

## UC1b – Agro-environmental monitoring

### Description of the Use Case

Agricultural practices have a strong impact on environment. This impact should be measured to support decision making and implementation of environmental policies. Thus, there is a need for agro-environmental indicators. Goal of this Use Case is to elaborate (select, test and propose for use) a set of relevant agro-environmental indicators and demonstrate feasibility of their calculation through models and algorithms at the level of parcels, farm holding and other units (e.g. catchments, administrative units).

Initially we identified 11 agro-environmental and climatic indicators was discussed, all of them addressing different CAP objectives and 5 categories of environmental issues related to:

- Climate mitigation: Carbon budget, reduction of nitrogen fertilisers
- Water quality: nitrate leaching, pesticides, herbicides, fungicides
- Biodiversity: biodiversity conservation, biological control, pollination

A workshop was organised in Paris (5 February 2020 ; [NIVA workshop “The development of agro-environmental and agro-climatic indicators for monitoring the impacts of future CAP”](#) and hosted by the French Paying Agency (ASP) to select three of these agro-environmental indicators. Participants included members of the European Commission (DG-AGRI, DG-CLIMA, DG JRC) and several NIVA partners especially Wageningen Research, INRAe and the European Environment Bureau.

It was decided during this workshop that NIVA should work in priority on three agro-environmental indicators with several levels of complexity (TIERS 1 to 3):

| Agro-environmental indicator                 | Short description of the principle   |
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| Carbon budget                                | Accounting for the percentage of time of soil coverage during a cropping year for estimating the net plot CO <sub>2</sub> fixation |
| Nitrate leaching                             | Accounting of the effect of the previous crop (mineralisation) and of the current crop (absorption)                                |
| Biodiversity conservation at landscape scale | Accounting for the spatial diversity of crops, the quantity and diversity of semi-natural habitats and the average size of parcels |

For each type of agro-environmental indicator there are several levels of complexity called TIER as follows:

- TIER 1 approaches is a basic indicator could easily be implemented requiring only IACS data and Sentinel indexes coming from the SEN4CAP processing chain or other sources.
- TIERS 2 to 3 are more elaborate indicators and more complex to implement (require agricultural practices from FMIS and/or external data e.g. climate/soil maps) but they offer higher levels of accuracy and reliability.

All scientific methodologies are evidence-based, most of them published and several were adapted from the H2020 DiverImpacts project.

## Innovation in the Use Case

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Agro-environmental indicators enable quantifying annually the impact of agricultural practices, at parcel, farm, country or EU scale. The calculation of these indicators will allow the analysis of agricultural activities over several years and on a large scale.

Tools developed in this use case combine existing Earth Observation data and Area Monitoring System methodologies but our objective is to go further by using specific algorithms for indicator calculation (e.g. biomass production for the Carbon budget indicator TIER3 approach).

This use case is developed with an innovative approach connecting data and cross-disciplinary actors to achieve the same tangible objective related to agro-environmental issues.

## Benefits

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As algorithms will be under EUPL licence, the agro-environmental indicators will be calculated by any operator with computer knowledge. The aim of the use case is to calculate and disseminate these indicators in each Member State to ensure a wide range of stakeholders will be able to use the results.

A first level of beneficiaries are directly farmers and their organisations (e.g. cooperatives) to be aware of their impact on environment, to encourage fertilizers reduction and adopt good practices improving biodiversity (cost reduction, better quality production) and climate mitigation.

A second level of beneficiaries are public institutions especially environmental research institutes, water agencies, ministries concerned. The aim is to evaluate the impact of agricultural practices highlighting good methods and suggesting improvements or regulation framework.

A third level of beneficiaries are private sector driven by the search for production optimization and valorization of efforts in the environmental sphere (e.g. carbon market).

More generally, the real expected benefits are for the planet as those tools could be used to sustain an agricultural economy that is compatible with the preservation of the environment.

## Involvement of stakeholders

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### **UC1b NIVA partnership**

The UC1b NIVA French team is composed by:

- ASP (French Paying Agency) leader of the use case in charge of CAP and IACS issues and professional organization involvement
- INRAe (National Research Institute for Agriculture, Food and Environment) scientific coordination
- IGN (National Institute of Geographic and Forest Information) for the technical coordination part

During the multi MS pilot phase, various members of the NIVA consortium will be involved:

- Danish paying agency (DAA)
- Dutch paying agency (RVO)
- Spanish paying agency (FEAGA)
- And other Member State interested to test agro-environmental indicators developed in this use case

#### **A multi-stakeholder approach**

- Farmers: they are key stakeholders as both data providers regarding agricultural practices and key users concerned by holding environmental performance;
- French Ministry of Agriculture: setting up of CAP national strategic plan;
- Permanent assembly of French chambers of agriculture (APCA): contact with professional organization, IT providers (interoperability), provide technical advices to farmers;
- Agence BIO, French agency for development and promotion of organic farming: organic farming certification process and tools, IACS process;
- French Biodiversity Agency, a public organization in the area of biodiversity protection and management: environmental data user;
- French National Institute for Agricultural Research INRAe: NIVA consortium partner. INRAe participates to the NIVA project through 3 research units (CESBIO, DYNAFOR and LBAE) INRAe provides the UC1b with scientific approach for indicator design and calculation both with the agronomic justifications and with the earth observation methodologies.