PACC-RRC TRAINING PROGRAMME

CLIMATE CHANGE ADAPTATION AND DISASTER RISK REDUCTION IN AGRICULTURE

WMO Regional Training Center Italy

INTERNATIONAL TRAINING COURSE

CLIMATE CHANGE IMPACTS: ASSESSMENT AND COMMUNICATION

Report 2018

WORLD METEOROLOGICAL ORGANIZATION

Ibimet Istituto di Biometeorologia Consiglio Nazionale delle Ricerche

AGENZIA ITALIANA PER LA COOPERAZIONE ALLO SVILUPPO

PAC-RRC TRAINING PROGRAMME
CLIMATE CHANGE ADAPTATION AND
DISASTER RISK REDUCTION IN AGRICULTURE

Training Program on Climate Change Adaptation and Disaster Risk Reduction in Agriculture

International Training Course on

Climate Change impacts: assessment and communication

Course Report

28 May – 22 June 2018 (Distance Learning)

25 June – 06 July 2018(Classroom Learning)

20th August 2018

WORLD METEOROLOGICAL ORGANIZATION

Ibimet ISTITUTO DI BIOMETEOROLOGIA
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CILSS

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1. Background

The Training Program on Climate Change Adaptation and Disaster Risk Reduction in Agriculture (PACC/RRC), financed by the Italian Agency for Development Cooperation (AICS) is led by the World Meteorological Organization in collaboration with two WMO Regional Training Centers, the Institute of Biometeorology of the Italian National Research Council (CNR-IBIMET) and the AGRHYMET Regional Centre, which operate with technical and financial support of WMO.
The World Meteorological Organization, IBIMET–CNR and AGRHYMET Regional Centre have been collaborating since the '70s to support National HydroMeteorological Services in the transfer of technological innovations.
In 2015, WMO, IBIMET-CNR and AGRHYMET decided to propose a Regional Training Programme to support CILSS/ECOWAS countries on Climate Change Adaptation and Disaster Risk Reduction in Agriculture.
On 23rd October 2015, WMO proposed to the Italian Ministry of Foreign Affairs and International Cooperation, Directorate General for Development Co-operation, to fund a multi-lateral aid proposal addressing Climate Change Adaptation and Disaster Risk Reduction in Agriculture in West Africa.
On November 19th 2015, with the resolution n.165 the Italian Ministry of Foreign Affairs and International Cooperation, Directorate General for Development Co-operation, decided to make a contribution of 822.843,27 to support the Initiative.
On December 24th 2015, the Third-party cost-sharing agreement between the WMO and the MAECI-DGCS for the implementation of the project was signed.
WMO organised the kick-off meeting of the project on 10-12 April 2017 in Geneva at its headquarters.
The inaugural ceremony took place on Monday 10 April with the presence of the WMO Secretary-General, Prof. Petteri Taalas and his Excellency Ambassador Maurizio Serra, Permanent Representative of Italy to the UN. The two WMO Regional Training Centers partners for the project were represented by the Director of IBIMET-CNR, Dr Antonio Raschi, and Dr Moussa Waongo from AGRHYMET.
On 07 June 2017 a letter of Agreement was signed between WMO and IBIMET-CNR for the implementation of the project.
The Program consists of four high training courses, two organized by the Regional Centre AGRHYMET in Niamey (Niger) and two by IBIMET-CNR in Florence (Italy), and a final conference in Rome

The four training courses are:

- Climate services for disaster prevention (IBIMET-CNR, November 2017),
- Agrometeorological Services for agriculture and water use (AGRHYMET, February 2018),
- Climate Change impacts: assessment and communication (IBIMET-CNR, June 2018),
- Agrometeorological Services for rainfed crops (AGRHYMET, October 2018)

The international training course on "Climate Change impacts: assessment and communication" is the third event of the PACC/RRC project. The general goal of this training course is to strengthen the capacities of CILSS/ECOWAS Member Countries in developing effective methodologies for assessing and communicating the impacts of climate change on agriculture in West Africa.

Project	**Training Program on Climate Change Adaptation and Disaster Risk Reduction in Agriculture**
Partnership	WMO (World Meteorological Organization), IBIMET-CNR (Italy), AGRHYMET Regional Centre (CILSS/ECOWAS),
General objective	To reduce the impacts of Natural Disaster and Climate Change on agricultural sector in West Africa.
Specific objective	To improve the capacity of West African governments through their national technical services to support government actions in sustainable development and food security, in response to climate change, natural disasters and their associated risks.
Project's duration	20 months
Target Countries	Western Africa CILSS/ECOWAS states Members
Target groups	Experts of National Agriculture, Agro-Meteorological, Hydrological and Early Warning Services.
Project's typology	Capacity Building (Art. 18)
Budget	€ 822,843.27
UN Millennium Goals	Goal 1 : Eradicate extreme poverty and hunger Goal 7 : Ensure environmental sustainability

Table 1, General overview of the Training Program on Climate Change Adaptation and Disaster Risk Reduction in Agriculture (PACC/RRC)

2. Objectives and Expected Learning Outcomes

Weather and climate are some of the major risk factors impacting on farming performance and management. Extreme weather and climate events such as severe droughts, floods, or heat waves strongly affect crop production worldwide and particularly in the semi-arid tropics and sub-tropics. Climate change is expected to exacerbate the magnitude and frequency of such events with probable worsening of impacts on cropping systems. In western Africa, Climate Change is a major risk for rural population because it affects crop production and exacerbate food insecurity in an area where most livelihoods rely on small-farm agriculture and on annual rain fed crops for satisfying basic food needs. Crop production system, are, then, particularly fragile due to desertification, soil degradation, low soil fertility, high levels of crop and livestock diseases. Such a vulnerability to climate risks is worsened by population pressure and food insecurity and adds to poverty, that is definitely the greatest source of vulnerability to climate at all latitudes and time scales.

The general goal of this 3rd training course is to strengthen the capacities of CILSS/ECOWAS Member Countries in developing effective methodologies and tools for assessing and communicating impacts of climate change on agriculture in West Africa. The specific objective of the Course is to strengthen the capacity of national technical services on for a better assessment of climate change and its impacts on agriculture and water resources and the consolidation of a network among scientific and technical institutions of the participating Countries to work on shared methodologies and to create an objective and harmonized base of information. The aim is to transfer and share the know-how, to expand cooperation in sensitive areas to national and regional levels and to promote exchanges and collaboration through the application of common research products and operational tools.
The course was designed for technicians and experts of National Hydro-Meteorological Services and other technical Services involved in climate risk reduction and adaptation. The course has been realized in Florence, Italy.

The training course consisted of two parts:

- Distance learning module (mandatory) from 28th May to 22th June 2018;
- Workshop in Florence from 25th June to 06th July 2018.

The distance learning module has been carried out using the platform Moodle as a learning management system. Moreover, students and teachers of the course used the same platform to share educational material and fulfil training assessment procedures.

Through the course, participants were expected acquire theoretical and practical knowledge on current approaches to assess climate change impacts in West Africa, with emphasis on:

- General aspects of agro-climatic analysis using observed and projected climatic datasets
- Fundamentals of agro-climatic modelling for impact assessment
- Communication of climatic information

- Operational application of geostatistical analysis tools for agro-climatic risk analysis and assessment.

3. Training approach

The training approach adopted for this course was based on the 50-50 ratio between theoretical and practical sessions. Therefore, the course included other activities expanding theoretical knowledge and practical exercises and allowing the direct application of theoretical concepts through the analysis of case studies. Moreover, practical sessions have been designed to foster the active participation of the trainees to collaborative exercises, necessary for the realization of an interregional partnership among technicians and scientists.

Figure 1, sharing of knowledge between trainees

A blended solution of distance learning and classroom workshops was adopted for the course.
The Training was conducted in English. Tutoring in French was guaranteed for theoretical and practical sessions. Training material was available in both languages as far as possible.
Trainers were asked to provide in advance the training resources including presentation with summary and annotations translated as much as possible to allow bilingual

participation. Trainers were provided with guidelines for developing their training materials, and layout of presentations.
Training resources will be made available with open access after the core training events, as well as shared via the WMO Global Campus for other users.

3.1 Didactical approach

In order to build up and improve the networking of the technical services' community involved in the CCA and DRR to increase collaboration and strengthen the technical and scientific cooperation among the HydroMeteorological Services, the National Technical Services and other regional and international institutions, we asked participants from different countries to work in groups, clustered on the basis of homogeneous geographical area. This allowed a productive exchange of information among participants from neighboring Countries, and a collaborative effort in analyzing climatic risks which are trans-disciplinary and trans-boundaries.

Figure 2, a practical session in the lab

A learner-centered and a participatory training method was adopted. Indeed, learning occurred through active involvement of the trainees, stimulating their own questions and answers. Learning opportunities were thus created by sharing with trainees new information together with analytical methodologies to be discussed in the light of their own work experiences.

In this course, we focused the attention on the learners needs, in particular during some practical lessons and practical exercises aiming to learn by thinking, understanding and applying new concepts.
In particular:

- To learn by thinking, because trainees demand to have responsibility to work out their own conclusions.
- To learn by understanding, because trainees demand to relate the learning experience to their own knowledge and previous experiences.
- To learn by applying, because trainees demand to use and test a new skill achieved and receive feedback on their performance on practical case studies.

3.2 Training tools

The main training tool implemented for the course is the distance learning platform on Moodle.
On May 25th 2018 the GDPR - the General Data Protection Regulation (EU) 2016/679 - became enforce replacing the data protection directive (officially Directive 95/46/EC) from 1995. This required some technical interventions in order to make the Moodle Deployment compliant with the GDPR regulation. A specific plugin has been activated to apply GDPR to the existing users and to the new ones; a new privacy policy has been edited and published on the Moodle platform. The registering process was modified: the registration is now free, but the enrollment to PACC2018 (or future courses) requires a specific key depending on the role (trainee, trainer, non-editing teacher). The enrolment key was sent to the participants with the new instruction.[1]
In order to improve the usability of the Moodle platform, a new core theme (Boost) was used, to have a better navigation within and between courses, and more space on the screen for the content. Moreover, this new theme is built with Bootstrap, a free and open-source front-end framework (library) for designing websites and web applications, and it is easier to customise Moodle components. It allow to share own presets in the Moodle preset repository and it contains HTML- and CSS-based design templates for typography, forms, buttons, navigation and other interface components, as well as optional JavaScript extensions. The Boost theme allows a better harmonised experience with Moodle Mobile app, a "must" choice as we noticed that in the previous courses several participants were using the mobile phone to surf the Moodle course; after installing the Moodle Mobile app[2] users can easily access and navigate the course also via mobile. Another improvement was the possibility to export the lessons in PDF format allowing the participants to take the lessons offline.
Another change was to create a unique deployment for the whole course (DLC and Workshop) to better manage badges, grades and activity completion. The Moodle platform used by the RTC-IBIMET is powered by the Institute of Crystallography of CNR and is managed by Dr. Guido Righini.

The distance learning platform developed on Moodle was used for multiple purposes:

- pre-workshop activities in order to ensure a common background knowledge for all participants and basic skill in the handling of tools and software that will be used in the workshops.
- preliminary assessment of the specific skills of the students and preliminary distance training activities;
- sharing with students training materials and technical and scientific documentation on the topics and practical exercises covered during the workshop;
- sharing of course materials during and after the course, and make it available for staff members of target countries who cannot attend the course;

[1] link to the instructions for trainees and non editing teachers https://drive.google.com/open?id=1LyeR4TXl9dPtukq6um-VbKbd5LxMnjN4
[2] https://goo.gl/jQPrtT

- assessment of students and workshops using online questionnaires;
- sharing of multimedia material produced for the course;
- monitoring and evaluating trainees after the workshop.

Course resources have been translated as much as possible to allow bilingual participation. They have been published on the Moodle platform in order to make them available to trainees.

4. Distance learning

The overall goal of the distance learning is to give the participants tools and knowledge in order to facilitate the face to face course, and to ensure a common entry level of the participants to the face-to-face course.
The DLC was delivered through a dedicated page implemented on the RTC Moodle platform from 28 May to 22 June 2018.

Figure 3, the banner of DLC on the Moodle page

The course was divided into several consequential lectures activated following a specific time schedule.

1-2 INTRODUCTION TO CLIMATE DATA ANALYSIS WITH R (Part 1 and 2)
Trainer: Edmondo Di Giuseppe, CNR-IBIMET
Contents: R software installation and first steps of R language, RStudio IDE (integrated development environment) for R Lesson, Data import and Time Series analysis
Quiz: Quiz on Climate Data Analysis with R / Part 1 and 2

3 IRI/LDEO CLIMATE DATA LIBRARY
Trainer: Massimiliano Pasqui, CNR-IBIMET
Content: IRI/LDEO Climate data Library Tutorial
Exercise: IRI/LDEO EXERCISE Assignment demand to produce maps to be uploaded
Quiz: Quiz on IRI/LDEO Climate Data Library OLD

4 INTRODUCTION TO CLIMATE DATA ANALYSIS WITH R - PART 3
Trainer: Edmondo Di Giuseppe, CNR-IBIMET
Contents: Conditional statements, Loops and Function creation, Introduction to analysis of gridded datasets,
Quiz: Quiz on Climate Data Analysis with R / Part 3

5 INTRODUCTION TO CROPSYST SOFTWARE
Trainer: Roberto Ferrise, University of Florence
Contents: The Cropsyst model: a brief description, Cropsyst software download and install
Quiz: Cropsyst quiz

6 COMMUNICATING CLIMATE INFORMATION FOR AGRICULTURE
Trainer: Elena Rapisardi, CNR-IBIMET
Contents: How to organize information
Exercise: Illustrate your case of Climate Communication

7 FURTHER READINGS
WMO Climate Data and Monitoring (Publication):
Guidelines on Analysis of extremes in a changing climate in support of informed decisions for adaptation
Climate Change Detection and Indices:
Documentation by the joint CCl/Clivar/JCOMM Expert Team
Climate Information & Early Warning Systems Communications Toolkit:
UNDP Programme on Climate Information for Resilient Development in Africa. Includes: best practices, defining roles, required tools; comet resources on early warmings and communications; WMO common alerting protocol; WMO communications guidelines.

8 QUESTIONNAIRES
Questionnaire on programming skills: this questionnaire is proposed for a better organization of the face-to-face training course. Results will not be published.

In terms of participation, 25 students subscribed the DLC, and 10 obtained the badge for having completed the requested training lessons and exercises. However only 7 amongst them took the final questionnaire. Although several reminds to complete the DLC questionnaire, probably participants didn't well understand that there were two evaluation questionnaires (one each for the DLC and Workshop) to be taken.
Further investigations is needed to understand the reason of the scarce participation level. As happened in previous editions, from email exchanges, we know that some participants were not able to complete the DLC, because travelling to other Countries in order to get their Visa. Internet connection problems, highlighted by some of the respondents of the questionnaire (2 over 7), could represent a barrier to access the platform; one more issue

could be the need to have more time as the period chosen coincided with the rainy season, a very busy period for farmers and weather forecasters.

In fact, in order to overcome some the issues, the DLC was open for a period of time much longer than for past courses.

Fig. 3 shows the activity completion (Moodle data source), where the value represents the number of users that completed each set of lessons (a further participant completed the DLC offline).

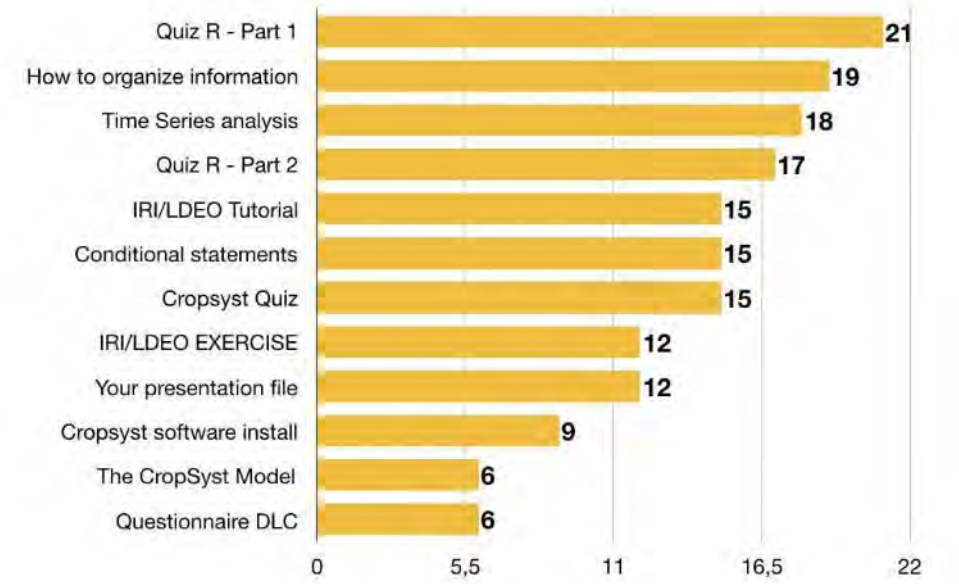

Figure 4, activity completion by lesson sections

5. Workshop in Florence

The workshop lasted 2 weeks, from 25th June to 06th July 2018. It was organized at the CNR Research Area of Sesto Fiorentino. The objective of the training course was to strengthen the capacities of National Technical Services for assessing and communicating the impacts of climate change on agriculture, through the application of research products and operational tools. The workshop was conceived as a 50-50 balance of theoretical and practical sessions.

The topics covered by the workshop include:

1. Climate Data and Projections
2. Agroclimatic Modelling for Impact Assessment
3. Communication of Climatic Information

4. Practical exercitation (afternoons)

Students and teachers of the course benefit from the use of the same Moodle platform through which educational material was shared and assessment procedures ensured.
Only 2 participants, out of the 27 registered, could not attend the course, which finally gathered 25 trainees from 16 different countries of West Africa. Nevertheless, some participants arrived after the beginning of the course because of changes in flights schedules and because of delays in the issuing of entry visa.

Last name	**First name**	**Organization**
DAKO	ADJAKOBINON PIERRE	METEO BENIN, Benin
SAWAGODO	WENDYAM LAZARE	DMN, Burkina Faso
DANGO	ALFRED	DMN, Burkina Faso
MENDES MARTINS GOMES MORENO	MARIA ALEXANDRINA	INMG, Cabo Verde
PEREIRA DA VEIRA	ANTONINO CARLO	INMG, Cabo Verde
GAYA	DJERGO	DGMN, Tchad
KINDIA	BONI NARCISSE	DMN, Côte d'Ivoire
N'ZUE	KOUAKOU AUGUSTIN	DMN, Côte d'Ivoire
GIBBA	PETER	DWR, Gambia
MINKAH	OBED AMANKWAH	GMET, Ghana
BAH	ALHASSANE	DNM, Guinea
MENDES	ORLANDO	INM, Guinea Bissau
TAYLOR	SPENCER S.	LMS, Liberia
KOLLIE	JAMES	LMS, Liberia
SAO	AISSATA	ANM, Mali
TRAORE	ISSA	ANM, Mali
AHMED	SID ELEMINE	ONM, Mauritania
COULIBALY	HAMIDOU	ONM, Mauritania
GARBA	ABDULRAHMAN ABDULKAREEM	NMA, Nigeria
AKEH	UNIMKE CHRISTIAN	NMA, Nigeria
KONTE	OUMAR	ANACIM, Sénégal
MUSA	PATRICK	MA, Sierra Leone
KAMARA	IBRAHIM SINNEH	MA, Sierra Leone
KPABEBA	LAOUKOSSIMA	DMN, Togo
N'KOYI	M'POH	DMN, Togo

Table 1, list of participants

Figure 5, participants and trainers

The following is the list of the trainers and their affiliation:

1. Maurizio Bacci, CNR IBIMET, Italy
2. Marina Baldi, WMO-RTC Italy
3. Christian Baron, CIRAD, France
4. Lazreg Benaichata, Université IBN Khaldoun, Algerie
5. Luca Brocca, CNR IRPI, Italy
6. Marta Bruno Soares, University of Leeds, UK
7. Claudio Cassardo, University of Turin, Italy
8. Giorgia Ceccarelli, OXFAM, Italy
9. Tanja Cegnar, Slovenian Environment Agency, Italy
10. Ylenia Curci, Université de Strasbourg, France
11. Luc Descroix, IRD Marseille, France
12. Edmondo Di Giuseppe, CNR IBIMET, Italy
13. Roberto Ferrise, UNI DISPAA, Italy
14. Marco Gaetani, Latmos-IPSL, Sorbonne Universités, France
15. Ramona Magno, CNR IBIMET, Italy
16. Emmanuel Oladipo, University of Lagos Nigeria
17. Patrick Parrish, WMO, CH
18. Massimiliano Pasqui, CNR IBIMET, Italy
19. Elena Rapisardi, CNR IBIMET, Italy
20. Benjamin Sultan, Latmos Univ Curie Paris, France

21. Vieri Tarchiani, CNR IBIMET, Italy
22. Jost Von Hardenberg, CNR ISAC, Italy
23. Moussa Waongo, AGRHYMET, Niger
24. Federica Zabini, CNR IBIMET, Italy
25.

The course implementation was ensured by the support of CNR staff, particularly:

- Francesca Caporossi: logistics
- Francesco Giannetti: shooting and editing
- Monica Giannini: administration
- Elvira Giannozzi: HR
- Monica Liburdi: administration
- Valentina Marchi: tutoring and assistance of participants and trainers
- Francesca Martelli: administration
- Luciano Massetti: photography
- Fabio Migliacci: technical management of infrastructures
- Antonella Parigi: logistics
- Guido Righini: management of the Moodle platform
- Francesco Sabatini: technical management of infrastructures
- Gian Mario Scanu: interviews

Participants have been hosted in the same hotel of the past course and a shuttle bus was organised to bring them from the hotel to the training center and back. Lunches during the training days were offered at the CNR cafeteria. A Social dinner was organised on Wednesday July 4 at the restaurant “Il Vecciolino” on the Monte Morello mountain.

A visit to the Chianti Observatory (http://www.osservatoriochianti.it/) was organized on Saturday 30 June where participants could see some agrometeorological instruments as well as an operational precision agriculture system for operational monitoring agrometeorological conditions in vineyard farms. After the visit a lunch was offered to participants.

Figure 6, visit at the Chianti Observatory

5.1 Lectures and practical sessions program

The program has been developed in 10 lectures and 8 hands-on sessions:

Day 1
Lectures | Morning
Introduction to the course and report of the previous ones - Vieri Tarchiani CNR IBIMET
Introduction to Agro-climatology - Maurizio Bacci, CNR IBIMET
Risk communication in a climate change context – Marina Baldi, WMO-RTC Italy
Hands-on / Afternoon
Introduction to Climate Data Analysis with R
Importing data in R

Day 2
Lectures | Morning
Climatic Datasets and projections: availability, differences and limitations for agro-climatic analysis - Claudio Cassardo, University of Turin
GCM Spatio/temporal resolution, suitability for analysis and downscaling techniques – Jost Von Hardenberg, CNR ISAC
Hands-on / Afternoon
Data analysis with R - student case studies
Data download from IRI with R

Day 3
Lectures | Morning
Integration of observed climate trends with climate projections for the assessment of climate change in the short term - Marco Gaetani, Sorbonne Universités
Vegetation monitoring tools and methods- Ramona Magno, CNR IBIMET
Agrometeorological Monitoring for Food Security Early Warning in West Africa – Moussa Waongo, AGRHYMET Regional Center

Hands-on / Afternoon
Data formatting with R – Students case studies
Climate Projections for crop Simulation Model with R

Day 4
Lectures | Morning
Crop modeling. Basic concepts - Roberto Ferrise, UNI DISPAA
Climate changes and agriculture: examples in West Africa - Benjamin Sultan, Latmos Univ Curie Paris

Hands-on / Afternoon
Check of the crop simulation model installation
Practice with the crop simulation model

Day 5
Lectures | Morning
Assessment of economic impacts of climate change - Ylenia Curci, Université de Strasbourg
Assessment of economic impacts of climate change, Practical case studies - Giorgia Ceccarelli OXFAM
Hands-on / Afternoon
Yield simulation present conditions

Day 6
Lectures | Morning
Soil moisture monitoring through in situ and satellite observations for crop modelling - Luca Brocca, CNR IRPI
Sahelian lands evolution and climate change - Luc Descroix, IRD Marseille
Hands-on / Afternoon
Future yield simulation

Day 7
Lectures | Morning
Mainstreaming Climate Change into Country Strategy Papers - Emmanuel Oladipo, University of Lagos
Agroclimatic modeling in West Africa - (SARRA-O) - Christian Baron, CIRAD
Hands-on / Afternoon
Synthesis of the results and analysis

Day 8
Lectures | Morning
The complexity of Climate Change Communication. Short seminar (30 min) on the importance of communication of climate information to general public/stakeholders/policy makers, Session during which participants share their experiences (Experiences Storytelling: Tell your communication story) - Tanja Cegnar, Slovenian Environment Agency
Key principles for effective communication on climate change - Marta Bruno Soares, University of Leeds
Precision Information: a word in not enough - Elena Rapisardi, CNR IBIMET

Hands-on / Afternoon
Communicating climate projections and crop yield scenarios to stakeholders: institutions, media, public

Day 9
Lectures | Morning
Climate services: what, why and how? - Marta Bruno Soares, University of Leeds

Climate Communication: "Whodunit"? Opportunities and critical issues in communicating climate issues. Open discussion with experts (Experts Panel) - Tanja Cegnar, Slovenian Environment Agency - Marta Bruno, University of Leeds - Patrick Parrish, WMO
- Massimiliano Pasqui, CNR IBIMET

Hands-on / Afternoon

Practical session on communication. Exercise: Prepare 3 communication message

Day 10

Lectures | Morning

How to communicate Risk in Agriculture:
Participants - Case studies presentation
Training Course Evaluation and Final Test
Distribution of Attendance Certificates - Closing Remarks
Final remarks and conclusion

5.2 Practical Sessions

The goal of the practical sessions was to analyze climate change impacts on crop production and to communicate the results to different stakeholders.

5.2.1 Agroclimatic simulations

Trainees were invited to use their own dataset to produce a simulation on the crops and zone of interest using CropSyst. We combined R and CropSyst in order to produce simulation on different location and different crops. Thus, the secondary goal of the training session was to give a basic knowledge of the open source R programming language and CropSyst tool for crop simulation analysis.

In general, the main objective was to stimulate the trainees to broaden their programming knowledge and to develop the capability to perform a complete analysis of data, from the raw data to the final estimated yield map using customized data.

Figure 7, a practical session in the lab

Trainees had the possibility to download the pdf of the whole lessons as well as the R scripts and the rainfall and temperature dataset using the Moodle platform. Furthermore, they were noticed to download the pdf of the daily lesson and those script useful for the development of the daily lesson before the starting of the face-to-face training session.

Before the training, most of the trainees (79%) had the capability of manipulating dataset with tools other than spreadsheets (e.g. Excel). Few of them declared to be able to use advanced programming language such as Fortran and Matlab. Their knowledge of crop simulation models was inhomogeneous, and only some of them regularly use the CropSyst to perform simulations.

However, several of them were interested in learning a data manipulating software such as R and crop simulation models. 30% of them was able to learn advanced commands and to improve their knowledge during the face-to-face sessions. In general, programming languages were quite challenging and the willing to learn strongly depends on the trainees' job duty.

Concerning CropSyst the most of participants were able, after the training, to use the software and produce some basic simulations. The training improved their abilities and skills in producing crop simulation and they improved their knowledge of the overall process in performing simulations using current and future climate scenarios. The comparison of the different results coming from the simulation allows a more advanced expert interpretation of how the future evolution of the climate could impact in agriculture production in their own countries. With this in mind, the last step of the practical session was to build a message for a key stakeholder using the results of the analysis.
The trainees have learned the basic of a complex crops simulation analysis. Their efforts to replicate the proposed analysis with their own data were appreciable. It was noticed an ability to customize their result with their own knowledge about agricultural production system and the implication of climate alterations in their countries.

5.2.2 Agroclimatic Communication

In this edition, a session focused on Communication with lectures, discussions, practical exercise, and participants' presentation was proposed. The main idea was to involve participants into a "two-ways" training session so to increase sharing and exchange amongst participants and trainers.

The pillars of the communication session were:

- A discussion panel of experts, brilliantly conducted and managed by Tanja Cegnar, highlighted experiences and perspectives on climate communication overcoming the "constraint" and the pace a lecture requires, and allowing the participants to be involved in the discussion.
- "Your communication experience storytelling": one of the activities of the DLC was to create a presentation on a communication experience that the participants could use to prepare a 10 minutes presentation during the communication session. This

presentation should allow the participants and the trainers to have an overview on experiences and communication practices carried out by the institution of the countries involved.

The hands-on afternoon was focused on creating a communication message on Climate Change impacts on crop yields from agroclimatic simulations addressed to different stakeholders. This exercise required the collaboration between communication and climate experts and the setting up of the exercise highlighted one key point of any communication activity: communication is a team work.

Description of the exercise:

- The data: the results from crop yield simulation (Cropsyst) for one imaginary location present yield statistics (1987-2016) for 2 crops and future climate projections rcp 45 and 85 (2021-50) (Data extracted with R on CHIRPS and Cordex future projections datasets).
- every group had to create a message for one user group of non-expert (Media Representatives, Decision Makers, Citizens)
- the group had to make an handmade poster (not a digital one) illustrating: the Key Message, the message note describing in plain language the scenario addressed to non-experts users, the users information needs, the communication goals, how to deliver the message, and how to measure efficacy of the communication.
- the final poster was presented by a rapporteur for each working group the last day of the conference.

Despite an initial warming up phase, dedicated to illustrate and explain how to interpret the datasets and the meaning of some communication concepts (key message, message note, user needs), that could have foretold some difficulties in meeting the goal of the exercise, the majority of the posters got to the point and highlighted a good level of comprehension both of the importance of a structured communication process and of the critical points to raise awareness (and understanding) when communicating long term climate projections.

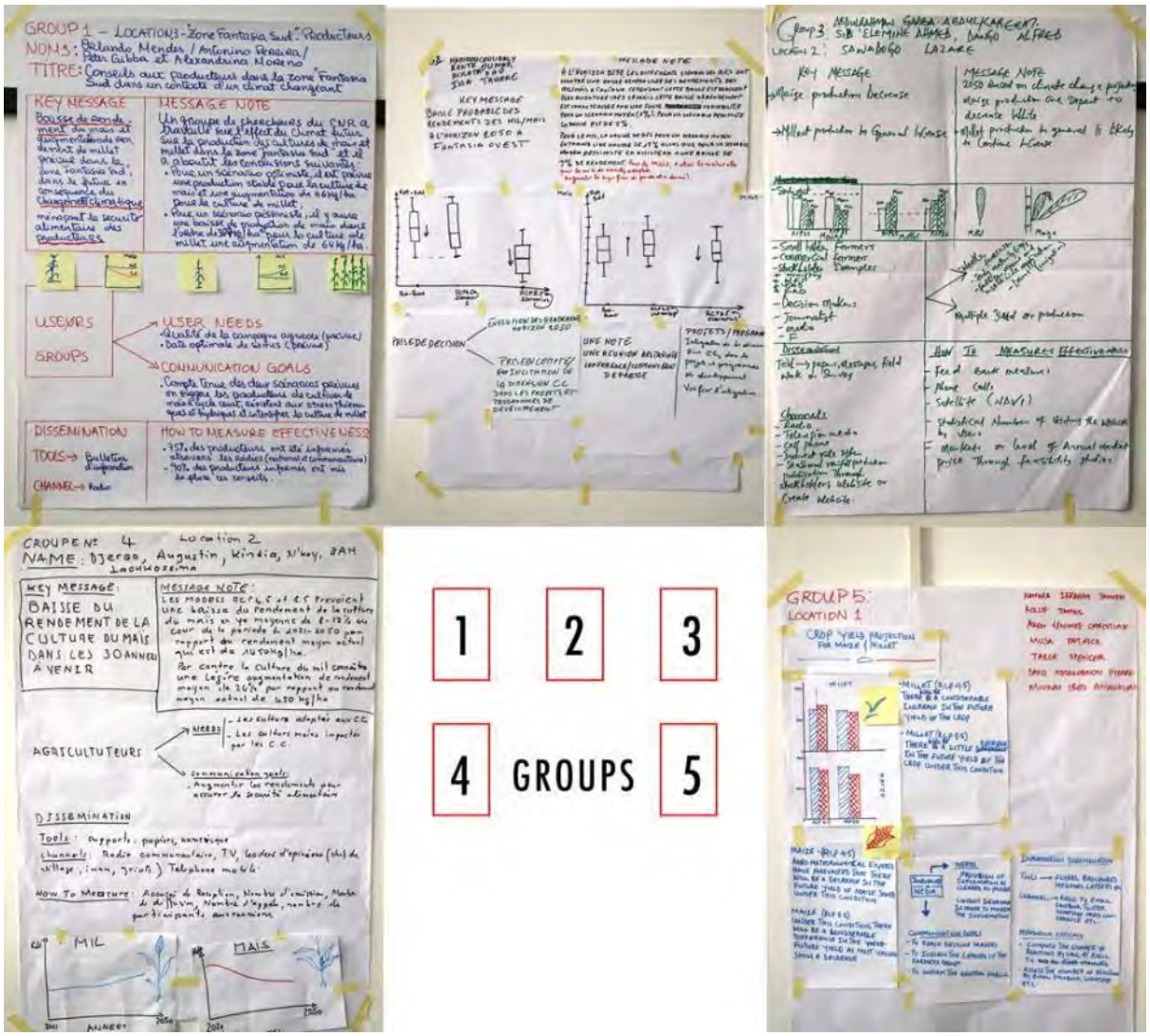

Figure 8, communication posters produced by the working groups

5.3 Workshop evaluation

As a final task to complete the course the participants were asked i) to respond to the evaluation questionnaire on the Moodle platform and ii) to pass the competency test. As a result of the questionnaire, participants evaluated positively the overall event and the programme. The results of the questionnaire are presented in annex 2.

The analysis of the answers to the questionnaire show that the initiative was evaluated positively although the period was not favorable as it overlapped with the rainy season when the national Met Services are very busy. Training is perceived as a valuable resource to improve meteorological and climate services tailored for farmers. The participants expressed the desire to strengthen their skills and competencies and overall we could say they appreciated to be part of a learning community where web technologies could be used to set up a permanent learning programme. Main limits participants pointed out are the

language gap and the time available to practice with software. Concerning the first, even if the majority of participants, when applying, didn't declare language difficulties (70%), the language issue is highlighted in some comments and suggestions that confirm language gap is still an issue. We were able to add French annotations only to some lectures, as trainers didn't provide materials sufficiently in advance before the course start. Presentations have been done in English, even if many trainers (francophone trainers) translated part of their lecture in French on the fly. To overcome language difficulties, during the practical sessions, the presence of a French speaking tutor was always ensured.

Figure 9, participants during a lecture

6. Follow-on

Follow-on activities proposed for trainees are interlinked with the networking component of the project. All participants have been asked to share the knowledge gained during the course within their home institutions. They have been encouraged to organize local courses, short seminars or mentoring activities with colleagues. Participants have been asked to report to the project team and other participants the follow-on activities they will carry out.

As a post-course activity, trainees have been asked to prepare a typical conference poster, describing an application of the acquired knowledge to a case study relative to their own country. Posters will be evaluated, and accepted posters will be exposed at the final conference in Rome.

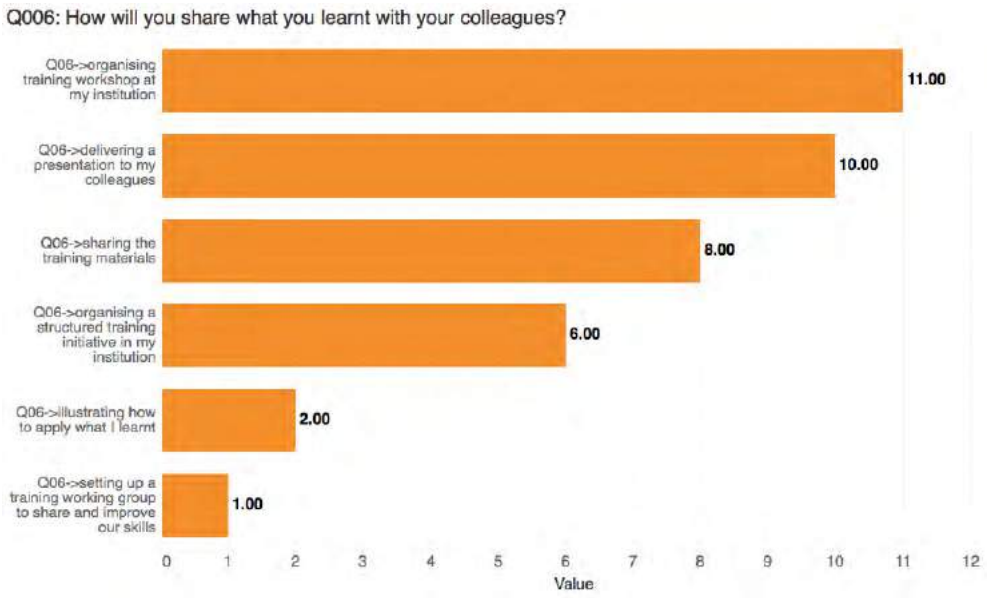

Figure 10, statement of participants on how to share knowledge in their own institutions

7. **Monitoring and evaluation**

A monitoring and evaluation system has been developed and put in place in order to assess the efficacy of the learning process.
Participants have been awarded with badges for incremental competency development during the DLC and the presencial course and certificates for completion of the presencial course.
Distance learning: tests and quizzes have been used to evaluate participants' competencies. A badge has been awarded to participants completing the DLC.
Workshop in Florence: a final test has been proposed to participants' for the evaluation of their competencies. The final test is an 'Interactive with multiple tries" test, so the participants had three tries to get the right question, but this option has a penalty for each incorrect try. The penalty is a proportion of the total grade. Each question values three marks and the penalty for each incorrect try was 1/3. Example: the right answer on the first try is 3 scores, 2 on the second try, and 1 on the third try.
The questions are "single choice" or true/false. The minimum grade needed to pass was 45, 90 the maximum number of points. The participants scored the average value of 55.71 grades, from a minimum of 45 to a maximum of 90.
A badge has been awarded to 20 over 25 trainees attending the workshop.

Post-course activities: a badge will be assigned to participants who, at a fixed deadline, will submit the poster and document the sharing activities carried on at their home Institutions:

- Preparation of a poster (typical conference poster) consists of presenting an application of acquired knowledge on a case study relative to their own country/area. Posters, uploaded by participants on the platform, will be evaluated and a grade assigned. Posters will be presented at the final conference.
- Sharing the course content in the participant's local institution. This will be evaluated based on evidence documented in multiple formats (videos, photos, presentations) to be uploaded on the platform.

Badges are cumulative. An award will be granted to the participant that got the three badges (DLC, workshop and post-workshop) and best performed in terms of grades in each PACC-RRC training course. The four best performing participants, one for each course, will be invited to the final conference in Rome, to give a speech about their poster and the training experience.

Figure 11, delivery of certificates

7. Building Competences

The RTC Courses are an opportunity to design and produce high quality training material. Until now this material has been organised in courses structures following the RTC agenda. This training material could be the building block of a new instructional content strategy aimed at increasing the dissemination and usage of this material.

The main idea is to switch from courses enrolment and completion to a sort of "Competency-based education (CBE), also known as Competency-based learning or Skills-based learning", that refers to systems of assessment and grading where students demonstrate competencies completing a course. In this perspective, the training content materials produced and collected during the PACC project can be reorganized in a new structure creating stand-alone courses on Moodle Platform: ex. R lessons in the DLC and the R hand-on session exercises can be redesigned to create an R basic course, an R advanced course and a course on the use of R for Seasonal Forecast and so on.

A course such as the PACC2018 DLC, could be transformed in a package of knowledge/skills that can be acquired through courses, as each course allows to achieve a specific skill/knowledge. In this way each user, course by course, will achieve a set of skills/knowledge, and the progress in his/her "trainee career" will be clearly shown in his profile. When attending a new training initiative (a package) the user will be able to "use" the skills/knowledge previously gained. For example, the DLC PACC2018 included some lessons on R Software, in the future DLC the user will not be obliged to retake the lesson on R if he/she can prove that acquired the skills/knowledge required.

8. Conclusions and recommendations

The surveys, distributed via the Moodle allowed to collect participants' opinions and impressions on the two phases of the course, DLC and face-to-face. The surveys' questions were designed in order to get information on the efficacy of the course, on the tools used and the subject matters, as well as on the duration and structure of the course. The purpose of the survey was also to get suggestions for future courses and distance learning.
Generally speaking, the overall feedback was positive for both courses. The whole initiative is perceived as an important step to improve knowledge and skills so to be more effective in supporting farmers and reduce the impacts of risks.

Nevertheless, once more, the DLC showed a decreasing interest by participants, in part due to objective limitations in time and internet connection, but partially due also to a lack of awareness about the importance of the DLC and consequently of commitment to complete the course.
The success of online training programme depends on the possibility the trainees have to access to the online learning environment. In RTC experience, lack of access is an issue that arises particularly when delivering the Distance Learning. The lack of fast and stable internet connection is an issue to be taken into account, as it could be one of the reason why the DLC was not completed by the majority of the participants. Limited access to the platform can prevent a wider use of further online training initiatives. To overcome this issue, in this edition the lessons where downloadable as pdf, but better solution could be investigated to propose off-line lessons and limiting the online duties for verification exercises. Probably,

for future training initiatives, the DLC should be considered a separate course, and the selection of participants to the workshop done considering only participants having completed the DLC with good scores.
Another issue that would require further analysis is the assessment of computer and web literacy of the participants to have useful insights to make a fine tuning of tutorials and other instructions guides.

Other recommendation for the DLC are the need to have more time, to practice more and to have video tutorials support for R lessons.

The workshop in Florence was very successful. All the participants rated the knowledge acquired an important asset to contribute more effectively to the activities of their institutions and relevant for their job. This is probably due the fact that all participants were well motivated to participate, as we had the opportunity to verify this aspect well before the start of the course, reading the emails we received.

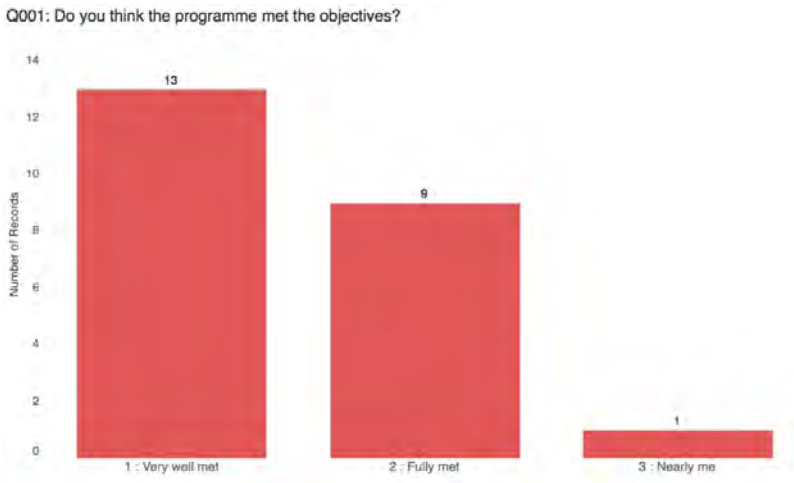

Figure 12, participants' evaluation of the course

A crucial point, highlighted by the practical exercises was the inhomogeneous entry level of the participants. The evaluation questionnaire investigated two dimensions of the background level: the language and the specific competence.
About the language, some participants declared to have some difficulties with English. While, the majority of the participants affirm that the educational background level well suits the level of the training course.
The “more practice” issue is recurring across participants’ comments; although it is an issue for a minority, it could be useful to understand if the motivation could be rooted in the need to have more time and more support to practice and experience what they learnt, particularly the R software tool. Considering the answers given throughout the questionnaire, we could say that the “more practical” request could be interpreted as a request of more “applied knowledge”. In this perspective for future workshops, we could revise the format, inversing the paradigma that exercitations follow the theoretical lessons. We could develop the training programme on the basis of the path of practical sessions, integrating them with just few lectures or seminars.

The course was perceived as helpful and truly valuable: 100% of the participants affirm that the knowledge acquired is relevant to contribute more effectively to the activities in their own Institutions, underlining the importance and the benefit they received from the hands-

on session and the practical application of these two tools. We are comforted to continue in this process of knowledge transfer using some tailored case studies on real data from the participants. This could represent a real advantage for the trainees, which could apply what they learn in the course during their daily activity.
To achieve more effective results in the future, we intend to put more attention on the preparation of the participants to the course and especially in retrieving agronomic data from the field at home to be used for case studies. This could benefit the whole performance of the crop simulations giving more accurate results close to reality instead of using generic parameters for generic crops varieties.

The majority of the respondents evaluate the training materials both for theoretical and practical lectures to be exhaustive.

Interaction with the participants is not only a need but also a driver to foster the setting up of a proactive community of practice. In some cases the Moodle platform could be perceived rigid when compared with more dynamical tools such as social media, on the other hand social media require a constant attention to keep the interaction alive and constructive. However, some mixed solution could be implemented, taking into account the social media practices of the participants.

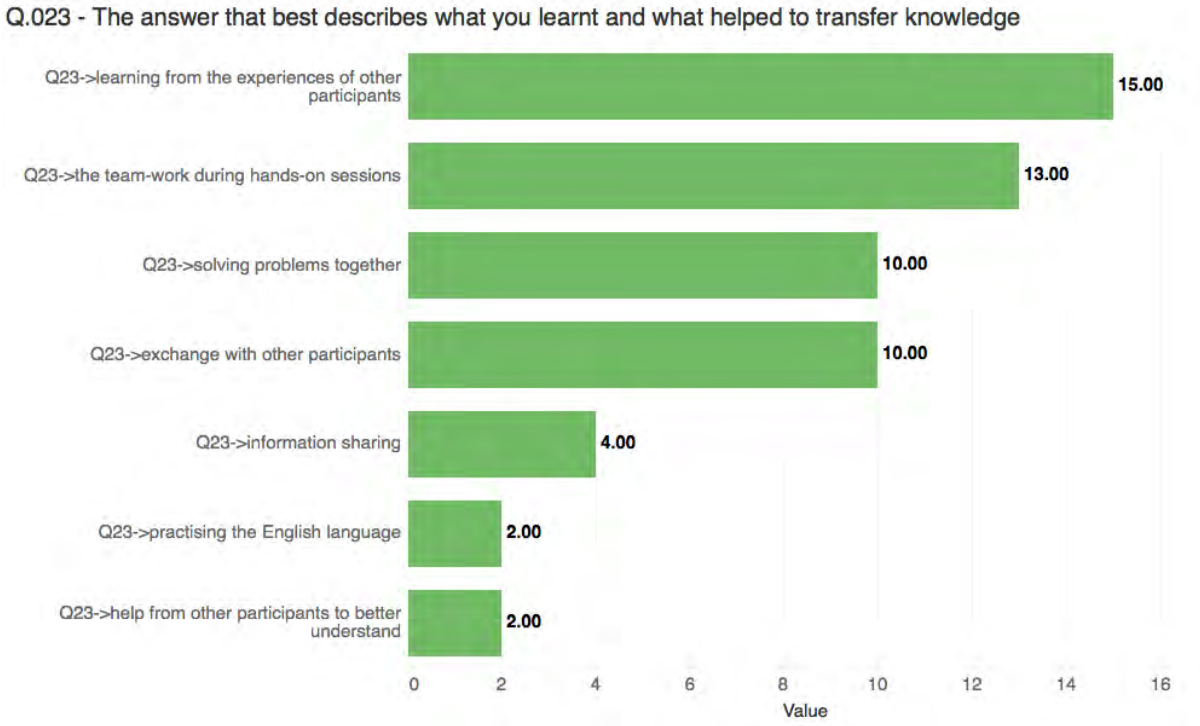

Figure 13, perceived added value of networking

As pointed out in the previous paragraphs the software training and the language gap are the main critical issues highlighted by the participants. In this perspective we should rethink the instructional design of the distance learning and of the face-to-face course offering

more tutorials in English and French, more video lessons and more best practices and exercises.
Probably the idea to define custom training paths, aimed at acquiring some skills both through e-learning tools and face-to-face courses, could overcome some weak points, and ensure to have all participants at the (almost) same entry level at the beginning of the face-to-face course.
Finally, a well structured e-learning platform could allow a better management and use of the training resources and materials produced during the different initiatives, improving the dissemination and usage of this material in the framework of a new training content strategy.

ANNEXES

Annexe 1, Training course programme

Annexe 2, Results of the training evaluation

PAC-RRC TRAINING PROGRAMME
CLIMATE CHANGE ADAPTATION AND
DISASTER RISK REDUCTION IN AGRICULTURE

International Training Course on

Climate Change impacts: assessment and communication

Course Program

25th June – 6th July 2018 (Classroom Learning)

Area di Ricerca CNR,
via Madonna del Piano, 10
50019 - Sesto Fiorentino (Florence) - ITALY

WORLD METEOROLOGICAL ORGANIZATION

Ibimet ISTITUTO DI BIOMETEOROLOGIA
Consiglio Nazionale delle Ricerche

CILSS

AGENZIA ITALIANA PER LA COOPERAZIONE ALLO SVILUPPO

Day 1: Monday 25th June 2018

09:00	**Participants registration**
09:30	**Opening Session** Marina Baldi, IBIMET WMO-RTC Antonio Raschi, IBIMET-CNR AICS TBC Col Silvio Cau, Italian WMO-PR
10:30	Vieri Tarchiani / Agrhymet – PACC-RTC Courses **Introduction to the course and report of the previous ones**
11:00	**Coffee Break**
11:30	Maurizio Bacci **Introduction to Agro-climatology** Marina Baldi **Risk communication in a climate change context**
13:30	**Lunch**
14:30	Edmondo Di Giuseppe / Maurizio Bacci / Massimiliano Pasqui **Introduction to Climate Data Analysis with R** (Practical Session)
16:00	**Coffee Break**
16:30	Edmondo Di Giuseppe / Maurizio Bacci / Massimiliano Pasqui **Importing data in R** (Practical Session)

Day 2: Tuesday 26th June 2018

09:00	Claudio Cassardo **Climatic Datasets and projections: availability, differences and limitations for agro-climatic analysis**
11:00	**Coffee Break**
11:30	Jost Von Hardenberg **GCM Spatio/temporal resolution, suitability for analysis and downscaling techniques**
13:30	**Lunch**
14:30	Edmondo Di Giuseppe / Maurizio Bacci / Massimiliano Pasqui **Data analysis with R - student case studies** (Practical Session)
16:00	**Coffee Break**
16:30	Edmondo Di Giuseppe / Maurizio Bacci / Massimiliano Pasqui **Data download from IRI with R** (Practical Session)

Day 3: Wednesday 27th June 2018

09:00	Marco Gaetani **Integration of observed climate trends with climate projections for the assessment of climate change in the short term**
11:00	**Coffee Break**
11:30	Ramona Magno **Vegetation monitoring tools and methods** Moussa Waongo (AGRHYMET Regional Center) **Agrometeorological Monitoring for Food Security Early Warning in West Africa**
13:30	**Lunch**
14:30	Edmondo Di Giuseppe / Maurizio Bacci / Massimiliano Pasqui **Data formatting with R – Students case studies (Practical Session)**
16:00	**Coffee Break**
16:30	Edmondo Di Giuseppe / Maurizio Bacci / Massimiliano Pasqui **Climate Projections for crop Simulation Model with R (Practical Session)**

Day 4: Thursday 28th June 2018

09:00	Marco Bindi / Roberto Ferrise **Crop modeling – Basic concepts**
11:00	**Coffee Break**
11:30	Benjamin Sultan **Climate changes and agriculture: examples in West Africa**
13:30	**Lunch**
14:30	Roberto Ferrise / Maurizio Bacci **Check of the crop simulation model installation**
16:00	**Coffee Break**
16:30	Roberto Ferrise / Maurizio Bacci **Practice with the crop simulation model (Practical Session)**

Day 5: Friday 29th June 2018

09:00	Ylenia Curci **Assessment of economic impacts of climate change**
11:00	**Coffee Break**
11:30	Giorgia Ceccarelli **Assessment of economic impacts of climate change- Practical case studies**
13:30	**Lunch**
14:30	Roberto Ferrise / Maurizio Bacci **Yield simulation present conditions (groups 2-3 p.)**
16:00	**Coffee Break**
16:30	Roberto Ferrise / Maurizio Bacci **Yield simulation present conditions (groups 2-3 p.)**

Saturday 30 June 2018
09.30 Departure from the Hotel for the visit to the Chianti Observatory (see the social events programme).

Day 6: Monday 2nd July 2018

09:00	Luca Brocca **Soil moisture monitoring through in situ and satellite observations for crop modelling**
11:00	**Coffee Break**
11:30	Luc Descroix **Sahelian lands evolution and climate change**
13:30	**Lunch**
14:30	Roberto Ferrise / Maurizio Bacci **Future yield simulation (groups 2-3 p.)** - (Practical Session)
16:00	**Coffee Break**
16:30	Roberto Ferrise / Maurizio Bacci **Future yield simulation (groups 2-3 p.)** - (Practical Session)

Day 7: Tuesday 3rd July 2018

09:00	Emmanuel Oladipo **Mainstreaming Climate Change into Country Strategy Papers**
11:00	**Coffee Break**
11:30	Christian Baron **Agroclimatic modeling in West Africa - (SARRA-O)**
13:30	**Lunch**
14:30	Roberto Ferrise / Maurizio Bacci **Synthesis of the results and analysis** (groups 2-3p.) (Practical Session)
16:00	**Coffee Break**
16:30	Roberto Ferrise / Maurizio Bacci **Synthesis of the results and analysis** (groups 2-3 p.) (Practical Session)

Day 8: Wednesday 4th July 2018

09:00	Tanja Cegnar **The complexity of Climate Change Communication** Short seminar (30 min) on the importance of communication of climate information to general public/stakeholders/policy makers, *Session during which participants share their experiences (Experiences Storytelling: Tell your communication story)*
11:00	**Coffee Break**
11:30	Marta Bruno **Key principles for effective communication on climate change** Elena Rapisardi **Precision Information: a word in not enough**
13:30	**Lunch**
14:30	Tanja Cegnar **Communicating climate projections and crop yield scenarios to stakeholders: institutions, media, public** - (Practical Session)
16:00	**Coffee Break**
16:30	Tanja Cegnar **Communicating climate projections and crop yield scenarios to stakeholders: institutions, media, public** (Practical Session)

19.30 Social Dinner, Ristorante Il Vecciolino (see the social events programme)

Day 9: Thursday 5th July 2018

09:00	Marta Bruno **Climate services: what, why and how?**
11:00	**Coffee Break**
11:30	**Climate Communication: "Whodunit"?** ***Opportunities and critical issues in communicating climate issues.*** ***Open discussion with experts*** Experts Panel - Tanja Cegnar Slovenian Environment Agency - moderator - Marta Bruno, University of Leeds - Patrick Parrish - WMO - Marco Cattaneo, Le Scienze and National Geographic Italia, Editor-in-chief - Massimiliano Pasqui, CNR-Ibimet
13:30	**Lunch**

14:30	Federica Zabini - Elena Rapisardi **Practical session on communication** Exercise: Prepare 3 communication message (Technical services, Decision makers, large public)
16:00	**Coffee Break**
16:30	Federica Zabini - Elena Rapisardi **Practical session on communication** Exercise: Prepare 3 communication message (Technical services, Decision makers, large public)

Day 10: Friday 6th July 2018

09:00	**How to communicate Risk in Agriculture:** ***Participants - Case studies presentation***
11:00	**Coffee Break**
11:30	**Training Course Evaluation and Final Test** **Distribution of Attendance Certificates - Closing Remarks** **Final remarks and conclusion**
13:30	**Lunch**

ANNEX 2

CLIMATE CHANGE IMPACTS: ASSESSMENT AND COMMUNICATION

Course Evaluation

INDEX

FOREWORD

This report illustrates the results of two surveys distributed to the participants of the Distance Learning Course (DLC) and the International Training Course (RTC) on **Climate Change Impacts: Assessment and Communication** in the framework of PACC-RRC project (CLIMATE CHANGE ADAPTATION AND DISASTER RISK REDUCTION IN AGRICULTURE)

The surveys was distributed via the Moodle training courses PACC 2018 deployment, the aim was to collect participants' opinions and impressions both on the distance learning course and on the workshop. The surveys' questions were focused on the effectiveness of the course, tools and subject matters, duration, courses' structures, and suggestions for future courses and distance learning. Generally speaking, the overall feedback was positive.

For this edition the questionnaire has been modified: some questions have been transformed from open-ended questions in multiple choice, following the answer patterns of the responses of the previous editions.

Methodological note

As in small groups surveys, the percentages values could be misleading, most of the graphs, here presented, display the absolute values, to better show the real proportion of the results. For example, in a group of 23, 1 respondent represents the 4%.

WORKSHOP SURVEY

A POSITIVE INITIATIVE AND A SUCCESS

The workshop survey was taken by 23 participants out of 25. The respondents evaluated positively the overall event and the programme, the majority of the respondents rated the workshop "Very Successful", and the majority would recommend this course to their colleagues: Probably 5 (22%), Definitively 18 (78%).

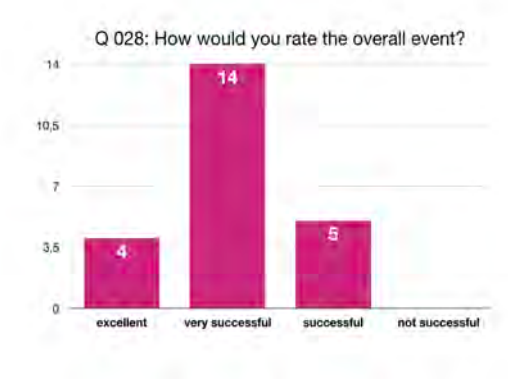

Fig. 1 Q. 028

Most of the participants agree that the course objectives were clear; the average rank of the question 2 is 4.3 over 5, and the responses are concentrated on "Agree" (70% - n.16) and "Strongly Agree" (30% - n.7).

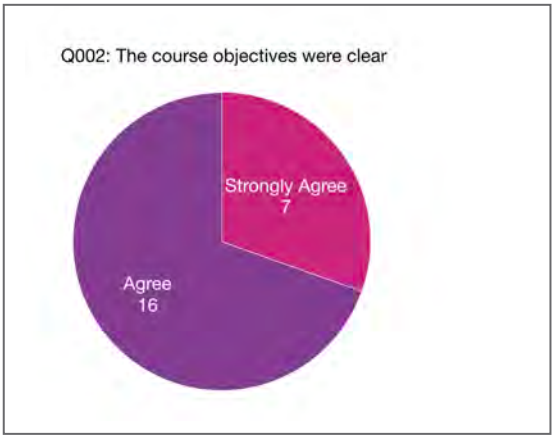

Fig. 2 Q.004

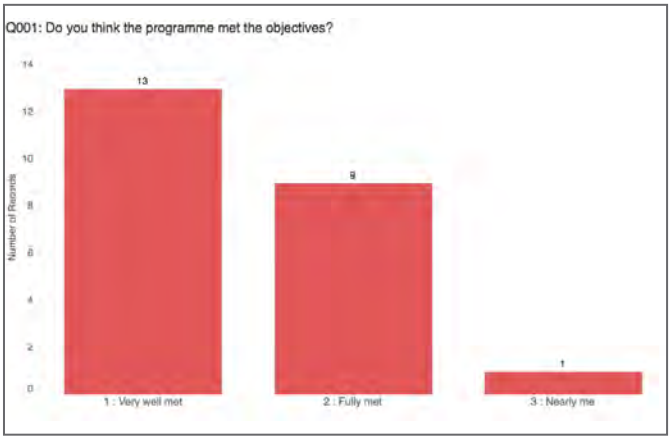

Fig. 3 Q.001

All the respondents consider the knowledge acquired an important asset to contribute more effectively to the activities of their institutions and relevant for their job (Q.4).

These initiatives are important not only to improve and update knowledge and techniques, but also to stimulate new approaches and application of advanced research to better cope with climate change and increase adaptation. In this

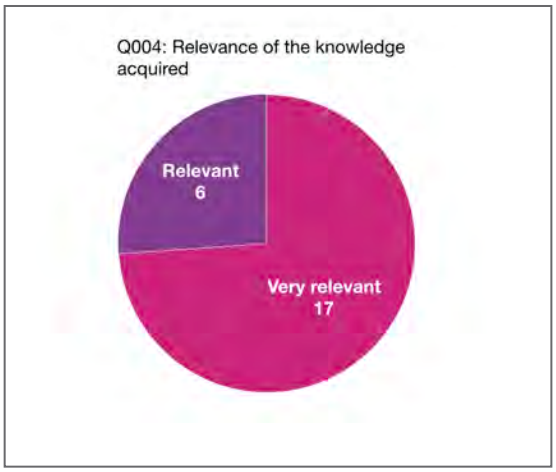

Fig. 6 Q.004

perspective it is crucial the dissemination and spreading of the knowledge/ techniques learnt during the course when returning back to their home countries. The responses to the question Q.6 "*How you will share what you learnt with your colleagues*" show that there is a will to share the knowledge acquired not only with short event (presentations and workshop)

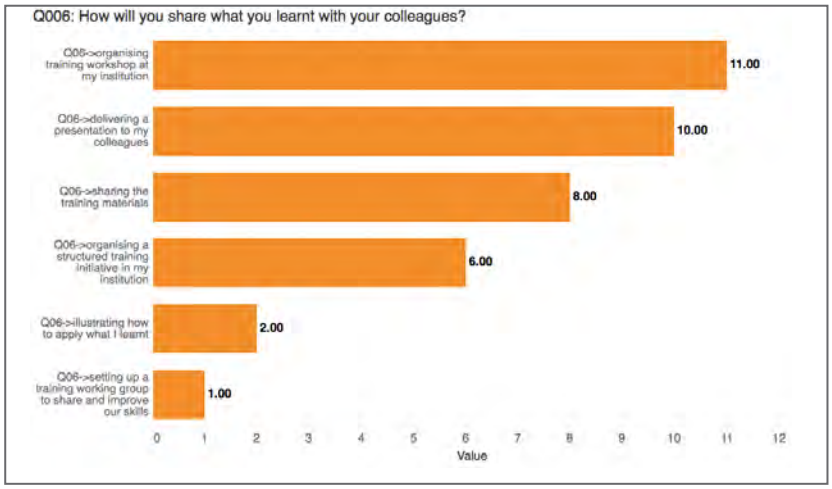

Fig. 5 Q.6

but an interesting number of participants (6/23) show an interest in organising "structured training initiative" in their institution, that could be interpreted as a longer term engagement in learning activities.

The post-workshop assignment, focused on documenting (photo, videos, presentations) the sharing initiatives in participants' home country will give better insights on how the participants will share the workshop content.

The success of this initiative is also witnessed by a group of responses concerning the goal of the initiatives but also on how to apply the knowledge acquired. In term of learning experience, we could affirm that learning is successful when the knowledge gained is applicable in practise. In this perspective the workshop has been a positive experience as the majority of the participants (91%) declared that they received advice on how to apply knowledge gained during the seminar to relevant situation in their country. (Q. 007) The two participants that gave a

negative answer pointed out they would have liked: "*Translate for the members of my direction*" and "*R software*".

The importance of training and learning to improve skills knowledge and competencies is highlighted also in Q.017, highlighting which type of training initiatives the participants would like to implement. The answers show a wide interest in participating to continuous training initiative also in their home country.

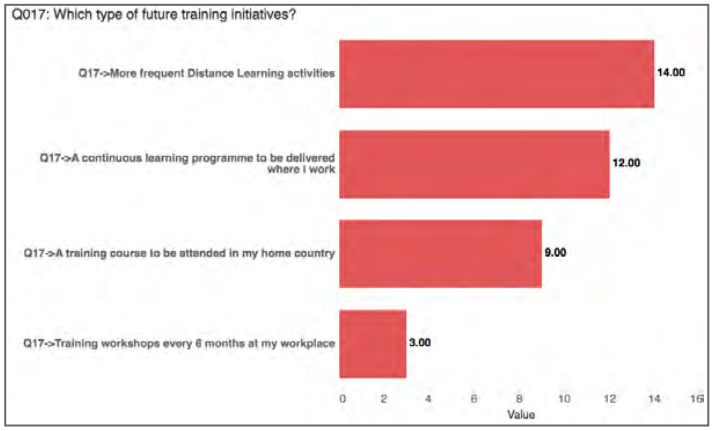

Fig. 9 Q.017

Educational Background

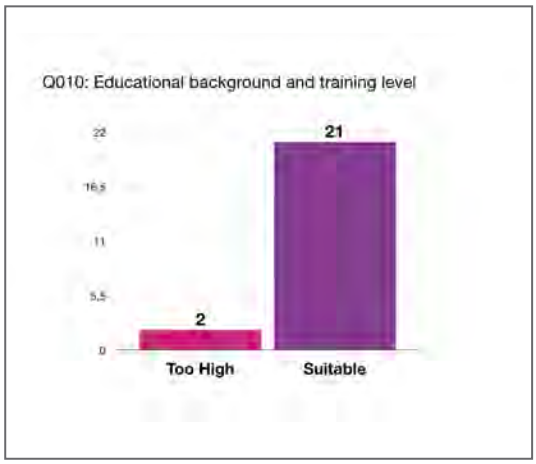

Fig. 7 Q.10 - Educational Background

The survey investigates two dimensions of the background level: the language and the specific competence.

In term of suitability of the training course with educational background, the participants perceived their educational background and experience suitable (91% n.21- Q.010) to attend the training course. Only two respondents considered the training level too high because too academic (Q.012, Q. 013).

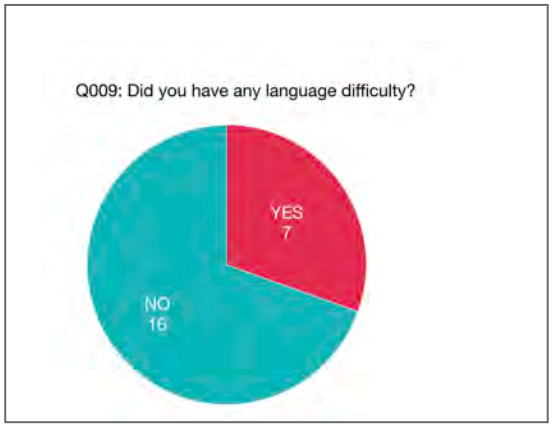

Fig. 8 Q.009

For what concerns language gap, apparently only a minority declared to have some difficulties.

However, analysing the open-ended and others questions a different scenario comes to light: the language is a critical issue and a weak point for several participants.

Language gap

The language gap was an issue also in previous editions. A comparison 2017/2018 reveals the participants having language difficulties is increased.

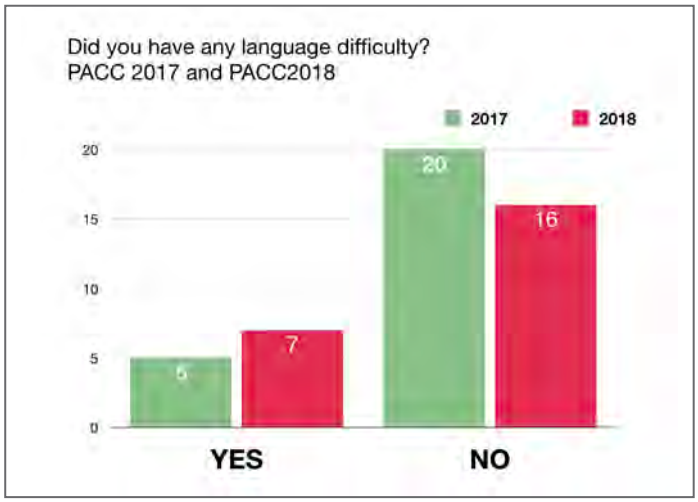

Fig. 10 Language difficulties 2017 vs 2018

The language issue is highlighted in some comments and suggestions that confirm language gap is still an issue.

Training manuals must be in both English and French.

Provide translation into French of courses and exercises

Multiple language materials should be made available

Amongst the 30% of the participants who have language difficulties the 57% (n.4) says "I have some problems in understanding English", the 29% (n.2) "I don't feel confident about speaking English", and just one participant (14%) says "Teachers were speaking too fast". Further investigation (interviews or focus groups) could clarify the extend of the issue and why the participants are in some ways reluctant to admit their language difficulties.

Learning software

As a matter of facts, learning how to use software (R and Cropsyst) is a bit critical for some participants. The "software issue" arises in different questions.

When asking suggestions for further training activities (Q.026), the most chosen answer option (26%) was "more time to practice with software". Here below some quotations from the blank option of question Q.026

> *"More time must be dedicated to teaching and learning of models and programming softwares."*
>
> *"Step by step manual on the use of R software."*
>
> *"However the practical work especially for the R software was not well understood by the majority of participants."*
>
> *"It was desirable to give prerequisites how to write the scribe language for R. "*

Also in the comments Q.029

> *"All aspects of the programme were very necessary and well presented, except for the length or duration of the programme which give us limited time to efficiently master the soft-wares."*
>
> *"les cours se sont bien passés, mais je souhaite une formation beaucoup plus approfondis sur le logiciel R et le Crop system."*

Learning software seems to be another critical issue that should requires further investigation, as we have no detailed information on ICT and web literacy of each participant.

THEORY/PRACTICE

The surveys results of the previous editions of RTC Italy training courses highlighted the need of practical training. On the basis of these findings, also the RTC 2018 course has been structured as follows: in the morning theoretical lectures and hands-on afternoons focused on R and Cropsysts software, and Communication. The *50% theory / 50% practice* approach is preferred by the 65% of the respondents (n.15), the 22% (n.5) prefer more practice than theory, and only the 13% (n.3) choose more theoretical. The majority of the respondents think that the workshop was a right balance between theory and practice (91% - n.21), only 2 persons perceived the course too practical.

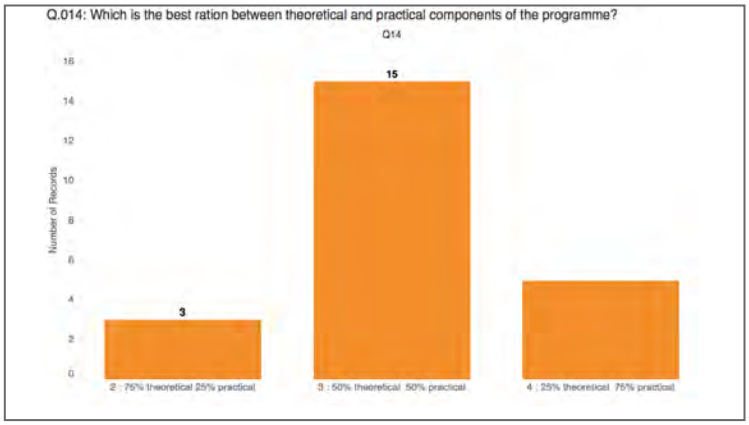

Fig. 11 Q.14

However, as in the comments some participants ask for more practice, and usually it is related with learning software, this request could be interpreted as the need for more time to practice software such R and Cropsyst.

This should be taken into consideration when designing next training initiative, either empowering the DLC to build the necessary competencies to attend the workshop or have more strict pre-requisite or redefine (lower) the goal of the practical sessions.

COURSE SETTING

Duration

The duration of the workshop divides the respondents in two groups. For those who perceive the duration inadequate the suitable duration is longer than 2 weeks.

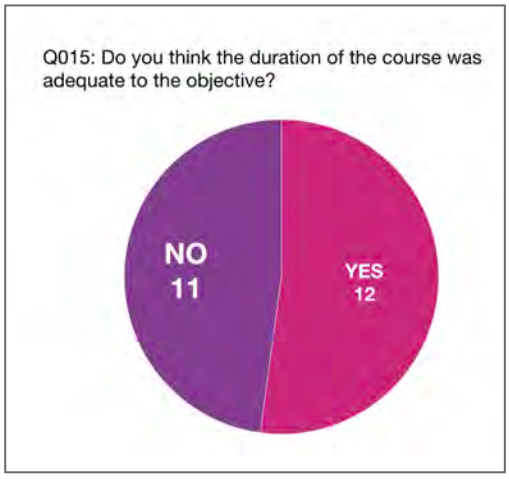

Fig. 12 Q..015

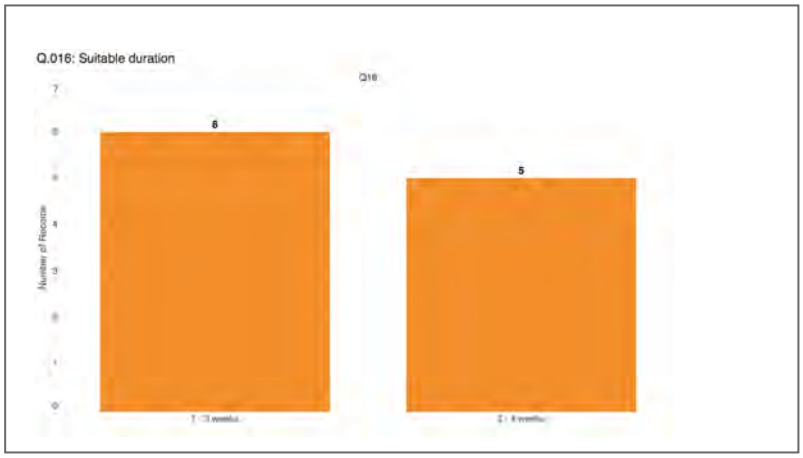

Fig. 13 Q.16

Finally I would like the training program to be extended as follows two weeks distance learning and four weeks practical session for hand on deck for operation of the module

The need to spend more on training is confirmed by answers to Q.17

The right balance between continuous learning initiatives in their home countries However, as in the comments some participants ask for more practice, and usually it is related with learning software we could interpret this request as a need for more time to practice software such R and Cropsyst.

This should be taken into consideration when designing next training initiative, either empowering the DLC to build the necessary competencies to attend the workshop or have more strict pre-requisite or redefine (lower) the goal of the practical sessions.

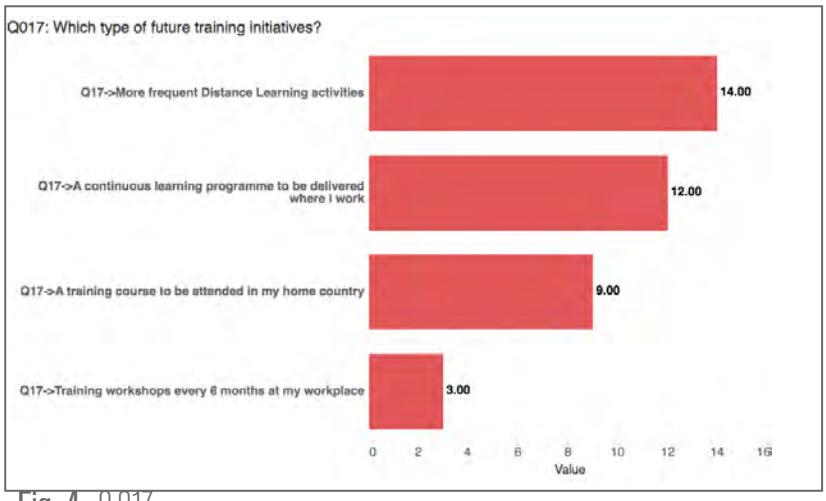

Fig. 4 Q.017

Training Materials

The majority (96% - n.22) of the participants consider the training materials provided comprehensive; only one person choose "the training materials were not enough complete and helpful". How to improve the training material is well described in the next figure.

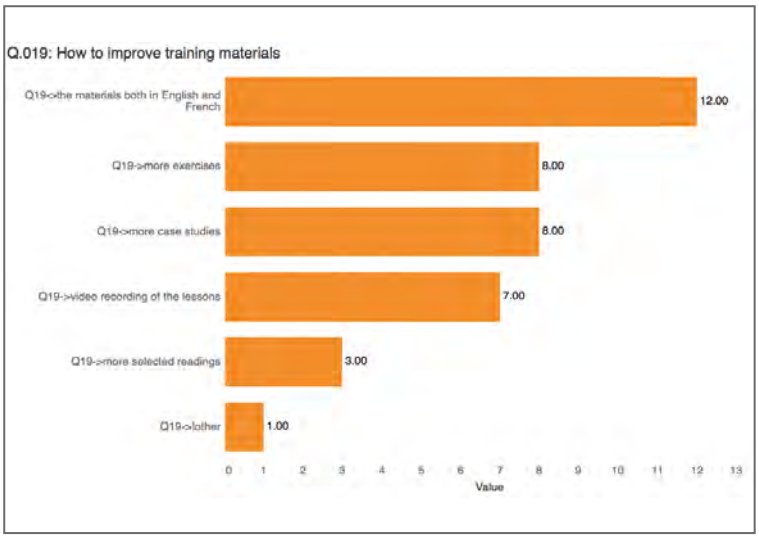

Fig. 14 Q.019

(the question was a multiple choice with blank optional field, the choices have been created considering the questionnaires of the previous editions).

The most chosen answer highlights once more the need to have all the materials

in English and French.

"I would like to them to master also French language in order to be more understandable to the french trainees."
"provide translation into French of courses and exercises"
"Training manuals must be in both English and French"

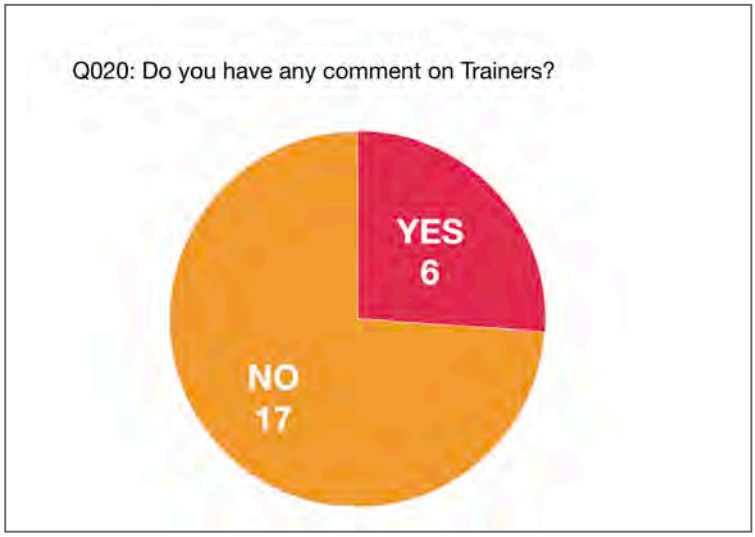

Fig. 15 Q.20

This responses in some ways highlight that although the language gap is not perceived as an issue by the 70% of the respondents (Q.009), in other questions the answers reveal that bilingual materials or lessons are need for many of them.

Trainers

Most of the respondents have no comments on the trainers and the few comments are generally positive and suggest to have a more engaging and interactive approach to gain a better attention from trainees.

"The trainers are of quality; They are available."
"They are good lecturers, taking good care of the students. I would like to them to master also French language in order to be more understandable to the french trainees."
"The training is very important especially in communication."

"I think the trainees were very accommodating, a joy to work with but should engage the class a bit more to keep students focused and alert. Also, it makes sharing of ideas much easier in a classroom scenario."

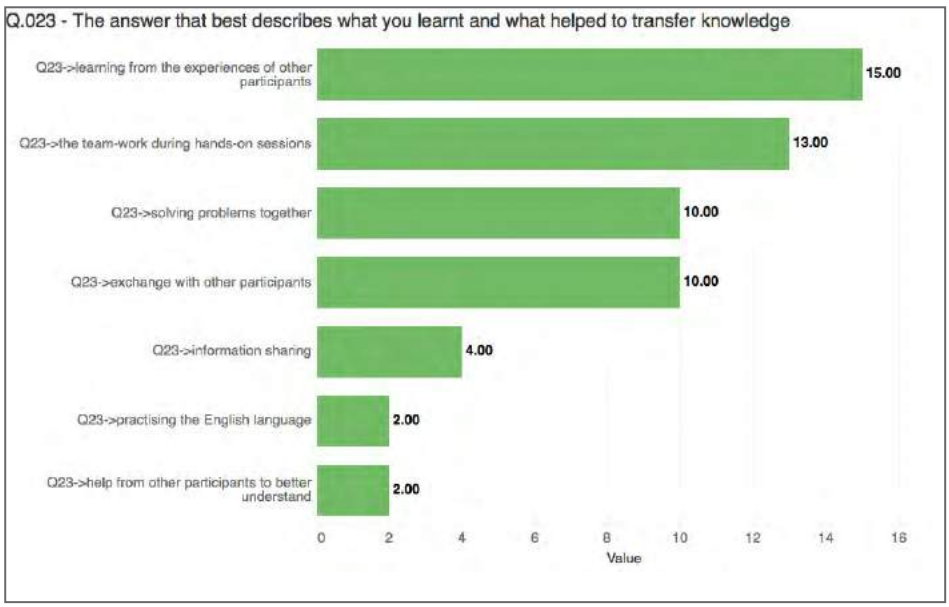

Fig. 16 Q.23

LEARNING AND KNOWLEDGE TRANSFER

In a learning environment the interaction with other participants is undoubtedly an empowering factor. Interaction is also the weak point of distance learning where interactions between teachers and students, and between students are mediated by the internet/platform and require a different mindset, that someone could not always feel at ease with.

Sharing is a value to gain knowledge, and the majority of the respondents (96% - n. 22) think that they gained valuable knowledge from other participants, particularly learning from others experiences, but also the teamwork during the hands-on sessions.

Only one respondent underlines that he/she could not gain valuable knowledge from others for language difficulties (Q.024).

CONCLUSIONS

Considering the answers given throughout the questionnaire, we could say that the initiative was positive although the period was not favourable as it overlapped the rainy season when the national Met Services are very busy. Training is perceived as a valuable resource to improve meteorological and climate services tailored for farmers, and the participants expressed the desire to empower their skills and competencies, than can be interpreted as the need to be part of a learning community where web technologies could be used to set up a permanent learning programme.

Participants are aware that there are new techniques and approaches that could increase their capacity to cope with climate challenges, but in order to be able to apply them in their work activities they need to practice more and to dedicate more time to training.

One participant suggest "*a more balanced focus on hydrology and meteorology. I think training are meteorology bias*"

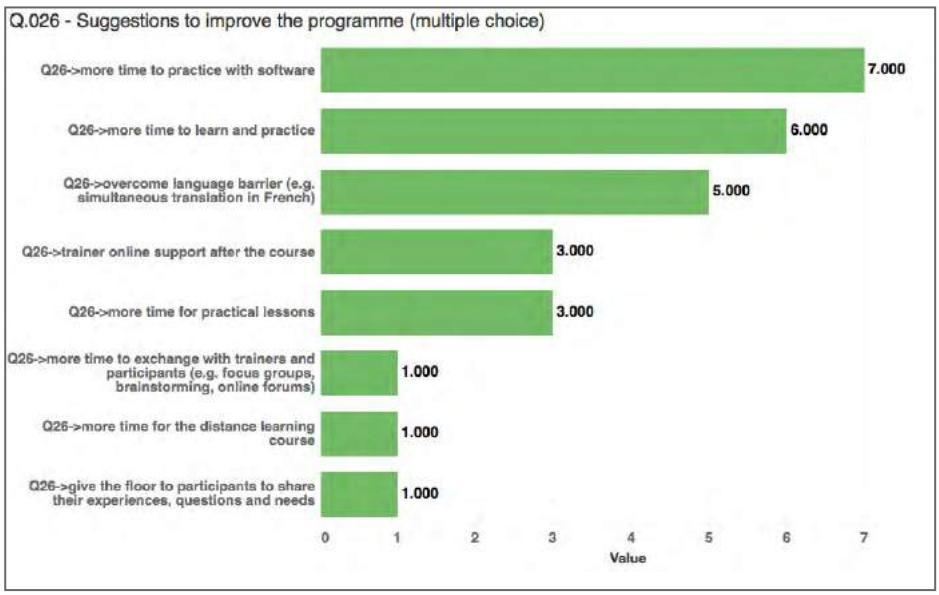

Fig. 17 Q.26

Suggestions on topics

CLIMATE CHANGE: CAUSES, CONSEQUENCES AND SOLUTIONS

"I suggest that IBIMET can organize other training courses on the use of agrometeorological information."

"Hydrologie"

"SIG et la Télédetction"

"adaptation et attenuation"

"Tools for good weather forecasting at regional and national levels."

"Climate Services and Products"

"development and implementation of index in climate insurance"

"maybe python software"

"Seasonal forecast and climate change adaptation strategy field survey for the impact of climate change adaptation , mitigation on Africa or europe."

"les aspects liés aux manque des ressources en eau; la mise en place de gestion des basses de données en Afrique"

"More lectures on Climatic Change Communication"

"More detailled risk management"

"downscaling and biais correction"

"Use of satellite images for the provision of climate services"

The positive comments of some participants on the communication session, confirm that information and communication management is a field of knowledge to include also in further training initiatives.

Lessons learnt for future initiatives

As pointed out in the previous paragraphs the software training and the language

gap are the main critical issues highlighted by the participants. In this perspective we should rethink the instructional design of the distance learning and of the face-to-face course giving more tutorials in English and French, more video lessons and more best practices and exercises.

Probably the idea to define custom training paths, aimed at acquiring some skills both through e-learning tools and face-to-face courses, could overcome some weak points. A well structured e-learning platform could allow a better management and use of the training resources and materials produced during the different initiatives, improving the dissemination and usage of this material in the framework of a new training content strategy.

GRADES PACC2018

WORKSHOP FINAL TEST GRADES RESULTS

The analysis of the results of final test shows that the participants acquired knowledge and skills during the two weeks course.

The 20 questions test was focused on the topics illustrated during the course; the questions were mainly single choice questions (a multiple choice question that has only one correct answer). The minimum grade to pass was 45 and the highest grades that could be obtained is 90.

The majority of the participants (65% - n.15) obtained between 45-60 points, the 6% (n.2) between 61-75 points, the 16% (n.3) between 76-90. Only three participants did not pass the test. Two never submitted.

The minimum, maximum, mean, median and mode describe the central tendency of the results (the two who did not submit the test have not been considered)

Mean	55.71
Minimum	31.75
Maximum	90
Mode	53
Median	51.75

The badge for the workshop in Florence was obtained by 20 out of 25 participants; the badge is obtained when doing the test and the questionnaire.

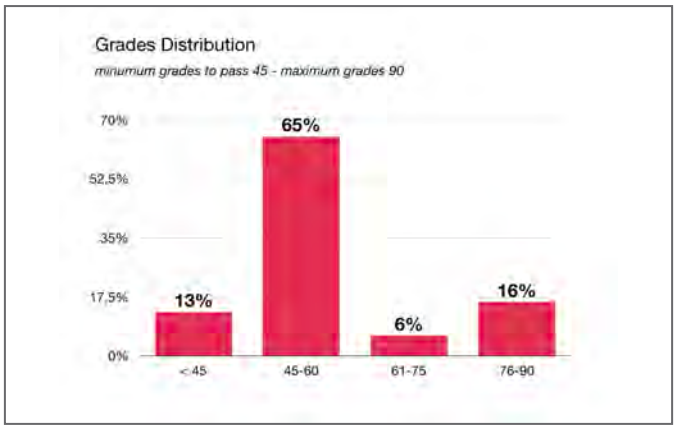

Fig. 18 - Grades distribution

The following table displays the grades of PACC2018 (DLC + Workshop)

Data Source: PACC2018 Moodle platform

First name	Surname	Lesson: R software installation	Quiz: Quiz R - Part 1	Lesson: Data import and Time Series	Quiz: Quiz R - Part 2	Lesson: Conditional statements. Loops and Function	Quiz: Cropsyst Quiz	Assignment: your presentation file	Final Test Workshop	Moodle Average	TOTAL (SUM)	Badge DLC	Badge RTC
PATRICK	MUSA	1.17	9.00	4.00	-	-	-	-	32.75	13.54	46.92		
ALHASSANE	BAH	1.17	5.00	5.00	2.50	0.00	-	-	36.00	14.31	49.67		
ISSA	TRAORE	-	-	-	-	-	-	-	51.00	14.69	51.00		✹
AISSATA	SAO	-	-	-	-	-	-	-	53.00	15.25	53.00		✹
UNIMKE	AKEH	5.83	5.00	4.00	-	-	-	-	43.75	16.83	58.58		✹
GAYA	DJERGO	-	3.00	-	3.50	-	6.00	-	51.50	18.36	64.00		✹
IBRAHIM SINNEH	KAMARA	5.83	8.50	5.75	-	-	-	-	46.75	19.16	66.83		✹
JAMES	KOLLIE	5.83	9.00	-	-	-	-	-	52.25	19.23	67.08		✹
DAKO	A. PIERRE	-	7.00	-	5.00	-	5.00	7.00	53.00	22.03	77.00		✹
ORLANDO	MENDES	4.67	8.00	5.00	5.50	7.33	-	-	48.50	22.60	79.00		✹
PETER	GIBBA	5.83	7.00	6.00	3.50	3.67	5.00	7.00	50.25	25.21	88.25		✹
SPENCER S.	TAYLOR. JR.	5.83	9.00	6.00	10.00	3.67	6.00	-	49.50	25.71	90.00		✹
M'POH	N'KOYI	1.46	6.50	6.00	7.00	4.40	4.00	10.00	51.75	26.02	91.11	✹	✹
ALFRED	DANGO	3.89	6.33	6.00	6.00	3.67	5.67	6.00	56.50	26.85	94.06	✹	✹
HAMIDOU	COULIBALY	5.83	7.67	5.60	6.00	6.11	5.00	-	59.75	27.39	95.96		✹
ABDULRAHMAN	GARBA	7.00	10.00	6.00	7.00	7.33	5.00	6.00	50.75	28.27	99.08	✹	✹
OUMAR	KONTE	7.00	7.00	6.00	6.50	7.33	7.00	10.00	49.75	28.70	100.58	✹	✹
OBED AMANKWAH	MINKAH	5.83	7.00	6.00	8.00	3.67	5.00	7.00	62.75	30.01	105.25	✹	✹
ANTONINO	PEREIRA	5.83	7.33	6.00	9.00	5.04	7.00	10.00	56.75	30.50	106.95	✹	✹
LAZARE	SAWADOGO	7.00	9.50	6.00	8.00	6.11	5.50	6.00	67.25	32.87	115.36	✹	✹
MARIA	MORENO	5.83	9.00	6.00	9.00	5.50	7.00	10.00	63.25	32.93	115.58	✹	✹
BONI NARCISSE	KINDIA	5.83	10.00	6.00	10.00	10.00	7.00	10.00	78.08	38.96	136.91	✹	✹
KOUAKOU A.	NZUE	7.00	10.00	6.00	9.50	8.56	7.00	10.00	79.58	39.16	137.64	✹	✹
LAOUKOSSIMA	KPABEBA	-	-	-	-	-	-	-		-			
SID ELEMINE	SALECK	-	-	-	-	-	-	-	-	-			