Annual report on the implementation of IAI CRN3106 project

1. **Project Title:** Transferring climate knowledge in the science-policy interface for adaptation to drought in Uruguay
   Project Number: CRN3 106

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   Co principal Investigators: Valentín Picasso, Javier Taks y Bianca Vienni de UDELAR; Guillermo Podestá de Univ. de Miami; Renzo Taddei de UNIFESP; Marta Vinocur de UNRC; Hermes Morales del Instituto Plan Agropecuario (Uruguay) e Ignacio Lorenzo del Sistema Nacional de Respuesta al Cambio Climático (Uruguay).

   Reported period: May 1st 2016 to May 1st 2017 – Year 3

2. **Research Activities and Findings**

The activities of the third year included the fourth workshop, courses, seminars, meetings and interviews. In these activities various communication strategies were used (face-to-face, virtual) and they were performed with the total or partial integration of the research team depending on the task. Next, the main collective activities and their progress over time from the beginning of the project is presented.

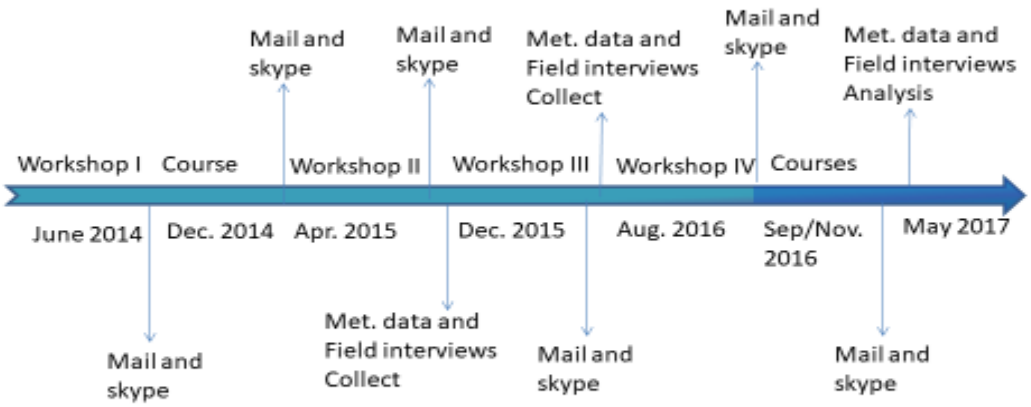

Figure 1. Main collective activities and communication strategies of the CRN3106 project since workshop 1

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The composition of the project's researchers has remained the same, as in the previous period, both in its inter-institutional and interdisciplinary conformation (See Second Report, pages 2 and 3).

3.1 Workshop IV August 29t^{h} to 31th 2016

For Workshop IV, it was agreed to emphasize the importance of communication channels to support decision-making in climate risk management, and to discuss and reach to agreements about the mechanisms for communication / dissemination of the process and results of the project (program in Annex 1). In this sense, experts in communication were invited to carry out an activity within the Workshop. This activity triggered proposals of social sensitization, particularly directed to the urban community, since in the city the general public does not know or does not handle the relevance that the problem of agronomic droughts has and the impacts that it generates. However, this task was considered beyond the scope of the project. It was agreed, then, to make an effort in the writing of a book (intended to be elaborated within the project), kipping the idea in mind that it has a true interdisciplinary scope, that is, that it can be read fluidly beyond the disciplines involved in its elaboration. The chapters that comprise the book, as well as those responsible for the elaboration, were designated in this workshop.

On the other hand, progress in the work of postgraduate students is a central concern, since the project raised from the beginning to carry out its research through the training of human resources. In this workshop again, all of the master's thesis students presented their progress and participated in presentations and group discussions as well as in instances of direct exchange with the project Pi and CoPis (the presentations of Workshop IV are available at htttp: // www. Agrodrought.ei.udelar.edu.uy/). At the same time, the reflections, thoughts and observations on the interdisciplinary process of the collaborative cohort of students were presented; the abstract is attached in Annex 3 as audiovisual material.

Another aspect that was worked on during a whole day was the paper "Thirty years of multi-level processes for adaptation of livestock production to droughts in Uruguay", co-produced with participants of INUMET, INIA, IPA and MGAP (see Publications in evaluation). This article required an important contribution of each of its authors, in order to elaborate the base line information, as well as to perform several exercises of interpretation and re-interpretation as the information was being completed (numerous exchanges by mail or skype were carried out). The article shows the effort of searching, compiling, systematizing and interpreting information that was scattered, about the process of adaptation to agronomic droughts in Uruguay. Also, the negotiation of meanings and ideas was an important of the work, such as the conceptualization of the phenomenon "agronomic drought" within the framework of a level of complexity that transcends the biophysical dimension, as well as the conceptual framework on adaptation to interpret and assess the changes that occurred in the studied period. We consider that this elaboration represents one of the first steps of construction at the level of the science-political interface: the dialogue. This paper was submitted to the journal Weather, Climate and Society, and it is now in the first round of revisions.

Finally, we carried out the activity "How do we experience interdiscipline in this project? Talking about roles", with the facilitation of guest psychologists. This activity had the objective to make visible difficulties, especially related to interdisciplinary dialogue, and to obtain recommendations / suggestions that would allow the team to continue improving the work shared. The difficulties that occur in teams of diverse conformation are commonly known, more so if they are subjected to the pressure of results, and that interact face to face in a limited way. The report prepared by the experts is attached* in the Annex 4.

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The Workshop IV took place in Montevideo in the Interdisciplinary Center (Espacio Interdisciplinario) of UDELAR. Program and list of participants of Workshop IV is attached* (Annex 1). All activities were recorded.

3.2 Courses

3.2.1 Course: "Social studies of science and technology and actor-network theory in climate studies", directed to graduate students. The objective of this course was to lead students to develop a more complex understanding of interdisciplinarity, through exposure of the debates of STS, and the actor-network theory in particular.

The course accredited for the Postgraduate Program of the Faculty of Agronomy (UdelaR). It was dictated by Renzo Taddei (CoPi) in coordination with Gabriela Cruz (Pi) in the *Espacio Interdisciplinario* (UdelaR, Montevideo) from September 26th to September 28th, 2016.

The IAI CRN3106´s students attended this course, as well as one official of the Uruguayan Ministry of Livestock, Agriculture and Fisheries.

The program and the list of students are attached* as Annex 5.

3.2.2 Course: "Climate change and climate variability as environmental problem", directed to undergraduate and graduate students. The objective of this course was to provide conceptual and methodological elements that facilitate the approach of agricultural problems related to the occurrence of weather extremes and climate change scenarios.

The course accredited for the Postgraduate Program of the Faculty of Agronomy (UdelaR). It was dictated by Gabriela Cruz (Pi) in the Faculty of Agronomy (UdelaR), from November 20th to November 30th, 2016.

The IAI CRN3106´students attended this course, as well as officials of the Uruguayan Ministry of Livestock, Agriculture and Fisheries, and others students from Facultad de Agronomía (UdelaR).

The program and the list of students are attached* as Annex 6.

3.3 Seminars

Seminars were held in order to adjust the use of methodologies for the calculation of drought indexes and estimation of potential evapotranspiration, in the Espacio Interdisciplinario (UdelaR). Participants: Sofía Alvariño, Alessio Bocco, Mario Bidegain, Gabriela Cruz and Rafael Terra. Some of these instances were recorded in video as an input for interdisciplinary analysis. Here, as a listener and director of the audiovisual record, participated the thesis student Hugo Partucci.

The progress made so far in the thesis works were presented by Claudia Simón and Sofía Alvariño, in the cycle of talks carried out by the CIRCVC. Place: Espacio Interdisciplinario (UdelaR).

The progress of the project was presented periodically in the coordination meetings of the CIRCVC (Gabriela Cruz). Place: Espacio Interdisciplinario(UdelaR).

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3.4 Meetings / Gatherings: Colaborative cohort of students of the proyect.

Five meetings where held with in order to analyze thoroughly the link between those who investigate within the collaborative framework of the postgraduate thesis of the project (approximately a bimonthly frequency). The analysis was complemented with monthly online surveys, interviews with each of the members and participant observation in the meetings of the collaborative cohort. In the joint work there have been different agreements and disagreements, problematizations of concepts that are used between the theses, and collaboration from the methodological, theoretical, practical and management points of view (see Publications 4.1.7, 4.1.8 and 4.1. 9, and audiovisual). The process of exchange between theses has deepened the analysis about the scope and limitations of each discipline, generating new instances of communication where each individual researcher projects the use of knowledge generated by his/her work in relation to the overall development of the project. Therefore, the gap, recognized from the beginning between social and natural sciences, has been reduced through a series of practices and exercises that have facilitated a more fluid translation between the languages of each discipline.

3.5 Interviews

According to the information gathered by the different researchers that make up the project as a whole, several interviews have been conducted in 2015 and 2016, and the plan is to continue carrying them out even more frequently in the months of June, July, August and September 2017.

The interviews were conducted by Gabriela Cruz and Hugo Partucci with the collaboration of the other thesis students, to social actors involved in agronomic drought problems, according to the Science-Policy interface and the Science-Society interface. This implies relieving information in three groups identified as decision makers (government officials, scientific-technicians and agricultural producers). For the purposes of each research and within the general framework of the project, the questionnaire design was based on information of the use of climate information and the effects generated by drought events, among others.

In the context of the investigation of Gabriela Cruz, the interviews were carried out to people related to the three areas previously described. In the case of agricultural producers, information was relayed from livestock producers and specifically those who occupy positions of hierarchy in Rural Development Societies or Agrarian Cooperatives. In the field of scientific technicians and government representatives, the interviews were aimed at actors that cover both the departmental (Maldonado) and the national spectrum.

In the case Hugo Partucci´s research, even though the main members of the study unit are the agricultural producers of Maldonado, interviews were carried out in other areas as well. At the government level, interviews were aimed at having a national and departmental scope, as in Gabriela´s case. For example, at the national level the director of the SNIA (National Agricultural Information System) and at the departmental level to officials of the Maldonado Municipality. As far as the producers group is concerned, interviews with the widest possible range of producers were carried out and continue being carried out. Up until now,

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interviewees have been limited to those who participate in the spaces of Cooperatives and Rural Development Societies. Although this type of producer is the one that makes up the majority of the population that is distributed throughout the department of Maldonado, we have found another type of producers, who are not associated and are not considered in the levels of small and medium producer. So, unlike the work of Gabriela Cruz, not only livestock producers have been addressed, but producers of other agricultural items. With the help of the Cooperatives and Development Societies, we aimed to conduct interviews not only to those who preside over these spaces, but also to the participants in general of these spaces.

In accordance with Rossana González´s research, plans were made for shared interviews with Hugo Partucci and Gabriela Cruz, in addition to representatives of the government. Taking into account the axes of each research, these interviews aim at the relationship between the use of scientific information (in particular climate information) and the design and execution of public policies.

3. Publications

4.1 Published articles

4.1.1.- Alvariño, S; Cruz, G; Terra, R; Bidegain, M. Evolución temporal y espacial de la Evapotranspiración Potencial (ETP) en Uruguay. Seminario Sustentabilidad de los Sistemas de Producción Agropecuarios, Departamento de Sistemas Ambientales, Facultad de Agronomía, UdelaR. Montevideo. 18 de Octubre de 2016.

4.1.2.- Astigarraga, L; Picasso, V; Cruz, G; Terra, R; Taks, J; Carriquiry, M. 2016. Contra viento y marea. Construcción de un centro universitario interdisciplinario de respuesta a la variabilidad y cambio climático en la Universidad de la República, Uruguay. I Congreso Latinoamericano de Investigación y Educación Superior Interdisciplinaria. Montevideo. 27-30 de Septiembre de 2016.

4.1.3.- Bocco, A; Vinocur, M. 2016. Análisis del comportamiento de las sequías en el Sur de Córdoba utilizando los índices SPI y SPEI. XVI Reunión Argentina y VIII Latinoamericana de Agrometeorología. Puerto Madryn, Argentina. 20-23 de Septiembre de 2016.

4.1.4.- Bocco, A; Vinocur, M; Cruz, G. 2016. Evaluación temporal y espacial de las sequías y de sus impactos en la producción agropecuaria del Sur de Córdoba (Argentina) y Uruguay. Seminario Sustentabilidad de los Sistemas de Producción Agropecuarios, Departamento de Sistemas Ambientales, Facultad de Agronomía, UdelaR. Montevideo. 18 de Octubre de 2016.

4.1.5.- Cruz, G; Baethgen, W; Taddei, R. 2016. Sequías agronómicas, información climática y toma de decisiones en la ganadería pastoril. Seminario Sustentabilidad de los Sistemas de Producción Agropecuarios, Departamento de Sistemas Ambientales, Facultad de Agronomía, UdelaR. Montevideo. 18 de Octubre de 2016.

4.1.6.- Hidalgo, C. 2016. Interdisciplinarity and knowledge networking: co-production of climate-authoritative knowledge in Southern South America. Issues in Interdisciplinarity Studies, 34, 183-199.

4.1.7.- Simón, C; Vienni, B; Cruz, G; Alvariño, S; Partucci, H; Bocco, A. 2016. Juntos a la par: Una aproximación analítica sobre la interdisciplina en una experiencia de investigación interdisciplinaria sobre sequías

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agronómicas en Uruguay. I Congreso Latinoamericano de Investigación y Educación Superior Interdisciplinaria. Montevideo. 27-30 de Septiembre de 2016.

4.1.8.- Simón, C; Alvariño, S; Bocco, A; González, R; Partucci, H; Vienni, B; Cruz, G. 2016. La sequía agronómica en Uruguay abordada desde una cohorte colaborativa interdisciplinaria de tesis de posgrado: desafíos y oportunidades. Segundo Congreso Argentino de Estudios Sociales de la Ciencia y la Tecnología (CAESCyT). San Carlos de Bariloche, Argentina. 30 de Noviembre-2 de Diciembre de 2016.

4.1.9.- Vienni, B; Simón, C. 2016. Estudios sobre Interdisciplina como área de la Ciencia Tecnología y Sociedad aplicado a la sequía agronómica de Uruguay. Segundo Congreso Argentino de Estudios Sociales de la Ciencia y la Tecnología (CAESCyT). San Carlos de Bariloche, Argentina. 30 de Noviembre-2 de Diciembre de 2016.

4.1.10.- Taddei, R; Hidalgo, H. 2016. Antropología posnormal. Dossier. Cuadernos de Antropología Social, 43, 21-32.

4.1.11.- Taddei, R. 2017. Meteorologistas e profetas da chuva. Conhecimentos, práticas e políticas da atmosfera. São Paulo. Ed. Terceiro Nome. 240 p. ISBN: 9788578162016.

4.2 Articles under evaluation or in preparation

4.2.1.- Cruz, G; Baethgen, W; Bartaburu, D; Bidegain, M; Giménez, A; Methol, M; Morales, H; Picasso, V; Podestá, G; Taddei, R; Terra, R; Tiscornia, G; Vinocur, M. 2017. Thirty years of multi-level processes for adaptation of livestock production to droughts in Uruguay. Submitted to *Weather, Climate and Society* Journal. In evaluation.

4.2.2.- Cruz, G; Gravina, V; Baethgen, W; Taddei, R. 2017. To use or not to use climate information: A Q methodology analysis on stakeholders' perceptions on climate information in order to deal with drought. Submitted to The 33rd annual conference of the International Society for the Scientific Study of Subjectivity, that will be held on September 2017 in Glasgow, Scotland. In evaluation.

4.2.3.- Cruz, G; Astigarraga, L; Guevara, R; Terra, R. 2017. De la información climática a la provisión de servicios climáticos para la toma de decisiones: el caso de las sequías en la ganadería uruguaya. 2017. Article in preparation for submitting to INTERdisciplina journal.

4.2.4.- Cruz, G; Gravina, V; Baethgen, W; Taddei, R. 2017. Uses and meanings of climate information in the context of agronomic drought in Uruguay. In preparation.

4. Data

There are several areas of information creation and there are different types of data generated.

At the meteorological information level, digital archives have been created with information of rain, wind, heliophania, humidity and temperature of the air on a daily basis. Quality control of the data series has been performed. This information is used to estimate potential evapotranspiration and different drought rates in Uruguay and South Córdoba (see Publications 4.1.1, 4.1.3 and 4.1.4).

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At the interdisciplinary academic work level, the collective work process of the cohort of theses (see Publications 4.1.7, 4.2.8 and 4.2.9) was recorded and analyzed, and audio-visual material was prepared (Partucci, H. 2016, attached as Annex 3 to this report).

At the science-policy and science-society interface levels, information on interviews with stakeholders in science, public policy and agricultural production in Uruguay has been surveyed and processed (see Publications 4.1.5, 4.2.1, 4.2.2, 4.2.3 and 4.2.4). The process of survey continues in the framework of the theses of Hugo Partucci and Rossanna González.

5. Capacity Building

6.1 Master's thesis

6.1.1. On the biophysical causes of agronomic droughts: Thesis of Sofia Alvariño and Alessio Bocco

The increased precipitation in the region has been proven, but not the temporary trend of atmospheric demand (potential evapotranspiration). These two are the atmospheric variables involved in the frequency of droughts, their duration and intensity. In order to determinate droughts frequency, it is necessary to estimate potential evapotranspiration in time and space, as well as it is necessary the validation of simple indicators that allow its monitoring. These two thesis are in the analysis stage, although there are preliminary results (see Publication 4.1.3 and Annex 2 of this report).

6.1.2. On the perceptions of agronomic droughts and the science-politics interface: Thesis by Hugo Partucci and Rossanna González.

People process subjectively and with incomplete information the world around them, so it is necessary to distinguish between reality and perception in the decision processes that affect the living conditions of people. Depending on the scale at which decisions are made, their impacts are different. Policy-makers affect a large number of people directly, who make day-to-day decisions at the farm level and directly affect natural resources. Understanding how these "mechanisms" work and the role of science in this interaction is the objective of these thesis work. These works are completing their field survey and beginning the analysis of the information collected (Progress in Annex 2 of this report).

In addition to his thesis work, Hugo Partuccci leads the process of recording, editing and analyzing audiovisual materials generated within the framework of the project (eg Video in Annex 3).

6.1.3 On the interdisciplinary process: Claudia Simón's work.

Within the framework of the project, Claudia Simón has implemented online monthly surveys for postgraduate students of the project, in order to have sustained information with the intention to make face-to-face meetings of this last year more productive. At the same time, she has led the reflection and analysis of the interdisciplinary process of the thesis cohort (see Publications 4.1.7, 4.1.8 and 4.1.9).

7 Regional Collaboration/Networking

7.1 Academic networking of the project

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In the academic field data, methodologies and fieldwork were shared. Examples of this are the tutorials shared between the universities that integrate this project and the synergic work that has occurred through thesis´s tutoring (thesis of Hugo Partucci), which is a result of the link with the IAI-CRN3035. It is outstanding the collaboration between CoPIs and other later members of the project (INUMET) for the development of theses, an aspect that is highlighted by some researchers (see reports of Alessio Bocco and Sofia Alvariño in Annex 2).

Opportunities for gathering such as those convened by IAI in December 2016 in Mar del Plata, contribute to the expansion of academic networks. At that time, the development of joint activities between CRNs 3106 and 3036 was proposed, in the context of changes in land use and agro ecological food production.

7.2 Networking outside of the academic field (public policy officials and agricultural producers)

It is considered as very positive achievement to have collaboratively written the paper "Thirty years of multi-level processes for adaptation of livestock production to droughts in Uruguay", in which all governmental institutions from Uruguay related to agronomic droughts participated. At the same time, the network of participants has been expanded with the inclusion of livestock producers and representatives of rural organizations. Once the information gathering stage (interviews) has been completed, results validation meetings and discussions are scheduled with the stakeholders, both from politics, academia and rural organizations.

8 Media Coverage and Prizes

As stated in item 3.1, the dissemination of the project´s activities and its results (to date preliminary) has been a concern of the team during the third year. One of the initiatives in this sense was to develop a Facebook page of the project under the name "Uruguay Drought", which is linked to the website "Agrodrought", created in the first year. On the other hand, a survey is being carried out on artistic expressions related to droughts (paintings, songs, poems, among others), as well as other ways of visualizing the problematic. Claudia Simón is the one who performs the web administration and the mentioned survey.

9 Policy Relevance

As concrete project products, both the meteorological database created for the estimation of potential evapotranspiration and the calculated drought indexes are of interest to be included in the National Agricultural Information System (SNIA) and INUMET, as expressed by their representatives in Workshop IV.

Other products that are relevant to decisions related to agronomic droughts are the results on the interaction between the actors involved in the problem (see Publication 4.2.1 and network analysis in Publication 4.2.4 and Annex 7), and the characterization of the users of the Climatic information according to different profiles (analysis of methodology Q, Publications 4.2.2 and 4.2.4 in Annex 7). All of them are, although with different degree, in a phase of preliminary analysis. A synthesis of these preliminary results is presented in Annex 7.

However, and keeping in mind the progress made so far, the network generated / strengthened from this project is considered to be the most relevant result terms of the science-policy interface. It has allowed to

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cultivate the links that enable the exchange in future activities, which is an aspect that is part of the overall objective of the project.

10 Main Conclusions

In the third year of the project the attention of the researchers and the resources were focused on the development of the thesis works, with the idea to consolidate the collective vision of the problem and its perspective in a collaborative publication, and to disseminate the work in the areas within our reach (congresses, articles in journals and broadcast in digital media).

Although the interdisciplinary work was carried out at all levels, during this year the reflection on the interdisciplinary process (meta-study) was developed in the field of the project's thesis, with a high degree of dedication and generating positive feedback in the rest of the activities.

Based on the progress made so far and thanks to IAI for the extension of the deadline of this project, the completion of the project and the fulfillment of tis objectives is planned for November 2017.

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