Fostering Rural Innovation and Sustainability with GREENCOOP

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Abstract. Rural areas cover 83% of EU territory and face critical socio-economic challenges, with nearly 20 million hectares at high risk of abandonment by 2030. This is driven by aging populations, youth outmigration, low social inclusion, and a lack of viable rural business models, resulting in land degradation, biodiversity loss, and declining food and water security. Funded by Horizon Europe, the Green Transition Cooperation for the Integration of Rural Innovation-Based Business and Production Models (GREENCOOP) project aims to develop and implement innovative Rural Community Business Models (RCBMs) that integrate Agroecology and Digital Innovations (ADIs). GREENCOOP will establish an International Rural Innovation Business Community Network (RIBC-Net) with 15 EU and 3 Chinese Living Labs (LLs) to co-create and test six ADI-driven strategies: energy supply, nutrient management, weed control, landscape connectivity, water security, and value chain optimization. The project will promote bio- and circular economies, improve labor conditions, and create quality jobs. By enhancing environmental sustainability and rural vitality, GREENCOOP seeks to combat land abandonment and reinforce food security. This communication presents the initial ADIs to be implemented in selected EU and Chinese regions.

Keywords: Land abandonment, agroecology, business models, digital innovation, ecosystem services.

1. Introduction

Rural areas in the European Union (EU) cover 83% of its territory (European Comission, 2020) and face an increasing threat of land abandonment, with nearly 20 million hectares at high or very high risk of being abandoned by 2030 (Perpiña-Castillo et al., 2018). This trend is driven by the lack of viable rural business models connected to the broader economy and exacerbated by the aging farming population — 60% of EU farmers are over 55 years old — combined with low generational renewal (only 11% are under 40), limited social inclusion (just 8.6% of farmers are women), and continued migration from rural to urban areas (5.6 million agricultural workers left the sector between 2005 and 2017; European Comission, 2019).

Land abandonment is directly linked to soil degradation, loss of biodiversity, and reduced food and water security, resulting in less resilient rural territories in the face of market and climate change. These challenges must be addressed through the lens of the New European Bauhaus initiative, which calls for (i) inclusiveness across cultures, disciplines, genders, and generations, (ii) sustainable innovations in harmony with nature, and (iii) solutions inspired by culture and exceeding mere functionality.

In response, there is an urgent need to develop and test new Rural Community Business Models (RCBM) that enhance current rural enterprises. These models must integrate agroecological and digital innovations/solutions (ADIs) to improve environmental ecosystem services, farmer well-being, and the overall vitality of rural areas. This study aims to develop and validate innovative RCBMs incorporating ADIs to combat land abandonment, support rural sustainability, enhance labor conditions, and foster inclusive, resilient rural communities.

2. Materials and methods

The GREENCOOP project is structured around seven Work Packages (WPs), implementing a transdisciplinary, multi-actor approach. Central to the project is the creation of an International Rural Innovation Business Community Network (RIBC-Net), supported by 18 Living Labs (LLs)

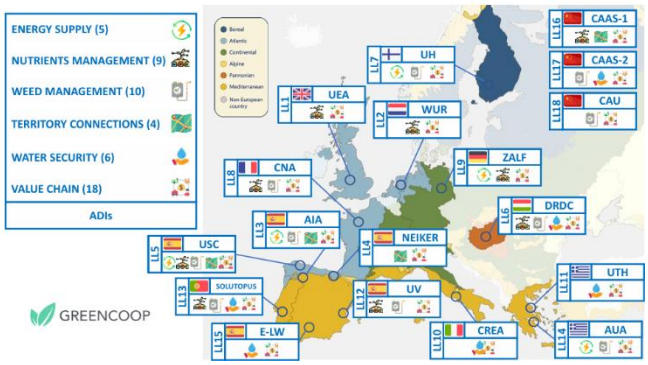

Figure 1. RIBC-Net and GREENCOOP LLS

in Europe and China (Figure 1). These LLs will facilitate stakeholder co-creation, testing, and adaptation of innovations following the Quadruple Helix model (involving Citizens, Government, Industry, and Academia).

The LLs will generate data feeding into the harmonized BUS-DB, supporting sustainability evaluations via the BUS-DST decision-support tool. This tool compares existing farming models with innovative RCBMs across agroecological, organic, and conventional systems. Advanced modelling tools (MODAM and CGE) will be used to assess trade-offs and synergies across environmental, economic, and social dimensions. The implementation of ADIs will follow both top-down and bottom-up approaches: a top-down analysis of technologies for sector integration, and a bottom-up strategy through co-designed demonstrators developed, tested, and validated within LLs. Innovation Brokers will support knowledge flow, while participatory workshops and regional engagement events will ensure stakeholder-driven adaptation.

3. Results and discussion

GREENCOOP is expected to deliver transformative results by integrating ADIs into RCBMs across a variety of pedoclimatic zones through the RIBC-Net establishment (WP1). The project will provide ADI demonstrators (WP2) tailored to conventional, agroecological, and organic systems across four key land uses (arable land, permanent grasslands, permanent crops, forests) and nine agri-food sectors (dairy, beef, poultry, sheep, pigs, arable, fruit, olives, and horticulture).The demonstrators will inform sustainability assessments (WP3) and optimization modelling (WP4), supporting the development of scalable business strategies and policy tools. A centralized platform (BUS-PT, WP5) will provide access to guidelines, protocols, and best practices. The decision-support tools developed will empower stakeholders to select appropriate ADIs based on their specific conditions.

Dissemination, communication, and exploitation activities (WP6) in 11 countries will maximize impact, foster cross-sector collaboration, and accelerate the adoption of project outcomes. The RIBC-Net will ensure long-term connectivity among LLs and stakeholders, promoting continued innovation and knowledge exchange beyond the project's duration.

Through its integrative and participatory framework (Figure 2), GREENCOOP will advance EU policy goals, including those of the Green Deal, the Farm to Fork Strategy, and Horizon Europe Missions, while actively addressing climate and demographic challenges in rural territories.

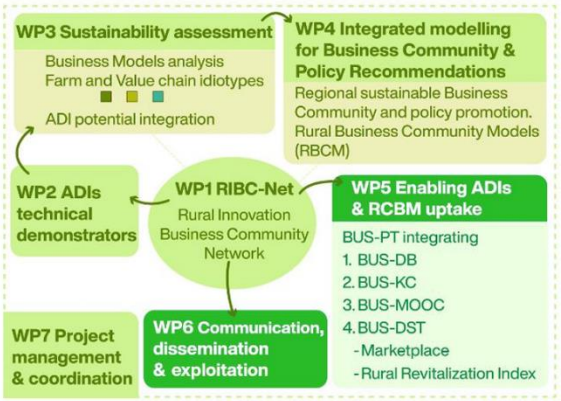

Figure 2. GREENCOOP Pert chart.

4. Conclusion

GREENCOOP will provide a robust framework for revitalizing rural regions through the integration of Agroecology and Digital Innovations into sustainable, inclusive business models. By leveraging Living Labs and the RIBC-Net for co-creation and real-world testing, the project will promote viable RCBMs suited to diverse contexts. Demonstrators, assessment tools, and policy frameworks will guide stakeholders in adopting practices that enhance environmental, social, and economic outcomes. With wide-scale dissemination and long-term collaboration platforms in place, GREENCOOP will support systemic change aligned with EU sustainability goals.

5. Acknowledgements

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