AgMIP

The Agricultural Model Intercomparison and Improvement Project

SOUTH ASIA MID-TERM WORKSHOP REPORT

REGIONAL INTEGRATED ASSESSMENTS

JULY 22-26, 2013
KATHMANDU, NEPAL

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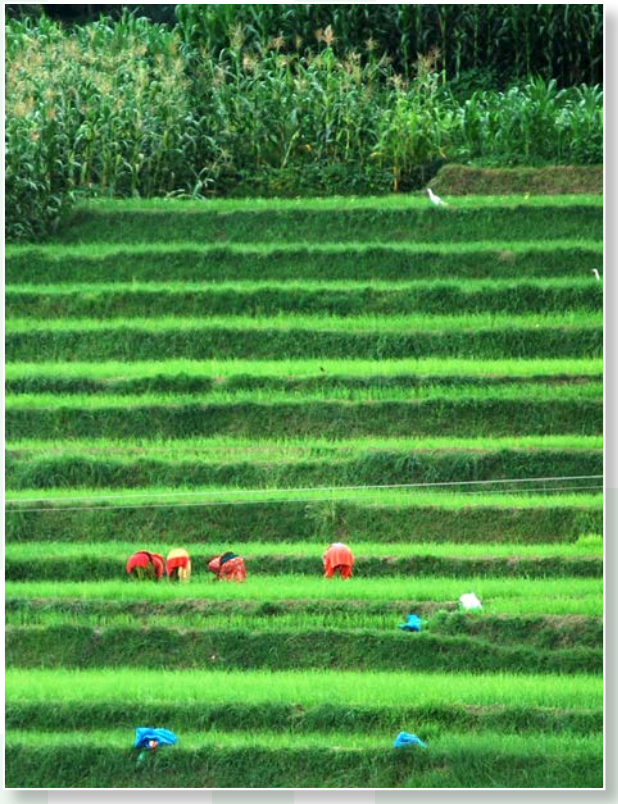

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Introduction

The Agricultural Model Intercomparison and Improvement Project (AgMIP) is a major international effort to improve the state of global agricultural modeling and to understand climate impacts on the agricultural sector (www.agmip.org). AgMIP connects research communities for climate science, crop models, and agricultural economics models via a transdisciplinary framework with an emphasis on developing the information technology tools required for probabilistic projections of current and future climate impacts.

AgMIP has a Two-Track Science Approach – one is Model Intercomparison and Improvement and the other is Climate Change Multi-Model Assessment. Both tracks are facilitated by a series of regional workshops held in each AgMIP region over a 3-year period of time as well as by global studies and workshops that focus on particular crops and on global analyses. Participants at the regional workshops conduct analyses at field-to-regional scales and include crops and economic model intercomparisons and improvement activities, as well as simulations with guided climate sensitivity tests and climate change scenarios.

Mission and goals

The mission and goals of AgMIP are to improve substantially the characterization of risk of hunger and world food security affected due to climate change and to enhance adaptation capacity in both developing and developed countries.

Objectives

- Incorporate state-of-the-art climate products as well as crop and agricultural trade model improvements in coordinated regional and global assessments of future climate impacts
- Include multiple models, scenarios, locations, crops and participants to explore uncertainty and impact of data and methodological choices
- Collaborate with regional experts in agronomy, economics, and climate to build strong basis for applied simulations addressing key climate-related questions
- Improve scientific and adaptive capacity for major agricultural regions in the developing and developed world
- Develop framework to identify and prioritize adaptation strategies
- Link to key ongoing efforts with partners including,
    - CCAFS, Global Futures, MOSAICC, Yield Gap Analysis, SERVIR, MACSUR
    - National Research Programs, National Adaptation Plans, IPCC, ISI-MIP

Summary

The AgMIP South Asia Mid-term Workshop was conducted to bring together participants from the Regional Research Teams and Coordinating Team with AgMIP Leadership to:

- Demonstrate the full and accurate completion of the fast-track;
- Ensure that each team has a clear work plan to achieve full project goals, including the engagement of technical stakeholders;
- Work on post-fast-track integrated assessments and analyses; and,
- Develop plan for dissemination of AgMIP results to inform stakeholder actions.

Sessions – DAY 1

Welcome and Introductions, Workshop goals

The workshop began with Jim Jones giving a snapshot of the whole program for the week. The workshop consisted of scientists from all four spheres. There were economists, crop modellers, climate scientists, soil scientists, and agronomists. The workshop was supposed to have a number of breakout sessions to work on the fast-track work, prepare presentations, and harmonize those presentations so that the results can be compared across the region.

Jim Jones

State of AgMIP

It was also announced during the session that the whole project will have a major publication apart from the other publications and all the work will be brought together in the form of a book which is a part of the series "A Handbook of climate change and agro eco systems" and each of the regional teams will have their individual chapters.

Another task to be performed by the teams was to prepare a poster of the regional project which will be presented at the global annual workshop of AgMIP, which will be held in October in New York. The prinicipal investigators were invited to present the regional projects in the AgMIP symposium at the annual society of agronomy annual meetings to be held at Tampa, Florida, as well as a presentation on the regional projects, results, interpretation, and analysis of the results at the American Socity of Agronomy (ASA) meetings. They were also requested to bring along a draft of the respective chapter, in order to help in the completion of the book by the next ASA meeting one year later.

AgMIP has a Two-Track Science Approach:-

1. Model improvement and Intercomparison
2. Climate Change Multi-Model Assessment

It was mentioned that a model includes not only the biophysical modelling but also the economic modelling; in order to understand how changing climate, climate extremes, and climate variability will affect agriculture, we have to work together across these disciplines to have the full picture. AgMIP works both at the regional and global scales.The speaker also talked about cross cutting themes like Uncertainty, Aggregation, and Scaling at site, field, farm, regional, national, and global scales.

Cynthia Rosenzweig

It was also mentioned that the Representative Agricultural Pathways (RAP) are representations of other future aspects of agriculture, not just the changing future climate but also population growth, economic growth, technological development, etc. To fulfill this, we need good data and for this we need to measure it; this can be done on the AgMIP sentinel sites through discussions with the group on how to use this data from experimental sites for modelling purposes, which will be further classified into three categories; Silver, Gold, and Platinum for modelling and finalize the decision rules that apply on them. AgMIP organized to achieve those scientific approaches in four main teams: Climate Team, Crop Modelling Team, Economics Team and Information Technology Team. The work groups were divided into Soil, Water Resources, Livestock and Grasslands, and Pest and Diseases.

All the activities in AgMIP resulted in the following outcomes:

- Improvements and Intercomparisons in Crop Models, Agricultural Economic Models, Scientific Construction, Aggregation Methodologies
- Assessments in regional, global. Crop specific
- Capacity Building and Decision Making in Regular Expertise, Adaptation Strategies, Technology Exchange

Pakistan

The Lead PI of the Pakistan team presented on the topic of Assessing Climate Vulnerability and Projecting Crop Productivity Using Integrated Crop and Economic Modelling Techniques.

The speaker shared that the study was done on rice on a larger scale i.e. for 150 farmers for 5 rice strata and the data collected was given to the crop models in the system. The AgMIP file was prepared with the help of lot of people and then handed over to the economics team. The results for 150 farmers were displayed from an area well known for the production of rice. Each team had nine members from different fields such as economics, crop modelling, meteorological department. A group of five institutes was involved in carrying out the project and the University of Agriculture, as a premier institute, was heading the activity.

A total of five districts were selected for the study on rice, namely Sheikhupura, Sialkot, Nankana Sahib, Gujranwala, and Hafizabad. These are in the northern part of Punjab and more rainfall is found in this area. This area is a very conventional area famous for rice production in Pakistan. For the study of rice, various villages were selected and a climate analysis of the baseline (1980-2010) and future scenario was shown with temperature as a factor. The data collected was of 30 farmers per strata i.e. total of 150 farmers. It was found that the trends for temperature in the future scenario are rising.

Ashfaq Ahmad Chattha

During field survey, management data on the following aspects were collected: previous crops and residues, tillage practices, volume and number of irrigations, seed rates and sowing dates, fertilizer application rates and dates, pesticides application rates and dates, harvesting date and method, harvested and biological yield, and socio-economic variables. Data on initial conditions were collected by district soil laboratories (available water and nitrogen percent). For soil series, data was collected by Federal Soil Survey Department. The Federal Soil Survey Department provided data on pH, organic matter, sand, silt, and clay percentage. Missing values were recalculated by S-Build of DSSAT.

A prerequisite for all the work was that the meteorological data for all locations and the soil series for rice were available. A total of nine soil series were used for study on rice. Three rice cultivars were used in the study of Genetic Coefficient. Subsequently the graphical preliminary results were displayed for fast track farmers field evaluation, relationship between observed

and simulated yield of 150 farmers, frequency distribution of observed rice yield in kilograms per hectare (kg/ha), and frequency distribution of simulated rice yield (kg/ha).

Later on, districtwide (5) results were shown for climate change using RCPs 4.5 and 8.5. The graphs depicted Baseline vs. Near, Mid, and Late Century Scenarios. It was seen that in some cases the gap between the trend lines is more, showing that the climate change is taking place and the farmer will be more vulnerable and we should think and act accordingly to develop adaptation and mitigation strategies. There were also scenarios where the climate change was found to be very minimal due to unique and favourable weather conditions. An overall aggregate graphical depiction for all the 150 farmers was also shown.

AgMIP Pakistan-Datanode components and features were discussed. The AgMIP data node and web portal had been established where all stake holders can put data for sharing purposes, ftp had started working along with posting of data files on secured medium, data merging tools were developed, and two translation software programs were developed for creating new ACMO-files from DSSAT output file.

Yields Summary for Early, Mid and Late Century Scenarios was shown parameters like Base Period Yield (Kgs), Base Period Simulated Yield (Kgs)(S1), Future Simulated Yield (Kgs)(S2), Time Averaged Relative Yield(r), Predicted Future Yield (Time Averaged(Y2) (Kgs), and Crop Model used.

The presentation continued with the preliminary results (without adaptation) of the Aggregated Gains and Losses so far for the Early, Mid, and Late Century Scenarios; the parameters used were Stratum, Climate Scenario, Gainers (%), Gains (As a Percent Of Mean Net Farm Returns), Losses (As a Percent Of Mean Net Farm Returns), and Net Losses (As a Percent Of Mean Net Farm Returns).

Overall adaptation results were also shown. The speaker strongly agreed with the management's idea of coming up with a publication and inviting the stakeholders, as they are the bureaucrats and the policy makers. It was shared that the team was working on a proposed publication for crop modelling and the topics included are as follows: assessing risk, reducing vulnerability, and developing adaptation strategies for food security of rice region, application of DSSAT and APSIM for climate risk management in rice production, and simulating the climate change temporal and spatial variations in the rice region of Pakistan. The topics for the proposed publication for economics are as follows: Vulnerability of Agricultural Systems to Climate Change and Impact of Economic Adaptation on the rice farmers in Punjab, Pakistan; Multidimensional Impact Assessment of the trade-offs caused by climate change: A case of rice farmers of Punjab, Pakistan; Integrated Impact Assessment of adaptation strategies in Punjab: Comparison of different climate and crop models; and Representative Agricultural Pathways: A transdisciplinary approach towards Impact Assessment and adaptation strategies.

Indo – Gangetic Basin

Lead PI of the Indo Gangetic Basin team presented on the topic of Strengthening Simulation Approaches for Understanding, Projecting and Managing Climate Risks in Stress-prone Environments across the Central and Eastern Indo-Gangetic Basin. The study was carried out at

different sites like PDFSR, Meerut, India; CIMMYT, Karnal, India; ICAR-NEH, India; NARC, Nepalganj, Nepal; and BARC, BARI, Bangladesh. A team of knowledgeable members was constructed for the project from these institutes as well as an independent researcher and AgMIP researcher.The Indo-Gangetic basin is divided into three parts: Upper catchments, Western region, and Eastern region. Each region has its own pros and cons in regards to productivity, investment in infrastructure, use of fertilizer, irrigation network, water quality hazards, and migration of laborers.

It was mentioned that climate change impacts are increasingly visible in South Asia with greater variability of the monsoon. It was seen that increases in the occurrence of extreme weather events such as heat waves and intense precipitation affect agricultural production drastically. It was reported that if the current trends continue until 2050, the yields of irrigated crops in South Asia are projected to decrease significantly.The near term goals of the project were to apply crop simulation tools in the major production ecologies of the central and eastern Indo-Gangetic Basin, understand the linkages between climate risks and agricultural productivity, assess the value of adaptation strategies under current and projected climatology while addressing the following question: do current simulation tools and approaches adequately capture the potential of different strategies for building resilience?

Nataraja Subash

The objectives of the project were defined as: segregate the major production domains for cereal crop based production systems and assemble climate, benchmark soil and crop cultivar characteristics for each major production domain for model parameterization and calibration; assess the performance of common crop models (APSIM, DSSAT, INFOCROP) with existing experimental data as well as against district-level data; decompose simulation outcomes to understand the nature and influence of contemporary climate risks in each major production domain; conduct ex-ante evaluations of promising adaptation strategies that respond to major climate risks/projected climate scenarios in each production domain; suggest areas for model improvement that would better represent key processes involved with the development or expression of abiotic stress; and strengthen and broaden the existing simulation modelling network formed through the SAARC initiative.

The site selected for fast track was Meerut, India. In accordance with the handbook, RCP8.5 – Mid Century (2040-2079) was selected as the climate scenario to be used for the study and MIROC5 as the climate model. A comparison of average monthly maximum temperature during baseline (1980-2010) and future (2040-2069) was shown where it was found that the maximum temperature is increasing for the future scenarios and the highest difference was seen in the months of March and April, which are considered a vital time in wheat reproductive stage. A percentage increase/decrease of monthly rainfall during mid-century period 2040-2069 over baseline 1980-2010 was also displayed, showing that monsoon is highest during July and a decrease in rainfall was found in the months after July. For crop modelling in wheat, the crop model selected was the APSIM model. A wide variability in dates of sowing - 17th October to 3rd January was seen. The date of harvest was 10th April - 17th May and five cultivars of wheat were used – PBW223, PBW243, WL502, PBW343, UP232. Variability in N, P, and K applications was also found.

Some assumptions were made, as out of the five dominant varieties of wheat only one of them was considered for the study and it was assumed that potential yields of five varieties were almost the same. Due to lack of data of irrigation depth it was assumed to be five centimeters as recommended irrigation depth. Same was the case for plant density and plant spacing. Soil parameters for seven farms were analysed and were incorporated to the nearby farms. Sentinel data source and treatment details for crop modelling purpose and long term data on nutrient management experiment running for the last 25 years were collected. Other collected data included soil data, crop data (Phenology, LAI, and Biomass partitioning at different phenology, Grain and straw yield), variety and irrigation data. The genetic coefficient used for APSIM wheat calibration was also shown. Calibration of model for crop seasons 2007-08 & 2008-09 was shared through the comparison between simulated and actual yield for both wheat and rice was calibrated and the results found were similar for both simulated and actual. For both biomass and LAI, a time series of observed and simulated yield was shown and it was found that there is minor difference between the observed and simulated yield for biomass but a lot of variation was found in case of LAI.

A comparison of frequency distributions of observed and simulated farm survey wheat yield was shown which was normally distributed. Also a comparison of APSIM simulated wheat yield and observed farm yield was shown which depicted that after some time, the simulated yield is lower than the actual observed yield. A comparison of simulated wheat yield during baseline (1980-2010) and future periods (2040-2069) was shown that in case of baseline period the variability is higher and decrease in yield is greater in comparison to the mid-century period. A percentage decrease of 26.5 was seen in this case. A comparison of distribution of yields simulated for baseline weather and future climate was also shown.

For the interaction with stakeholders a methodology approach was followed, also called the conical approach. It starts at the farm level with an interaction with 140 farmers of the district during farm survey and listing their views and opinions about current climate variability and how they visualize climate change affecting agriculture. At the institute level, multidisciplinary interactive meetings with researchers/ scientists at PDFSR during personal interactions/ group meetings were conducted and some of the problems were solved. At the district level, a stakeholder workshop was conducted and officials of district agricultural development agencies, universities, progressive farmers, researchers of organizations in the district were

invited. Similar activities are proposed at the state as well as the country level as the project included multiple countries.

The RAP narrative was also presented at the workshop, which is comprised of mainly long-term and short-term policy measures, decline of wheat production, labour out migration, farm labour productivity declines, increase in new wheat cultivars, and investment in food chain logistics. Even though the committed site for fast track analysis was just one site i.e. Meerut in India, similar work was done at Bangladesh and Nepal. The results of the analysis were also shown. The gains and losses results were also shared only for one location i.e. Meerut in India. Huge divergence in the group of stakeholders was seen because the farmers are talking more about the non-farming sector issues like increase in farm input cost, transportation facility cost, marketing facility, etc. All the meetings lead to the development of the RAPs.

The main target was to bring all the modellers like crop, economic and climate modellers on a single platform and discuss their needs, work together, and discuss about the issues they are facing during the analysis. A joint boot camp meeting was organized by IGB Project team and SA Regional Coordination Team, ICRISAT during 24-28th June, 2013, at ICRISAT, Hyderabad. The completed tasks included: assemblage of survey data in AgMIP format, simulation of rice/wheat farm yield, historical yield simulation and future yield simulation, development of draft RAPs for different study sites, TOA-MD analysis of different sites, etc. A super DOME was developed by the ARP, to help the rice simulation as after running the model it was not taking the crop establishment as well as the crop file. This issue was solved using the super DOME.

Future plans for integrated assessment were to include more crops to be added for simulation i.e., rice, maize, sugarcane, simulation for predominant cropping system, incorporation of more soil strata and sites because of wide variability in IGB, state level and IGB level stakeholder consultation meeting has to be organized, emerging need is to incorporate livestock and fisheries components in modeling to get more accurate integrated assessment, methodology has to be developed for up scaling the integrated assessment for the entire IGB.

Sri Lanka

The title of this session was Modelling the impacts of a variable and changing climate on rice and sugarcane agricultural systems in Sri Lanka. The project has a large number of collaborators, namely the University of Peradeniya, University of Ruhuna, University of Rajarata, Sugarcane Research Institute, Department of Agriculture and Foundation for Environment, Climate and Technology. The study was carried out in rice and sugarcane dominated systems and field stations. The crop models used to carry out study in the rice dominated areas were DSSAT, APSIM, STICS and AgMIP tools. Similar work was done in the sugarcane producing regions. Climate datasets had been prepared for various locations at Sri Lanka and the progress is being recorded. Temperature and rainfall are the main parameters taken for the study.

In the course of the study farm surveys were conducted at 3 districts, namely Kurunegala district, Matara district, and Ampara district. The details of each farm survey were also presented. A compiled assessment of the results was given which displayed the gains and losses from TOA-MD analysis and gain loss curves for climate scenarios. RAP scenarios were also developed with the team members but more work is needed in their development. Stakeholder

engagement was not comprehensive. There was consultation with National Policy Making and Agricultural, National Agricultural Operational Agencies (Department of Agriculture, Sugarcane Research Institute and Mahaweli Authority), and engagement with farmers and earmer erganizations.

From the IT perspective there was work done for revamping the local crop model for sugarcane developed by Sugarcane Research Institute in 1991, developed using pascal programming language. From the economic perspective, an economic model was developed for integrated sugarcane industry in Sri Lanka.

S P Nissanka

The second speaker from Sri Lanka talked about the status of fast track on rice. It was mentioned that the Kurunegala district was selected to carry out the fast track study as it is the largest district and farmers are involved in irrigated as well as rainfed agriculture. Also the Rice Research Institute is in the same district. The climate data i.e. for Temperature and Rainfall was collected and the future values for the same were predicted.

Along with this a lot of rice variety trials were conducted on different rice varieties for calibration. They collected the experimental data for few varieties and also the data on the coordinated variety trials used for the validation purpose done at two different research institutes. The detailed method of conducting a calibration experiment was explained over two seasons, Yala and Maha. These experiments helped in understanding that the soil can be categorized into three groups and then the farmers were grouped according to the soil groups. These data were entered into the model and farmer yield was calculated. Huge variation was seen and the yield was much lower than observed values. The reason was due to soil variation and necessary reforms were made.

Several meetings and symposia were conducted among the stakeholders. Many short terms as well as medium to long term adaptation measures were proposed. Four adaptation scenarios were identified for future yield simulation: advanced planting date, delayed planting date, replace with the heat tolerant variety, and adjusted planting date with the heat tolerant variety.

Considering these different scenarios, the best option was chosen and it was observed that when the planting date was delayed by one week, the overall yield increased. The increase in yield was also due to the selecting of the variety Bg 300 which is a short term variety and gives better yield under changed climate conditions.

The adaptation results were also shared during the session which shows an increase in yield and decrease in poverty rate with the use of adaptation. A large area of Sri Lanka was covered and in future the same scenarios will be used in other major rice growing seasons. It was also brought to notice that capacity building is given due importance during this project and the major stakeholders for this were the research officers in Department of Agriculture, Research Institutes, Universities, etc.

Southern India

The title of this session was Integrated Assessment of Climate Change Impacts on Principal Crops and Farm Household Incomes In South Asia. The study is being carried out at two locations i.e. Tamil Nadu and Andhra Pradesh. For the whole Tamil Nadu, four different ecosystems were selected from four districts for the study of impact on climate change and water which is one of the limiting resources in the state. Irrigation was classified into four categories: canal irrigation, well irrigation, tank irrigation, and rainfed irrigation. The data used in this study were taken from the ongoing studies, which were further provided to the crop modellers like soil type, variety used, climate system, and irrigation details. For the fast track, climate data were collected for temperature and precipitation for the districts, for both the baselines and the future scenarios. A similar pattern was seen for both the minimum as well as the maximum temperature scenarios. The different models show that there is an increase in the temperature and a decrease in rainfall but the intra year variability remains the same across.

Based on the predictions and crop modelling results, predictions were made for each farmer and it was found that there is a variation across different regions. It was also found that there were no variations found for a single farmer but the variations increased in number when studied across number of farmers. The soil data collected from the different soil profile studies was shared. The soil data was also collected for other study sites from some other sources like the soil science department or the GIS and remote sensing department. The soil found in the study sites is mainly of two categories i.e. clay and sandy loam soil. Nine different rice cultivars and genetic coefficients were used for the study. The data shared with the economic and crop modellers were also shown. The predictions for individual farmers was shown and it was found that there was much less variation for yields of a single farmer, but across multiple farmers, a huge variation can be seen. The cumulative frequency result comparing the crop model projections and the actual survey yields that was gathered from the farmers was also shown.

For Andhra Pradesh, Mahabubnagar District and maize crop were selected. Climate scenario was created for RCP4.5, for the period of 2040-2069, using the GFDL-ESM2G climate model. Similar results were obtained for the minimum and the maximum temperature i.e. an increase was predicted. The other details of the crop model are as follows: Model used: DSSAT- CERES-Maize, Data source: Field experiments conducted at ANGRAU, Hyderabad (2007-2008). A graphical result between the observed and the simulated yield was shown. A comparison of yields simulated for baseline weather and future climate for the same example location and

cumulative frequency distribution with means showing distribution of simulated yields and the observed farm survey yields for the farm survey sites was also shown.

P Paramasivam

Results received from the TOA analysis for both Tamil Nadu and Andhra Pradesh was shared. The analysis units used in the fast track analysis was the per farm analysis and considered only a single stratum and in future, other startas will be taken into consideration for all ecosystems for the study.The future time averaged yields were shared for both Tamil Nadu and Andhra Pradesh. The results were calculated for all GCMs but the results shown were only for one among them as the results were almost similar. When these results were substituted in the TOA model the net loss of 2.84% was found in case of paddy in Tamil Nadu and 3.6% in case of maize in Andhra Pradesh. It was predicted through the results that almost 57% people will be affected by the climate change but the speaker recalled a discussion and remarked about the impact that everybody will be affected, but by keeping in mind the present distribution of perception of farmers of how they are positioned as far as their current yield and their incurring losses these results were presented. Similarly results for Andhra Pradesh were 43%.

Some ideas were given on how to conduct the stakeholder workshops like it should be done before we plan the project and discuss on how to proceed and what are the goals and objectives. Around 25 people were called from the across the state to participate in the RAPs where the views of the participants were taken on some of the variables. A large scale meeting with planners and policy makers was also conducted where results obtained from the earlier stakeholder meeting were shared and the results were acceptable. The speaker shared some interesting experiences and discussions with the farmers and the fellow scientists during the workshops. Similar workshops were conducted by ANGRAU, Andhra Pradesh for maize.

South Asia Regional Coordination Team

The topic discussed by the speaker was Enhancing Capacities of the AgMIP South Asia Regional Teams through Capacity-Building Workshops and Knowledge-Sharing Platforms. The main objectives covered by the project were to build capacity of the multi-disciplinary Research

Teams throughout the region to prepare integrated assessments of climate change impacts and adaptation, to develop learning objects on knowledge-sharing platforms designed to facilitate learning exchanges among and across the various AgMIP regional teams of South Asia, design workshops in collaboration with the AgMIP Leadership Team, and to publish the results of the integrated assessments.

The summary of the work done by the south Asia regional coordination team was shared. This included three workshops, two regional multiple crop training program, IGB boot camp, regional climate training program, and AgMIP South Asia Regional teams' mid-term workshop. The main notion behind was that workshops will build capacity for the AgMIP regional climate assessments and guide projects through assessments to publication.

The workshop is designed in three phases: preparatory phase/ pre-workshop phase, implementation phase and evaluation phase/ post-workshop phase. After defining the goal and objectives of each workshop, the regional research teams will be informed and advised on how to organize their own internal meetings so as to meaningfully prepare for the workshop. In the implementation phase as per the agenda, the workshop activities will be executed to meet the goal and objectives as proposed. In the last phase, Post-workshop activities will be carried out as required such as identifying and planning of regional level training programs (these are small training programs for 15-20 participants).

V V Sumanth Kumar

The main objectives of Multiple Crop Model Training Programs (MCMT) were shared which were to enhance the capacities of the participants, to encourage the facilitation of the use of multiple crop models for simulating crop production variations, to ensure that all the participants got an opportunity to learn a new crop model, so that each RRT team is capable of doing at least two crop models for their project. Many challenges emerged at the MCMTs like greater need of detailed input parameters and related difficulties, issues in collection of soil information of farm, compatibility among software and different crops, difficulty in calibrating the model for all varieties, quality of farm survey data, and accuracy of output.

The salient features of the boot camp and climate training were shared, which were to bring together the climate, crop, and economic modelling scientists of the IGB. All participants completed at least one crop, one crop model, and one site farm survey simulation and completed draft RAPs. There were 12 participants from India, Nepal and Bangladesh. For the climate training, all trainees were able to generate their own climate scenarios using their baseline data. They were able do quality checking and gap filling and develop regional RAPs, which was attended by 24 participants from ANGRAU and private companies. The challenges faced at the boot camp and climate training were shared and were as follows: issues related to the integration of inputs and outputs of different models, issues of APSIM translation tool, inability to use the QuadUI tool for APSIM simulation, no provision of farm survey under AgMIP project, and getting quality of basic information from meteorological stations.

The major outcome of all the activities was to enhance capacities of the AgMIP Research Teams in South Asia and ensure that the teams accomplish the proposed project activities during the project period. A brief of various digital learning resources like KSIConnect, AgMIP Connect (currently not available) were shared. Apart from these resources, some other platforms that can be used for capacity building such as AgEd and can be used for training purposes, delivering of research material, conducting tests, etc., include open access repositories for data, publications, and reports of AgMIP. Virtual interactions to enable knowledge exchanges among and across regional teams, ICRISAT Team, and AgMIP Leadership Team were also discussed.

The proposed focus areas were curriculum development on climate modelling, crop modelling, economic modelling, and specific Requirements of regional Teams, customized training programs for Regional Research Teams, Bbanking on the strength of KSIConnect and AgED Open courseware toward improved capacities of regional participants, Workshop reports & Final Book – South Asia AgMIP Regional Assessment Projects, stakeholder engagement, promoting human resources through train the trainer model on various crop, climate, and economic models to make each team perfect in using all multi models, and need to study the impact different GCMs on their crop yield for their location by RRTs.

Sessions – DAY 5

Pakistan

The title of the presentation was Modelling the Impact of Climate Change on Rice Crop in Rice-Wheat Zone of Pakistan. Pakistan team was working on rice-wheat cropping system. It was shared that rice is planted in the month of June and harvested in the month of October and wheat is planted in the month of November and harvested in the month of April. Five districts from Pakistan were selected for the study, namely Sialkot, Gujranwala, Hafizabad, Nankana Sahib, and Sheikhupura, all known for rice and wheat production. From the climatic perspective it was mentioned that the region selected is closer to the foothills of Himalayas and rainfall is variable across the region but the thermal regime is almost constant.

The RCP8.5 Mid-century temperature and precipitation scenarios were taken for all GCMs and this was done for two areas, Mundiar and Baluki in Pakistan. A significant rise in temperature was seen for both areas. A rise in rainfall was seen in the months of July and August for Mundiar whereas the monsoon peak is shifting from July to August in case of Baluki. Yield prediction data

was collected from five strata for each district. From each district, two villages were selected, the farmers were interviewed, and data were collected. A consistent decrease in yield was found between the baseline and the Mid-century yields of rice.

Muhammad Ashfaq

The Relative Yield Distribution (Mid-Century, RCP 8.5) was discussed for all five strata and a lot of variation was seen. The summary of the economic impact and the distribution of gains and losses were also shared. For the scope of home stretch it was mentioned that the rice and wheat cropping system was used, which are the main crops of the area, the climate scenario taken was mid-century RCP 8.5 using five GCMs. They were also trying the conduct an Impact Assessment using Climate Change Effects along with an Adaptation Impact Assessment. Extensive farm surveys would be conducted for wheat farmers as well as rice farmers.

As part of the adaptation package (Rice-Wheat Zone) the different variables were finalized. For Bio-Physical Factors: change in cropping pattern, improved cultivars, and improved agricultural practices. For Policy Variables – groundwater/surface water policies, subsidy on critical inputs, efficient input/ output markets, government investments in agriculture, implementation of GAP especially for rice, supportive trade policies, and farm consolidation. For Socio-Economic: diversification to avoid risk, optimal use of inputs, participatory management approach, off-farm income opportunities, and agro-forestry. For Others: use of IT tools (climate / market data, etc.), agro-climatic advisory services for farmers, and establish and strengthen interaction among stake-holders.

The deliverables by February 2014 were integrated assessments of rice-wheat system, publications, and establishment of database. Various ideas of extension were also shared including stakeholder engagement and dissemination and outreach.

Indo Gangetic Basin

The title of the discussion was Strengthening Simulation Approaches for Understanding, Projecting and Managing Climate Risks in Stress-prone Environments across the Central and

Eastern Indo-Gangetic Basin. The progress of the work was shared. The study sites were Meerut, Umiam (only rice) and Karnal in India, Nepalganj in Nepal and Dinajpur in Bangladesh. The crop models used were APSIM and DSSAT and simulations were completed for four out of nine simulations to be done.

The rice season is from July to October and wheat season is from November to March. The comparison of the temperature showed an increase in temperature throughout the months. There was a spatial variation of March-May maximum temperature within the district. The spatial variability of weather parameters derived from WorldClim and station data showed a high difference between the higher and the lower values of maximum temperature as well as rainfall which were not correct when seen practically. A comparison of APSIM and DSSAT simulated wheat yield and observed farm yield was shared and it was seen that the DSSAT values were much higher as compared to the observed and the APSIM values above 60% probability but the scenario was reversed below the same probability percentage. A large scale of fluctuation was found in the wheat yield under future scenario when a comparison was done for 34 farmers for baseline and future climate.

Harbir Singh

For the economics analysis, four sites were selected, Meerut (77 farms), Umiam (34 farms), Nepalganj (60 farms), and Dinajpur (30 farms). The analysis was done for both rice and wheat. The comparison could be done using results from APSIM and DSSAT models. When APSIM was used, there was a decline in the yield by 30% and when using DSSAT the yield decline was around 22%. It was also found that Bangladesh would benefit from the climate and no significant change was seen in case of Umiam and Nepalganj.The relative yield distribution showed a difference in case of different models (DSSAT & APSIM). The results in terms of gains and losses were shared. Climate change impact also depicted some difference when the two models were used separately.

The interactions and feedback of the stakeholders was provided in detail for all three countries. For Nepal, MoSTE is the main policy making body, a digital agricultural atlas is being developed, there is a need to prioritize main vulnerable crops and regions, there is lack of information on

mitigation measures, and need for capacity building for climate change and adaptation. For Bangladesh, MoEF deals with issues related to climate change, real time data were not available (floods, draught, cyclones), weak technology delivery system, and no linkages of public extension system with the private sector. For India, no formal action plan for adaptation, NDMA for extreme events, short-term agromet advisory (IMD) by DoAC, District Contingency Plan & mid-term correction, 632 Farm Science Center for information delivery, and expected to double production with available technologies.

Stakeholders' expectations were also shared , such as more sites may be covered under AgMIP plan, CC requires long term strategy, network of institute working on CC in IGB, develop many RAPS for each region, and farming system approach to manage CC and minimize risk. The proposed adaptation package included the adoption of high yielding, short duration, stress (heat/drought/disease and pest) tolerant cultivars, enhancing/altering various management options, and at least three adaptation options would be suggested for each site.

The timeline for the home stretch and the deliverables by February 2014 were discussed during the session. The need and importance of extension was discussed which included the need to develop methodologies for upscaling of district level IA into state/country/ IGB level, crop-livestock-fisheries interaction modelling approach, and organizing of capacity building workshops in the region for crop modelling. The lessons learned from the workshop were discussed, which comprised the need for all the partner institutions to reach same level, so now they can independently work, efforts needed to make the AgMIP tools more flexible, and continue capacity building and hands-on workshops. The future challenges were also discussed in detail.

Sri Lanka

The team from Sri Lanka shared that they were able to clear most of the doubts they had regarding the fast track analysis and also they were able to fine tune the crop modelling, climate modelling, and TOA-MD shortcomings they had earlier. Based on the advice given, the work improved and work still needs to be carried out. The updates of the crop, climate, TOA-MD modelling and how the home stretch was going to be carried out were presented. Experts from different sections presented the major updates that took place during the workshop. The first speaker talked about the climate of the home stretch region. The region selected for climate study was Batalagoda representing the Kurunegala rice growing area. Intentions to increase the number of study stations was shared. Based on the present study some interesting things came forward. Variation of temperature and rainfall during the year was seen in the lower part of the diagram. Four models were used; the first one showed that it had captured the temperature change over the month; the second graph showed the rainfall variation between the baseline and the mid-century is very marginal but there was a slight increase in the second half of the Maha season and also in October there was a drop in rainfall. No significant difference was seen in the Yala season between the baseline and the mid-century rainfall. The model also captured the rainfall distribution of the region. A consistent increase in temperature was found in the region for both the seasons.

Lareef Zubair

The next speaker explained about what has happened regarding the improvement done in calibration for the rice varieties based on the suggestions given for one cultivar (BG 357). The team got three detailed experiments and tested for 22 coordinated rice variety trial experiments, from which we got only phenology and yield. The information of the experiments was used to derive the genetic coefficients. The results received were an improvement from the previous results and the same approach will be used for other cultivars as well.

The next speaker shared the updated TOA-MD results. The parameters taken for the study were corrected period – normalized yield, predicted yield, relative yield, and net loss. The results depicted that almost 30% of the farmers will be benefitted by the climate and the net losses will be around 15%.

The stakeholder views and the scope for home stretch were discussed in detail. The adaptation package for rice was mentioned and it consists of adjusting planting window, introduction of better adapted varieties, use of potential rice varieties to adapt heat tolerance better, development of genetic coefficients for more tolerant varieties, diversification of minor season crops, and application of traditional information. The timeline was discussed and then the reasons for the extension of the project were discussed. The reasons given were as follows: An extension shall enable the team to really consolidate and be more definitive in outcomes; the areas covered (for both rice and sugarcane) limit the generalization of output, as there is considerable agro-ecological and socio-economic diversity across Sri Lanka; work going on in parallel (especially sugarcane) can be brought to a completion (fruition); ensuring development of capacity sustainably; and proper engagement with policy makers requires in-depth work and robust results.

Southern India

The report by South Asia presented the overview of the baseline agroclimatic analysis which was covered under the fast track and will be covered in the extended analysis. The results started with the depiction of the growing season for rice i.e. September/October to December/

January, which is the northeast rainy season for Aduthurai, Tamil Nadu. A comparative analysis of the baseline yield was conducted with the baseline rainfall, baseline minimum temperature, and the baseline number of rainy days. A positive relationship was seen between the yield and the amount of rainfall and the number of rainy days. On the other hand, a negative relationship was found between the yield and the minimum temperature. Similar results were obtained for the Maize crop in Mahabubnagar, Andhra Pradesh. But a shift was seen in the results during the time period of 1995 and the reason was predicted as the increase in the stress days during the reproductive stage.

A study on the Spread of Temperature and Rainfall Changes in 20 CMIP5 GCM Simulations of Mid-Century RCP 8.5 was done for both the rainy seasons for Tamil Nadu and similarly for south west monsoon of Mahabubnagar, Andhra Pradesh. In case of Andhra Pradesh we found a shift in temperature towards the positive side that means all the models are projecting increase in temperature and an increase in rainfall is also shown by most of the models. The variability was found to be much lesser in Andhra Pradesh than in Tamil Nadu. The north east monsoon is the major rainy season of Tamil Nadu and a positive shift is seen in case of temperature while in case of rainfall is found to be lower in growing season. Also, it was mentioned that the southwest monsoon is more stable than the northeast monsoon.

Vellingiri Geethalakshmi

A comparison was done for the baseline with the future climate with RCP8.5 Mid-Century temperature scenarios for both seasonal and annual. It was found that for Mahabubnagar, the temperature for the growing season was elevated and a variation in rainfall was identified for the growing season. Among the growing season the month of June was expected to get higher rainfall, but the months of July, August, and September would receive either similar or less rainfall. A higher temperature was expected in Tamil Nadu in all the seasons and in case of rainfall it was expected to increase in the month of November. In case of rainfall, it was expected to be less than the baseline in the months of June, July, August, and September. At the same time, the temperature was increasing in all the cases even in the growing season. Higher rainfall was

expected during October, November, and December, as it is the main growing season at the same time temperature was also expected to increase.

A graphical representation of the relative yield distribution was also shared. The results for Andhra Pradesh were much more spread out in comparison to Tamil Nadu. The gains and losses were also shared for both the states. The summary of the economic analysis was discussed. Later the scope of home stretch was discussed and the crops and the sites are mentioned which were used for the study in future also. Holistic view of the approach to address climate change / variability was also discussed in detail. The cropping system along with livestock was addressed in the approach and used to calculate the net gain and loss. Similar approach is planned in Andhra Pradesh also.

The adaptation package was discussed which comprised of the crop models and the economic models. There were four crop models, namely water management, varietal change, N management, and dates of planting. Among these, water management was given more importance due to the water-constrained nature of the area. The delivery timeline for the study and some ideas for extension were also shared.

South Asia Regional Coordination Team

The speaker provided a summary of the work done by all the teams and the results of the workshop. The results were divided in three parts: crop modelling, climate modelling, and economic modelling. The status report of the crop modelling was presented and the work was divided into three categories: Completed, In progress and Future Course of Action. Under crop modelling for IGB India, APSIM Rice and APSIM Wheat are completed, DSSAT Wheat was in progress, and DSSAT Rice was under Future Course of Action. For IGB Nepal, APSIM Wheat was completed, DSSAT Rice and APSIM Rice was in progress, and DSSAT Wheat was under Future Course of Action. For IGB Bangladesh, APSIM Rice was completed, APSIM Wheat was in progress, and DSSAT Rice and DSSAT Wheat were under Future Course of Action.

For Sri Lanka, DSSAT Rice was in completed stage but more work was required and APSIM Rice, APSIM Sugarcane, and DSSAT Sugarcane were under Future Course of Action. For Pakistan, DSSAT Rice and DSSAT Wheat were completed, APSIM Rice and APSIM Wheat were in progress, and APSIM Cotton was under Future Course of Action but yet to decide whether to do or not. For South India, DSSAT Maize and DSSAT Rice were completed, APSIM Rice was in progress, and APSIM Maize was under Future Course of Action. Under economic modelling, the Fast Track was done by all the teams and for IGB Bangladesh and Sri Lanka minor fine tuning in the results is required. For Home Stretch, the case studies were presented by all the teams. Under climate modelling all the teams were found to be empowered with the techniques of how to do the climate modelling.

The various issues expressed by the regional research teams regarding the IT tools were also discussed in detail for the different models like DSSAT Rice and APSIM Rice. Some immediate needs of the regional research teams were also discussed in terms of the capacity building needs for the teams. IGB for DSSAT -Rice, Wheat, South India -APSIM-Rice, Maize for Andhra Pradesh & Tamil Nadu, Sri Lanka- APSIM-Rice, STIC-Rice and DSSAT-Sugarcane , APSIM-Sugarcane and Pakistan - APSIM Rice, Wheat, Cotton.

G Dileepkumar

The coordination team also presented an action plan which consisted of conducting AgMIP Home Stretch Sprints which will be facilitated by CRT experts backed up by experts from Leadership team to be held at Sri Lanka (September 2013). There was a need for participants to be experienced model users and they should have model ready datasets. Also there was a need expressed to identify leadership team experts/E-experts. Periodical research discussions using web technologies as face-to-face meetings are expensive and sometimes it's not possible to bring all the people together. So, it was proposed that bi-weekly virtual meeting on specific issue/monthly update/need based to be conducted. It was considered ideal to plan the Advance Intensive Workshop on Integration and Interpretation in December 2013, as teams can be ready with their results and can come interpret them with the help of the leadership team and after this they can further use the interpreted results for the final reports.

As part of the action plan of the CRT, preparing RRTs for Upcoming Events in terms of providing the templates for the posters and the assistance in building up the chapters and the follow-up mechanism was discussed. Also preparation for the AgMIP Global Annual Meeting, ASA was shared. For effective contribution to the scale up operation that was planned for future, some other points regarding the action plan were shared, which included the creation of regional expert trainers to document methodologies, issues, best practices to enhance learning materials, for creation of learning objects, to develop knowledge products, outreach and dissemination through knowledge products and platforms, and engagement and coordination of stakeholders.

The time line for the activities was shared along with the ideas for extension which included stakeholder engagement and synergies to work with national projects, dissemination and outreach through knowledge products and platforms, improve human resources through capacity building activities and student scholarship program, and design and development of AgMIP knowledge base.

Breakout Sessions

The Fast Track results from each regional team were reviewed and economic components were corrected as required for the team. The economic team discussed the revised methods for incorporation of time variation in yields from crop simulation model. The protocol of linking crop simulation results with economic models was also discussed and made clear to the regional team to implement in the fast track analysis and the results were revised and presented in the plenary session of the workshop. The methods for incorporating additional crops which is not part of the crop modeling exercise were discussed. And also the incorporation of livestock component was also discussed. The issues in fast track exercises were addressed in some of the regional projects in advanced stages. Extension of the model to whole farm systems and complete climate impact and at least one adaptation scenario were modeled. Also, the revised protocol from implementing the crop model simulation results were presented to the regional economic team and explained for implementing in the whole farm modeling exercise. The RAPS construction and various issues in developing the adaptation strategies were discussed with the team. The regional teams presented their concern in developing RAPS.

The interpretation of the economic modeling results were discussed and made clear on how to present the TOA-MD results and graphs to explain the results. The price and yield projections for the region or country for developing the RAPS narrative were discussed and global economic modeling projection results required for the regional teams from different SA countries will be provided by Global Regional economic team.
Discussions were held for conducting Sri Lanka Boot camp, to polish, analyze, understand, justify, interpret and present the modelled data, keeping the following principles in mind:

1. Not training, but doing the 'home stretch' analyses, supported by experts, 2. Need is greatest in Sri Lanka. Also include some participants, who are at a similar skill level, from other areas with need (e.g. Pakistan), 3. Participants need to be experienced model users, 4. Participants need to have already modelled the data, 5. CRT staff can contribute to the role of experts and need to define their vision for the long-term, role of CRT team members as regional resource people and experts, and how to use the boot camp to facilitate the transition into this role.

The tasks to be taken to fulfill the principles discussed were:

1. Need to prepare a Participant list, 2. Preparatory work needed by participants and CRT members, 3. To bridge the expertise need, identifying external experts in crop modelling and economics needed, 4. Identify e-experts needed to provide additional support, 5. Date and venue needs to be decided (subject to travel constraints of participants) along with logistical details (e.g. letter invitation to those who need it).

The AgMIP Leadership team interacted with IGB Project team on 23rd July, 2013, to take stock of the work progress and future plans in view of the project objectives and goals. During the interactions, the IGB team briefed about the challenges being faced with cropping system simulation, as the validated model capturing farming system as a whole is not available. The AgMIP leaders also asked the team to prepare a system diagram for a better understanding of the existing farming systems in their respective study region. After meeting the AgMIP Leaders, the IGB team held interactions with the stakeholders as per the programme. During the interactive session with the stakeholders, the importance of farming system approach was

emphasized to sustain the agricultural productivity under projected climate change scenarios as well as under the extreme weather variability situations. The stakeholders also briefed the team about the decision making process in their respective countries to deal with the climate change impacts and adaptation strategy. In the afternoon, methodological challenges and multi-disciplinary issues were discussed in the team breakouts. In the plenary session, each project team presented the progress and outcome of the day report.

On the 24th July, all the RRTs kept working on result updates and refinements in the morning. The resource persons also clarified certain methodological issues and project protocols. In the afternoon session, the organizer arranged a field trip to Bhaktapur district of Nepal to show the existing farming system in the countryside to all the workshop participants. The following day (25th July), a presentation was made on the research goals for the remainder of the project to sensitize all the teams about the remaining work to be completed. The speaker also presented a Coordinated Climate Crop Modeling Project (C3MP) and invited interested modelers to join in the proposed project. Thereafter, all the RRTs kept working on finalizing the results from fast track. Several issues related with AgMIP tools for running APSIM rice and wheat were discussed and informed the issues to the leadership. The last day (26th July) goal was to finalize workshop reports and future work plan. The RRTs finalized their workshop report. Thereafter, all the regional teams presented workshop report and future plans in the plenary session.

Conclusion

The regional research teams assessed the fast-track evaluations and planned the completion of their regional assessments by meeting with AgMIP PIs and crop, climate, economic, and IT leaders. The teams also met independently to further their integrated assessments on the impact of climate change on agriculture in their region. The workshop enabled the continuation of joint advancement of integrated assessments of the impact of climate change on agriculture in specific regions of South Asia. It also provided opportunities for interactions between researchers and stakeholders.

Attendees of AgMIP South Asia Mid-Term Workshop Kathamndu, Nepal.

Annexure 1: Agenda

Regional Research and Coordination Team

Mid-Term Workshop

South Asia Teams

Hotel Annapurna, Durbar Marg

Kathmandu, Nepal

July 22-26, 2013

Final Program

Overall workshop goals:
1) Demonstrate the accurate completion of the mid-term workshop checklist
2) Work together on multidisciplinary analysis of simulation results
3) Ensure that each team has clear work plan to achieve full project goals
4) Work on post-fast-track integrated assessments, analyses, and publications
5) Develop plan for dissemination of AgMIP results to inform stakeholder actions

Day 1 - Monday, 22 July
Goals: 1) Provide overview on "state of AgMIP" to the teams and stakeholders
2) Assess overall progress of teams and disciplinary leaders to date
3) Conduct facilitated discussion with Stakeholders

08:00 **Registration**

08:30 Welcome and Introductions, Workshop goals – J Jones

09:00 Official opening speech – C Rosenzweig

09:20 State of AgMIP – C Rosenzweig

10:00 Regional Research Team (RRT) presentations based upon Mid-term Workshop Report-in Template

Indo-Gangetic Basin

Pakistan

10:40 **Tea/Coffee Break**

11:10 Continue Regional Project Presentations

Sri Lanka
South India
Regional Coordination Team (CRT)

12:10 Discussion

12:30 **Workshop Photo, Lunch**

14:00 Charge to afternoon breakouts – P Craufurd

14:15 Climate, Crops, Economic, and Coordination Team breakouts

- RRT members breakout by expertise
- Present Mid-term checklist results in detail
- Determine methodological challenges for workshop
- CRT meets with stakeholders

15:30 **Working Tea/Coffee Refreshment**

17:00 Facilitated discussion with stakeholder inputs – C Rosenzweig

18:00 **Adjourn for the day**

18:30 **Reception**

Day 2 – Tuesday, 23 July

Goals: 1) RRT interactions with stakeholders
2) CRT facilitates stakeholder interactions and learning among groups
3) Leaders review and evaluate progress of each team

08:30 Plenary Session - Review workshop goals, day's goals – J Jones

08:45 Charge to RRT/CRT breakout groups – P Craufurd

09:00 RRTs meet with stakeholders from region to discuss progress, aims, and potential outcomes. Each team will also have a 45 minute technical session to meet with the AgMIP leaders for feedback and guidance on next steps (this technical session will not include stakeholders). CRT members disburse among RRTs to learn more about each regional project and its stakeholder objectives.

09:00 Indo-Gangetic Basin visits Leaders
09:45 Pakistan visits Leaders

10:30 **Working Coffee/Tea Refreshment**

10:45 Sri Lanka visits Leaders
11:30 South India visits Leaders
12:15 CRT visits Leaders

13:00 **Lunch**

14:00 Plenary Session – Charge to RRT Breakouts – P Craufurd

14:15 RRTBreakouts – methodological challenges and multidisciplinary assessment

15:30 **Working Coffee/Tea Refreshment**

17:30 Plenary - Report Back - Review next day plans – C Rosenzweig& J Jones

18:00 **Adjourn for the day**

Day 3 – Wednesday, 24 July
Goals: Continue RRT & CRT work

08:30 Plenary Session – Goals for Day 3 – C Rosenzweig

08:45 Charge to RRT Breakouts – P Craufurd

09:00 RRT Breakouts

10:30 **Working Coffee/Tea Refreshment**

13:00 **Lunch**

14:00 **Field Trip – Chittapole VDC of Bhaktapur District**

18:30 **Return**

Day 4 – Thursday, 25 July
Goals: Continue RRT and CRT work, design work priorities for remainder of project

08:30 Plenary Session – Results from Day 3, goals for Day 4 – J Jones

08:45 Charge to Team Breakouts – P Craufurd
09:00 Team Breakouts – Leaders Breakout & Float as needed

10:30 **Working Coffee/Tea Refreshment**

13:00 **Lunch**

14:30 Plenary – Research goals for remainder of Project – A Ruane

15:05 Plenary – Data Plan – J Jones

15:15 **Working Coffee/Tea Refreshment**

15:30 RRT Breakouts– Organize workshop reports and assess priorities for the remainder of the project

17:00 Plenary - Report Back - Review next day plans – C Rosenzweig& J Jones

17:30 The Coordinated Climate Crop Modeling Project (Optional) – A Ruane

18:30 **Adjourn for the day**

Day 5 Friday, 26 July

Goals: Teams and Leadership finalize work plans and workshop reports

08:30 Plenary -Goals for Day 5 – C Rosenzweig& J Jones

08:45 RRT Breakouts & Leaders Breakout – Finalize workshop presentations and create work plan for remainder of project including potential publications

10:15 **Working Coffee/Tea Refreshment**

10:45 **Plenary –** RRT & CRT Reports – 45 minutes each – status and plans
10:45 Indo-Gangetic Basin
11:30 Pakistan
12:15 Sri Lanka

13:00 **Lunch**

14:00 **Continue Plenary**
14:00 South India
14:45 Coordination Team

15:30 **Feedback from leadership, Discussion**

17:00 **Adjourn**

Annexure 2: Participants

South Asia Regional Research and Coordination Team Mid-Term Workshop

22-26 July 2013

Hotel Annapurna, Kathmandu, Nepal

List of Participants with full contact information

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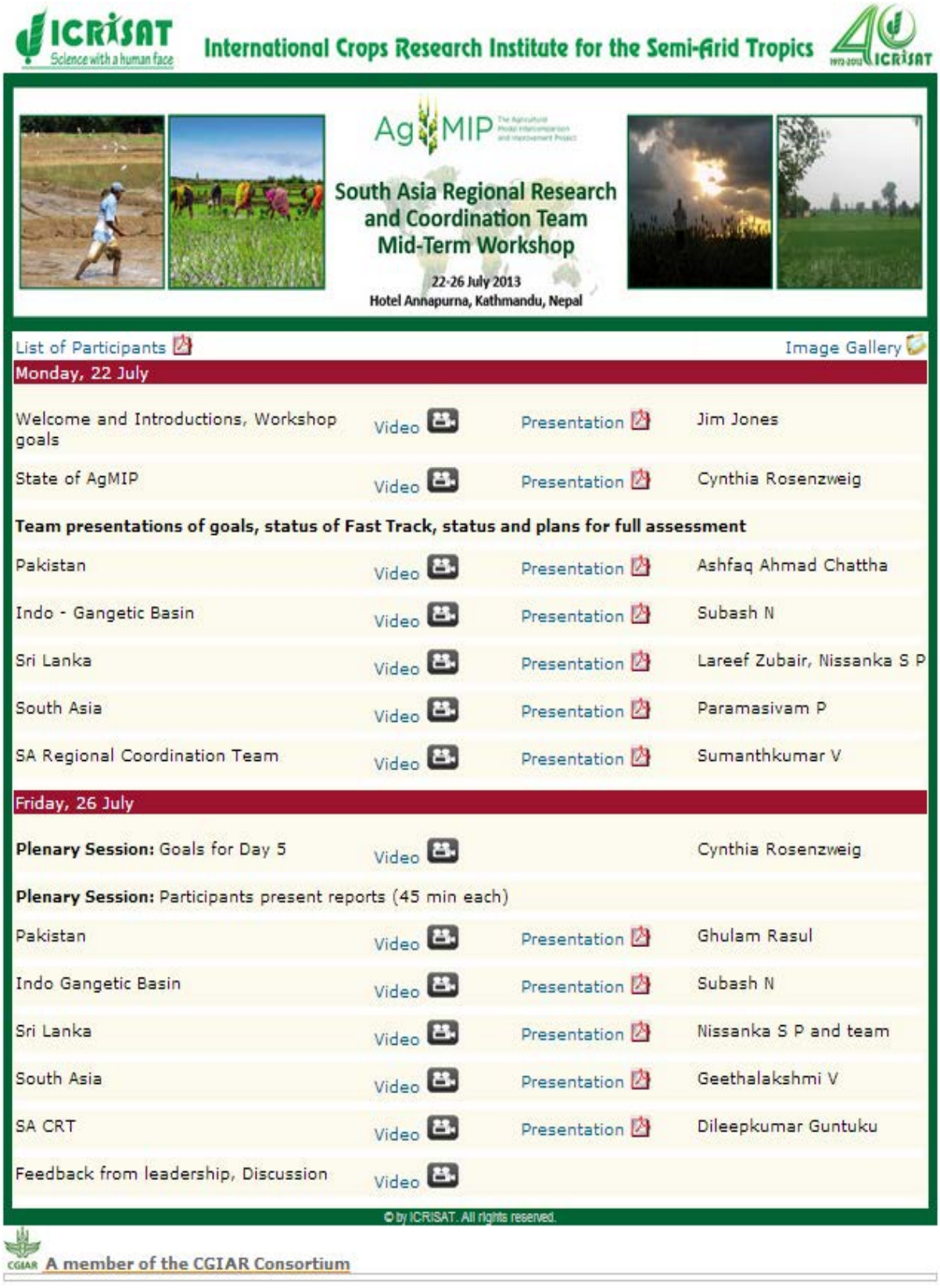
Annexure 3: Presentations Website



http://ksiconnect.icrisat.org/wp-content/uploads/2013/08/AgMIP-Nepal.html

Annexure 4: FAQs

Climate Team FAQs

1) Which specific climate scenarios are required for core question simulation sets:

- RCP8.5
- Mid-Century
- Delta Scenario ('XA.AgMIP' in Climate Codes)
- 5 GCMs [CCSM4 (E), GFDL-ESM2M (I), HadGEM2-ES (K), MIROC5 (O), MPI-ESM-MR (R)]
- All farms

2) Why do we all use the same 5 GCMs?

- We are interested in consistency among regions and therefore require the same 5 GCMs to be used in all locations in Sub-Saharan Africa and South Asia.
- The 5 GCMs above were selected for their:
  - Widely used in recent assessments
  - Rigor of processes and resolution
  - Performance in monsoon regions

3) Will we assess the broader uncertainty of climate change projections?

- Yes, for 2 crop models, RCP8.5, Mid-Century

3a) Mean Changes Only

- 20 GCMs run only through crop/livestock model (no TOA runs)
- Delta Scenarios ('XA.AgMIP' in Climate Codes)
- 1 field: Best calibrated crop/livestock model location

3b) Mean and Variability Changes

- 20 GCMs run only through crop/livestock model (no TOA runs)
- Mean and Variability Scenarios ('XF.AgMIP' in Climate Codes)
- 1 field: Best calibrated crop/livestock model location

Crop/Livestock Model Team FAQs

1) How many crop/livestock models are needed for core question simulation sets?

- 2 crop models
- 1 livestock model (CLIPs)

2) How many crops/livestock are required for a given production system?

- At least one

3) What are the crop/livestock model components of the adaptation package?

- Regional Research Teams devise combination of adaptations represented in crop/livestock model parameters

Economic Model Team FAQs

1) Will we use a RAP for core question #1?

- No

2) What RAP will we use in core questions #2 and #3?

- Regional Research Teams are developing R1: Current Trends Continue

3) How will RAPs incorporate global and regional drivers?

- Begin with national-level drivers from global economic model
- Adjust to regional drivers
-

Information Technologies Team FAQs

1) How can we organize and execute large number of simulations?

- Core question crop/livestock runs at all farms: DOME
- Climate sensitivity runs at one location: Take experiment file (e.g., from QuadUI) for location and add 40 fields that each have different climate

2) Where will inputs, outputs, and products be archived?

- Utilize AgMIP data flow for Regional Integrated Assessments

Annexure 5: Mid-Term Workshop Checklist

This document provides a checklist that will help each team determine whether they are on track to produce all needed elements for the full examination of an integrated assessment at the July Mid-term Workshop. We will go through the entire integrated assessment for this single scenario in your integrated assessment region at the workshop, and then will develop a clear plan for the full assessment(s) going forward from the Midterm workshop to the end of the project (which will include additional elements). Details of these files and the associated methodologies are provided in the AgMIP Integrated Assessment Handbook (available at http://www.agmip.org/wp-content/uploads/2013/05/AgMIP-Regional-Research-Team-Handbook-v4.1.pdf)

Checklist – Climate Time Series Files

The .AgMIP file name is shown here to indicate that these files will need to be consistently formatted following the example in the AgMERRA dataset, and the naming convention detailed in the handbook also provides information about the specific files created. These will enable the full suite of crop modeling runs and agro-climatic analyses for the project.

Using New York City (USNY) as an example:

*** 1.1 obtain AgMERRA estimated climate series for main weather location**
first step: send an email to Alex (alexander.c.ruane@nasa.gov) with location's latitude, longitude, elevation, full name, and a 4-character code (e.g., USNY)
file: **USNY0QXX.AgMIP**

*** 1.2 combine with observations and quality control main weather station**
first step: collect observations and calculate biases of AgMERRA time series. Fill in gaps using methodologies described in Section 4 of AgMIP Regional Integrated Assessment Handbook to achieve 1980-2010 daily file with all AgMIP variables.
file: **USNY0XXX.AgMIP**

*** 1.3 create CMIP5 GCM delta scenarios for Mid-Century (2040-2069) RCP8.5 using the CCSM4 global climate model scenario**
first step: download CMIP5 datasets (meantasmax, meantasmin, meanpr, and lat/lon files) and Matlab/R scripts package
file: **USNYIEXA.AgMIP**

Check List – Crop Modeling for Integrated Assessment

*** 2.1** Document calibration of selected cultivar used (indicate experimental site, number of years, and type of experimental data used for calibration). Provide the cultivar genetic coefficients and evidence of calibration (simulated and observed anthesis and maturity with statistics, and graphical time-series if done). Provide model-ready input files.

*** 2.2** Provide completed template spreadsheet (Survey_Data_Import file) of entered field survey data that includes all farmer fields.

*** 2.3** Document source and identity of weather data used for farm survey simulations (including the weather used for simulating farm survey seasons, as well as the historical baseline weather (USNY0XXX.AgMIP), and the future climate scenarios (e.g., USNYIEFA.AgMIP). Also confirm that your weather files follow the AgMIP-scripting method and that the future climate scenario is for the correct time-slice and RCP).

*** 2.4** Document source of soil profile information and provide soil profiles (either as separate page on the template spreadsheet, or as separate soil profile that can be viewed).

*** 2.5** Provide Field Overlay files (DOME or DOMES) used to fill in missing information relative to the farm survey simulations. For example, that will give evidence for setting initial soil water, initial soil nitrate and ammonium, assumption for initial crop residue, stable soil C pool fraction, etc. This may require a short amount of explanatory text.

*** 2.6** Provide the ACMO file with the simulated crop yield outputs for the matched farm yield survey fields, with explanation. Discuss causes for outliers in observed and simulated farm yields, *but as requested by economists, do not make any bias adjustments.*

*** 2.7** Provide the ACMO file of successful 30-year simulations for baseline weather, for all farms (30 years per farm, show simulated yields for individual years, no averaging). Also provide Seasonal Strategy file (DOME) to provide sowing date rules and other assumed management information.

*** 2.8** Provide the ACMO file of successful 30 year simulations for the appropriate identified climate scenario, for all farms (30 years per farm, show simulated yields for individual years, no averaging). This is for historical management without RAPS. This will require an additional Seasonal_Strategy file (DOME) to provide sowing date rules and other assumptions.

*** 2.9** For adaptation simulations, provide Seasonal_Strategy file (DOME) with RAPS adaptations, sowing rules, and assumptions, along with ACMO file of 30 year simulations for climate change scenario with adaptation, for all farms (30 years per farm, show simulated yields for individual years, no averaging).

*** 2.10** Provide evidence of interactions with economists on your team to confirm their understanding of the files and how to interpret crop modeling results, with yield distributions associated across farms in the matched survey case, and yield distributions associated with multiple weather years per individual farm.

Check List – Economics Team: TOA-MD Modeling

This checklist is to be used by RRT's economists for TOA-MD data preparation, model setup and results review. This checklist should be used for each scenario that is being modeled (i.e. Fast track, and adaptation scenarios).

DATA: Review data received from crop modelers and economic survey data

*** 3.1** Make sure you received data from crop modelers in ACMO format

*** 3.2** Check actual data for outliers, make histograms

*** 3.3** Check simulated yields distributions

*** 3.4** Correctly estimate relative yields and predicted future yields - Follow instructions provided on the updated Appendix 1 of the Handbook v4.1

*** 3.5** Stratification: decide if stratification is needed/possible

*** 3.6** Calculate statistics and double check they are correctly estimated (check predicted/modeled standard deviations, CVs) - Check again for outliers, strange values, etc

***3.7** Make sure input parameters are consistent with scenario being modeled

*** 3.8** Estimate and make sure RHO12 (correlation between returns in systems 1 and 2) makes sense

* **3.9** If needed**,** estimate and check values for correlations between returns to activities within systems (e.g. RHOC1, and RHOC2 for crops).

* **3.10** Use DATA and STUDY sheets to document the scenario that is being modeled.

MODEL Setup: Review key TOA-MD parameters and output data

* **3.11** Select the appropriate value for Do_Climate (Setup sheet)
* **3.12** Check units and select appropriate value for C_UNITS, L_UNITS, P_UNITS

* **3.13** Check units for CVs

* **3.14** Check STD_C, STD_L, STD_P: Standard deviation of net returns

* **3.15** Check activity Weights

* **3.16** Check fixed costs (are they needed?, enter correct values and check values for T1, T2 ,R)

* **3.17** Review all sheets making sure all the values are correct, consistent and in the correct places

Model Results:

* **3.18** Check output sheets for consistency

* **3.19** Check range of tradeoff points
* **3.20 Interpretation:** Review results to make sure they are consistent with economic theory and TOA-MD economic/statistical properties

Check List – Technical Stakeholder Engagement

The workshop includes engagement of at least one technical stakeholder (TS) per team for the first 1.5 days of sessions. This is owing to 1) A requirement by the funder (UK/DFID) to engage stakeholders broadly and across time; 2) Recognition that TS engagement is part of the underway work; and, 3) To ensure teams are not too far down the product line for a country before taking into consideration the likely areas of influence or need. The TS interactions should actually help to shape the work. Below we provide some criteria to help you in your selection of suitable TS. Teams should plan to have no fewer than two TS participating. AgMIP (HQ) will fund one, with the team funding the other.

* **4.1** TS works in one of the countries in your region

* **4.2** TS contributes technical expertise at a sub-national or national level

* **4.3** TS would likely benefit from exposure to the fuller AgMIP SSA representation

* **4.4** TS would likely engage in the technical discussion session on the afternoon of Day 1

* **4.5** TS would likely be interested and able to explore some RAPS-like work with your team in the morning of Day 2.

Team PIs will reach out to TS and provide information and full contact information also the Coordinating Research Team PI (Job or Dileep) with a copy also to agmip@columbia edu. AgMIP HQ will fund one TS for each team.

Annexure 6: FTP site naming conventions

1. CLIMATE

1.1 The merged historical period file (file name format: USNY0XXX.AgMIP). This come from historical observations merged with the MERRA-based data (bcMERRA is the same as AgMERRA), and should be complete from 1980-2010 with all variables and should not have any major outliers or physical discontinuities (e.g., Tmax < Tmin).

1.2 The historical period files for each farm in the region (e.g., if we had 12 farms around New York, we would have files name formats NY010XXX.AgMIP --> NY120XXX.AgMIP). These come from the agmip_farm2climate R scripts and the WorldClim data.

1.3 An example of the future climate data (from agmip_simple_delta.R and agmip_simple2full.R) from one GCM (use CCSM4 if you are looking for a first one to upload). File name format: NY01GEXA.AgMIP --> NY12GEXA.AgMIP

2. CROP

2.1. Crop model files for DSSAT (or XML for APSIM) documenting cultivar genetic coefficients used (provide experimental data for site used for calibration).

File name format: Files X, A, T, *.SOL, *.WTH, and *.CUL used for DSSAT models (in the standard DSSAT naming conventions), and the XML files for APSIM (with corresponding cultivar, management, soils, weather information in the APSIM naming conventions).

2.2. Field survey data entered. File name format: Survey_Data_Import-Region-Crop.csv

2.3. Field Overlay files (DOMES) used to fill in missing information for farm survey simulations. File name format: Field_Overlay_Region-Crop-Model.csv [Note: provide all (multiple) DOMES associated with the above Survey_Data_Import-Region-Crop.csv files]

For all the below ACMO files please use the following naming format:

ACMO-region-stratum-ClimID-RAPid-MgmtID-model.csv

For example

ACMO-Machakos-1-0XFX-0-0-DSSAT.csv for baseline,

ACMO-Machakos-1-MTFA-3-2-APSIM.csv for future conditions.

2.4. ACMO file with simulated crop yield outputs for the matched farm yield survey fields.

2.5. ACMO file of 30-year simulations for baseline weather, for all farms, with Seasonal Strategy file (DOME) for sowing rules and other assumed management information.

2.6. ACMO file of 30-year simulations for climate scenario, for all farms, with Seasonal Strategy file (DOME) for sowing rules and other assumed management information.

2.7. ACMO file of 30 year simulations for climate scenario with adaptation, with Seasonal_Strategy file (DOME) with RAPS adaptations, sowing rules, and assumptions.

3. ECONOMIC

3.1 Modeling:

- TOA-MD Input files (excel files). Use the TOA-MD data file name format: MD4data_YYYYY.xls (YYYY:Project identifier: team, region and scenario description)

- TOA-MD Output files (excel files). Use this TOA-MD output File name format: MD5_YYYY.xls

3.2 Reporting: use previously provided template to report results:

- RRTs FT-AD Report (PowerPoint and Excel files). Use the file name format of the templates provided and add the project identifier: YYYY_RRTs FT-AD Report.PPt and YYYY_RRTs FT-AD.xls

3.3 RAPs:

- DevRAP Matrix Use the DevRAP filename and add the Project identifier: YYYY_DevRAP.xls

- RAPs Documentation (based on template we distributed). Use this File name format: YYYY_RAPS Documentation.doc

- RAPs Presentation – Summary of RAPs narratives. Use this File name format: YYYY_RAPs Summary.PPT