1. **Title, acronym and code of proposal**

Socio-Environmental VulnErability in RurAl Spain (SEVERAS), SR0419

2. **Summary**

Rural areas in Spain are experiencing unprecedented environmental and social changes. Climate change and biodiversity loss are occurring alongside depopulation and the abandonment and intensification of rural landscapes. Understanding inter-connections of environmental and social stressors, and their impact on rural development is paramount to devise policy that can enhance the wellbeing of rural populations whilst promoting sustainable land uses. The aim of this project is to develop country-wide and regional indexes of Socio-Environmental VulnErability in RurAl Spain (SEVERAS) and use them to explore policies that can reduce said vulnerability. The project will assemble so far disconnected climatic, census, land-use and rural development data into a unique socio-environmental database. The indexes will be elaborated and validated with key stakeholders through participatory planning workshops ("rural vulnerability laboratories") where rural citizens and policy makers will also co-design policies aimed at reducing vulnerability. Overall, SEVERAS will generate new science on the compounded effects of socio-environmental drivers of rural vulnerability; provide a new quantitative tool for rural development diagnosis and policy making in Spain; and empower rural citizens by involving them in the development of the indexes and new policies.

3. **Research proposal**

<u>Societal challenge, objectives, and research questions</u>

Rural regions, in Spain and worldwide, are responsible for global food production, and they host the largest share of the world's terrestrial biodiversity [1]. These regions, in turn, are highly sensitive to environmental and social stressors, and rural peoples' often limited economic and political capacities constrain their ability to cope or adapt to such stressors [2].

Three of the main stressors that rural regions in Spain are facing include depopulation, climate change and biodiversity loss [3], [4]. Little systematic knowledge exists about their compounded effects and the complex ways they interact with rural development factors. Qualitative, local accounts of said effects exist: younger generations are increasingly migrating to urban areas, which contributes to the abandonment of agricultural, husbandry and forestry activities and paves the way for land concentration, land-use intensification and biodiversity loss; this in turn reduces the profitability of small-scale rural livelihoods and makes rural landscapes more sensitive to rainfall variability and droughts.

Accounts like the above are illustrative but not sufficient if the goal is to promote social and policy learning across local contexts. The SEVERAS project will move beyond qualitative accounts of vulnerability by: i) developing a systematic understanding of the inter-connected drivers of rural
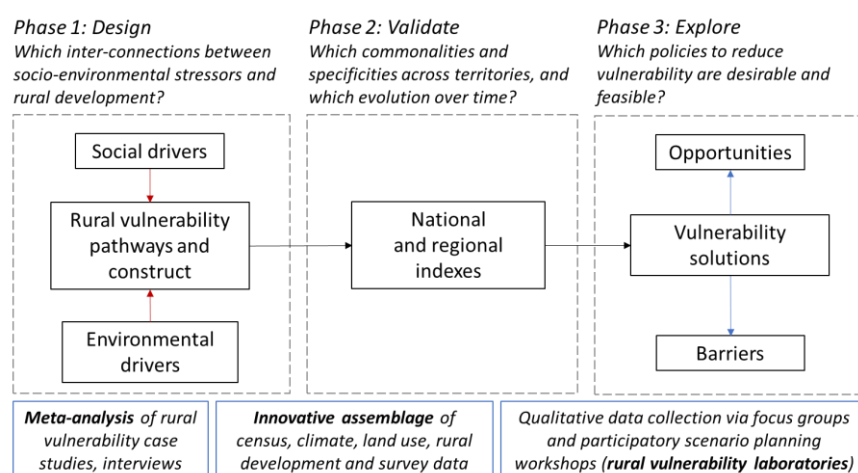
vulnerability in Spain; ii) generating national and regional index of rural vulnerability; and iii) working with national and regional stakeholders to explore policies that reduce vulnerability.

The research questions of the project are: **1.** How do depopulation, climate change, biodiversity loss and other socio-environmental **stressors jointly affect** rural development across Spain's rural regions? **2.** Which regions are experiencing the highest and lowest **levels of rural vulnerability** and how have these levels **evolved over time**? **3.** Which regional and national **policies to reduce vulnerability are desirable and feasible**?

Contribution to the state of the art

Originally focused on agrarian affairs and farming communities, rural development research has gone through three paradigm shifts that SEVERAS will capitalize on [5], [6]. The first shift has been the sustainable livelihoods (SL) approach and its interest in the combination of assets and activities that constitute a viable livelihood strategy for the rural families. Another important shift has been the switch from top-down or 'blueprint' approaches, characterized by external investments and national-level policies, to bottom-up, stakeholder-empowering approaches. A final innovation has been the interest in ecological, socio-economic and political stressors that threaten rural livelihoods, and the economic, institutional and political factors that allow individuals, households and communities to reduce their exposure and sensitivity to those stressors. SEVERAS will build and expand on the above scholarship by: involving a diversity of rural stakeholders in the design and validation of multi-scale vulnerability indexes and policies; identifying typical pathways that explain inter-connections between environmental and social stressors; and paying attention to both measured and perceived vulnerability across social groups and women in particular.

Data and methods

Phase 1: Design
Which inter-connections between socio-environmental stressors and rural development?

Phase 2: Validate
Which commonalities and specificities across territories, and which evolution over time?

Phase 3: Explore
Which policies to reduce vulnerability are desirable and feasible?

Social drivers → Rural vulnerability pathways and construct ← Environmental drivers → National and regional indexes → Vulnerability solutions (Opportunities / Barriers)

Meta-analysis *of rural vulnerability case studies, interviews*

Innovative assemblage *of census, climate, land use, rural development and survey data*

*Qualitative data collection via focus groups and participatory scenario planning workshops (**rural vulnerability laboratories**)*

Rural vulnerability research has been traditionally informed by either qualitative or quantitative approaches, whilst mixed methods have been rarely used. SEVERAS will tackle this gap by combining interviews and focus groups with quantitative data collection and the design and calculus of vulnerability indexes at national and regional levels. The methodological approach will consist of three phases (see Figure above). In

Phase 1, we will select regions that represent the diversity of socio-ecological and rural livelihood contexts in Spain. Phase 2 will rely on vulnerability assessments developed in other countries [7] and diversity of data sources, including biodiversity and soil erosion inventories (https://www.miteco.gob.es/es/biodiversidad/temas/inventarios-nacionales/), remote sensing cartography (https://land.copernicus.eu/), historical climate and meteorological databases (www.aemet.es), agrarian and population census (www.ine.es), and rural development statistics (https://ec.europa.eu/agriculture/statistics_en), to name a few. The "rural vulnerability laboratories" of Phase 3 will follow the principles of citizen science and living labs: open and inclusive spaces, reflective social learning through a collaborative multi-actor approach, and design thinking [8].

Innovation potential and impact

To our knowledge, SEVERAS will be the first project to: 1) advance an interdisciplinary, socio-environmental approach to the study of rural vulnerability in Spain; 2) develop a methodology to systematically assemble and generate quantitative and qualitative and data for the study of national and regional vulnerability in the country; and 3) generate vulnerability indexes that balance attention to territorial diversity and country-wide commonalities, and allow for historical assessment.

The societal benefits of SEVERAS include: generating new valuable data on rural vulnerability that is ready to use by rural development planners, including governmental and non-governmental organizations; empowering rural citizens in selected regions by raising collective awareness and ownership over the pathways that connect socio-environmental stressors and rural development; and identifying opportunities and barriers of integrative policies that ameliorate vulnerability to climate change, rural depopulation and biodiversity loss.

From a scientific standpoint, the project will pioneer a new interdisciplinary research agenda for the joint study of social and environmental drivers of rural vulnerability in Spain. The vulnerability indicators will serve as a stepping stone for future data collection endeavors and inspire new research questions; and the insights gained about inter-connections between environmental and social stressors will serve as hypotheses for further test. Ultimately, the methodology used to elaborate the vulnerability indices and organize the "rural vulnerability laboratories" will pave the way for a longer-term observatory of socio-environmental vulnerability in rural Spain.

References
[1]doi.org/10.1016/j.worlddev.2014.03.007;[2]gala.gre.ac.uk/id/eprint/14369/;[3]https://www.miteco.gob.es/es/cambio-climatico;[4]doi.org/10.1002/psp.1745;[5]doi.org/10.1111/1467-7679.00143;[6]doi.org/10.1016/j.gloenvcha.2006.02.006;[7]doi.org/10.1016/J.WORLDDEV.2015.02.011;[8]doi.org/10.1504/IJIRD.2009.022727.