EUROPEAN
EVALUATION
HELPDESK
FOR RURAL DEVELOPMENT

ITALIAN CASE STUDY- EVALUATION OF CLIMATE STABILITY MEASURES IN EMILIA ROMAGNA

FACTSHEET OF THE EUROPEAN EVALUATION HELPDESK FORRURALDEVELOPMENT - October 2016

MEETING THE CLIMATE OBJECTVIES OF THE CAP

Climate change presents one of the central challenges for agriculture and rural areas in the European Union (EU). Agricultural emissions (methane and nitrous dioxide) account for 10% of Europe's greenhouse gases (GHG) and Land Use Land Use Changes and Forestry (LULUCF) is a significant means of carbon sequestration. Climate stability is one of the main environmental objectives of the reformed CAP, responding to the goal of the EU of reducing GHG emissions by 20% of 1990 levels by 2020.

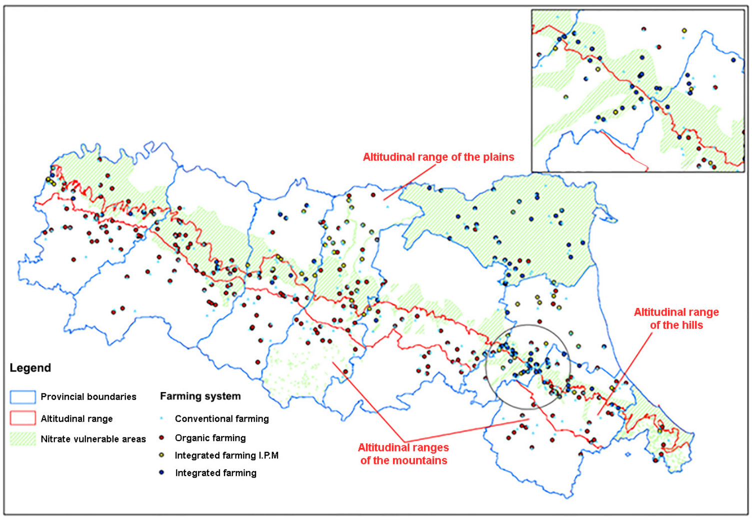
Emilia Romagna is located in the north of Italy, predominantly in the Po Valley. The area occupied is approximately 22,500 km^2 (48% low-lying, 27% hilly and 25% mountainous) with 4.4 million inhabitants. The Po Valley is one of the most intensively farmed areas in Italy. Over recent decades, the agricultural sector has increased its competitiveness through considerable structural reorganisation leading to highly specialized, innovative and intensive production systems. The farming sector is split between traditional high quality produce, and large-scale industrial production produced for export. The principal environmental issues relate to the 75% of farming, which is of a high or medium intensity which produces a high concentration of nitrates and phosphorus in freshwater and groundwater, and soil erosion. Agri-environmental payments (M214) represent the highest budget allocation in the Emilia Romagna Rural Development Programme (RDP) in terms of measures.

Main Evaluation Challenge Addressed:

The main challenge is how to evaluate the contribution of the two most important sub-measures of the agri-environmental scheme (i.e. integrated and organic production) for GHG emissions, in comparison to conventional production which is not supported by the RDP.

FURTHER INFORMATION

- Emilia-Romagna (IT) Evaluation Report RDP 2007-2013, agri-environmental payments (M214)
- Envieval is a project within the EU 7th Framework Programme for research
- Andrea Povellato - The Council for Agricultural Research and Economics (CREA)
- On-going evaluator: Agriconsulting



A CARBON FOOTPRINT APPROACH

Climate stability can be evaluated in terms of the GHG balance (emission and sequestration) of the agricultural sector using a carbon footprint approach (CF). The unit of measurement of CF is metric tonnes of carbon dioxide equivalents. CF includes GHG absorption and emission during the life-cycle of a product or service, from the extraction of raw materials to its final use. Thus, CF can be considered as a sub-set of data derived from a Life Cycle Assessment (LCA). The application is at the process level (functional unit), with the regional levels derived through a consistent application of upscaling of available representative process-level data. The CF approach focuses on emission drivers, taking into account indirect effects of changes in farming practices on other sectors, e.g. the energy sector (changes on fuel consumption) or industry (changes on fertiliser and pesticide use). Carbon footprint methods provide inputs to counterfactual approaches. Where sufficient data is available (i.e. samples with more than 30 to 50 observations per group) quantitative methods can be linked to a quasi-experimental design.CF methods allow for the creation of comparison groups. This enables the researcher to analyse the changes occurring in the period before and after the implementation of the measure by the participants. This method also allows for the comparison between RDP participants and non-participants. When the number of observations is insufficient for an elaborate statistics-based evaluation, a naïve group comparison counterfactual approach can be used preferably using expert knowledge to create similar comparable groups in order to avoid sample selection bias.

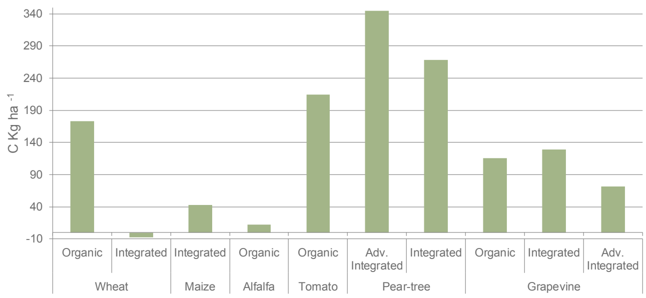
Analysis of GHG emissions at a process level compared 6 crops (wheat, corn, alfalfa, pear, tomato and vineyards) under organic and integrated versus conventional farming systems. Hierarchical sampling allowed for the selection of pairs (factual and counterfactual) at a process level. The 3-year survey involved 700 farms and 2,828 combinations of cropping systems (1,414 pairs). Evaluators used a multi-purpose survey, that covers multiple evaluation related topics, to increase the overall efficiency of the evaluation activities. The representativeness of cases is less of a problem for evaluations at a process-level in which there is a reduced number of productive systems to be analysed. Evaluations at the farm-level, however, become increasingly more complex as the variability of the whole farming system increases the requirements for assessing CF at farm-level. This requires ensuring a satisfying representativeness of both treated (RDP participants) and non-treated (non-participants) productive systems. The aggregated estimation at a regional/macro level has to use assumptions that can reduce the robustness of the overall evaluation.

Exemplary Results

Organic farms are located primarily in mountain areas, with more extensive crops, which results in smaller differences in GHG emissions then with the conventional farms. Integrated management farms are located in either plain or hill areas where crops are more intensively cultivated, leading to more significant differences in GHG emissions between them and conventional farms.

Organic management had lower emissions per unit area compared with those of Integrated and Conventional systems. This is perhaps due to the use of organic fertilizers, with lower emission potential, and the use of chemical plant protection products in the non-organic systems. The contribution to GHG emissions of mechanisation is always high compared to the impacts of fertilization and pesticide application. Emissions caused by input applications vary but are always lower in Organic and fluctuate in the Integrated systems.

The carbon sink is higher in permanent crops (pear and grapevine) compared with annual crops (wheat and tomato), with no high differences reported between the crop management systems (organic, integrated and advanced integrated). The use of organic fertilizers contributes to an increase in the carbon sink of the soil,



tending to increase the differences between Organic management and Integrated or Conventional systems.

A well-established farm sample, such as the Farm Accountancy Data Network (FADN), provides a good basis for collection of such information covered in this case study. However, current farm databases do not contain all the data required for the carbon footprint calculation (e.g. information on farming practices). Counterfactuals can be developed using data on GHG emission for naive quantitative comparison or for more robust and elaborate statistics-based models as seen in this study. The lack of sector- and region- specific emission factors for important agricultural inputs remains a source of uncertainty in outputs. Moreover, a high variability between farms within the same support type can challenge researchers.

KEY LESSONS AND RECOMMENDATIONS

Two main (interdependent) factors could undermine the final result of the evaluation: the representativeness of the sample and the availability of information on farming practices.

The design of a sample that is statistically representative of two distinct populations (participant and non-participant) requires a higher number of observation units than the normal sample representative at the regional/macro levels. The need to estimate separate effects of different measures could further increase the number of observations. A better estimation of GHG emissions at a functional unit level relies on detailed information of farming practices, at the moment this is only partially collected from FADN and FSS samples. The collection of additional data is a pre-condition to obtain sufficiently reliable estimations.

The problem of poor representativeness is less relevant in the case of the process-level approach where a reduced number of productive systems is analysed with a more specific and detailed comparison of the treated and non-treated productive systems. However, some assumptions are required for the aggregated estimation at the regional/macro level, which can reduce the robustness of the overall evaluation. The farm level approach takes advantage of the existing FADN/FSS samples, which can be integrated with information derived from administrative data sources in place of missing data. However, additional data collection is always needed and difficulties in the pairwise comparison arise due to structural differences between treated and non-treated groups. Overall, the process-level approach gives reliable and useful results requiring less time and effort, in this case, than the farm-level approach.

European Evaluation Helpdesk for Rural Development

T +32 2 737 51 30
info@ruralevaluation.eu
http://enrd.ec.europa.eu/evaluation/

EVALUATION WORKS!

European Network for Rural Development

The Evaluation Helpdesk works under the supervision of Unit E.4 (Evaluation and studies) of the European Commission's Directorate-General for Agriculture and Rural Development.