COVER PAGE

Name: Alberto Bernués Jal

Subject title and number of fellowship: Towards a targeted agrienvironmental policy in Europe: adaptation of a novel Payments for Ecosystem Services framework to Nordic agroecosystems.

Contract number TAD/CRP JA00100639

Host institution: Norwegian University of Life Sciences (NMBU)

Host collaborator: Prof. Lars Olav Eik

Dates of fellowship: 04 March to 08 July 2019

Consent: I consent this report being posted to the co-operative research programme web site.

1. What were the objectives of the research project? Why is the research project important?

The general objective of the research was to adapt the design and operation of a Payments for Ecosystem Services (PES) framework designed for Mediterranean agriculture, to Atlantic and Alpine agroecosystems in the Nordic regions in Europe. The PES framework is based on relationships between agricultural practices and relevant ecosystem services, it is designed at the farm level, it is generic and scientifically sound (Rodríguez-Ortega et al., 2018)[1]. The specific objectives of the proposal were: i) to quantify the effect of beneficial agricultural practices on ES delivery in Nordic regions; ii) to adapt the current management-based PES framework to incorporate new agricultural practices and ES; and iii) to apply this PES framework to diverse policy settings represented by different combinations of ES.

The project addressed land and biodiversity issues. We considered agroecosystems as multifunctional landscapes, having multiple roles that deliver a wide range of services to society, including: 1) the maintenance of agricultural landscape; 2) the conservation of biodiversity, 3) the improvement of soil fertility; 4) climate regulation trough carbon sequestration; and 5) the provision of quality products linked to the territory. These ES were selected based on previous work by Bernués et al. (2015)[2]. The proposal focused on farm level management and agricultural practices, which impact the provisioning of the above ES to society. According to one of the call priorities, which specifies that '*particular areas of concern with respect to biodiversity are subsidies*', this proposal addressed the design and operation of a PES framework to improve accountancy and efficiency of agrienvironmental policy in Nordic conditions, following the principle of "public money for public goods".

2. Were the objectives of the fellowship achieved?

The objectives 1 and 2 of the fellowship were achieved. We quantified the effect of agricultural practices on ES delivery in Nordic regions and adapted the PES framework to incorporate new agricultural practices (see list of practices in Appendix 1) and ES (specifically soil fertility). However, objective 3 (application of the PES systems to diverse policy settings) is on its way to be achieved. The reason for the delay relates to the methodology of the project, in particular the Delphi panel. It was more difficult than expected to find, and specially encourage, stakeholders to fill the questionnaire. After some reminders, 32 experts have filled the questionnaire and we are still expecting few more answers. Consequently, we decided to drop further rounds of the Delphi process and keep the information of just the first round, i.e. the actual method is an in-depth questionnaire to experts rather than a Delphi survey *per se*. This should not make a big difference, as previous research has shown that the degree of convergence after the first round was minimal (i.e. experts virtually did not modify their opinions in successive interviews). Once the survey is completed, we will proceed to finalize the analysis of data and the application of the PES system. The questionnaire to collect expert opinion can be accessed at https://forms.gle/5vfKNZqa8sZK7gJV8

3. What were the major achievements the fellowship?

The major achievements can be summarized as:

1. Measurement in quantitative terms the effect of beneficial agricultural practices on ES delivery in Nordic regions, according to the opinion of different experts (researchers, technicians, NGOs, managers and decision makers).

---

[1] Rodríguez-Ortega T., Olaizola A.M., Bernués A., 2018. A novel management-based system of payments for ecosystem services for targeted agri-environmental policy. Ecosystem Services 34, 74-84.
[2] Bernués A., Rodríguez-Ortega T., Alfnes F., Clemetsen M., Eik L.O., 2015. Quantifying the multifunctionality of fjord and mountain agriculture by means of sociocultural and economic valuation of ecosystem services. Land Use Policy 48, 170-178.

2. Adaptation of a management-based PES framework developed for Mediterranean agroecosystems to incorporate new agricultural practices and ES relevant to Nordic conditions.
3. Application of the PES framework to diverse policy settings represented by different combinations of ES in Norway (in progress).

4. Will there be any follow-up work?

A publication is envisaged. The outlet will be chosen after the data analysis is completed. The first draft of the article will be finished before of the end of the year and submitted for publication in early 2020. The results of the project will not originate any protected intellectual property product.

The fellowship has helped reinforcing the collaboration between the fellow and NMBU, in particular at the Faculty of Landscape and People (LANDSAM). A new research proposal entitled "*Multipurpose Small Ruminant Value Chains for Adaptation to Climate Change in Coastal and Fjord Areas of Norway. The cases of sheep and goats*" was submitted to the Research Council of Norway. The project is coordinated by the Host collaborator, Dr. Eik, with the active participation of the fellow in the preparation and in research activities, if approved. In addition, the fellow is coordinating now a research proposal to the call RUR-01-2018-2019 *Building modern rural policies on long-term visions and societal engagement. [2019] Building resilient mountain value chains delivering private and public goods (RIA)* of H2020 Work Programme 2018-2020. NMBU-LANDSAM is a partner in this proposal that has passed the first stage evaluation.

5. How might the results of your research be important for helping develop regional, national or international agro-food, fisheries or forestry policies and, or practices, or be beneficial for society?

The current implementation of agri-environmental schemes heavily relies on common sense models characterized by weak formulations that have no clear scientific evidence, but rather reflect general perceptions of how environmental outcomes are linked to interventions. Traditional voluntary agri-environmental schemes have been widely criticized for their low efficiency and effectiveness to improve nature conservation; see for example Erjavec and Erjavec (2015)[3] or Pe,er et al. (2019)[4]. In order to make the concept of ES useful for land management and legitimate policy, our PES will be implemented with alternative designs of agri-environmental schemes, following the "provider gets" principle. By looking into the links between a large number of agricultural practices at farm level, which can be the target of agri-environmental policies, and the provision of a wide range of ES, our framework can facilitate conservation of ES at the global level with decisions made at the local level, guiding farmers from a more familiar perspective such as their own land management.

The most important ES according to social preferences are at the core of the PES framework for targeted, management-based, location-specific, agrienvironmental policy. The project (i) placed stakeholders at the centre; in particular, the role of the farmer was explicitly recognized; (ii) used farm level indicators (agricultural practices) for farmers and decision makers; (iii) allowed the upscaling of findings as it used the same approach of other representative case-studies in

[3] Erjavec, K., Erjavec, E., 2015. 'Greening the CAP' – Just a fashionable justification? A discourse analysis of the 2014–2020 CAP reform documents. Food Policy 51, 53–62.
[4] G. Pe'er*, L. V. Dicks, P. Visconti, R. Arlettaz, A. Báldi, T. G. Benton, S. Collins, M. Dieterich, R. D. Gregory, F. Hartig, K. Henle, P. R. Hobson, D. Kleijn, R. K. Neumann, T. Robijns, J. Schmidt, A. Shwartz, W. J. Sutherland, A. Turbé, F. Wulf, A. V. Scott. EU agricultural reform fails on biodiversity. Science 344, 1090-1092.

Europe; (iv) promoted public awareness, accountability and stewardship in managing agroecosystems.

6. How was this research relevant to the objectives of the CRP and the research theme?

The proposal fitted with Theme I as it aimed at managing natural capital (in this case Nordic agroecosystems) to optimize the quality of natural resources (ES such as agricultural landscape or soil fertility) while securing the availability of food products (provisioning of quality products linked to the territory). Among the aspects of the Theme I, the proposal directly addressed Land and Biodiversity issues. Regarding Land, we considered agroecosystems as multifunctional landscapes, having multiple roles that deliver a wide range of services to society, defined following the ES taxonomy, which is mainstream in research and policy nowadays. Regarding Biodiversity, our proposal focused is on farm level management and agricultural practices, and their impact on biodiversity, among other ES. According to the call, one of the '*particular areas of concern with respect to biodiversity are subsidies*' [sic], which precisely constituted the main objective of this proposal, i.e. design and operation of a PES framework, moving from subsidies to payments to improve accountancy and efficiency of agrienvironmental policy.

7. Satisfaction

The OECD fulfilled my expectations and allowed not only to develop the project but also to continue and expand the collaboration trough new research proposals (see section 4).

I am a senior scientist with a stable position. I am not able to say if the OECD fellowship might mean an advance of my career in the future.

I did not find practical problems at NMBU.

I have no suggestions on improvement of the Fellowship Programme. Perhaps the funding should be a bit higher in very expensive countries like Norway.

8. Advertising the Co-operative Research Programme

I learned about the Cooperative Programme though a colleague of my home institute that enjoyed a scholarship previously.

The Programme could be more visible through advertising in scientific congresses and seminars.

I just want to thank the Programme for funding my fellowship.

Appendix 1. List of practices relevant in Nordic agroecosystems and their potential impact on ES

n	Farming practices (with original code)	Lands.	Biodiv.	Soil fertility	Carbon seq.	Quality products
1	1. Maintaining semi-natural vegetation (trees and shrubs) characteristic of each area	x	x	x	x	x
2	2. Maintaining grasslands (non-cultivated)	x	x	x	x	x
3	3. Managing land in small plots	x	x			
4	4. Retention of hedges, shrubs and trees among arable fields	x	x	x	x	
5	6. Retention traditional buildings and field boundaries (stone walls, etc.)	x	x			
6	7. Retention of water points (ponds, springs,...)	x	x			
7	8. Retention of drove roads, tracks and paths	x	x			
8	9. Forage crops diversification (e.g. inclusion of legumes)	x	x	x	x	
9	10. Growing locally adapted breeds and crop varieties	x	x	x	x	x
10	12. Genetic selection for high animal productivity		x			x
11	13. Retention of high proportion of semi-natural meadows and pluri-annual crops (vs. monospecific and annual crops)	x	x	x	x	
12	19. Reducing use of heavy machinery	x	x	x	x	
13	21. Reducing chemical fertilizers		x	x	x	x
14	22. Utilizing manure correctly	x	x	x	x	x
15	23. Reducing pesticide/herbicide use		x	x		x
16	25. Reducing animal drugs (e.g. antibiotics, antiparasitic)		x	x		x
17	26. Reducing the use of animal concentrates		x		x	x
18	27. Reducing off-farm dependency of inputs (e.g. feed, fertilizers)	x	x	x	x	x
19	28. Extend grazing annual period	x	x	x	x	x
20	29. Grazing in semi-natural habitats	x	x	x	x	x
21	30. Grazing in remote and/or abandoned areas	x	x	x	x	
22	31. Grazing with several animal species (mixed or sequential grazing)	x	x	x	x	
23	32. Moving flocks seasonally between areas (e.g. from valley to mountain)	x	x	x	x	x
24	33. Maintaining meadow mowing	x	x	x	x	
25	35. Adapting stocking rate to the carrying capacity of agro-ecosystem	x	x	x	x	
26	36. Active management of forest (forestry/silviculture)	x	x	x	x	x
27	37. Optimize soil drainage (non organic soils)	x	x	x	x	
28	41. Biogas production from animal waste				x	