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Guidelines for the Sustainable Development of Agriphotovoltaics in Orchard Cultivation: An Approach for Their Harmonious Application in the Natural, Landscape and Socio-Cultural Context of South Tyrol

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Abstract : In response to the escalating recognition of the need to combat climate change, renewable energy sources (RES), particularly solar energy, have witnessed exponential growth. The intricate nature of agriphotovoltaics, which combines agriculture and solar energy production, demands rapid legislative and technological development, facing various challenges and multifaceted design. This complexity is also represented by its application for orchard cultivation (APVO), which, in the first part of this research, was studied in its environmental, economic, and sociocultural aspects. Insights from literature, case studies, and consultations with experts contributed valuable perspectives, forming a robust foundation for understanding and integrating APVO into rural environments, including those in the South Tyrolean context. For its harmonious integration into the sensitive Alpine landscape, the second part was then dedicated to the development of guidelines, from the identification of the requirements to be defined as APVO to its design flexibilities for being integrated into the context. As a basis for further considerations, the drafting of these guidelines was preceded by a program of interviews conducted to investigate the social perceptions of farmers, citizens and tourists on the potential integration of APVO in the fruit-growing valleys of the province. Conclusive results from the data collected in the first phase are, however, still pending. Due to ongoing experiments and data collection, the current results, although being generally positive, cannot guarantee a definitive exclusion of potential negative impacts on the crop. The guidelines developed should, therefore, be understood as an initial exploration, providing a basis for future updates, also in synergy with the evolution of existing local projects.

Keywords : agriphotovoltaics, Alpin agricultural landscapes, landscape impact assessment, renewable energy
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