

## **Reflections on the appropriateness of the adapted Social Ecological Systems framework as a management tool to assist adjustment in agricultural and forestry management in the EU that aid the provision of public goods & ecosystem services. (PEGASUS H2020 project)**

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### **Abstract:**

This paper summarises the experiences made with the use of an adapted Social Ecological Systems framework in 34 case studies across Europe aiming to understand better the interlinkages between different collective actions and the delivery of ecosystem services and public goods by agriculture and forestry. Following an initial assessment using the SES framework in the 34 case studies, 12 of the case studies were continued with varying levels of action-oriented research. We conclude that case studies gain substantial system knowledge by using the SES framework; however, the PEGASUS concept is not quite congruent with the SES framework leading to some difficulties particularly for cases without a clear territorial focus. Other shortcomings relate to the lack of dynamic perspective or the unclear location of the social and beneficial outcomes within the framework.

### **The application of the PEGASUS concept**

A key aim of the EU HORIZON 2020 project PEGASUS (Public Ecosystem Goods And Services from land management – Unlocking the Synergies, 2015-2018) was to develop a mechanism that allows for increased understanding of the nature of resource management and other processes, that influence the delivery of public goods and/or ecosystem services by different types of farming and forestry systems in Europe. Following a review of the theories and concepts that underpin both public goods and ecosystem services (Marechal et al 2016) the term ‘environmentally and socially beneficial outcomes’ (ESBOs) was introduced to capture not only the intrinsic characteristics but also the effects and impacts of their provision and production in a systemic approach.

Table 1 provides an overview of the key terms used in the PEGASUS concept. We started our analysis in 34 case studies from the perspective of initiatives, which foster provision of environmental and social beneficial outcomes through different mechanisms. Our focus here was particularly on market-based and collaborative mechanism that targeted land use and land management (intensity) in very different forms. The development and the functioning of the initiatives and through them the provision of ESBOs are strongly influenced by different drivers/ factors.

The project used the social ecological systems (SES) framework as further developed and discussed by McGinnis and Ostrom (2014). The framework was adapted to be used as an analytical tool in 34 case studies; it has been outlined in the introductory paper. In a second phase, action-oriented research methods in 12 out of these 34 cases were used to further deepening the insights and to develop approaches and activities to strengthen or enhance the delivery of public goods and ecosystem services.

Table 1 Main components of the PEGASUS concept

PEGASUS terminology	PEGASUS concept
<b>Initiatives (collective action)</b>	Different types of collective actions are maintaining or changing particular land use and management practices; with the explicit or implicit objective to maintain or increase provision of ESBOs
<b>ESBOs</b>	Provision of ESBOs is directly or indirectly linked to land management and land use; ESBOs are defined and target levels determined through societal and political actors.
<b>Land use and land management</b>	The combination of land uses and land management practices (intensity) determines the level of ESBO provision
<b>Drivers / factors for collective action</b>	Exogenous and endogenous factors are driving collective actions; interrelated to factors affecting land use and management intensity, among those also awareness and appreciation

## Conclusions

Even the adapted SES framework, presented various challenges to the case studies. There were five main concerns about the SES framework:

- a) The dynamic aspect of the SES framework is implicit but the key focus is not on change itself but on understanding the often complex system that is currently in place. There are several places where dynamic aspects can and should be articulated.
- b) Use of the SES framework on non-geographical case studies is clearly a challenge issue. Almost all of the examples use SES in the context of natural systems and in PEGASUS, the focus is on agriculture and forestry, so in this sense the project is also focussed to some extent on natural resource management. However, there are significant social and economic aspects that may not fit so well with the territory or geographically well-defined aspects. Still, there are adjustments that can be made to ensure that the most is made of the SES framework in the less/non-geographical case studies.
- c) The communication with stakeholders is critical to both PEGASUS and the SES framework. To some extent, all research tools need translating for use with local and national stakeholders. The level of detail is considerable, not least because these are complex situations and the approach is attempting to look at the whole rather than a small part of it. The PEGASUS and the SES framework agree meeting stakeholders where they are; that researchers engage with stakeholders to understand their position, attitudes and behaviours in key areas.
- d) Complex situations are part of the rationale for developing and adopting the SES framework, however every tool has its limitations. This might be a case of scale, scope or a combination of both. The strength of the SES concept is that it promotes a systematic analysis and representation of the connections within the CS area. It does this by comprehensively addressing the interplay between social and ecological elements and associated systems and linking this to management practices and social mechanisms.
- e) The link between ESBOs and the SES framework needs clarifying, not least because there was an assumption that the ESBO would most comfortably equate with the resource units. While the assumption that ESBOs and Resource Units worked in some cases the experience of the 34 CSs

suggests that this was an oversimplification. ESBOs may have a root within the Resource Unit but the interactions associated with them means that they stray into the Resource system as well. Furthermore the values and experiences associated with ESBOs will also related to the Action Situation. The SES diagram has been adjusted to include a box where the ESBOs can be listed and these can be linked to Resource Units and Resource Systems by a number.

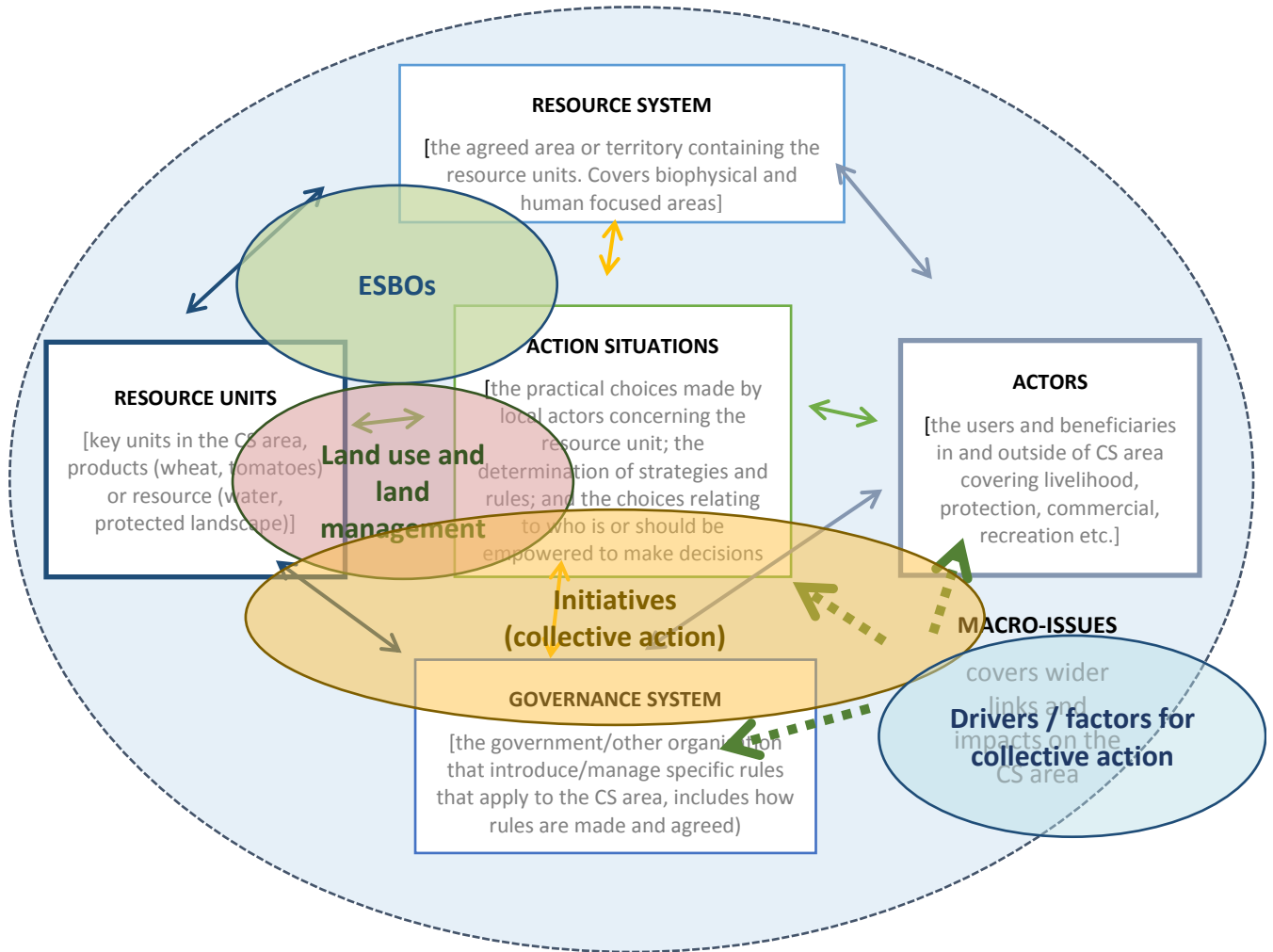


Figure 1 Main components of the SES framework and overlay of key PEGASUS concept terms (adapted from Ostrom and Cox 2010; McGinnis and Ostrom 2014)

As a concept the SES has been tested and adapted by PEGASUS, not least because of its use in a project with people from diverse backgrounds working on different resource sectors in different geographic areas as in PEGASUS. However, the presence of a common framework has proved valuable and it will continue to inform our work, including the common vocabulary and the shared aim of understanding

the various processes and outcomes and their impact on the provision of ESBOs in a particular CS and in agriculture and forestry more generally.

### References:

Marechal, A., Baldock, D., Hart, K., Dwyer, J., Short, C., Pérez-Soba, M., Paracchini, M.L., Barredo, J.I., Brouwer, F., Polman, N., 2016. Synthesis report - The PEGASUS conceptual framework. Deliverable 1.2

McGinnis, M. D., Ostrom, E., 2014. Social-ecological system framework. Initial changes and continuing challenges. E&S. 19.