



FELLOWSHIP SUMMARY REPORTS

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Indicators for evaluating sustainability of agricultural systems. Options at farm scale.

Theme II. The sustainability in practice in oecd co-operative research program. Managing risks in a connected world.

Host collaborator: Miguel Gómez,

Host institution: Charles H. Dyson School of Applied Economics and Management.
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From: 1 of July 2017 to 26 August 2017.

I consent to my report being posted on the Co-operative Research Programme's website.

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

The main objective of the project is to improve the capacity of agricultural systems to build resilience to encourage sustainability.

To reach these objectives the proposal has three specific objectives:

OBJECTIVE 1: To measure the potential of the regions that we have selected (ecological and agricultural biodiversity, biological hazards, etc.)

OBJECTIVE 2: To own tools of analysis and forecasting; incorporate the valuations of these attributes (i.e. 'local' and 'sustainable management practices') in current bioeconomic models designed to identify optimal control of invasive species in wine grapes and berries.

OBJECTIVE 3: professional transference of knowledge to inform both the producers and decision makers and society.

Importance of the research

Successive reports of the Intergovernmental Panel on Climate Change (IPCC) have established both the risks associated with climate change, and the scientific consensus that human action is a contributing factor. Some of the consequence of climate change include freshwater scarcity, river and coastal flooding, species extinction and loss of biodiversity, reduced fish stocks and crop yields with implications for global food production, increasing forest fires and extreme weather events such as heat-waves or extreme precipitation, and increased prevalence of food- and water-borne diseases (IPCC, 2014).

Humans contribute to climate change by burning fossil fuels which release carbon dioxide (CO₂); by industrial processes which release methane (CH₄), nitrous oxide (N₂O) and other Greenhouse Gases (GHGs), and by land use change, which may release carbon stored in biomass. Data from various ice core reading stations show that atmospheric concentrations of each of these three gases fluctuated cyclically for hundreds of thousands of years during the prehistoric period, and have risen sharply to reach record levels since the 1950s¹ (though this result is less clear for nitrous oxide), while current NASA data suggests the mean global temperature has risen around 0.5°C from its average level in 1950-80².

Climate change has natural, economic and social consequences, to assess and mitigate such consequences, we must know both the condition and genetic potential of natural and agricultural resources; politicians must have predictive tools to guide their decisions; and society must understand the impact of climate change on environment and welfare. The global trend is to develop local responses integrating policy and society.

The primary contribution of this project is generate knowledge of the impact of agricultural systems on the environment and welfare, and will facilitate their understanding at the level of research, production business, government and society.

The research can contribute with the design and testing of their mathematical models, parameters and equations, the formation of associations of agricultural producers, the constitution of networks of knowledge, and the development of extension models and the collective intelligence the project intends to minimize the systemic risk in the economy and in agricultural sector.

¹ <http://www.epa.gov/climatechange/science/indicators/ghg/ghg-concentrations.html>

² <http://climate.nasa.gov/vital-signs/global-temperature/>



2. Were the objectives of the fellowship achieved?

The project involves different fields of knowledge to achieve the various goals that lead to the ultimate objective of the project: improve the capacity of countries to build resilience against climate change and thus deal with the multiple challenges posed by this phenomenon according to the reports of the IPCC, FAO and WHO, among others. These challenges are summarized in increasing food production 70% by 2050 on the same arable surface, with less water and less fuel.

To do so, three conditions are needed: 1) know the potential of the regions (ecological and agricultural biodiversity, biological hazards, etc.); 2) own tools of analysis and forecasting; and (3) professional training and transference of knowledge to inform both the producers and decision makers.

The following objectives have been achieved:

1. Determine the biodiversity of certain crops.
2. We select cocoa, banana and grapes due of economic importance of this crops in different regions where climate change has natural, economic and social consequences.
3. Gather information of agricultural and economic relevance to integrate and generate agronomic maps; produce graphical tools for visualization of local, regional or national data.
4. Generate new, agricultural and economic data to project them in the produced models and assess the ability of prediction of future scenarios and to build a database for use by academic, governmental and social institutions.
6. Communicate the vital meaning of the concept of resilience which, together with adaptation and vulnerability, is key to the impact of climate change on productivity to strategic economics plans.

The objectives have been achieved, but we are going working on then in the next two months, with Dr. Miguel Gómez, and publish the results in next 2018.

3. What were the major achievements of the fellowship? (up to three)

1. Generate knowledge of the impact of climate change factors on the environment and welfare.
2. The research will contribute to design plans and testing of their mathematical models, parameters and equations.
3. Constitution of networks of knowledge, and the development of extension models to model resilience against climate change.

4. Will there be any follow-up work?

- Is a publication envisaged? Will this be in a journal or a publication? When will it appear?
Yes, we are working together in different publications we can send to different journals in 2018.
- Is your fellowship likely to be the start of collaboration between your home institution and your host?
Yes, we are planning a collaboration during 2018.



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

Please express this in terms of environmental/food security/food safety/economic/health (human and livestock and plant) benefits, etc.

1. Inform farmers about expected Climate Change impacts in local agriculture
2. To find farmer opinions regarding the recommended Climate-Change adaptation measures
3. Inform farmers about the results of the conducted Climate-Change impact assessments, pointing out clearly the expected risks for the local agriculture.
4. Looking for farmer resilience to introduce any of the recommended adaptation options and why.

6. How was this research relevant to:

- o The objects of the CRP?

In line with this aim, the proposed project will provide useful information based on scientific evidence to European and U.S. stakeholders in the agriculture systems (i.e. policy makers).

The project will provide evidence that can be used to formulate policies and programs to promote strategies for reach sustainable agricultural systems.

- o The CRP research theme?

This proposal is directly relevant for theme II: the sustainability in practice in oecd co-operative research program, Managing risks in a connected world our proposal examines agricultural systems and how would maintain or even productivity into the future with minimal inputs and conserving natural resources.

7. Satisfaction

- o Did your fellowship conform to your expectations?

Yes, this research project has all practical arrangements that will ensure its successful implementation and management. This proposal is aimed at obtaining funding for my stay at Cornell University in USA for 8 weeks. I have had full access to all necessary facilities at the host institution and I worked in close collaboration with Dr. Gómez.

Dr. Gómez has extensive experience in researching 1) bioeconomic models of and 2) the economics of local foods.

On the other hand, I have experience in economics of climate change and agriculture. Thus, this new collaboration brings together the required expertise from Cornell University and from University of Zaragoza to ensure the success of the project and a long lasting research collaboration between the two institutions after the fellowship is completed.

Moreover, I have been in close contact with Dr. Gómez to plan for my visit.

Since then, Dr. Gómez has visited to Zaragoza of a period of one week every two years, and I have been exploring collaboration research opportunities with him.

This is a unique opportunity to strengthen the collaboration between Cornell University and University of Zaragoza.

- o Will the OECD Co-operative Research Programme fellowship increase directly or indirectly your career opportunities? Please specify.

YES



The funding of this grant will be essential not only to achieve the goals described in the proposal but also to facilitate the establishment of a long-term relationship of the applicant with the research group in the host institution, University of Cornell. This opportunity has contributed to combine my expertise in the field of economic models and the economics of climate change with the experimental economics expertise of Dr. Gómez. In addition, Dr. Gómez and I will be work in collaboration with scientists in the US and in Spain who are focusing on production systems and sustainability.

This is enabling us to implement a multidisciplinary approach to reach the proposed project objectives. This new acquired knowledge will contribute to place our research not only in the front line of the applied economics field but will also place us in the position to make impacts beyond de academia, and will allow us to influence public policy decisions. Moreover, the proposed project allowed me to build future collaborations with researchers in United States and with researchers in other disciplines, giving me the opportunity to develop an international network.

- Did you encounter any practical problems?

No, all management has been completely satisfactory.

- Please suggest any improvements in the Fellowship Programme.

Look for the way to continue the collaboration and economic aid with the host institution in the months following the finalisation of the project.

8. Advertising the Co-operative Research Programme

- How did you learn about the Co-operative Research Programme?

Researchers who have had scholarship in previous years.

- What would you suggest to make it more “visible”?

- Are there any issues you would like to record?

