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RESEARCH PROGRAM ON
Climate Change, Agriculture and Food Security

CCAFS

Workshop report: Participatory Integrated Climate Services for Agriculture (PICSA) Intermediary Training, Kiteto District, Tanzania

October 2016

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WFP World Food Programme wfp.org

University of Reading

Participatory Integrated Climate Services for Agriculture (PICSA) Intermediary Training

Arusha, Tanzania, October 2016

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Correct citation:
Gathenya, J. 2017. Participatory Integrated Climate Services for Agriculture (PICSA) Intermediary Training, Kiteto District, Tanzania. CCAFS Workshop Report. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Available online at: www.ccafs.cgiar.org

CCAFS Workshop Reports aim to disseminate interim climate change, agriculture and food security research and practices and stimulate feedback from the scientific community.

Published by the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) is a strategic partnership of CGIAR and Future Earth, led by the International Center for Tropical Agriculture (CIAT). The Program is carried out with funding by CGIAR Fund Donors, Australia (ACIAR), Ireland (Irish Aid), Netherlands (Ministry of Foreign Affairs), New Zealand Ministry of Foreign Affairs & Trade; Switzerland (SDC); Thailand; The UK Government (UK Aid); USA (USAID); The European Union (EU); and with technical support from The International Fund for Agricultural Development (IFAD).

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Photos: all photos by J. Gathenya.

Abstract

A Participatory Integrated Climate Services for Agriculture (PICSA) training workshop for extension workers from Kiteto District of Tanzania was conducted in Arusha town from 3rd to 7th October 2016. The aim of the workshop was to equip 35 extension workers with skills to implement PICSA in their villages and wards during the October-November-December season of 2016-2017. The training consisted of short presentations by facilitators, group discussions and presentations by participants, a field practice session and a planning session. The extension workers learnt how to use local climate information from historical data to seasonal forecasts to reduce risks associate with climate variability. Each of the extension workers was expected to go back to their duty stations and train farmers how to use climate information to make better decisions in the farms. In this way, the agricultural productivity would be increased and farmers would become more resilient to future climate change.

Keywords

Climate information service, global framework for climate services; Participatory Integrated Climate Services for Agriculture; Climate variability; Adaptation.

About the authors

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Acknowledgements

The Global Framework for Climate Services Adaptation Programme for Africa (GFCS-APA) is funded by the Ministry of Foreign Affairs of the Government of Norway. The partners of the GFCS-APA are World Meteorological Organization (WMO), World Health Organization (WHO), World Food Programme (WFP), International Federation of Red Cross and Red Crescent Societies (IFRC) including Norwegian Red Cross and Red Cross/Red Crescent Climate Centre, CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), Centre for International Climate and Environmental Research - Oslo (CICERO) and the Chr. Michelsen Institute (CMI). This workshop was supported by WFP and CCAFS with funds from GFCS-APA.

Contents

Acronyms

AAIDRO	Arusha Archdiocesan Integrated Development and Relief Office
CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security
CGIAR	Consultative Group for International Agricultural Research
CRP	CGIAR Research Program
DAICO	District Agriculture, Irrigation and Cooperatives Officer
FAO	Food Agriculture Organization of the United Nations
FRI	Farm Radio International
GFCS - APA	Global Framework for Climate Services Adaptation Programme for Africa
ORS	Orkonerei Radio Service
PICSA	Participatory Integrated Climate Services for Agriculture
TMA	Tanzania Meteorological Agency
WFP	World Food Programme

Introduction

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), is a strategic ten-year partnership emerging from new collaboration between CGIAR and Future Earth aimed at overcoming the additional threats posed by a changing climate to achieving food security, enhancing livelihoods and improving environmental management in the developing world. CCAFS brings together strategic research in agricultural science, development research, climate science, and Earth System science, to identify and address the most important interactions, synergies and trade-offs between climate change, agriculture and food security. CCAFS is structured around four closely inter-linked global research themes: Adaptation to Progressive Climate Change; Adaptation through Managing Climate Risk; Pro-poor Climate Change Mitigation; and Integration for Decision Making.

Under the auspices of the Norway-funded Global Framework for Climate Services Adaptation Programme in Africa (GFCS-APA), CCAFS, in collaboration with the World Food Programme (WFP) - Tanzania and Tanzania Meteorological Agency (TMA) held an intermediary training workshop for intermediaries or extension workers involved in delivering climate services to smallholder farmers in Kiteto District. The training in Participatory Integrated Climate Services for Agriculture (PICSA) was offered by the Walker Institute of the University of Reading, United Kingdom in partnership with WFP -Tanzania. The training was held in Lush Garden Hotel in Arusha, Tanzania from October 3rd to 7th 2016.

Aims of the workshop

The aim of the workshop was to train the intermediaries to understand the PICSA approach and to develop their skills so that they can train other intermediaries, farmers and livestock keepers. The intermediaries are expected to integrate the PICSA approach in their normal work routines so that PICSA can be implemented with minimal additional resources and hence be scaled out effectively. Once trained, the farmers would be able to use participatory planning tools to make informed decisions

based on accurate, location-specific, climate and weather information and locally relevant crop, livestock and livelihood options.

More specifically, the training aimed to introduce the core components of PICSA, adapt PICSA for the climate and agriculture conditions in Kiteto District of Tanzania, develop skills of the field staff in training others in PICSA, and help the field staff to make plans to implement PICSA starting from the 2016-2017 cropping season.

Programme and Content

The 5-day PICSA intermediary training took place in Arusha, Tanzania from October 3rd to 7th, 2016 to train extension workers or intermediaries from agriculture, livestock and media sectors from Kiteto District, Tanzania. The PICSA training manual produced by the University of Reading was used, with the detailed programme is given in Appendix 1. The training was led by facilitators from the University of Reading (on behalf of CCAFS), TMA, and WFP. The training covered in detail each of the steps in PICSA that field staff undertakes with farmers. The sessions included explanation and background followed by hands-on practice of each step, feedback and reflection.

Figure 1. Participants listening to workshop facilitator during a training session

During the first day, the training participants were introduced to PICSA, climate change and climate variability, resource allocation map and seasonal calendar, as well as historical climate information and probabilities. On the second day, the training covered topics such as farmers' options and climate forecast and how it can be used to support farmers' decision-making. On day three, the training covered short-term forecasts and warnings and tips for facilitation, and prepared the participants for the field day. Day four was spent at Tingatinga village in Longido where participants worked with groups of farmers to try out and gain experience in use of the methods they had been trained in. On the final day participants identified and developed plans for key follow-up activities and to prepare for implementation.

Participants and facilitators

A total of 35 agricultural and livestock staff (15 male staff, 10 female staff) from Kiteto District Council of different levels attended the training (Table 1). In addition, there were two participants from the media. All these participants were from organizations that used weather and climate information in their work and they supported farmers and livestock keepers in decision making that involved weather and climate information. The workshop facilitators were drawn from CCAFS, the University of Reading, TMA, and WFP (Table 2). See Appendix 2 for the full list of participants. On the fourth day of the week, the trainees worked with about 40 farmers from Tingatinga Village of Longido District.

Category of participants	Number of Male Participants	Number of Female Participants
District Level Agriculture and Livestock Extension Officers	5	0
Ward Level Extension Officers	7	3
Village Level Extension Officers	13	7
Media Officers	2	0
TOTAL	27	10

Table 1. Participants in summary

Organization	Number of Male Participants	Number of Female Participants
CCAFS / University of Reading	1	0

Tanzania Met Agency	2	1
World Food Programme	1	0

Table 2. Facilitators in summary

Adapting PICSA Kiteto District climate and agriculture

The participants trained during the PICSA workshop are expected to return to their work stations (in this case the Villages and Wards in Kiteto District of Tanzania) and train other extension staff, farmers, and livestock keepers. Ideally this training should have been held within as close as possible proximity to the villages where they work, but various logistical challenges prevented this from happening. However, measures were taken to ensure that the participants get adequately prepared to function in their work stations, including:

- Using long-term meteorological data for sites nearby or similar in climate to the work stations where the participants are drawn from;
- Using crops, livestock and livelihood information and examples that reflect the work stations of the participants (the list of crops and crop information for Kiteto district was prepared by the DAICO in advance);
- Drawing from the experiences of the participants to enrich the discussions during the training.

PICSA relies on an analysis of locally-relevant, historical rainfall and temperature data. The analysis determines the mean and variability and any significant changes over the recorded time period in any of the elements that would affect agriculture. For rainfall, this would be for instance, the seasonal amounts, the start and end of the season, the length of the season, and length of dry spells. The results are presented in the form of easy-to-read graphs. This forms the basis of discussions on the impacts of climate change and climate variability on farming and livestock enterprises and other livelihoods, and how farmers should respond to minimize the imposed risks. The analysis of historical data and preparation of relevant graphs was done by the national meteorological service ahead of the PICSA training.

In the case of the training for Kiteto district, there was no long-term data available for the kind of analysis needed for PICSA. The central station at Kibaha did not have adequate data. For this reason, we used climate data for Dodoma Airport. This data had been analysed during earlier PICSA training sessions. The annual rainfall amount in the northern half of Dodoma district is quite similar to that of the major portion of Kiteto district (Fig. 2).

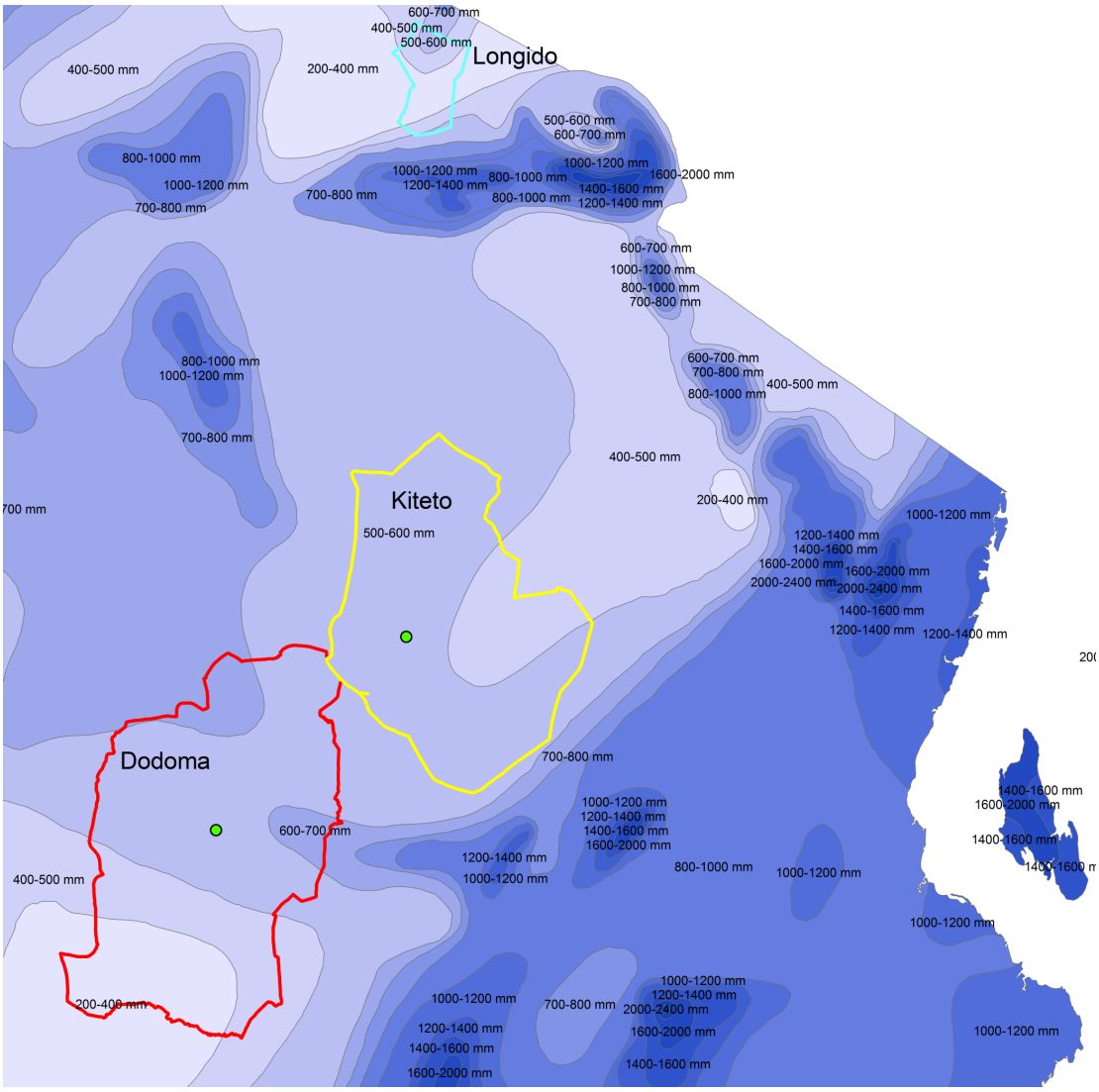

Figure 2. Spatial distribution of mean annual rainfall in northern Tanzania and boundaries of Dodoma, Kiteto and Longido districts. Figure by Worldclim.

Although the training was for agriculture and livestock extension officers of Kiteto District (Fig. 2), the workshop was held in the town of Arusha. Among other reasons, there was a local partner, Arusha Archdiocesan Integrated Development and Relief Office (AAIDRO), that works with WFP in this town whose local facilitation played

an important role the running of the workshop. The field day was held in Tingatinga Ward, Longido District in Arusha Region due to its proximity to the training venue and the fact that the climate of Longido closely resembles that of Kiteto District.

Before the training, the District Agriculture, Irrigation and Cooperatives Officer (DAICO) of Kiteto District provided information on crops that are commonly grown in Kiteto. From this information, the crop water requirement shown in Appendix 4 was calculated. The crop water requirement was calculated using the Food and Agriculture Organization of the United Nations (FAO) Cropwat 8.0 software[1]. The calculation procedures used in CROPWAT 8.0 are based on the two FAO publications of the Irrigation and Drainage Series, namely, No. 56 "Crop Evapotranspiration - Guidelines for computing crop water requirements" and No. 33 entitled "Yield response to water". The climate data for the two nearest stations Kondoa and Dodoma was obtained from FAO CLIMWAT 2.0 software[2]. CLIMWAT provides long-term monthly mean values of seven climatic parameters: mean daily maximum temperature in °C, mean daily minimum temperature in °C, mean relative humidity in %, mean wind speed in km/day, mean sunshine hours per day, mean solar radiation in $MJ/m^2/day$, and monthly rainfall in mm/month

From these climate parameters, the crop water requirements can be calculated using the Penman-Monteith method. This is possible for crops whose data is in the Cropwat 8.0 database such as maize, sorghum, millet, sunflower, groundnuts and beans. The planting date and the length of the growing season have to be specified and this is the information that was provided by the DAICO.

The combined probability given in Appendix 4 represents information from the separate probability tables in Appendix 3. It integrates the three probabilities: 1) probability of season length being at least equal to the length of the growing season, 2) probability of seasonal rainfall total (calculated from planting to harvesting date) being at least equal to the crop water requirement estimated using Cropwat and local climate data, and 3) probability of season starting on or before the given date.

[1] Downloaded from http://www.fao.org/nr/water/infores_databases_cropwat.html

[2] downloaded from http://www.fao.org/nr/water/infores_databases_climwat.html

Planning of activities to follow after the training

The intermediary training workshop aimed to develop the skills and capacity of frontline agriculture and livestock extension staff that will go back to their duty stations and participate in the implementation of PICSA by training farmers. Each participant prepared a schedule of the farmers they expected to train in the months of October and November 2016. They committed themselves to cover the PICSA approach in trainings with farmers prior to the growing season and communicate the October-November-December seasonal forecast and subsequent monthly and ten-day forecasts to the farmers as they await the rains. A two-day planning and review meeting was planned for November 2016 to monitor the progress and address any challenges experienced by the extension workers.

Figure 3. Participants engaging in a group work activity during the training workshop

The field day activities and feedback

The field day took place in Tingatinga Village of Longido district on the fourth day of the training. The site was not an ideal one for extension workers from Kiteto District but various logistical reasons contributed to this site being chosen. Among them is the accessibility of the site for the time that was available. Moreover, this was the site for the PICSA training for Longido district that was held in February 2015. Some of the

farmers who were present had been trained during the Longido training and were familiar with the procedure. The day was very hot and the training took place outdoors. This presented a worst-case scenario of what happens during field training and the trainees have to learn to cope with the sun and wind as they train the farmers.

Figure 4. Introductions between farmers and workshop participants during the field visit to Tingatinga Village on the fourth day of the training.

The participants worked in groups of 5 to 8 and each group was assigned about 8 farmers. The training took four hours. After explaining the purpose of the exercise to the farmers, the workshop participants were tasked to cover the following:

Step A – Resource Allocation Map and Agriculture/Livestock Calendar

Step B – Historical climate information

Step C – Probabilities and risks

Step D – Livestock, Livelihood or Crop options matrix

Step E – Farmers decide which option they would like to explore

Step F – Participatory budget for the option that the farmers choose

Figure 5. Farmers practice drawing a resource allocation map during the village visit and training.

Figure 6. Extension workers lead an exercise for farmers during the village visit.

The participants generally understood the materials well. Women, especially older women, were able to assert themselves and participate in the training. In some instances, one of the members of the community interpreted the information to those who had poor knowledge of Kiswahili language. It is important to pay attention to some cultural aspects when organizing the groups and asking for information. For example, young Maasai men or young married women may be uncomfortable to answer questions in the presence of older men. Another example is that it may not be easy for men to feel comfortable disclosing the number of animals they own.

Evaluation of the workshop

To evaluate the workshop, the participants answered the questions in Appendix 5. The responses are given in Appendix 6. Overall the training was rated highly. The average ranking to the five questions asked during the evaluation is given in Table 3.

Statement	Rank out of 5
I learned a lot from the PICSA course.	4.7 / 5.0
I now know more about the weather and climate in my location than I did before the course.	4.4 / 5.0
I am now able to understand the difference between climate change and climate variability.	4.6 / 5.0
I am now able to use information on the climate in my decision making for farming.	4.5 / 5.0
I am now able to train my fellow farmers so that they better understand climate and weather in their locations.	4.6 / 5.0

Table 3. Results of the questions asked during course evaluation

According to the evaluation, training participants perceived that the methodologies used by the trainers were good and allowed everyone to participate, the group work was especially interesting, and the presentations after the group discussions were enjoyable. They found the sessions on relating climate information to crops, livestock, and livelihoods—such as how to use climate information to select seeds for specific locations and seasons—very interesting There was a good cooperation between the trainees and the facilitators.

Participants also found that the training period for the entire course was too short, especially the time allocated for the field training. More time should be allocated to the topic on probabilities and for discussions on weather and climate. It would have been helpful for the extension workers to have historical climate data for the specific locations where they worked.

Conclusion and recommendations

The aim of GFCS-APA is to improve access to timely, credible and relevant climate information for decision making by farmers and livestock keepers, and in so doing improve agricultural production and climate resilience. Training of extension workers, other intermediaries, and farmers is a key aspect of the GFCS-APA as it enables them to understand and make use of climate information in decision making and to

participate effectively in production of climate information thus ensuring continuous improvement of climate service products. The climate information is also supposed to be downscaled so that it is relevant to the scale of operation of extension staff.

Several recommendations can be drawn from this training workshop to improve future activities to better achieve the goals of the GFCS-APA. TMA and all the other partners should continue pursuing the goal of providing downscaled seasonal and short term forecasts. There is need to improve access to location-specific, analyzed historical climate data. In some cases, there is climate data closer to the areas where the extension workers operate but the data has not been analyzed. To bridge this gap, TMA should provide guidance on areas that have similar climatology where data for one location would be useful for another location. Continual support should also be provided to extension workers to take up the PICSA approach as part of their regular package to farmers and not just see it as an activity that can only be done if project resources are available. It is important to provide training materials and materials used by farmers in the local language, such as Kiswahili in the case of Tanzania. PICSA graphs and crop information tables for the GFCS districts, especially in Kiswahili language, should be prepared and made readily accessible to the trainers. Perhaps these could be available on the TMA website.

Appendix 1: Workshop programme – Intermediary training for Kiteto District, Oct 3-7th, 2016

DAY 1	Time	Topic	Facilitator	Step
8.30	30	Registration		
	20	Introduction and welcome	JK	
	10	Formal opening	JK	
	10	Logistics	JK	
	5	Ice-breaker	JK	
	5	Course aims and outline	JG	
	20	An overview of climate services and the PICSA approach	JG	
Break – 10.10-10.30 incl. group photo				
	40	What are climate, climate variability and change	MM/CJ	
	1hr50	Current farming & livelihoods in your location (using RAMs, Seasonal Calendars for crops and livestock) (Exercise)	JG	**A**
Lunch – 1.00-2.00				
	25	Historical climate information (what is it, where is it from, who collects it and how, and how is it produced)	MM/CJ	**B**
	10	Historical Climate information for your area 1: explanation of graphs	MM/CJ	**B**
	1hr	Historical Climate Information 2: What has happened to the climate, what does this mean + what are the potential causes (Exercise)	MM/CJ + JG	**B**
Tea – 3.35-3.50				
	1hr	Using historical climate graphs to work out probabilities and introducing the use of probability of exceedance (Exercise)	MM/CJ + JG	**C**
	5	Review of day / logistics	JK	
DAY 2 START 8.30				
	10	Recap from day 1 and timetable for day 2	JK	
	45	Using historical climate graphs to work out probabilities and introducing the use of probability of exceedance (Exercise)	MM/CJ + JG	
	45	Identifying and selecting suitable crops, varieties and crop practices (presentations and feedback)	MM/CJ + JG	**D**
Break – 10.10-10.40				
	15	Crop management, livestock and livelihood options - intro *(Refer back to historical climate & consider options that respond to variability as well as other constraints such as water shortage, flooding, low soil fertility)*	JG	**D**

	1hr 45	Crop management, livestock and livelihood options – exercise	JG + JK	**D**
Lunch - 12.40-1.40				
	20	Farmers as decision makers & the role of facilitators What are 'options by context'	JK	**E**
	15	Exploring/planning for selected crops, livestock & livelihood options – PBs Intro	JG	**F**
	1hr30	Exploring/planning for selected crops, livestock & livelihood options – PBs – exercise	JG +JK	**F**
Tea - 3.45-4.00				
	30	The farmer decides – revisiting RAMs and seasonal calendars	JK	**G**
	30	Enabling implementation (the role of seed supplies, markets, savings clubs and crop insurance etc)	JK	**G**
DAY 3 START 8.30				
	10	Recap from day 2	JK	
	20	Understanding and using the seasonal forecast – how does this effect plans for different types of farmers – exercise as individuals	MM/CJ + MM	**H**
	1hr	Improved downscaled seasonal forecast (if available). What is it? How is it produced and communicated, what are its advantages and limitations?	MM/CJ + JG	**I**
Break - 10.00-10.30				
	30	Short term forecasts, severe weather warnings & updates to the SCF – how and when are they produced and communicated	MM/CJ + MM	**J**
	1hr	Interpreting SMS forecasts and warnings (exercise using example SMS messages)	CJ + MM + JG	**K**
	15	Recap of process and main components	JG	
	30	Planning for field day	JK	
Lunch - 12.45-13.45				
	15	Tips for facilitation	HG	
	1hr	Prepare materials and practice exercises for field day	JK	
Tea - 3.30-3.45				
DAY 4 START 8.00				
		Field day	All	
DAY 5 START 8.30				
	1.30hr	Reflection, feedback, lessons learned	JK	**L**
BREAK 10.00-10.30				
	20	Recap on PICSA and key components	JG	
	2hr	Practical planning for implementation	JK	

Lunch 1.00- 2.00				
	40	Monitoring and evaluation	JK	L
	30	Course evaluation	JK	
	30	Certificates and close	JK	
Tea 3.40 - 4.10				
	50	Administration	JK	

Facilitators: Juvenal Kisanga (JK), Charles John (CJ), Mecklina Merchades (MM), John Gathenya (JG)

Appendix 1: List of participants from Kiteto District and workshop facilitators

Name	Title	Office/Organization	Gender
ROBERT E. URASSA	DAICO	District headquarter	M
GODFREY TAJAEL	Agricultural Officer	District headquarter	M
SAIDI A. SEMBADE	Agricultural Officer	District headquarter	M
DR. LUNONU E. SIGALLA	District Veterinary Officer	District headquarter	M
EMMANUEL MASHA	Livestock Officer	District headquarter	M
ALFRED MASHAKA KILANGAZI	Ward Extension Oficer	Lengatei Ward	M
GODWIN FABIAN MBUYA	Ward Extension Oficer	Chapakazi Ward	M
EUNIKE JAPHET MSENGI	Ward Extension Oficer	Bwawani Ward	F
MWASONI KAMBI NGELA	Ward Extension Oficer	Laiseri Ward	M
STEPHEN LULU NYANGURA	Ward Extension Oficer	Loolera Ward	M
JOYCE ZACHARIA MPANDUJI	Ward Extension Oficer	Bwagamoyo Ward	F
PEACE MEDORACK NYEMELE	Ward Extension Oficer	Matui Ward	F
ALLY SAIDI MAFITA	Ward Extension Oficer	Kijungu Ward	M
QADWE DAHAYE LULU	Ward Extension Oficer	Ndirgishi Ward	M
FRANK LAZARO KAVEMBA	Ward Extension Oficer	Partimbo Ward	M
ALISTADIUS A. KAHIGWA	Village Extension Officer	Magungu Village	M

JOHN ZACKARIA NAALY	Village Extension Officer	Njiapanda Village	M
MOHAMED HUSSEIN MAWERE	Village Extension Officer	Dosidosi Village	M
CHRISTINA DEUS MOME	Village Extension Officer	Chang'ombe (Sunya) Village	F
SEVERINE BALTAZARY KEELA	Village Extension Officer	Kimana Village	M
BETRAM SHAO HERRY	Village Extension Officer	Chekanao Village	M
VENELANDA ALFRED CHEYO	Village Extension Officer	Chang'ombe (Njoro) Village	F
EVAREST AMOS BUNGURA	Village Extension Officer	Mwitikira Village	M
AMON KALESI ARON	Village Extension Officer	Olpopong' Village	M
ZAKAYO JOHN KOMBA	Village Extension Officer	Krash Village	M
BEATRICE CLEOPHACE BITEGELE	Village Extension Officer	Ilera Village	F
GOODLUCK JOHN MURO	Village Extension Officer	Dongo Village	M
RITHA EMELIAN GENDA	Village Extension Officer	Mdunku Village	F
ABDALAH IBRAHIM EKINGO	Village Extension Officer	Engusero-Engine Village	M
NDOOSA SAPUN MOLLEL	Village Extension Officer	Makame Village	M
LOMA LOURISHA LAIZER	Village Extension Officer	Mbigiri Village	M
MDOE S. MAINDE	Village Extension Officer	Namelock Village	M
AISHA RAMADHANI OMARY	Village Extension Officer	Enguserosidan Village	F
SAUMU	Village Extension Officer	Nchinila Village	F

ATHUMANI MSANGI			
EVA PANTALEO MOSHA	Village Extension Officer	Zambia Village	F
Kanankila Pallangyo	Project Officer	Farm Radio International	M
Mathew Paul	Radio broadcaster	ORS FM	M

Facilitators

Name	Organization	Title	Station	Gender
John M. Gathenya	CCAFS / University of Reading	Consultant	Nairobi	M
Juvenal Kisanga	World Food Programme	Programme Officer	DSM	M
Charles John Malekela	TMA	Meteorologist	DSM	M
Mecklina Merchades	TMA	Meteorologist	DSM	F
Charles Nsalang	TMA	Meteorologist	Arusha	M

Appendix 3: Separate probability tables for seasonal rainfall, start of season, and length of season

This information considers climate only but it is useful in selecting crops and varieties. Calculate probabilities using the historical Nov-April seasonal rainfall totals for Dodoma Met Station, the start of season graph, and length of season graph.

Mvua ya Msimu Seasonal Rainfall (mm)	Uwezekano wa kupata mvua zaidi ya mm zilizooneshwa Probability of receiving seasonal rainfall equal or more than given amount (x/n)	Uwezekano wa kupata mvua zaidi ya mm zilizooneshwa Probability of receiving seasonal rainfall equal or more than given amount (p/10)
300	68/79	9/10
400	71/79	9/10
500	49/79	6/10
600	28/79	4/10
700	16/79	2/10
800	7/79	1/10
900	3/79	0/10

Note: the numbers in the first column could refer to the amount of rainfall needed to produce a good crop. However if for any reason the rainfall received does not benefit the crop, e.g. it most of it runs off and does not infiltrate into the soil, the farmers could still complain of water shortage even when the rainfall seems adequate. The solution in such a case would be to improve soil organic matter so that infiltration can be enhanced. N is the number of years on the record represented by the dots (points) on the graph.

Kuanza kwa msimu Start of Season	Uwezekano wa msimu kuanza tarehe iliyooneshwa au kabla Probability of season starting on or before given date (x/n)	Uwezekano wa msimu kuanza tarehe iliyooneshwa au kabla Probability of season starting on or before given date (p/10)
1 December	24/78	3/10
17 December	58/78	7/10
1 January	70/78	9/10
16 January	76/78	10/10

Urefu wa msimu Length of Season	Uwezekano wa msimu kuwa na siku zilizooneshwa au zaidi Probability of length of season being equal or longer than given period (x/n)	Uwezekano wa msimu kuwa na siku zilizooneshwa au zaidi Probability of length of season being equal or longer than given period (p/10)

60 (2months)	77/78	10/10
90 (3 months)	72/78	9/10
100	66/78	8/10
120 (4 months)	51/78	7/10
130	38/78	5/10
150 (5 months)	14/78	2/10

Note: Participants were given blank tables (without the values in red) and asked to calculate the probabilities from the three graphs: seasonal rainfall totals, start of season, length of season. Then the answers were provided and feedback given.

Appendix 4: Crop water requirement and combined probability table

				Combined probability for given start dates			
Crop	Variety	DTM	CWR	01-Dec	15-Dec	01-Jan	15-Jan
Maize (Mahindi)	Stuka OPV,Staha OPV, TMV 1	75	300	0.30	0.40	0.50	0.30
Maize	SeedCo SC403, Kilima OPV, Kitale 505	90	360	0.30	0.50	0.50	0.50
Maize	Pioneer 3252, SeedCo SC513, Meru HB 513	100	400	0.30	0.40	0.50	0.10
Maize	Seedco SC 527	105	420	0.30	0.40	0.50	0.10
Maize	Local	120	480	0.30	0.40	0.10	0.00
Maize	DK 9089	120	480	0.30	0.40	0.10	0.00
Pearl millet	Okoa	120	400	0.30	0.50	0.20	0.00
Pearl Millet (Uwele)	Local	135	500	0.20	0.20	0.00	0.00
Sunflower	Record	90	360	0.30	0.50	0.50	0.50
Sunflower	Kenya Fedha	90	360	0.30	0.50	0.50	0.50
Sunflower (Alizeti)	Local	120	480	0.30	0.40	0.10	0.00
Sorghum (Mtama)	Macia	105	380	0.30	0.40	0.50	0.10
Sorghum	Hakika	115	410	0.30	0.50	0.20	0.00
Sorghum	Wahi	115	410	0.30	0.50	0.20	0.00
Sorghum	Pato	120	430	0.30	0.50	0.20	0.00
Green grams (Choroko)	Nuru	75	300	0.30	0.40	0.50	0.30
Green grams (Choroko)	Imara	75	300	0.30	0.40	0.50	0.30
Lab lab (Ngwara)	Lab lab	75	300	0.30	0.40	0.50	0.30
Beans (Maharagwe)	Soya	60	240	0.30	0.40	0.50	0.30
Beans	Uyole-Njano	60	240	0.30	0.40	0.50	0.30
Beans	Jesca	60	240	0.30	0.40	0.50	0.30
Beans	Local	75	300	0.30	0.40	0.50	0.30
Beans	Lyamungo 90	90	360	0.30	0.50	0.50	0.50
Pigeon Pea	Komboa	90	360	0.30	0.50	0.50	0.50
Pigeon Pea (Mbaazi)	Mali	120	420	0.30	0.50	0.20	0.00
Groundnuts (Karanga)	Local	75	300	0.30	0.40	0.50	0.30
Bambara nuts (Njugu Mawe)	Bambara Nuts	90	360	0.30	0.50	0.50	0.50

DTM: Days to Maturity; CWR: Crop Water Requirement

Appendix 5: Workshop evaluation questions

The participants answered the following questions on a scale of 1 (lowest) to 5 (highest).

1. I learned a lot from the PICSA course.
2. I now know more about the weather and climate in my location than I did before the course.
3. I am now able to understand the difference between climate change and climate variability.
4. I am now able to use information on the climate in my decision making for farming.
5. I am now able to train my fellow farmers so that they better understand climate and weather in their locations.

In addition, the following questions were asked:

- What was the best part of the workshop?
- What could be improved?
- How was the venue?
- Any other comments?

An analysis of the responses is given below.

Appendix 6: Workshop evaluation results

	learnt a lot from PICSA?	know more about weather?	CC?CV?	use CI in decision making?	Train others?
Question	Qn 1	Qn 2	Qn 3	Qn 4	Qn 5
	5	5	5	4	5
	5	4	4	5	4
	5	5	5	4	4
	5	5	5	5	5
	5	5	5	5	5
	5	4	5	5	4
	5	4	5	5	4
	5	5	5	5	5
	5	4	5	5	5
	4	5	5	5	5
	3	4	4	4	5
	5	4	3	4	5
	5	4	5	4	5
	5	5	5	5	5
	5	5	5	5	5
	5	5	5	4	5
	5	5	5	5	5
	5	5	5	4	4
	5	5	4	5	4
	5	4	5	5	5
	5	4	5	4	5
	5	4	4	4	5
	5	4	4	5	4
	4	4	5	5	5
	4	4	5	4	5
	5	4	5	4	5
	5	4	5	4	5
	5	4	5	5	4
	4	3	3	4	3
	4	4	4	5	4
	4	5	4	4	5
	4	4	4	5	4
Answers	5	4	5	4	5
AVERAGE	**4.7**	**4.4**	**4.6**	**4.5**	**4.6**

1. The period was quite short
2. The best part of the training were;
   a). Understanding climate information with respect to human activities; i.e. CC 7 CV, Seasonal calendar
   b). Practical session which include presentation after discussion
   c). Participatory budget was very important and interesting to farmers
   d). tour to Longido(Tingatinga village)
   e). Group work
   f). The methodologies used by the tutors t o train
   g). The use of graphs in calculating probabilities

3. The training was good, weather information should be issued timely
4. Teaching materials should base from where the trainee s are comng from
5. The trainig shold be done all over the contry and farmers must be visited regulary
6. We gained knowledge on cc & cv issues
7. The time allocated for fie d work was quite short(more field practical than lectures)
8. The training on weather & climate and its associated impacts on crop production
9. Proper seed selection basing on climatic condition
10. Environmental conservation
11. The best part to be improved i s the historical climate information, it should be presented in a simple swahili language for the farmers to understand e.g. graphs

12. Extension officers should visit weather station so as to see how they work out
13. Seasonal calendar and RAMs
14. More time should be allocated for training on probabilities concepts and weather & climate issues
15. Trainig provided enough knowlege , good perticipation and there were no segregation intems of contributions
16. More fund should allocated for training farmers and for tghe resources back in the village
17. The venue was ok(this was ok to evey one)
18. Teaching materials should available prior to the training perod
19. Good cooperation between trainees and the trainers
20. For the training purposes, resources like t-shirt should be available so that farmers can be conviced and well trained on climate change
21. In the future, trainee should be provided with videos showing various weather & climatic events e.g. floods, volcano erruptons etc, this can be a very good illustrations to farmers

References

Dorward P, Clarkson G, Stern R 2015. Participatory Integrated Climate Services for Agriculture (PICSA): Field Manual. Walker Institute, University of Reading. ISBN: 9780704915633.