

Innovation Lab for Small Scale Irrigation

Results and Impact of IDSS workshops in Ghana

Introduction

The USAID Feed the Future Innovation Laboratory for Small-Scale Irrigation (ILSSI) was formed to undertake research aimed at increasing food production, improving nutrition, accelerating economic development, and contributing to the protection of the environment in Ethiopia, Ghana and Tanzania. Texas A&M University leads the project in collaboration with the International Water Management Institute, the International Livestock Research Institute, North Carolina A&T State University, and the International Food Policy Research Institute.

ILSSI is currently working to generate actionable recommendations for strategic investments in agricultural development in the three target countries by integrating: natural resources, agricultural, and socioeconomic data; input from local farm families; local agronomic research and demonstrations; and the Integrated Decision Support System (IDSS), a powerful suite of natural resource, agronomic, and farm-scale economic models. ILSSI also emphasizes capacity development at multiple levels of scale, including training university faculty and students and representatives from government agencies, non-governmental organizations, and the private sector to continue using ILSSI tools and methodologies after this five-year project is completed.

As part of its training mission, ILSSI has conducted multiple training sessions in the IDSS and its three component models: the Soil and Water Assessment Tool (or SWAT, at <http://swat.tamu.edu>), the Agricultural Policy/Environmental eXtender (or APEX, at <http://epicapex.tamu.edu>) and the Farm Income and Nutrition Simulator (or FarmSIM, at <http://afpc.tamu.edu>). Simetar© (Simulation for Excel to Analyze Risk), referenced below, is the simulation engine used to simulate the FARMSIM model. A workshop sponsored by the Council for Scientific and Industrial Research/Water Research Institute was held on February 1-5, 2016, in Accra, Ghana. This report describes the participants, content, evaluation, and effectiveness of the 2016 workshop.

Number of participants and their affiliations

A total of 50 participants attended the workshop, of which 30 were trained in SWAT, 11 in APEX and nine in FarmSIM. Ten of the 50 participants were women, with 5, 2, and 3 women attending the SWAT, APEX, and FarmSIM training sessions, respectively. A majority of workshop participants represented Ghanaian universities such as the University of Ghana, and the Kwame Nkrumah University of Science and Technology. A sizeable minority of participants represented international and local research institutions, such as the Council for Scientific and Industrial Research – Water Research Institute and the International Water Management Institute. One participant represented the Ministry of Food and Agriculture. [Figure 1](#) illustrates the breakdown of the 2016 workshop participants by gender and organizational affiliation.

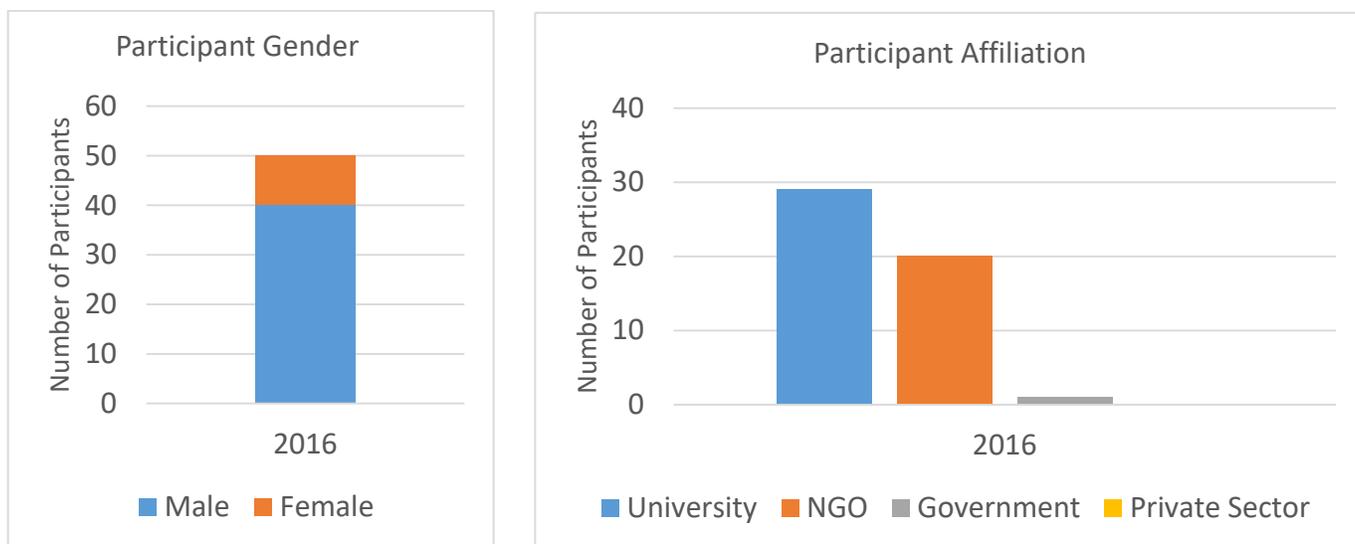


Figure 1. Participation at 2016 workshop by gender and affiliation.

Workshop content and structure

The first half-day of the 2016 workshop consisted of an overview of the IDSS and its three component models. From the afternoon of the first day through the fourth day, participants attended individual model trainings in either SWAT, APEX or FarmSIM. On the fifth day, participants came back together as a group for an in-depth case study of the integrated capabilities of the IDSS (drawn from ILSSI studies in the Dimbasinia watershed in Ghana) and a hands-on integration exercise. Finally, participants were divided into groups (each consisting of at least one trainee for each of the three models) to work together on the integration of their individual modeling results.

Participant evaluations of the workshops

Prior to the IDSS workshop, the IDSS team required each participant to complete an online survey ranking his or her competence in the following areas pertaining to SWAT, APEX or FARMSIM: depth of understanding of the general subject matter; level of experience with relevant software, tools, and databases; and ability to perform certain relevant modeling tasks. [Table 1](#) lists a sampling of these “competence questions” for each of the three IDSS models. A total of 48 respondents completed the pre-workshop survey, of which 28 attended SWAT training, 10 attended APEX training, and 10 attended FARMSIM training.

Following the workshop, participants were asked to complete a second online survey ranking their knowledge and competence post-workshop. (The “competence questions” included in the post-workshop surveys were identical to those posed in pre-workshop surveys and listed in [Table 1](#).) Participants were asked to assess whether course content was delivered as advertised and expected learning outcomes achieved. They were also asked to rate course materials, instructor content and presentation, overall quality of the workshop, and how well the workshop met the participant’s particular needs. Finally, participants were asked to make recommendations as to future course content. A total of 19 respondents completed the post-workshop survey, of which 6 rated the SWAT training, 5 rated the APEX training, and 8 rated the FARMSIM training.

Table 1. “Competence” questions in the SWAT, APEX, and FARMSIM workshop surveys

SWAT
<p>SWAT workshop participants were asked to rank their ability to, among other things:</p> <ul style="list-style-type: none"> • prepare spatial and temporal data and soil and land use tables • set up a watershed delineation model and a Hydrological Response Unit definition • write different inputs into the SWAT readable format • edit and update model parameters and databases • define model execution and warm-up periods • use the tool SWAT-check to assess water balance components, nutrient transports, erosion, crop growth • use QSWAT to animate and plot model outputs • simulate different fertilizer rates and types and different tillage practices • select suitable irrigable crops and identify irrigable areas for different crops
APEX
<p>APEX participants were asked to rate, among other things, their:</p> <ul style="list-style-type: none"> • proficiency in file management, text processing software, spreadsheets, and database management • understanding of the purpose, basic setup, structure, and file system of the APEX model, the structure of APEX outputs, and basic concepts of model evaluation • ability to define certain terms (such as relative sensitivity analysis, calibration, and validation) <p>In addition, APEX participants were asked to rank their ability to:</p> <ul style="list-style-type: none"> • run the APEX model using WinAPEX interface and use, modify and update WinAPEX databases • prepare weather data files, soil data, management files, and scenarios using WinAPEX • perform relative sensitivity analysis, and manual and automatic calibration and validation • generate output data for SWAT and FARMSIM
FARMSIM
<p>FARMSIM participants were asked to rate, among other things, their:</p> <ul style="list-style-type: none"> • understanding of farm management, agricultural economics, and statistics • understanding of and ability to use Excel, Excel tools, and risk/data analysis tools in Simetar • understanding of FARMSIM model, model inputs/outputs, how model simulates risk and scenarios • ability to interpret stochastic results in SIMETAR and FARMSIM • ability to interpret, obtain and input data, and to verify data entry • ability to determine and interpret results from the models

Assessment of effectiveness

Following the IDSS workshop, the IDSS team compared the responses on the pre- and post-workshop “competency questions.” These questions were identical in the pre- and post-workshop surveys. Since respondents ranked their abilities from 1-5 (with 1 being the lowest level of competence and 5 the highest), higher scores indicated a higher level of competency, and the difference in scores on the pre- and post- workshop provided a general (though not necessarily objective) measure of the workshop’s effectiveness in achieving advertised learning outcomes.

The answers of each respondent to all of the “competency questions” in the pre-workshop survey were totaled, creating a pre-workshop competency score for that respondent. The scores of each of the respondents were then

averaged to produce the average pre-workshop competency score for respondents. The same process with respect to post-workshop survey responses produced an average post-workshop competency score for respondents. Figure 2 compares the average pre-workshop and post-workshop competency scores for each IDSS model training session at the 2016 workshop. These results indicate improvements in average post-workshop scores ranging from almost 40% to almost 50%. The team did not perform any statistical analysis (test of significance for difference in averages, etc.) of the survey responses.

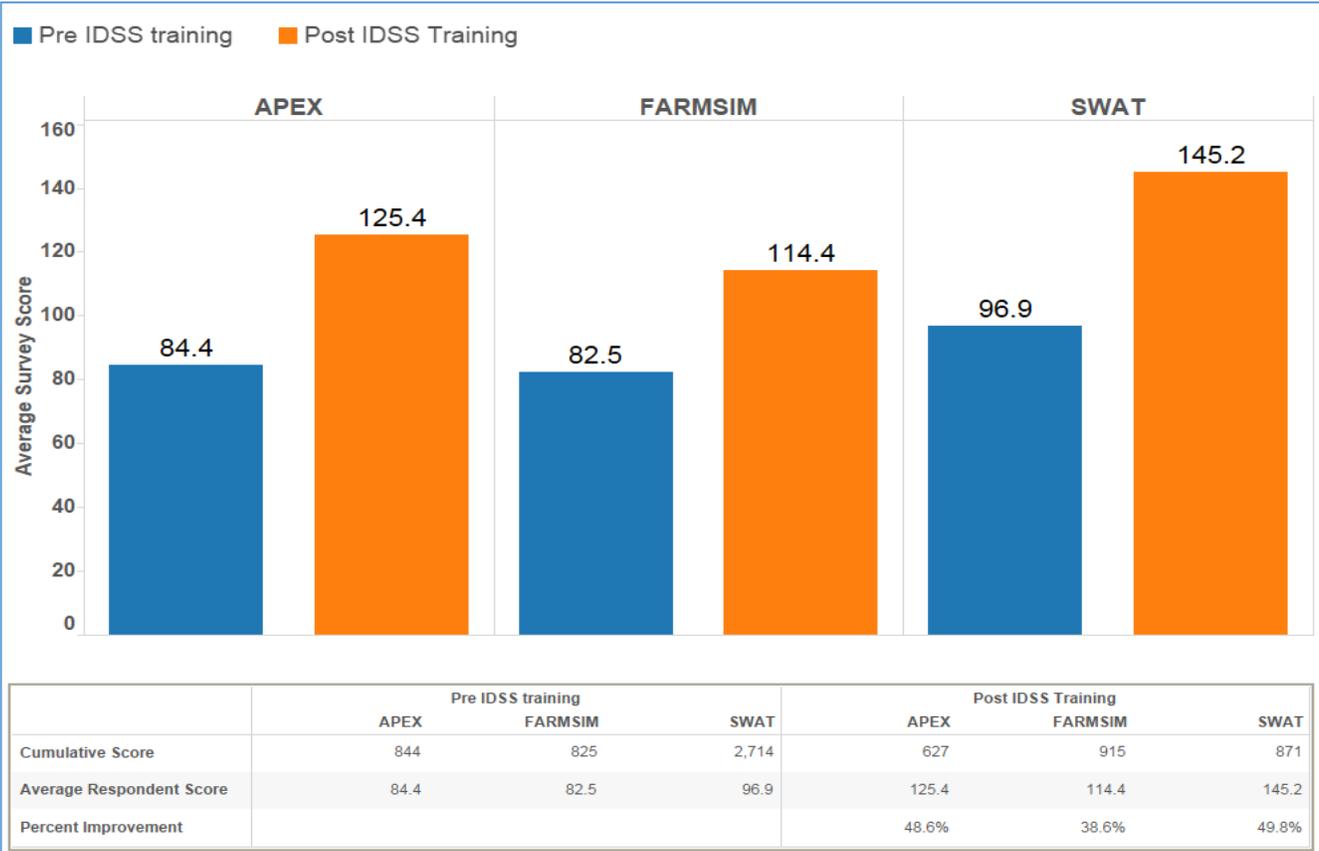


Figure 2. Comparison of average pre-workshop and post-workshop competency scores for SWAT, APEX, and FARMSIM training sessions at the Arusha IDSS workshop.

The IDSS team also reviewed respondents’ evaluations of course content and overall quality, instructor content and presentation, and how well the workshop met the participant’s particular needs, as well as respondents’ suggested adjustments to course content in subsequent courses. In general, reviews were very favorable. 85% of respondents agreed or strongly agreed that the course content was as advertised, with 5% disagreeing and 10% remaining neutral. 85% of respondents rated instructor content as very good or excellent, and 15% rated it as good. 75% of respondents ranked instructor presentation as very good or excellent, and 25% ranked presentation as good. 100% of respondents rated the overall quality of the course as good, very good, or excellent, and 80% of respondents said that the course exceeded their expectations.

In the comments section of the post-workshop survey, many participants were enthusiastic about using the models in their research. One APEX course participant stated, “The exercise in general was revealing and exciting, having the opportunity to interact with participants from diverse backgrounds and areas of expertise. In fact it should be organised again since I will be using this model for my personal studies.” Another APEX participant

requested follow-up assistance with respect to his research, asking, “How can IDSS be practically applicable in the livestock production sub-sector of the agricultural sector? especially in nutrition and growth curves.”

Many participants also expressed an interest in additional training sessions. A SWAT course participant commented, “More of such workshop should be organised taking other field of specialization into consideration.” Similarly, an APEX participant requested, “I wish the next training be opened and advertised enough in order to allow many researchers from other countries to take advantage of the tools.” A FARMSIM participant requested a longer training session, stating, “This workshop is very helpful, but I think more time is need to really appreciate all the aspects of the training. More so every member should have been given the opportunity to have a feel of the other components for one week before treating a particular component for another one week.”

Following completion of the Accra workshop, the IDSS team stands ready to provide ongoing support and assistance to workshop participants. The FARMSIM team has been in contact with one student regarding his plans to present a similar workshop on the IDSS to his university peers.

Expected impact

Most of the participants at the 2016 IDSS workshop represented universities, international and local research institutions, and the Ministry of Food and Agriculture. We hope they will apply the knowledge they gained over the course of the workshop in their current and future research activities. The survey responses noted above indicate that many workshop participants will use or have already begun using knowledge gained in the IDSS workshops in future and current research activities. Some of the participants are already engaged in ILSSI activities, and are now ready to apply what they have learned in the project.