high).





IACS data provide information about previous and current crops.

Information about catch crop is derived from Sentinel-2 images (NDVI temporal series)

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