Scientific Statement
Research, teaching and cooperation

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Executive Summary

I am a research fellow in economic geography interested in understanding the impact of climate change on rural territories under future policy scenarios and to use these methods for spatial planning and inclusive rural development. My research focuses on developing quantitative models of rural territories to address economic, social, and environmental problems, which are targeted to be directly used by decision-makers for territorial planning. I draw from my research case studies to teach students about practical territorial issues and invite them to use a diverse range of quantitative methods to challenge current paradigms and to propose alternative solutions for a sustainable and inclusive development of rural territories.

Research statement

My work uses a combination of empirical spatial approach with participatory research and quantitative economic modelling to advance knowledge on sustainable and inclusive development of rural territories. The following is a summary of my ongoing research contributions and some information about my future research plans and source of funding.

Current research

My ongoing research into the economic analysis of rural territories examines how rural finance, agricultural marketing, access to resources, and land use patterns shape regional economic development and rural livelihood opportunities, especially in the context of climate change.

Rural finance for inclusive development. Marginalised rural communities, either geographically or socio-economically, are the poorest and most vulnerable populations in any given country. Despite their remoteness to markets and services, they usually suffer from a lack of access to financial capital, which is necessary to invest in productive assets and develop their livelihoods. Based on a programme offering microcredit services to support pig breeding to ethnic minorities in Vietnam, I used qualitative data

from life trajectory analysis to build a statistical quantitative framework that aimed at characterising households' financial strategies. My findings showed that having recourse to credit is the only way for the poorest households to develop their means of production and to accumulate physical capital. However, formal credits from the Government offered to the poorest households without interests led to large-scale indebtedness due to the fact that they were untargeted: households did not use the credit to improve their means of production, and so were unable to refund the loan. My findings demonstrated that microcredit projects must implement modalities supporting households into the implementation of an income-generating livelihood activity and were presented to the local government and to international funders. One of the key messages that were raised to financial institutions and funders was the need to stagger repayments in order to avoid over-indebtedness.

Agricultural markets and price volatility. Improving the marketing of agricultural products is essential to increase farmers' incomes and agricultural production, thus reducing rural poverty and food insecurity. The model of bulk markets, based on the economic theory of free markets, is supposed to lead to the regulation of supply and demand by bringing sellers and buyers together in the same place, thus reducing agricultural market imperfections and increasing smallholders' bargaining power. In order to characterise the impact of this model on rural development, I conducted country-level analyses of agricultural marketing systems in Tanzania and Uganda by conducting rapid diagnosis in several rural territories and analysing time series of agricultural prices to characterise the impact of bulk markets on poverty and price volatility. My findings, currently being written as an invited short paper for the peer-reviewed journal *Regional Studies, Regional Science*, showed that bulk markets induce positive effects on farmers' incomes and galvanise agricultural channels only when there is a high number of agents using the market, as it increases farmers' incomes to the detriment of brokers. Active atomistic markets can lead to an activity specialisation of the different service providers, thus reducing the cost of services and increasing farmers' incomes. My conclusions, summarised in a policy brief provided to the Eastern and Southern Africa Farmers' Forum for their advocacy strategy to the parliament, recommended that wholesale markets should provide services that farmers need and usually get from brokers, such as financial and transport services.

Rural territory resources and Sustainable Development Goals. Despite the increasing interest of the Sustainable Development Goals in the field of international development and in academia and the recent call for the

use of mixed-methods approach, there has been little analysis that brings together qualitative and quantitative methods over a large geographical extent. Based on findings from participatory rural appraisals during which participants identified the key assets needed to achieve their livelihoods, I argue that common-pool resources (community capitals) should be differentiated from private goods (household capitals) as they operate under different dynamics of decision-making and management. Based on a case study in rural India, I created quantitative indicators that can be mapped across a large geographical extent by using data derived from national census and satellite sensors. I then examined spatial patterns and differentials in access to capitals across rural territories and quantified the associations that exist between the different levels of capitals by using principal component analysis. My findings, summarised in a forthcoming paper in the peer-reviewed journal *Applied Geography*, suggest that household physical capital is positively associated with household financial and social capitals but negatively associated with household human capital. This supports the hypothesis that households trade part of their workforce to increase their income, exemplified by the dynamics of male rural outmigration. A strong negative association between access to community amenities and access to natural resources was also clearly supported by my findings. Moreover, I demonstrated that proximity to main axes of communication increases access to community amenities but decreases access to natural resources, while remoteness increases household human capitals but decreases household physical and financial capitals.

Determinants of precarious rural livelihoods. The sustainable livelihoods framework has become popular amongst stakeholders in development practice or in research settings as tools to give insights into the way livelihoods intersect with their physical and natural environment. However, despite the recommendations from rural studies that have shown the importance of multi-level approaches to rural poverty, very few studies have quantitatively explored the role livelihood capitals play in the choice of a set of livelihood activities. Based on a participatory assessment conducted in rural communities in India, my research characterises how private assets and common-pool resources determine agricultural livelihood activities by using national census data in a statistical modelling framework (multilevel binomial logistic regressions). My research identifies that a lack of access to human, financial and social capitals at the household level is associated with vulnerable activities, such as daily-wage agricultural labour. Households located in communities with a greater access to collective natural capital are less likely to be agricultural labourers. My results also show that proximity to rural centres and access to financial infrastructures are

associated with greater chances of agricultural households being landless agricultural labourers. My findings, summarised in a paper currently under review in the peer-reviewed journal *Ambio*, suggest that investment in rural infrastructure might increase livelihood vulnerability, if not accompanied by an improvement in the provisioning of complementary rural services, such as access to rural finance, and by the implementation of agricultural tenancy laws to protect smallholders' productive assets.

Place-specific impacts of climate variability on livelihoods. Spatial factors, such as environmental conditions, distance to natural resources and access to services shape differential vulnerabilities and influence the impacts of climate change on rural households. However, neither the determinants of precarious livelihoods nor their place-specific context has been well understood yet. In my research, I investigated how location influences the drivers of livelihood precariousness. First, I defined a typology of rural landscapes in the Mahanadi delta (India) by clustering characteristic variables of common-pool resources, focused on natural resources, social services and productive infrastructures. Based on these typologies, I characterised the impact of agricultural shocks (using time series analysis of remote sensing data) and household capitals on precarious livelihood strategies (unemployment and daily-wage labour) for each landscape type. This enabled me to show how the type of community influences the impact of climate variability on livelihoods. It also showed how the type of territory where households are located modifies how their access to private assets interact with livelihood opportunities. My research demonstrates that the bundle of locally available community capitals influences households' coping strategies and livelihood opportunities, thus influencing the drivers of rural poverty. I also argue that agricultural shocks drive livelihood precariousness, while access to capitals tends to reduce it. My results, summarised in a paper currently under review in the peer-reviewed journal *Landscape and Urban Planning*, suggest that poverty alleviation programmes should include landscape typologies in their approach to provide place-specific interventions that would strengthen context-specific household capitals, thus reducing livelihood precariousness and rural out-migration.

Global change effects on rural territories. Rural territories face significant challenges to supply urban areas with agricultural commodities while ensuring livelihoods and providing living space to their growing population in the context of climate change and high uncertainty. One of the key challenges to achieving a sustainable and inclusive development is to identify plausible future changes in socio-ecological systems based on different strategies of territorial management and to characterise their impacts on both the envi-

ronment, economy and human societies. Based on participatory workshops with local and national stakeholders and an extensive political economy analysis, my research simulates alternative futures for the Vietnamese Mekong Delta arising from the combinations of two axes: the level of engagement of locals in the economy and the type of development pursued by the government. As the scenarios differ from each other significantly regarding the handling of major challenges that the delta will be facing in the future, I quantify them using changes in demand and different prioritisation of land systems. These parameters reflect the multi-functionality of landscapes by taking into account land use, land management, economic sector, irrigation and livestock density. Using Generalised Linear Models, I demonstrate that each land system can only provide secure livelihoods to a certain number of households. Furthermore, I predict future changes in land systems using the CLUMondo model, while accounting for the government's economic targets. The estimated impacts of each scenario on the provision of livelihoods show that pro-environmental policies would ensure a more equal repartition of wealth, while pro-liberal policies would trigger rural outmigration, thus exacerbating poverty in urban areas. My preliminary results, presented at the Regional Studies Association's conference on *Novel Approaches to Sustainable and Inclusive Development*, indicate that co-ordinating environmental policies with appropriate management of water resources and market access are needed to secure livelihoods while ensuring food security and inclusive economic development.

Future research plans and funding

In the coming years, I plan to pursue research on the role of territorial resources in determining unemployment and migration, with a particular focus on youth unemployment in Mediterranean rural territories and on sustainable management of natural resources. An important issue is how to find a satisfactory balance between environmental stability and economic growth while ensuring an inclusive development of rural territories. Another area which particularly interests me is policy-oriented research through the evaluation of rural development policies in different Mediterranean territories to quantify their economic, social and environmental outcomes. Finally, I would compete for potential funding, such as the Regional Studies Association's Early Career Grant Scheme, to undertake a research program on developing applied economic tools to understand the future threats of water scarcity on food security and food price volatility that will affect Mediterranean territories under climate change.

To summarise, at this point in my career, my primary interests are in quanti-

tative economic geography applied to the field of rural development and territorial planning. My research is designed to generate insights that can inform theory as well as real-world decision makers in the areas of public policy and management. Moreover, I intend to use my applied research outputs to deliver dynamic and up-to-date knowledge to postgraduate students by drawing directly from the research process and its outputs.

Teaching statement

As a lecturer, I aim to provide students with a solid foundation to understand, analyse and sustainably manage rural territories, regardless of discipline. As an "Ingénieur Agronome" specialised in agricultural economics and a doctor in economic geography, I have diverse interests ranging from social sciences to the natural and environmental sciences. I have established my teaching interests through designing and teaching undergraduate and graduate courses, as well as through mentoring and cross-disciplinary collaborations. I have taught theoretical courses on rural territories, development economics, the impact of climate change and from an economic geography perspective, as well as a graduate-level course in sustainability sciences and quantitative methods. I also have experience teaching methodological and practical courses on territorial diagnosis, quantitative modelling of rural territories, land systems, and geographical information systems.

My primary teaching objectives have been to train students to observe and analyse the patterns of the rural territories around them and to work to identify the processes responsible for those patterns. I emphasise to my students the need to seek out empirical evidence that challenges the development theories we stand on, as a way to continuously improve our understanding of how rural territories work. I strive to inspire my students by constantly improving and finding innovative ways to transfer and create knowledge. I hold two core pedagogical beliefs that shape my teaching philosophy: to foster involvement and ownership through critical thinking; and to encourage their experiential learning.

First, I invite students to get involved with the course materials provided by connecting different disciplines and modes of inquiry. I design my courses as a combination of theoretical and empirical approaches in order to develop students' capacity to argue synthetically and cogently. I also encourage active and participatory learning by employing simulations, debates, role-playing and thought experiments. For example, in my Environmental Economics section, students take on the role of villagers who are fishing

from a shared pond in order to illustrate the tragedy of the commons and the free-rider problem. I also use essay topics and research projects that are open-ended with no single correct answer to foster their ability to think through a holistic lens. Having taught in multicultural and multilingual classes, I recognise that students might have different inclinations to speak out in group settings. As a consequence, I also ask them for written reactions to key papers and encourage them to critically engage with the materials provided during my lectures. I give a great importance to the feedback I provide, knowing that extensive and detailed feedback (critical but positive) is the key to keeping students engaged and to ensuring a sustainable and good learning environment. Overall, I try to foster respectful yet passionate discussions in order to nurture a sense of ownership and involvement within the cohort. I challenge my students and ask to be challenged in return by encouraging brain-storm sessions, group projects and presentations.

Finally, I strive to create practical-oriented courses that emphasise students' ability to use quantitative modelling to answer specific questions from a real-world case study. I have found this approach, in conjunction with individual student-instructor meetings to be very effective. Projects allow students to pick a topic that excites them, and meetings let students privately express their concerns while giving myself a chance to understand student interests. Through this approach, students progress and learn at their own pace.

Services and cooperation

I maintain an active program of disciplinary, university, and departmental service. I presently serve as the coordinator of a seminar series showcasing the findings from the DECCMA project and have previously taken the role of PhD representative for the Economic and Social Research Council's South Coast Doctoral Training Partnership and facilitator for the pathway Sustainability, Environment and Resilience. I have also been involved in several committees for interdisciplinary teaching curriculum design during my role as a lecturer at the University of Winchester.

I also believe that organisation and participation in outreach activities is an integral part of the research. During my academic career, I have designed communication materials (newsletters, videos) and actively engaged with stakeholders through workshops and seminars. I also translate my research outputs into practical findings that can be used by practitioners and decision-makers, such as policy briefs, advocacy reports and software tools. Moreover, in order to improve my skills at the interface of science and policy, I have worked as a knowledge transfer officer at the French National

Research Institute for Sustainable Development, where I participated in the construction of collaborations between researchers and decision-makers to translate research findings into practice.