

# AgMIP

The Agricultural  
Model Intercomparison  
and Improvement Project



## AGMIP-PERU KICKOFF WORKSHOP

SEPTEMBER 19-20 2013  
LIMA, PERU





# **AgMIP-PERU KICKOFF WORKSHOP: INTEGRATED ASSESSMENTS OF CLIMATE CHANGE IMPACTS ON THE PERUVIAN AGRICULTURE**

**Lima, 19 -20 September, 2013**

SPONSORED BY :

**Agricultural Model Intercomparison and Improvement Project- AgMIP  
Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica-  
CONCYTEC  
Servicio Nacional de Meteorología e Hidrología del Perú -SENAMHI**

# TECHNICAL REPORT

## 1. BACKGROUND

The Agricultural Model Intercomparison and Improvement Project (AgMIP), which is composed of scientists from different disciplines coming from prestigious institutions such as the University of Columbia, University of Florida, USDA, Oregon State University, NASA, CGIAR, CCFAS among others, has the Objective of improve substantially the characterization of food security at global level and also to improve the adaptation capacity both in developing countries and in developed countries, within the context of climate change.

At present, the AgMIP team is conducting several climate change impacts and adaptation assessment projects in Africa and South Asia; in addition they are starting research activities in North America, China and more recently in Latin America and the Caribbean. In this context AgMIP, in collaboration with EMBRAPA-Brazil, organized the Second Latin America and the Caribbean AgMIP-LA Workshop held in Campinas, Brazil (September 24-26, 2013). The workshop's main goal was to support teams in Latin America to plan activities and projects for the assessment of climate change impacts.

In order to become part of this meeting, the Workshop entitled **“AgMIP-Peru Kickoff Workshop: Integrated Assessments Of Climate Change Impacts On The Peruvian Agriculture”** was held in Lima, Peru from September 19 to 20, 2013; the event was organized by SENAMHI-Peru with the support of AgMIP and the Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica (CONCYTEC) from Peru.

## 2. OBJETIVES

The main objective of the workshop was to disseminate the activities, methods and models being developed by AgMIP. A second objective was to bring together a multi-disciplinary team of Peruvian scientists with the goal of planning regional proposals to conduct integrated assessments of climate change impacts and adaptation on agriculture, following AgMIP's globally standardized methodologies and protocols and adapting them to our reality.

## 3. ACTIVITIES CARRIED OUT PRIOR TO THE WORKSHOP

SENAMHI-Peru carried out the following activities prior to the workshop:

- a) Gathered a list of specialists in different disciplines with experience in climatology, climate change, crops, livestock, economics, information systems, modeling and in other related areas.

- b) Organized two virtual forums (webinars), the first one on March 14 and the second on September 10th. These webinars were conducted by Roberto Valdivia, a scientist from AgMIP, who presented AgMIP's framework and methodology of AgMIP and showed us some research examples that are being carried out. The persons that participated in the webinar were specialists that guided the workshop working groups.
- c) With the presence of Roberto Valdivia, a meeting was organized in Lima on September 18th, with the participation of members of the Technical Group for Food Security and Climate Change (GTTSACC) of the Ministry of Agriculture and Irrigation (MINAGRI). From SENAMHI the participants were the Director of Training Center, Eng. Nicéforo Ita; the Director of Agrometeorology, Eng. Irene Trebejo, and also Eng. Karim Quevedo. From MINAGRI there were 16 participants including officials from different divisions of the Ministry. In this meeting, Roberto Valdivia gave a presentation about the objectives of AgMIP, applications and about some research and development perspectives to be applied in Peru. In this meeting participants discussed ways to fund AgMIP-Peru activities within each institution. SENAMHI will follow up with these institutions.
- d) Meeting with Ms. Amelia Diaz, Executive President of SENAMHI, to discuss role that SENAMHI can play for AgMIP-Peru, and an MOU with AgMIP.

## **4. WORKSHOP DEVELOPMENT**

### **4.1 Methodology**

The dynamic of the workshop included the presentation of the specialist from AgMIP about its objectives, current situation and activities, followed by the presentation of national experiences on climate change and assessment of impacts. Then, AgMIP scientists addressed topics related to impact assessment protocols: climate, crops, economy and information technology by means of virtual and in-person sessions, (See attached Workshop Agenda).

Next, working groups by discipline were established to review the protocols and to determine the key points and identify possible gaps according to the Peruvian situation. On the second day, the representative of AgMIP explained in detail the new approach to regional integrated assessments of climate change impacts and adaptation and the Representative Agricultural Pathways concept. Breakout groups then discussed about setting priority research regions based on data availability, expertise and institutional support.

### **4.2 Agenda**



## AGENDA

### Day: 1

08:30 - 09:00 Registration of participants

09:00 - 09:10 Opening remarks  
Amelia Díaz, Executive President of SENAMHI

09:10 - 09:20 Workshop objectives  
Irene Trebejo, Director of Agrometeorology - SENAMHI

09:20 - 09:50 What is AgMIP? - Current status and activities  
Roberto Valdivia, AgMIP- Oregon State University

09:50 - 12:00 Some research on the impact of climate change in Peru.

- Global circulation models for climate change scenarios in Peru - Clara Oria- Specialist in Numerical Modeling- SENAMHI
- Experiences in the evaluation of climate change on annual crops. Janeet Sanabria – Specialist in Agrometeorology - SENAMHI

Coffee break

- Progress on Ag-MIP Pilot Project - potato.  
Carolina Barreda- Associated researcher of the Centro Internacional de la Papa-CIP
- Economical impacts of climate change on some sectors in Peru.  
Laura Alvarado-Specialist in Agricultural Economics from the Universidad Nacional Agraria.
- Computing technologies applied to cropping and livestock systems, José Guerrero, Computing Technology Analyst from the Centro Internacional de la Papa.

12:00 - 12:30 AgMIP: Protocols and Methods: **Climate**  
Sonali P. McDermid/Alex Ruane. AgMIP-NASA.  
Videoconference.

12:30 - 1:30 Lunch

1:30 - 2:00 AgMIP Protocols and Methods: **Crops**  
Guillermo Baigorria. AgMIP- Universidad de Nebraska.  
Videoconference.

2:00 - 2:30 AgMIP Protocols and Methods: **Economics**.  
Roberto Valdivia. AgMIP- Oregon State University

2:30 - 2:45 AgMIP Protocols and Methods: **Information Technology**  
Cheryl Porter. AgMIP-University of Florida  
Video-conference.

- 2:45 - 3:00 Coffee break
- 3:00 - 5:00: Breakouts: Group meetings to identify the different models used in climate, crops and economics in Peru; also, to review the AgMIP protocols and how they agree with the reality of Peru
- Group1 : Protocols for climate scenarios
- Group 2: Protocols for crop models
  - Group 3: Protocols for economic models
  - Group 4: Protocols for IT
- 5:00 – 6:00 Report to the Plenary: The representative of each group will present a summary of the breakouts, emphasizing on the models used and highlighting important items about the protocols (information supply and demand, others).
- Day 2:**
- 08:30 - 9:30 Methods to conduct comprehensive assessments of climate change impacts. Representative Agricultural Pathways (RAPs) and examples of current research in the framework of AgMIP.  
Roberto Valdivia. AgMIP- Oregon State University.
- 9:30 - 12:30 Group meetings:
- Group 1: With at least one member of each discipline, identify priority areas in order to propose ideas for impact assessment projects, including objectives of the research, work scope, data sources, production systems (main crops, livestock etc.), specialists and possible methodologies to be followed.
  - Group 2: For the Andean Region, with at least one member of each Discipline, propose a plan to implement an impact assessment Project. Prepare a proposal including objectives of the research, data sources, production systems (main Crops, livestock, etc.), specialists and possible methodologies to be followed.
  - Group 3 (if an additional region has been identified): With at least one member of each discipline, identify priority areas in order to propose ideas for impact assessment projects, including objectives of the research, work scope, data sources, production systems (main crops, livestock etc.), specialists and possible methodologies to be followed.
- 12:30 - 1:30 Lunch
- 1:30 - 3:45 Report to Plenary breakout groups.
- 3:45 - 4:00 Coffee-break
- 4:00 - 4:30 Plenary discussion about the way forward.
- 4:30 - 5:00 AgMIP & Organizers  
Discuss next steps in terms of institutional agreements, potential partners and funding sources.  
Presentation of preliminary research network list for AgMIP-Peru
- 5:00 - 5:15 Closing remarks and Certificate Awarding Ceremony

## 4.3 Participants

There were 38 participants of different professions (meteorologists, environmentalists, economists, agronomist, others); a representative of AgMIP Headquarters (Oregon State University); 4 specialists of the Andean region (Puno) and 33 representatives from different institutions in Lima (SENAMHI, UNALM, CIP, INIA, AGRORURAL, SENASA, MINAM, MINAGRI).

PARTICIPANTS LIST:				
	NAME		COUNTRY/ INSTITUTE	PROFESSION
	EEUU			
1	VALDIVIA ALATRISTA	ROBERTO O.	OREGON STATE UNIV.	Economía
	PERÚ - PUNO			
2	ARCOS PINEDA	JESÚS	INIA - PUNO	Agrónomo
3	CHARAJA ORTEGA	MIDWARD	UNA - PUNO	Economía
4	CHÁVEZ PAZO	DANIZA MARÍA	INEI - PUNO	Economía
5	VALDIVIA FERNÁNDEZ	ROBERTO ENRIQUE	CIP - PUNO	Agronomía
	PERÚ - LIMA			
6	ALVARADO BARBARÁN	LAURA SILVIA	UNALM	Economía
7	ANDRADE ORÉ	RAÚL HUMBERTO	MINAGRI	Estadística
8	BADARACCO MEZA	ROLANDO RENEE	MINAG	Teledetección
9	BARREDA POLAR	CAROLINA	CIP	Agronomía
10	CANCHARI CARRASCO	GLICERIO	SENAMHI	Agronomía
11	CERRÓN PALOMINO	LUZIDNYA LYSKOVA	MINAM	Gestión Ambiental
12	CRUZADO CUZQUEN	LUIS ANGEL	SENAMHI	Agronomía
13	FELIPE OBANDO	OSCAR	SENAMHI	Hidrología
14	GALARZA BAZÁN	JOSÉ	SENASA	Agronomía
15	GARCÍA VILLANUEVA	JERÓNIMO	UNALM	Meteorología
16	GUERRERO BARRANTES	JUAN ANTONIO	UNALM	Agronomía
17	GUERRERO ROMERO	JOSÉ A.	CIP	Analista
18	GUEVARA BARRANTES	LUIS	AGRORURAL	Mecánica de Fluidos
19	GUTIÉRREZ ROSALES	RAYMUNDO OSCAR	CIP	Agronomía
20	JAIMES ESPINOZA	ENA	SENAMHI	Meteorología
21	LLACZA RODRÍGUEZ	ALAN GERARDO	SENAMHI	Físico
22	ORIA ROJAS	CLARA	SENAMHI	Meteorología
23	ORIHUELA ROMERO	CARLOS ENRIQUE	UNALM	Economía
24	PÉREZ DÍAZ	NELLY	SENAMHI	Geógrafo
25	QUEVEDO CAIÑA	KARIM LISETTE	SENAMHI	Ambiental
26	RAMOS FERNÁNDEZ	LIA	UNALM	Recursos Hídricos
27	RIVERA CCACCACHAHUA	MARISELA	SENAMHI	Meteorología
28	RONQUILLO G.	PILAR	INEI	Economía
29	RUÍZ VILLAVICENCIO	PATRICIA JUDITH	SENAMHI	Sistemas
30	SALES DÁVILA	BEATRIZ	INIA	Ambiental
31	SERNAQUÉ SAAVEDRA	WALTER FRANKLIN	SENAMHI	Agronomía
32	SOLÍS CÁCERES	OLIMPIO	SENAMHI	Sistemas
33	SOMOZA VARGAS	EDWIN EDUARDO	AGRORURAL	Geógrafo
34	TREBEJO VARILLAS	IRENE	SENAMHI	Meteorología
35	VALVERDE BOCANEGRA	MANUEL	SENAMHI	Meteorología
36	VARGAS MAYO	GLORIA MARÍA	INEI	Economía
37	VILLAR	GESABEL	SENAMHI	Economía
38	YZARRA TITO	WILFREDO JULIÁN	SENAMHI	Agronomía

## **5. OUTCOMES**

Ms. Amelia Díaz Pabló, Executive President of SENAMHI, inaugurated the Workshop. She highlighted the importance of establishing an AgMIP-Peru Team that will start its activities aiming at the implementation of programs, projects and research for the assessment of climate change impacts. She also pointed out that it was great to see the participation of different specialists from different institutions in the event.

### **5.1 FIRST DAY: SEPTEMBER 19, 2013**

The first day consisted of presentations and breakout groups.

#### **5.1.1 Presentations**

##### **a) AgMIP Project Approach**

Roberto Valdivia presented the AgMIP Project Approach and the multi-disciplinary approach based on climate, crop, economics and technology information protocols.

##### **b) National Research on Climate Change:**

National experience on this matter was presented from the climate point of view and modeling of impacts on crops and the economic sector at a macroeconomic level.

Representatives from SENAMHI-PERU gave presentations on future climate scenarios made to 2039 and 2100 for localized areas of the country (Piura, Mayo, Santa, Urubamba, Mantaro River Basins; among others). The outcomes of these studies are currently the basis of different studies. In addition, preliminary outcomes of climate change impacts on crops (maize, potato) using biophysical models were presented (FAO-Lohme, Aquacrop).

On the other hand, representatives of the International Potato Center (CIP), addressed the need to implement methods, tools to identify, analyze, study and to face the challenges for a sustainable production of potato in a framework of climate change. In this context, he emphasized the activities being carried out under the AgMIP project aimed at establishing adaptation measures strategies.

The representative of the Universidad Nacional Agraria La Molina presented the results of the impact of climate change on the productive sectors (fishing, agriculture, livestock, mining, energy and tourism). The study showed that the highest negative impacts were on fisheries, agriculture and livestock sectors (In: Impactos económicos del cambio climático en algunos sectores del Perú-MINAM).

Finally, on the Information and Technology side, the CIP representative talked about the different models and technologies that are part of the computing support for modeling and estimation of variables for agriculture based on CIP's experience.

##### **b) Climate, crops, economics and information technology protocols**

Scientists from the AgMIP showed the most relevant aspects of the protocols:



**Climate Protocol:** Presented via teleconference by Alex Ruane, NASA scientist, AgMIP.

**Crop Protocol:** Presented via teleconference by Guillermo Baigorria, scientist from University of Nebraska, AgMIP.

**Economy Protocol:** Presented by Roberto Valdivia, scientist from Oregon State University, AgMIP.

**Information Technology Protocol:** Presented via teleconference by Cheryl Porter, scientist of University of Florida.

### **5.1.2 Survey on priority areas**

In order to prioritize sentinel zones in the country where the AgMIP activities would be done, we proceeded to implement a survey within the working groups to determine which regions in Peru could be prioritized, the results were:

1. 42% - Andean Region ( Puno ) at 3800 masl, associated with a high vulnerability due to the frequent occurrence of adverse weather events (frost, drought, hail ) in addition to the complexity of the environmental, climate, social and economic systems. This region is characterized by having a high rate of economically active population involved in agricultural activities, thus the huge dependence on agricultural activities and the associated climatic risks make the region vulnerable, in particular for food security as the main crop staples for rural families (potato and quinoa) are grown in this area. There is high data availability.
2. 38% - Mantaro Valley in Junin at 3200 masl on average, a predominantly agricultural area, frequent recurrence of extreme weather events. It represents the central highlands of Peru and it's characterized for supplying food products to Lima. The main crops are potatoes and maize. There is high data availability.
3. 20% - Piura, coastal area, associated to the production of crops for agro-exportation. Data availability to be determined.

### **5.1.3 Breakout Groups: Assessment of AgMIP protocols for implementation in Peru**

Groups were formed by discipline and experience of the participants, in order to answer questions about the applicability of AgMIP protocols, identification of possible gaps (from the scientific, technological, human resources, institutional, information availability point of view) and then, propose future actions to implement the protocols.

In this regard the difficulties to implement the protocols that have been identified are summarized as follows:

- Limited budget for research purposes.
- Lack of research on specific topics (genetic coefficients, agro-climate indices and requirements for the crops, calibration and validation of crop models, uncertainty management, others.).
- Lack of protocols for research.
- Limited scientific production (papers, reports, etc) which further limits the transfer of knowledge
- Weak institutional coordination reflected in the lack of an integrated information system.
- Studies and research at different scales, isolated efforts
- Poor training in components of AgMIP (climate, crops, economics and IT)
- Low investment in scientific equipment, human resources, training, etc.
- Lack of systematic information (theses, studies, etc.)
- Insufficient testing of crops for research purposes (crop models, etc.).

In addition, the following activities are proposed for the implementation of protocol-based studies in Peru, following AgMIP guidelines:

- Promote strategic partnerships between research institutions (national and international).
  - Establish an MOU with AgMIP
  - Revise and renew MOU with EMBRAPA
  - Partnerships with local institutions (governmental, universities, NGOs)
  - Partnership and networks with other Latin American AgMIP initiatives.
- Promote a scientific network for AgMIP objectives
- Incorporate research topics within institutional activities
- Strengthening quality control system related to meteorological data
- Promote specialized training in AgMIP components
- Standardize and disseminate existing protocols
- Strengthening of computing system and implement information platforms.

**Table 1. Characterization of Prioritized Regions**

BIOME/REGION	What are major production systems that need to be modeled?	What are major stakeholder/policy questions that need to be addressed?	What data are available?	Who will lead efforts for each portion of the project?	Who else do we need to involve?
Highlands (Puno)	Agricultural System : (potato, quinoa, bean), Livestock System: (ovine, bovine, alpaca)	How can we ensure the availability of food?	<b>Weather:</b> Data available (Temp, PP). Estimated: solar radiation	Weather: SENAMHI ( C.Oria, G. Avalos)	Decision makers from regional and local governments.NGOs and Universities
Mantaro Valley	Agricultural System : (potato, corn, bean, ), Livestock System: (ovine, bovine)	Which research could improve the quality of the product?  How to reduce or leverage the impact of climate on crop yields and livestock?	Not available: Long historical series, Little geographic coverage of meteorological stations  <b>Crops and livestock:</b> National statistical (area planted, area harvested, yield)	Crops: CIP (C. Barreda , B. Condori, R. Gutierrez), SENAMHI (K. Quevedo, W. Yzarra), INIA (J. Arcos, W. Barreda). MINAGRI (R. Andrade) Livestock: INIA , CIRNMA (C.Leon Velarde, R. Valdivia)	
North coast of Perú (Piura Valley)	Agricultural System : (cotton )	Which are potential area of production with low risk of extreme events?  What adaptation measures recommended to mitigate and leverage the impacts of climate change?  How will be the climate in the next agricultural campaign?	Results of research of public and private institutions: planting and harvest date, water and nitrogen management.  Difficulties:Not systematic information. There is no information about CO2, leaf area index, genetic coefficients  <b>Economy:</b> Data Available: Regional and national data time series of production and prices. Estimated Cross revenue. Not Available: Historical series of production costs, only cross-sectional.	Economy: UNALM (L. Alvarado, C. Orihuela), SENAMHI (G. Villar), INEI (D. Chávez)  TICS: SENAMHI (O. Solis, A. Uacza), CIP (J. Guerrero)	

## 6. RELEVANT ASPECTS OF THE WORKSHOP AND CONCLUSIONS

- The goals set for the workshop and were accomplished. 37 multi-disciplinary specialists from 12 national institutions participated in the workshop. They were introduced to AgMIP, its goals, activities, methodology and protocols. Participants were challenged to think about this novel methodology for climate change impacts assessment and establish an AgMIP-Peru base team. This was achieved by having the participants agree to continue collaboration and develop further plans for AgMIP-Peru.
- Breakout teams analyzed the difficulties that may exist in the country to work using the AgMIP thematic protocols. Several actions were suggested in order to overcome these difficulties and to implement them in the near future, for example, the promotion of

national strategic alliances and specialized training is something that will be given a high priority.

- c) Similarly, three AgMIP-Peru priority study sites were identified: Andean region, Piura and Mantaro. Breakout teams identified for each one of the study sites: the main production systems, the institutions that would lead the activities and actions to be taken, such as organization of workshops and training courses for the four components of AgMIP (climate, crops, economics and information technology), promoting agreements and memorandum of understanding with AgMIP central Program and with institutions in other Latin American countries for scientific and technical cooperation as well as the elaboration of regional projects.
- d) The results obtained in this event and other AgMIP-Peru meetings were presented at the Latin America and Caribbean AgMIP Workshop held in Campinas, Brazil (September 24-26). Four representatives from AgMIP-Peru attended the workshop in Brazil thanks to the support and funding from EMBRAPA Agricultural Informatics of Brazil.
- e) Finally, the creation of the AgMIP-Peru Team represents the beginning of a coordinated multidisciplinary work in the country, aimed at a comprehensive assessment of the impacts of climate change, with scientific and standardized methodology that would allow the provision of reliable information to the public and decision makers.

## **7. THE WAY FORWARD:**

- a) Subscribe a Memorandum of Understanding (MOU) with AGMIP headquarters. SENAMHI-Peru will be the institution that will lead and be responsible to sign the MOU.
- b) Subscribe national agreements to carry out the activities in the framework of the AgMIP program.
- c) Organize and carry out a training workshop for the four components of AgMIP (climate, crops, economics and information technology) in Lima-Perú. Tentative date: October 2014 (to be coordinated with AgMIP headquarters for dates and AgMIP leaders participation). AgMIP-Perú will start looking for funding for this event. Specific activities are outlines in Table 2.
- d) Disseminate all activities related to AgMIP-Perú and AgMIP around the world. SENAMHI will work to host an AgMIP-Perú website, mailinig list and link them to AgMIP main website. This effort will need to be coordinated with AgMIP central.
- e) Submit project proposals to national and international funding agencies.

**Table 2. AgMIP-Perú: The way forward: proposed activities 2014**

ACTIVITY		What is needed from AgMIP Central
Next: 6 Months	Coordination and discussion about MOU details	Develop an MOU with AgMIP
	Subscribe national agreements	
	AgMIP-Perú, Website and mailing list	Coordination to establish AgMIP protocols for website, communications, logo, etc.
	Seek for financial source	
Next: 12 Months	Training workshop for Andean Regions (all components).	Coordination and organization support; and attendance of scientists from AgMIP central to National Workshops.
	Submit project proposals to national and international funding agencies	Scientific support for diverse aspects of the project

## 8. PICTURES:



8.1. Pre-Workshop meeting with officials and specialist from the Ministry of Agriculture and Irrigation



8.2. Workshop Inauguration by Executive President of SENAMHI, Amelia Diaz



8.3. Presentation by Roberto Valdivia, AgMIP Scientist



8.4. Breakout CLIMATE Protocols



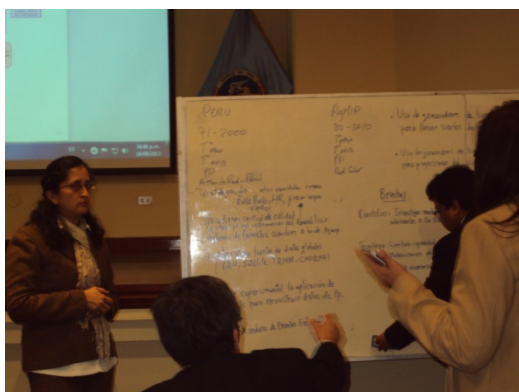
8.5 Breakout CROP Protocols



8.6 Breakout ECONOMICS Protocols



8.7 Breakout IT Protocols



8.8 Group discussions



8.9 Group presentations





8.10 Group presentations



8.11 Certificate awards ceremony