# Ag MIP

The Agricultural
Model Intercomparison
and Improvement Project

## REPORT

## SUB-SAHARAN AFRICA
## SOUTH ASIA

## INTEGRATED ASSESSMENT
## RESULTS WORKSHOP

JANUARY 30 - FEBRUARY 4 2014
ARUSHA, TANZANIA

UKaid
from the British people

CIAT 45
Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture

USDA

# Report

# Sub-Saharan Africa
# South Asia

# Integrated Assessment
# Results Workshop

## January 30th – February 4th 2014

# Table of Contents

# Introduction

The AgMIP Finish line workshop held in Tanzania Arusha from January 30th - February 4, 2014 brought together 138 participants from 26 countries and six resource persons from the United States and Australia. The participants were from the eight regional AgMIP research teams. The research teams from AgMIP Sub-Saharan Africa (SSA) were East Africa (17 participants), West Africa (17), Southern Africa Livestock (10), Southern Africa (10), and the Sub-Saharan Africa Coordination team (7). The research teams from AgMIP South Asia were the Indo-Gangetic Basin South Asia (9), Southern India (4), Pakistan (13), Sri Lanka (10) and the South Asia Coordination team (6). The ratio of senior to young scientists was 4:6 for Sub Saharan Africa and 7:3 for South Asia. The young scholars of today will be the pool from which the scientific leaders of tomorrow will emerge. In addition, there were key members of the AgMIP leadership team, some invited speakers and 11 stakeholders that participated in the workshop (see appendix 1 on brief bio-data of stakeholders and appendix 2 on list of participants).

The objectives of the workshop were to:

1) Present results to other regional researchers, leaders, and stakeholders,

2) Incorporate feedback and finalize main results of Phase I report (ASA chapter and additional sections) and,

3) Ensure timely completion of project.

# Day 1: Sharing Results

## Opening remarks

**Dr Saidou Koala** made opening remarks on behalf of CIAT. He highlighted the need to be able to feed the world's growing human population that is expected to reach 8 billion by 2050. He mentioned AgMIP's approach of bringing together a multi-disciplinary community of scientists to improve the next generation of climate impact projections is in line with CIATs new strategy and in line with the CIAT-led CCAFS (Climate change, agriculture and food security) of the CGIAR. AgMIP, he said, is well-placed to indeed improve substantially the characterization of world food security due to climate change and to enhance adaptation capacity in both developing and developed countries addressing the challenge of improving the livelihoods of the growing populations. Dr Saidou mentioned that AgMIPs effort to build the capacity of local experts in its modeling efforts is of particular interest to CIAT since this will ensure that developing countries in SSA and SA have a critical mass for this type of activities. He re-iterated that it is indeed notable that AgMIP is:

      a. Establishing teams of researchers with necessary skills to conduct these assessments in each of the participating countries by enhancing their capacity through training and hands on work

      b. Adding value and making best use of available data

c. Providing an opportunity for the local researchers to work under the guidance and continuous support from a highly reputed and globally acknowledged team of scientists

d. Developing a good framework linking climate-crop-economic models to make comprehensive assessments of impacts both on crop productivity and economic well being

e. Developing a good platform that can be more extensively applied to cover the whole country or any target region and with flexibility to update with more up to date information

f. Is pioneering data publication and accessibility

He noted that AgMIP should keep in mind the small scale farmers who have seen their production systems become unreliable due to shifts in crop suitability, change in rainfall patterns and degrading soils as its target beneficiaries and, to inform policy makers and farmers alike on how to sustain production and productivity in the face of the climate change.

*Dr Saidou Koala is the coordinator of the African Network for Soil Biology and Fertility (AfNet) of CIAT*

**Dr. Mboyi Mugendi**, Zonal Director of Research and Development, Ministry of Agriculture, Food Security and Cooperatives, Northern Zone of Tanzania officially opened the AgMIP meeting. After some welcoming remarks, Dr. Mugendi said that:

"Agriculture is the single most important sector in the developing countries including Tanzania. About 80% of the population live in the rural areas of the developing world and earn their living through agriculture. Considering that the agricultural sector is powerful in reducing poverty, the importance of transforming the sector cannot be over emphasized.

Like many countries in the developing world, Tanzania has long history of good collaboration with institutions, such as CIMMYT, ICRISAT, CIAT in the area of agricultural research. The collaboration has resulted in the development and use of many technologies that have improved food security in the past years. However, these efforts are now constrained by climate change. Both sub-Sahara Africa and South Asia are the areas with the greatest risk. In Tanzania for example, farmers are already experiencing climate-related production challenges including:

i) Shifts in the onset of the rainy season,
ii) Drying of what were previously known as permanent marshlands,
iii) Changes in the amount and rainfall distribution,
iv) Disappearance of bimodal rainfall distribution,
v) Increasing temperatures contributing to changes in the agricultural productivity levels,
vi) Emerging of new crop diseases, such as the current Maize Lethal Necrotic Disease (MLND),
vii) Acute Malaria affecting farmers in highlands where the disease was not existing,

viii)     Some adopted technologies such as date of seeding that is not working.

These challenges call for the need to clearly understand and inform policy makers on the best strategies of farming of the future, and to get farmers to adopt the right farming practices.

      The implementation of *Agricultural Model Intercomparison and Improvement Project* (AgMIP) is timely and is a solution to the above mentioned challenges."

Dr. Mugendi commended AgMIP for its approach of integration, stakeholder engagement, capacity building and the results that have generated so far. Also, he indicated that for Eastern Africa, we could take advantage of the positive impacts of climate change, such as increased rainfall, citing an example of Dodoma region of Tanzania.

## Workshop goals

Alex Ruane, AgMIP Science Coordinator, introduced the overall goals of the workshop. Participants were asked to incorporate any feedback received from peers and stakeholders and refine their reports and policy briefs. John Antle reminded the participants of the 3 key questions of AgMIP regional research teams (RRT).

# Presentations by Regional Research Teams

Each RRT presented the results of their research. The following are the key highlights from the teams:

## East Africa

*Assessing the impacts of climate change in eastern Africa*

*Presenter: KPC RAO*

Results from Kenya are more refined than other AgMIP East African (EA) countries. Climate data does not show differences in future seasonal rainfall or in the number of rainy days (>2mm) and there was no trend in the anomalies. The only observable trend is in the variability i.e., there is increasing coefficient of variation and also both minimum and maximum temperature increased over the years. Downscaled scenarios were in line with global predictions. Eastern Africa is getting wetter. Embu however is getting much wetter than it was projected globally. In one zone (LM4), there is a great difference between predictions with $CO_2$ and without $CO_2$. Agriculture Production Systems Simulator (APSIM) shows lower yield (and less variability) than in Decision Support System for Agrotechnology Transfer (DSSAT) where yields are also much higher. Response to fertilizer decreases with increasing temperature. Katumani variety is getting most adversely affected by the climate change due to its short duration nature. Uncertainties in the crop models are not translated into yields because there is no statistical difference in yields in Embu (across GCMs). Potential yield for the drier areas is decreasing (assuming no nutrient and water limitations).

## Indo-Gangetic Basin

*Strengthening simulation approaches for understanding, projecting and managing climate risks in stress-prone environments across central and eastern Indo-Gangetic basin*

*Presenter: Nataraja Subash*

Sensitivity of the models to CO2 differs between DSSAT and APSIM. There are wide variations of percent gainers under different climate scenarios. The translation tool (Quadui) can be improved for automatic change of management practices such as sowing dates. Quadui is also creating large (megabites) APSIM simulation files and this also needs to be improved. Forced maturity due to crop stress without adaptation, as opposed to with adaptation could be the reason of the variations in gainers under different climate scenarios.

## West Africa

*Climate Change Impacts on West African Agriculture (CHIWARA)*

*Presenter: Sibiry Traore*

Results for 3 sites (Nioro, Navrongo and Koutiala) were presented. In Nioro, three general circulation models (GCM) predict decrease and one increase while in Navrongo, one GCM predicts decrease and 3 increases. There are larger temperature increases in the southern parts of West Africa. Decreases in yields are predicted for all cereals in Nioro, while there is little change in Koutiala and Navrongo. Peanut yields are not affected by the climate change. There is much more sensitivity to climate change (temperature) in DSSAT than APSIM, except for peanut. Results show homogenization of model results across the GCMs. Percent gainers increase significantly as adaptation options are applied, but there is need to look into an expected strong effect of cash crops in future. APSIM is more sensitive to drought/moisture effects.

## Pakistan

*Impact of climate change on rice-wheat cropping system of Pakistan*
*Presenter: Ashfaq Ahmad*

Soil related issues are key challenge in this system, as is terminal heat stress in wheat. Rainfall is decreasing towards southern Punjab. Sowing 15 days earlier can help to avoid the high mid-march temperatures in Punjab.

## Southern Africa

*Agricultural Model Intercomparison and Improvement Project (SAAMIIP)*

*Presenter: Yacob Beleste*

There are a higher percentage of gainers with adaptation than without adaptation. There is increase in rainfall and temperature variability with climate change. There will be significant gain in maize production when there is positive development pathways (+ve RAP) and with adaptation.

## Sri-Lanka

*Modeling the impact of climate change on rice farming systems in NW Sri-Lanka*

*Presenter: Lareef Zubair*

DSSAT predicts lower yield than APSIM for Yala site. Sensitivity to temperature is much more significant than $CO_2$ and rainfall. One adaptation option is to change from long to shorter duration varieties.

## Southern India

*Integrated assessment of climate change impacts on principal crops and farm household incomes in Southern India*

*Presenter: Paramasivan Ponnusany*

The percentage of gainers declined across all GCMs from the near, mid and late century. Gainers are lower at high (8.5) than at low (4.5) GHG concentration scenarios. Both rainfall and temperature are on the increasing trend. APSIM predicted lower yields than DSSAT for the baseline. All GCMs show positive yield changes.

## Southern Africa Livestock

*Crop-livestock intensification in the face of climate change: exploring opportunities to reduce risk and increase resilience in Southern Africa using an integrated multi-modeling approach (CLIP)*

*Presenter: Patricia Masikate*

There is an over prediction of milk production. Suggestions were made for the need for diversification as opposed to pushing intensification systems that may not work.

Following the RRT presentations, a general question was how to communicate results to other people when models do not agree, as observed for DSSAT and APSIM. There are residual differences in the models that indicate we do not know everything about the models, but there are also artefacts that can be corrected to reduce some of the disagreements.

### SSA coordination team:

*Presenter: Job Kihara*

Presented work on synthesizing and sharing knowledge across regional research teams in SSA.


### SA coordination team:

*Presenter: Dileep Guntuku*

Showed tools designed and developed for information sharing and capacity building including KSIConnect and AgEd Open courseWare (AgED) and open data repositories.


### Organized media interviews

Media present at the opening of the meeting included Tanzania broadcasting corporation (TBC), the Guardian newspaper, and radio. Selected participants interviewed included Dr. Lucas Mugendi (Zonal Director), Dr. John Antle (AgMIP leadership), Dr. KPC Rao (Principal investigator, AgMIP eastern Africa) and Dr. Job Kihara (AgMIP SSA coordination). Media publications from these interviews are highly circulated and can be found for the Guardian (31st January 2014) and DailyNews (4th February 2014).


## Afternoon of day 1: Disciplinary Breakouts

*Charge to disciplinary breakouts was given by Alex Ruane and John Antle.*


Crop team breakout:

The agenda was:

1) To get impressions of the crop results from other teams,

2) Know what has been done to understand model results (e.g. sensitivity analyses),

3) Gain lessons on adaptation from other teams,

4) Discuss pending tasks for the final template,

5) Discuss methodological challenges/problems being experienced and

6) Develop action plans for the RRT.

The team discussed some possible model parameterization and functions that need to be checked/evaluated as plausible reasons to explain the source of model prediction differences. This could include soil parameters, carbon pools, vapour pressure deficits, nitrogen and water stresses. Understanding how different models simulate at the same soil layers is important, as

is the simulation of fertilizers. Sensitivity analysis helps point to possible sources of model differences, but this is not the only method.

The need to document how the models were tweaked was emphasized, including documentation of the data used for the model calibrations. It was also noted that it is important to document the DSSAT and APSIM model versions since some of the older versions differ e.g. in $CO_2$ sensitivity to newer versions.

# Day 2: Refining Reports and Chapters

Day 2 and 3 were devoted to teams working on refining their models, reports and ASA chapters. There was re-analysis of data by some teams, e.g. SAAMIIP to try and find out reasons for variability/uncertainty. During this time, the two coordination teams from SSA and SA held a joint learning event.

## Coordination meeting (Cross-region learning event)

Teams planned on video recording of plenary reporting sessions to supplement the PowerPoint presentations. The coordination teams identified the need to coordinate learning across teams and regions (SA vs. SSA). This is to take advantage of the different levels of expertise in analysis and presentation of economic data for example. As such, there is not much sharing of tools such as R codes for graphing, etc. across teams and this needs to be encouraged/catalysed. This is a nice way of supporting team reports.

The SSA coordination team can borrow ideas on information and communication technology (ICT) from SA coordination team which is having an AgED open course for agriculture and allied subjects where, through agreements, the online training materials can be hosted. SSA team will consider whether to use the Webex service or adopt the SAs KSI connect that uses Adobe Connect without the need to install add-ins to access, and where time delays are handled by keeping a copy of the videos of the livestream.

There are recurrent debates on what is the difference between APSIM and DSSAT with regard to how they handle different cases. Coordination teams, through modelling expertise of the SSA coordination team, can prepare materials with a local flavour that can be translated into video or a cartoon by SA ICT team, with input from the more experienced AgMIP modellers. Another material on this line would be in support of AgMIP results presentation and interpretation. We see a lot of potential to utilize the diversity of the SSA and SA coordination teams' expertise to move AgMIP forward.

Being close to the teams will help understand their needs better. Although there are some "single points" of contact e.g. in the SA case, there is need for a budget for coordination principle investigators (PIs) to visit RRTs during key events such as national stakeholder meetings.

The coordination teams noted the need for strategic communication for impact and the channels/medium have to be well planned. This communication should be in simple illustrations and in local languages (where needed). It was not clear yet what help is needed by the RRTs from the regional coordination teams (RCTs) on this, including in generation of policy briefs.

Both SA and SSA have quite similar future plans for capacity building including short-term courses or internships where students come to learn special skills in a residence set-up to fulfil AgMIP's research agenda (SA and SSA). Training in AgMIP will continue to be demand-driven and modules targeted to the specific needs. A key concern arising from SSA coordination team and coincidentally from Peter Craufurd was the need to know what the coordination led training is contributing to the capacity of the persons trained. Following this, a tool was quickly prepared and responded to by 78 participants of the Arusha workshop. Other members will be reached through Survey Monkey.

## Round robin discussions with leadership team

Different RRTs held separate discussions with the leadership group. Teams were provided some feedback on their book chapter, the expected reporting and timelines for the project.

# Day 3: Stakeholder Targeting Sessions

Logistics for field trip were introduced followed by the agenda for the day. RRTs continued with their breakouts. The coordination teams held discussions on their publications, future engagement in AgMIP, final reporting etc.

## Mid-day plenary

*What have we learned from global crop-economic model comparisons in AgMIP? Presenter: Herman Lotze-Campen*

Regional results for SSA on the above topic were presented. Key questions were the future of agricultural prices, evolution of agricultural production and how these will be affected by climate change in the future. Some models (3) showed price decreases by 2050 but other models had price increases. Wheat in SSA showed some differences in exogenous yield changes but there are greater differences when considering the effective yield change (following endogenous adjustments). Open issues for AgMIP global economics for the second phase were provided/ suggested such as representation of the different land types. Interaction across scales, considering the drivers and assessing consistency across the scales was highlighted. The work presented is consistent to AgMIP's RRTs focus of what would the economy be like with and without climate change. What have not been considered in the global economics are the adaptation strategies to mitigate climate change. The models differ in how they treat different aspects hence the variations in prices. An observation was made that there is worry of double

accounting for the highly aggregated global models when we add trends on data that is derived from adaptations, e.g. where fertilizer has been applied.

*Stakeholder identification and need matching in AgMIP: what to consider*

*Presenter: Joske Houtkamp*

Engagement of stakeholders requires boundary skills to facilitate dialogue between research and practice. Stakeholder identification and selection are based on power-interest dimensions, proximity to the project, information needs of each stakeholder at different spatial/regional scales etc. For AgMIP and going to the next level of identification of stakeholders, we need more insights into how to engage the stakeholders at the various levels, understand their responses etc. and a framework for doing this would be nice. Also, meeting stakeholder requirements without going astray is important. It is a constant struggle to find the match between project and stakeholder needs but we have to continue as we perfect our boundary work skills.

## Dry-runs of stakeholder-targeted presentations

RRTs presented slides developed with key messages for stakeholders. A few lessons or comments on the stakeholder targeted presentations included need to make visual illustrations of some of the results (double channel communication with numbers and visuals), reduce technicality of some of the graphs, give a final wrap-up slide with main conclusions. Posing also a few questions that can get stakeholders thinking of what next was praised.

# Day 4: Field Trip

The trip involved a travel to Mount Kilimanjaro region to appreciate the farming systems. At the first stop, participants interacted and discussed with farmers on their practices in production of maize, cabbages and sunflower under irrigation systems. At the second stop, participants appreciated the design, intensity and complexity of the Chagga home gardens including the aging farming community, the mining of nutrients from lowlands among others.

# Day 5: Stakeholder Sessions

Stakeholders representing Pakistan, Botswana (SAAMIIP), Kenya (AgMIP EA), Zimbabwe (Clip), and India participated. John Antle introduced to these stakeholders the goals of AgMIP and the need of AgMIP to derive and communicate climate change impact on agriculture results relevant for policy. Making science useful to stakeholders is a communication challenge posed to the stakeholders to help AgMIP find the best ways to create impact through better interpretation, visualization and presenting. After each of the invited stakeholders gave remarks pointing to their roles and the key climate change-related challenges in their countries and regions, RRT PIs presented the key messages designed for the stakeholders. Stakeholders then gave the following as responses to the presentations.

> Messages must be tailored to the target; whether farmers or policy makers, grassroots level etc. these grassroots don't speak the language of graphs. They need "if you do a, b, c, you will increase your yields.

I. Presenting a positive outlook is nice to provide hope and not doom to the people. Need to take into account drastic/extreme events that may be part of the future climate despite no change in mean rainfall and or temperature. An important question remaining is "What will be the critical point at which the high potential areas (projected at present not to be affected badly by climate change) will become vulnerable or stop being productive. Taking into account differences in c3 or c4 plants would be nice as they may react different to climate change. More representation of farmers' needs and opinions may be needed.

II. To what extent are farmers willing to change to adopt the range of options that are available (or presented)? This will require participatory action research, working with farmers to identify the different constraints and opportunities they would want to seize. Participatory visioning would also help. Farmers are concerned about profitability of the options so this should be captured.

III. As we look at changes in rainfall and temperature, to what extent are we looking at changes in pest/diseases and their behaviours? These are difficult to measure and they have capacity to regulate to climate changes than crops.

IV. How would you communicate the uncertainty evident in your results to the stakeholders? Is crop insurance one way of addressing this uncertainty problem for West Africa? Here, we could rely on probabilistic methods.

V. What are the strategies put forward in relation to livestock in ensuring the young generation becomes aware and start to adapt to climate change? The stakeholder involvement process is one step and in the next phase, we will engage more with stakeholders for this knowledge to reach the users.

VI. Most of our modelling is based on inorganic fertilizers, but are these sustainable? We need to include organic fertilizers as well since we might get answers on sustainability (i.e., compare and provide with the best future adaptation). AgMIP has tested only very

few adaptation options. For making recommendations, we need a range of options that farmers can choose from.

VII. The fusion of farmer concerns, scientists and policy makers is a key challenge for linking science and practice.

VIII. We need to see messages highlighting the role of stakeholders and policy in addressing the negative activities contributing to climate change (e.g., activities even external to agricultural sector).

IX. Many farmers want a solution for their problem today but in AgMIP we are talking of 2050, which may not be very interesting for the farmer today.

X. Decisions on whether to discourage production of certain crops that consume more water, such as rice and sugarcane are needed for certain production environments. Pulses such as mung bean and pigeon peas are coming up as alternatives for income. Cereal-based cropping systems highly impact the water-balance and soil health so introducing other varieties/crops (green maturing crops) will improve these.

XI. We have to talk to stakeholders at all levels to develop comprehensive adaptation packages.  We have to ask ourselves what we do with the losers reported in our economic analyses? Should they remain as losers or are there alternatives we can offer for these?

XII. At the Arusha meeting, AgMIP had more results and more confidence that it needed stakeholders to indicate the importance, interpretation and presentation of these results.


Small meeting with stakeholders: the importance of stakeholders was introduced and the need for their involvement in AgMIP. Persona-scenario technique was introduced and the stakeholders were requested to create a fictitious person and what that person needs, for what purpose and when, i.e., a detailed requirement of information for this persona is to be created and for AgMIP, we will have different personas. Persona is a short story of identities to help our researchers start to appreciate what kind of users they are targeting.


**In RRT breakouts**, scientists engaged with stakeholders from their region to discuss the following questions:

I. What are the adaptations needed?

II. What should teams do to influence stakeholders?

III. What timescales and, matching policy to timescales (farmers short-term, infrastructure long-term).

IV. What are the key messages that the teams should focus on for policy-makers?

V. What can stakeholders do to promote research, be an advocate of the program and the regional teams?

VI. Provide feedback & advice to teams on the interaction with policy-makers and with regard to presentations & policy briefs.

VII. How to speak the language of stakeholders and in this case, indicate some direct benefits of AgMIP work for farmers.

> *"A good policy should start addressing issues of now, before the medium and long-term timescales"—Stephen Kinguyu*

We need to quantify the benefits of adaptation vis-à-vis not taking action.  Also, agriculture should be addressed in terms of its linkages with other sectors such as water management and management of other resources. Adaptation strategies should be targeted to small and large-scale farmers who make up the farming community in southern Africa. On its part, the CIWARA team agreed that the most important stakeholders are the farmers. Current research can help identify the most vulnerable farmers so that policymakers can make plans to help those categories, to minimize climate-related risks. There is need to involve farmers associations and bring one or two to workshops as *personas*.

"Advice from stakeholders is keep the messages simple, link strategies to the livelihoods and show the gains" and,

 "Farmers don't listen, farmers want to see."

We need to expand our locations to validate the results. The capacity building of the researchers and other stakeholders is important. Food value chain development is needed.

# DAY 6: Stakeholder Feedback

Goals of the day as introduced by John Antle were (1) the incorporation of stakeholder feedback into analyses, reports and publications, 2) finalizing work plans to close of project and (3) separate discussions (for economists and crop scientists) on uniformity and presentation of ASA chapter results. The RRTs then went into breakout sessions for the rest of the morning.

In plenary, the RRTs presented themes for policy briefs that highlighted issues such as socio-economic transformations, adaptations, projected climate changes, policy changes and recommendations. For adaptation, these could, depending on region, include early/late maturing varieties/crops, heat/drought, pest/diseases tolerances, and diversifications of cropping systems. Climate change effects are on systems so there is need for cross-sectorial/holistic approaches. Also, more thought needs to be given to addressing or communicating uncertainty or data with large degrees of uncertainty.

## Closing remarks

Inclusion of livestock was good, capacity building was applauded, and continuous improvements where "AgMIP flying plane under construction." In the future, CLIP will include rangelands and effects of temperature on animals. CIWARA, despite challenges of multiple

institutions, had a lot of capacity built and AgMIP lessons will be used in other projects in West Africa. For Pakistan group, AgMIP developed capacity in novel research in the most upfront frontiers of climate change. The team has learned a lot about stakeholder interactions and working together. In the future, they will introduce new crops in the mixed cropping systems, and want to add the livestock component as well. The Pakistan group will be pleased to host a kick-off of second phase. PI foresees a regional centre established for the whole of south Asia region. Indo Gangetic Basin RRT benefited with capacity building e.g. through boot camps, have understood regional integrated assessments, and in the last six months have started integrated farming systems modelling. In future, the team would like to include livestock-crop interaction modelling. They will need resources to collect new AgMIP survey data. South India RRT has found AgMIP to be a truly integrated multi-disciplinary project. SAAMIIP reiterated the capacity building that started in some cases from scratch (some scientists without prior exposure to some models). Challenges for internet-based learning sessions were encountered due to connectivity problem. AgMIP EA observed the challenge of data quality coming from national partners.

Remarks by AgMIP leadership: Cynthia Rosenzweig reiterated the need to focus on extreme climate event analysis to understand trends, variability and change in the regions. The leaders appreciated the efforts made by the teams in realizing AgMIP Phase1 results and encouraged them to continue, especially on the area of stakeholder interactions to transfer this useful knowledge and results to impacts, and making data accessible within the project.

# Appendix 1: AgMIP Stakeholders' Bio-data

**Dr. K. Veeranjaneyulu** is the University Librarian & Professor and Head i/c., University Computer Centre at Acharya N.G. Ranga Agricultural University, Hyderabad and CCPI, e-Granth project. He has two and half decades of professional experience. He holds M.Com, MLISc, BGL and Ph.D. from S.V. University, Tirupati. He also possesses PGDLAN and a diploma in Software Applications. He has organized several workshops, seminars, conferences and training programmes in the field of Library and Information Science. Ten candidates were awarded M.Phil. degrees under his guidance. Currently he is guiding eight Ph. D. students. He is a resource person to various Academic Staff Colleges in the country. He has delivered many guest lectures at universities in Andhra Pradesh, Maharashtra, Tamilnadu, Karanataka and Haryana. He has organized more than 20 conferences, seminars, workshops and training programmes for working Librarians, Information Specialists, Teachers and Students and attended nearly 12 training programmes.

*Dr. K D. Kokate* was educated in Karnal, Haryana, India. He started his scientific career from Arid Desert Region (Jodhpur), worked in Temperate High Hills (Shimla), Scarcity Zone (Dhule), Coastal Peninsular Zone (Dapoli) and Western Region of Maharashtra State (Rahuri) in India. At present, he is looking after one of the largest and unique Technology Application Systems in the World having more than 10,000 scientific and technical staff in 637 Krishi Vigyan Kendras (KVKs)/ Agriculture Science Centres across the country. As Deputy Director General (Agricultural Extension), ICAR, since 2009, his contributions include reforms in technology application, market linkages, synergy and partnership with key stakeholders, ICT application for Knowledge management via mobile-based Farmer Advisory and e-linkage Connectivity to Eight Zonal Project Directors (ZPDs) and 192 KVKs across India, contingent crop planning for drought mitigation, organizing programs for sustaining yield of various crops, technologies related to climate resilient agriculture and advisory to 1.3 million farmers.

*Professor Iqrar Ahmad Khan* holds B.Sc. and M.Sc. from University of Agriculture, Faisalabad, Pakistan and M.Sc. and PhD from University of California, Riverside, USA. He has supervised more than 100 postgraduate students and involved in over 30 research and development projects.

*Dr. Arvind Kumar* has distinct professional experience of 39 years involving teaching/research/extension activities in various capacities in India. He was the principal Investigator of Oilseed Project, which developed 40 varieties of oilseed Brassica suited for different agro-climatic zone since 2002, leading to increase in production from 5.1 million tonnes in 2001-02 to all time high (8.2 million tonnes in 2010-11). Project Leader of Hybrid Project – Rapeseed-Mustard, funded by NATP, leading to development of first mustard hybrid based on Mori Cytoplasmic Male Sterility system. Dr. Kumar guided 31 PG Research Projects including 9 for Ph.D. degree programs.

***Eng. Ananda Weerasinghe*** has worked in the area of water resources management for the Mahaweli Authority of Sri Lanka for 40 years with a focus on the North-Western and neighbouring regions of Sri Lanka for 25 years.  He has been engaged with farmers, in helping set up pioneering farmer organizations, water management panels at the local scale and in overseeing comprehensive services for farmers in the river basin authority's command areas in Kurunegala and Anuradhapura districts. He is a corporate member of the Institution of Incorporated Engineers in Sri Lanka and holds an M.B.A from Wayamba University of Sri Lanka.

***Dr. H. Malleshappa*** belongs to the Indian Forest Service, 1985 Batch, Tamil Nadu Cadre.  He holds a Post Graduate in Agriculture from University of Agricultural Sciences, Bangalore and has completed his inter-disciplinary Doctoral studies in Agriculture and Biodiversity. As a Deputy Conservator of Forests he has undertaken many Soil Conservation, Afforestation assignments. Currently he is the Director of Environment and is in charge of preparation of the State Action Plan on Climate Change (SAPCC).

***Shakwaanande Natai*** is the Head of Environment Management Unit at the Ministry of Agriculture Food Security and Cooperatives (MAFC), Tanzania. She holds a Master of Science in Soil Science and land Management from Sokoine University of Agriculture, Morogoro, Tanzania. She is responsible for monitoring compliance with the Environmental Management Act (EMA Cap 191, Tanzania) in the Agricultural Sector. She also conducts, monitoring and overseeing Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) in Agricultural Projects and Programs.

***Manzoor A. Khan*** holds B.Sc. and M.Sc. in Agri-Economics from Punjab University, Paksitan. He served in various West African projects as a World Bank chief Agronomist. He was also involved in other World Bank funded projects, namely water resource conservation and development, rural infrastructure, new cropping system and techniques, education of rural communities, skill gap analyses and training of members of the local civil service officials. He is a permanent member of the international panel of consultants with the World Bank.

***Stephen Mutua KING'UYU*** holds B.Sc. and M.Sc. from the University of Nairobi, Kenya.  He is Agriculture Deputy Director – Adaptation and Mitigation at the National Climate Change Secretariat, Ministry of Environment, Water & Natural Resources. His responsibilities include: the domestication of conventions and protocols related to climate change adaptation and mitigation and coordination of the relevant national policy processes. He also coordinates efforts to mainstream climate change in the medium-term plan (MTP) for the implementation of Kenya's Vision 2030 and the climate-proofing of the Vision 2030 flagship projects.

***Dumisani Mbikwa Nyoni*** holds BSc (honours) agriculture, animal science and M.Sc. agricultural extension. He is the provincial agricultural extension officer in the department of

agricultural technical and extension services responsible for overseeing the provision of extension services and farmer training, development and dissemination of agricultural technologies and information, provision of technical and advisory services which includes food security monitoring, facilitate compliance with legal and policy measures including migrant pest control, coordination of agricultural programs, management of human, assets and financial resources to achieve set targets.

# Appendix 2: AgMIP List of Participants

| Name | Organization |
|---|---|
| **East Africa Team** | |
| Frank J. Wambura | Tanzania Meteorological Agency & Ardhi University, Dar-es-Salaam, Tanzania |
| Siza Tumbo | Professor & AgMIP PI-Tanzania, Sokoine University of Agriculture, Morogoro, Tanzania |
| Sixbert K. Mourice | Faculty Member, Sokoine University of Agriculture, Morogoro,Tanzania |
| Barnabas Msongaleli | Lecturer, Sokoine University of Agriculture, Morogoro, Tanzania |
| Ibrahim Kadigi | Researcher, Sokoine University of Agriculture, Morogoro, Tanzania |
| Girma Mamo | Agrometeorologist, Ethiopian Inst. of Agric. Research (EIAR), Adema, Ethiopia |
| Robel Takele | Ethiopian Inst. of Agric. Research (EIAR), Ethiopia |
| Fikadu Getachew | Ethiopian Institute of Agric. Research (EIAR), Ethiopia |
| K.P.C. Rao | Principal Scientist and Country Representative & PI AgMIP EA, ICRISAT, Addis Ababa, Ethiopia |
| G. Sridhar | Manager, Project Finance & MIS, Finance Dept. ICRISAT, Addis Ababa, Ethiopia |
| Richard Mulwa | University of Nairobi, Nairobi, Kenya |
| Mary N. Kilavi | Principal Meteorologist, Kenya Meteorological Service, Nairobi, Kenya; |
| Majaliwa-Mwanjalolo | Associate Professor, Makerere University, Kampala, Uganda; |
| Carolyn Nandozi | Research Assistant, Makerere University, Kampala, Uganda |
| Nampijja Josephine | Student, Makerere University, Kampala, Uganda |
| Bonabana Jackline | Makerere University, Uganda |
| Musinguzi Patrick | Asst. Lecturer, Makerere University, Kampala, Uganda |
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| **West Africa Team** | |
| MacCarthy, Dilys, S | Research fellow, University of Ghana, Accra, Ghana |
| Bright Salah Freduah | Research Assistant, SIREC University of Ghana, Kpong, Accra, Ghana |
| Stephen Narh | SIREC College of Agriculture, University of Ghana, Legon, Ghana |
| Eric Koomson | Research Assistant, Department of Soil Science, University of Ghana, Accra, Ghana |
| Evelyn Asante-Yeboah | Research Assistant, University of Ghana, SIREC, Accra, Ghana |
| Joseph Amikuzuno | Agro-Economist, University of Development Studies, Tamale, Ghana |
| Ibrahima Hathie | Director of Research, IPAR, Dakar, Senegal |
| Agali Alhassane | Agronomist - Crop Modeler, AGRHYMET Regional Center, Niamey, Niger |
| Seydou B. Traore | Agro-Meteorologist, AGRHYMET Regional Center, Niamey, Niger |
| Pierre Sibiry Traore | Remote Sensing Scientist, Bamako, Mali |
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| Madina Diancoumba | ICRISAT, Bamako, Mali |
| Fatondji Dougbedji | Ing. Agronome Scientist, ICRISAT, Niamey, Niger |

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| Sissoko, Manda | Scientific Officer, ICRISAT, Bamako, Mali |
| Tiganadaba Lodoun | INERA, Ouagadougou, Burkina Faso |
| Sanon Moussa | Senior Research Officer, INERA, Ouagadougou, Burkina Faso |
| Jon Lizaso | Professor, Technical University of Madrid (UPM), Spain |
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| **Southern Africa Livestock Team** | |
| Patricia Masikati | Post Doc Fellow, ICRISAT, Bulawayo, Zimbabwe |
| Sabine Homann-Kee Tui | ICRISAT, Bulawayo, Zimbabwe |
| Sue Walker | Theme Leader/Programme Director, Univ. of Free State, South Africa & Crops for Future Res. Centre, UNMC Jalan Broga, Semenyih, Malaysia |
| Lieven Claessens | Principal Scientist Natural Resources, ICRISAT/Wageningen University, Nairobi, Kenya |
| Sebastiao Famba | Lecturer, Universidad Eduardo Mondlane, Maputo, Mozambique |
| Christopher Lennard | Climate Scientist, University of Cape Town, Cape Town, South Africa |
| Arthur Gama Chibwana | Lilongwe University of Agriculture and Natural Resources, Bunda College of Agriculture, Lilongwe, Malawi |
| Sisito Givious | Principal Research Officer/Modeler, DR & SS, Bulawayo, Zimbabwe |
| Katrien Descheemaeker | Alterra Wageningen UR, Netherlands |
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| **Southern Africa Team** | |
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| Charles Nhemachena | Senior Research Specialist, Human Sciences Resource Council, Pretoria, South Africa |
| Mduduzi Sunshine Gamedze | Co-PI AgMIP SAAMIIP, University of Free State, Box 339, Bloemfontein, South Africa |
| Mogos Teweldemedhin | Polytechnic of Namibia, Namibia |
| Patrick Gwimbi | Lecturer, National University of Lesotho, Roma, Lesotho |
| Thembeka Mpuisang | Lecturer, Botswana College of Agriculture, Gaborone, Botswana |
| Weldemichael Tesfuhuney | University of Free State, South Africa |
| Matthew Jones | SASRI, South Africa |
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| **Indo-Gangetic Basin Team** | |
| Subash Nataraja Pillai | PDFSR, Uttar Pradesh, India |
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| Gokul Prasad Paudel | Socio-Economist, CIMMYT SARO, Kathmandu, Nepal |
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| Md. Abeed Hossain Chowdhury | Director (Computer & GIS), Bangladesh Agric. Res. Council (BARC), Farmgate, Dhaka, Bangladesh |
| Mohammad  Kamrul Hasan | Principal Scientific Officer, Bangladesh Agric. Res. Institute (BARI), Bangladesh |
| Sk. Ghulam Hussain | Soils Expert & Crop Modeler, Center for Env. Geog. Info. Services, Bangladesh Agric. Res. Council (BARC), Dhaka, Bangladesh |

| South India Team | |
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| Paramasivam Ponnusamy | Professor, Tamil Nadu Agricultural University (TNAU), Coimbatore, India |
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| Sreenivas Gade | Principal Scientist, ANGR Agricultural University, Hyderabad, Andhra Pradesh, India |
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| Muhammad Ashfaq | Institute of Agric. and Res. Economis, University of Agric., Faisalabad, Pakistan |
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| Jamshad Hussain | University of Agric., Faisalabad, Pakistan |
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| Wajid Nasim | Co-PI AgMIP Pakistan, COMSATS Institute of Information Technology (CIIT), Vehari, Pakistan; |
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| **South Asia Coordination Team** | |
| Dileepkumar Guntuku | AgMIP South Asia Coordination & Global Leader, ICRISAT-Patancheru, Andhra Pradesh, India |
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| Venkata Venigalla Sumanth Kumar | Scientist, ICRISAT-Patancheru, India |
| Chukka Srinivasa Rao | Senior Manager - Data Management, ICRISAT-Patancheru, Hyderabad, India |
| Dakshina Murthy Kadiyala | Scientist, ICRISAT-Patancheru, Hyderabad, India |
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| **Sri Lanka Team** | |
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| Samsudeen Zeenas Yahiya | Social Scientsit, Foundation for Environment, Climate &Technology (FECT), Rajawella, Sri Lanka |
| Kariyawasam Don Nandasiri Weerasinghe | Chair Professor, Faculty of Agriculture, University of Ruhuna, Mapalana, Kamburnpitiya, Sri Lanka |
| Sarath Premalal Nissanka | Administrative Leader of AgMIP-Sri Lanka, University of Peradeniya, Peradeniya, Sri Lanka |
| Wijayasiri M. Weerakoon | Director, Field Crop Research and Development Institute, Department of Agriculture, Mahailluppallama, Sri Lanka |
| Ahsa Sajeewani Karunaratne | Senior Lecturer, University of Sabaragamuwa, Belihuloya, Sri Lanka |
| Rasnayaka M. Herath | Agricultural Economist, SEPC, Department of Agriculture, Peradeniya, Sri Lanka |
| Janaka Gunaratne | Senior Lecturer, Crop Science/Climate, Faculty of Agriculture, Rajarata University, Mihintale, Anuradhepura, Sri Lanka |

| AgMIP Leadership Group | |
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| **PIs:** | |
| Jim Jones  (via video) | University of Florida, USA |
| Cynthia Rosenzweig (via video) | Goddard Inst. For Space Studies Goddard Inst. for Space Studies, New York, USA |
| John Antle | Oregon State University, USA |
| **Teams:** | |
| Alexander Ruane | NASA, GISS, New York, USA |
| Roberto Valdivia | Oregon State University, USA |
| Peter Thorburn | AgMIP Crop Co-Leader, CSIRO, Brisbane, Australia |
| Kenneth Boote | University of Florida, USA |
| John Hargreaves | CSIRO, Brisbane, Australia |
| Cheryl Porter | AgMIP IT Team, Co-Lead, University of Florida, Gainesville, USA |
| Christopher Villalobos | IT Coordinator, University of Florida, Gainesville, USA |
| Peter Craufurd | CIMMYT-Nairobi |
| Hermann Lotze-Campen | Dept. Head, Agric. Economist, Potsdam Institute for Climate Impact Research, Germany |
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| Sonali McDermid | Columbia University, USA |
| Daniel Wallach | INRA, Toulouse, France |
| Guillermo Baigorria | University of Nebraska-Lincoln, USA |
| Ioannis Athanasiadis | Democritus University of Thrace, Greece |
| Davide Cammarano | Postdoctoral, University of Florida, Gainesville, USA |
| **Coordination:** | |
| Carolyn Mutter | Columbia University, USA |
| Shari Lynn Lifson | Columbia University, USA |
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| **Participants**: | |
| Caleb Dickson | Oregon State University, USA |
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| Charles L. Vanya | Meteorologist, Dept. of Climate Change and Meteorological Services, Malawi |
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| **Stakeholders** | |
| Arvind Kumar | Dep. Director General (Education), Pusa, New Delhi, India |
| Olaotswe Kgosikomato | Department of Agricultural Research, Gaborone, Botswana |
| Stephen Kung'uyu | Coordinator, KCCAP, Min. of Environment, Nairobi, Kenya |
| Dumisani Mbikwa Nyoni | Dep. Director, Dept. of Agric. Tech. & Extension Services, Buylawayo, Zimbabwe |
| Shakwaanande Natai | Head of Env. Mgnt Unit, Min of Agric., Dar-es-Salaam, Tanzania |
| Kiran D. Kokate | Dep. Dirctor General, ICAR, New Delhi, India |
| K Veeranjaneyulu | Professor & University Librarian, ANGR Agricultural University, Hyderabad, India |
| Manzoor Ahmad Khan | Farmer & Retired World Bank Chief Agronomist, Lahore, Pakistan |
| Ijaz  Munir | Secretary to the Govt. of the Punjab, Agriculture Department, Lahore, Pakistan |
| Anandakithsiri Weerasinghe | Eng. Project Manager, Hydrodynamics Consultancy, Mahaiyawa, Kandy, Sri Lanka |
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