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D5.4 Submitted open access papers on resilience assessment of current farming systems across the EU

WU (P1)

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1 Introduction

Three papers have recently been submitted, based on D5.2 'Report on participatory impact assessments in case study regions'. The first paper is led by Pytrik Reidsma and has been submitted to 'Eurochoices' end of February 2020. This paper will be part of a special issue on the SURE-Farm project. It synthesizes results from a participatory assessment from all 11 case studies. The second paper is led by Wim Paas and has been submitted to 'Ecology & Society' early May 2020. This paper presents the framework for participatory assessment of sustainability and resilience in more detail, and presents applications for three specialized systems. The third paper is led by Elena Nera, and has already been published in 'Sustainability' in January 2020. It focuses on the application of the framework in one specific case study, i.e. hazelnut production in central Italy. It therefore provides detailed insights in the sustainability and resilience of one specific farming system. References are provided below, and abstracts are included in the next sections. To not interfere with submission processes (Reidsma et al., Paas et al.) and copyright issues (Nera et al.) this deliverable does not include the papers' full content.

Reidsma, P., M. Meuwissen, F. Accatino, F. Appel, I. Bardaji, I. Coopmans, C. Gavrilescu, F. Heinrich, V. Krupin, G. Manevska, M. Peneva, J. Rommel, S. Severini, B. Soriano, J. Urquhart, K. Zawalinska, W. Paas. 2020. *How do stakeholders perceive the sustainability and resilience of EU farming systems?* Eurochoices, submitted.

Paas, W. I. Coopmans, S. Severini, M. van Ittersum, M. Meuwissen, P. Reidsma. 2020. *Participatory assessment of sustainability and resilience of specialized EU farming systems.* Ecology & Society, submitted.

Nera, E., W. Paas, P. Reidsma, G. Paolini, F. Antonioli, S. Severini. 2020. *Assessing the Resilience and Sustainability of a Hazelnut Farming System in Central Italy with a Participatory Approach*. Sustainability 12(1), 343.

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2 How do stakeholders perceive the sustainability and resilience of EU farming systems?

An increasing variety of stresses and shocks provide challenges and opportunities for EU farming systems. This article presents findings of a participatory assessment on the sustainability and resilience of 11 EU farming systems, to inform the design of adequate and relevant strategies and policies. According to stakeholders that participated in workshops, main functions of farming systems were related to food production, economic viability and maintenance of natural resources. Performance of these and five other functions was perceived to be moderate. Past strategies were often geared towards making the system more profitable, and to a lesser extent also towards coupling production with local and natural resources, functional diversity, social self-organization and infrastructure for innovation. Overall the resilience of studied farming systems was perceived low to moderate, where robustness and adaptability were often dominant over transformability. To allow for transformability, being reasonably profitable and infrastructure for innovation were viewed as essential. For many farming systems, transformability is needed. This requires a shift in responses to short-term processes to strategies that deal with long-term processes, and, both ecological (e.g., coupling to natural capital) and technological (e.g., innovation) solutions are needed.

Keywords: agriculture, robustness, adaptability, transformability, European Union, policies

3 Participatory assessment of sustainability and resilience of three specialized farming systems

There is a need for participatory methods that simultaneously assess agricultural sustainability and resilience at farming system level, as resilience is needed to deal with shocks and stresses on the pathways to more sustainable systems. This paper presents the Framework of Participatory Impact Assessment for Sustainable and Resilient FARMing systems (FoPIA-SURE-Farm). FoPIA-SURE-Farm investigates farming system functioning, dynamics of main indicators and specifies resilience for different resilience capacities, i.e. robustness, adaptability and transformability. Three case studies with specialized farming systems serve as an example for the used methodology: starch potato production in Veenkoloniën, The Netherlands; dairy production in Flanders, Belgium; and hazelnut production in Lazio, Italy. In all three farming systems, functions that related to food production, economic viability, and maintaining natural resources were perceived as most important. Perceived overall performance of system functions suggest moderate sustainability of the studied farming systems. Strategies to maintain or improve performance of main indicators of farming systems were mainly related to either long-term trends or major shocks. In general, strategies for coping with challenges were assessed to contribute mostly to robustness and least to transformability of the farming system. For some strategies, a

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trade-off between robustness and transformability was observed. General characteristics of farming systems that supposedly convey general resilience, the so-called resilience attributes, were indeed evaluated to contribute positively to resilience, whereby contribution to robustness was perceived stronger than to adaptability and transformability. Profitability, having production coupled with local and natural resources, heterogeneity of farm types, and infrastructure for innovation were assessed as being important for resilience. However, these resilience attributes were generally perceived as being slightly to moderately present. Combined with perceived moderate sustainability levels, this suggests that resilience in the studied systems can and should considerably improve.

Keywords: adaptability; agriculture; robustness; socio-ecological systems; specialized systems; transformability

4 Assessing the resilience and sustainability of a hazelnut farming system in Central Italy with a participatory approach

European agriculture is facing increasing economic, environmental, institutional, and social challenges, from changes in demographic trends to the effects of climate change. In this context of high instability, the agricultural sector in Europe needs to improve its resilience and sustainability. Local assessments and strategies at the farming system level are needed, and this paper focuses on a hazelnut farming system in central Italy. For the assessment, a participatory approach was used, based on a stakeholder workshop. The results depicted a system with a strong economic and productive role, but which seems to overlook natural resources. This would suggest a relatively low environmental sustainability of the system, although the actual environmental impact of hazelnut farming is controversial. In terms of resilience, we assessed it by looking at the perceived level of three capacities: robustness, adaptability, and transformability. The results portrayed a highly robust system, but with relatively lower adaptability and transformability. Taking the farming system as the focal level was important to consider the role of different actors. While mechanisation has played a central role in enhancing past and present system resilience, future improvements can be achieved through collective strategies and system diversification, and by strengthening the local hazelnut value chain.

Keywords: resilience; sustainability; farming system; participatory assessment; perennial system; Viterbo; specialisation.

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