Info Note

Taking the Participatory Integrated Climate Services for Agriculture (PICSA) approach to extension actors for strengthening resilience in Africa: five years' experience in West Africa

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Key messages

- Capacities of key stakeholders (Meteo service staff, researchers, NGOs and extension staff) were strengthened in how to prepare and implement PICSA, especially in a) generating and understanding user-friendly climate information and b) how to support and empower farmers to identify and plan farming and other livelihood activities appropriate to farmer's contexts;
- In addition to directly enabling farmers to better cope with and adapt to climate variability and change, the PICSA approach enables stakeholders to work collaboratively, work towards common goals, enables them to play complimentary roles in supporting farmers and leads to improved understanding of farmer's requirements and how to meet them;
- The new knowledge and skills acquired by key stakeholders can set the foundation for deploying improved climate services and agricultural extension approaches and Climate- Smart Agriculture (CSA) in future projects or programs in the region.

Introduction

In West Africa, about 70% of the population live in rural area and have livelihoods mostly based on rainfed agriculture (Connolly-Boutin and Smit 2016; Serdeczny et al. 2017). Despite the low input practices, agriculture contributes of 30-40% Gross Domestic Product (Jalloh et al. 2012; Nin-Prat et al. 2011). However, farmers in this region are exposed to various weather-related risks, chiefly climate variability as well as climate change inducing droughts, which combined with their low adaptive capacities makes them the most vulnerable in the world (Von Soest 2020).

Moreover, the climate of West Africa is expected to become more arid due to increased temperature and uncertain rainfall regimes, while its population is expected to grow faster than the rest of the world (Mechiche-Alami and Abdi 2020). Climate smart agriculture aims at helping farmers cope with the negative impact of climate change and in line with this, accurate and timely climate information services are one of the major inputs for improving agricultural practices (FAO 2013, 2018; Hansen et al., 2011, 2019).

Developed by the University of Reading, within the framework of a CCAFS (Climate Change Agriculture and Food Security research program) funded project and with initial support from Nuffield Africa, the Participatory Integrated Climate Services for Agriculture (PICSA) approach is designed to help smallholder farmers to make plans and decisions for their individual contexts and that utilize climate and weather information together with participatory decision making tools. This approach is based on the analysis of livelihood activities by smallholder farmers in the light of climate information of their locality including historical weather data as well as seasonal and short-term forecasts, and helps farmers to make risk assessments and decisions to improve their production and meet their objectives (Dorward et al. 2015).

Various participatory tools, including resource allocation maps, seasonal calendars, participatory budget analysis,

World Agroforestry · CORAF · CILSS AGRHYMET · WAAPP / PPAAO · INERA · ICRISAT International Crops Research Institute for the Semi-Arid Tropics · CGIAR · Research Program on Climate Change, Agriculture and Food Security · CCAFS

are used for such analysis considering the specific context of each farmer as shown in the contextual framework in Figure 1. Two key principles of PICSA include 'the farmer decides' i.e. that farmers are best placed to make decisions about their agricultural practices, because they have detailed knowledge of their farm, system and environment, and they also face the consequences (whether favourable or unfavourable) of their decisions, and 'options by context' i.e. different farmers having different contexts. This includes differences in wealth, education, land, goals and attitudes to risk. Therefore, what works for one farmer might not work for another and farmers should thus make decisions that are right for their own contexts (see https://research.reading.ac.uk/picsa for full explanation and resources on PICSA).

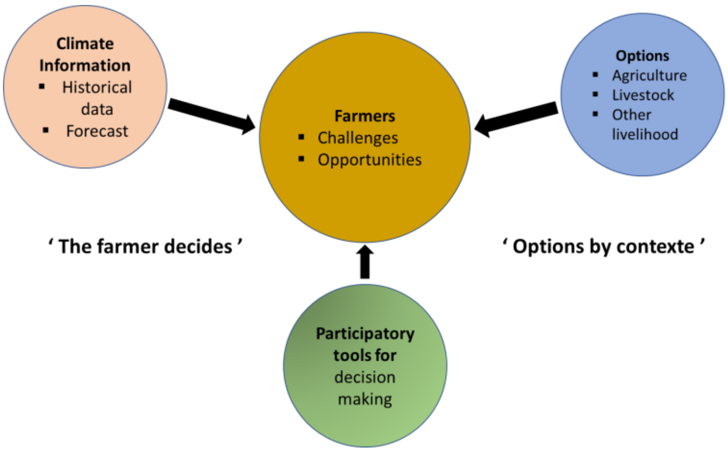

Figure 1. Contextual framework of PICSA approach (Source: https://research.reading.ac.uk/picsa/)

The use of PICSA by farmers (initially facilitated by trained extension staff or community volunteers) begins well before the planting season and continues through until after the season (Figure 2) has ended. It consists of 12 steps grouped in 3 main components:

- (1) providing and considering climate and weather information with farmers, including historical records and forecasts;
- (2) jointly analyzing information on crop, livestock and other livelihood options and their risks, by field staff and farmers and
- (3) using participatory tools to enable farmers to use this information in planning and making decision for their individual circumstances.

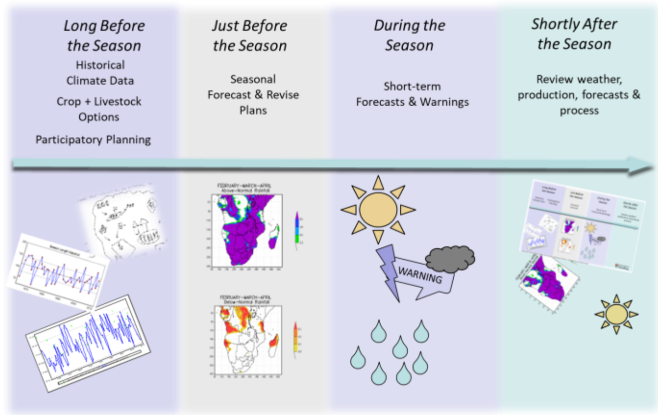

Figure 2. Different phases of PICSA approach (Source: PICSA Website https://research.reading.ac.uk/picsa/

Since 2015, the World Agroforestry (ICRAF) is collaborating with the University of Reading, national meteorological and hydrological Services, national research institutes and various NGOs in many West African countries to implement PICSA approach (Dayamba et al. 2018). This experience started in Northern Ghana where PICSA was first implemented with over 5,000 farmers (Clarkson et al. 2019) and then in Senegal, Mali, Burkina Faso, and Niger in the framework of a CCAFS funded project, Capacitating African Stakeholders with Climate Advisories and Insurance Development (CASCAID-I&II) project. This exercise was extended to other projects of ICRAF and those of its partners in Burkina Faso, Benin, Guinea, Mali, Niger, Togo, Senegal using funds from: CORAF (CASCIERA-TA), USAID (SmAT-Scaling, Africa RISING, GCC, BrASIL-CSVIL, CINSERE), Netherland (DryDev) and IDRC-2IE. The team also obtained supplementary funding from the World Meteorological Organization (WMO) for a training of Meteorological Services agents of the region. A total of eight West African countries have been reached including Benin, Burkina Faso, Ghana, Guinea, Mali, Niger, Senegal, and Togo.

Meteorological service agents training for data analysis

In PICSA, historical climate information in the form of graphs of rainfall and temperature values for each of the last 30 years or more is shared and analyzed with farmers. This enables farmers (along with field staff) to explore the characteristics of the climate in their location and to identify implications for agricultural planning and decision making e.g. which crops and varieties are most likely to succeed given the amounts of rainfall received in seasons, exactly how is the climate changing and what enterprises and agricultural practices are likely to be most successful. Often one of the main observations from looking at the graphs is the extent of variability from year to year and farmers consider ways to address this (e.g. by identifying a range of options including climate smart agricultural practices). In addition, later in the PICSA process farmers consider seasonal forecasts and the historical climate information helps provide useful context for this by giving a clear description of conditions in previous years against which to make comparisons.

Given the importance of the historical climate information and to support scaling-up of PICSA in West Africa, Meteo Service agents were first trained to analyze historical data and provide the easy-to-understand graphs needed for PICSA training. About 25 Meteo service agents were trained to clean, check and analyze historical climate data and to produce the graphs using the software Instat (R-Instat) (Figure 3). Each staff had worked on the long-term data (≥30 years) from sites in her/his country and by doing so, they make the large amount of historical data more useful and useable for anyone.

Moreover, in Africa, it is known that the main weakness of climate information including seasonal forecast is that the information is produced for wide areas which might not be relevant to the specific context of a given farmer. Good climate information data are available only for some few areas where weather stations are established. To address such constraint, met service agents of 5 countries (Benin, Guinea, Mali, Niger and Togo) were trained on a technique of combining data derived from satellites with data from ground observation stations. This so-called "merging" technique developed by the International Research Institute for Climate and Society (IRI), through ENACTS (Enhancing National Climate Services) initiative, aims to improve the availability of data for the development and dissemination of quality climate information and products to users (Dinku et al. 2017). A 5-days training workshop was held with practical sessions to capacitate the various participants to understand the merging technique and generate climate data to cover areas with no data or to provide missing data. For PICSA, this can be used to infill missing data at existing stations or generate graphs for completely locations where ground station data are not available. The origin and accuracy of the merged products should be clearly explained and communicated to other users, especially to farmers.

Training of trainers for PICSA implementation

In addition to capacitating met service agents, the implementation of PICSA required strengthening of the capacities of other stakeholders such as field agents of extension services and national and international NGOs working with farmers.

The main objectives of the workshops organized in various countries of West Africa (Figure 3) were to strengthen the capacity of the participants so that they can train and support farmers to use ~~the~~ PICSA approach. This was meant to compliment the work they are already doing with farmers (e.g. working with groups of farmers to provide training and information) and to help them improving livelihoods.

A total of 16 full length (5-days) and two short length (3-days) trainings sessions were organized in West Africa (Figures 3 and 4). For each of these trainings, national met services provided historical climate data as well as the seasonal and short-term weather forecasts in the form of easy-to-understand graphs. Participants were trained in and practiced to each of the 12 clear and logical steps of PICSA - see the PICSA field manual and Website for full details (https://research.reading.ac.uk/picsa/). These include enabling farmers to: assess their current resources and activities (using Resource Allocation Maps) and how the climate influences their activities and decision making (using seasonal calendars); use historical climate information to help explore the climate whether and how climate is changing and the implications for agriculture and other livelihoods; analyze and identify the suitability of different crops and varieties to local climate; identify suitable options i.e. enterprises and management practices for local conditions; plan and analyze the options using Participatory Budgets; understand and use the Seasonal and short term forecasts to adapt plans ahead and during the season depending on the forecasts and farmer's individual contexts. At the end of each workshop, the extension workers developed schedules for training groups of farmers in PICSA (normally over a total of approximately 5 meetings).

Based on lessons learnt from the various full length trainings delivered as well as specific interests of some groups that are already relatively familiar with some of the tools such as resources allocation maps, seasonal calendar or participatory budget elaboration, a short length version of PICSA was experimented to adapt to such groups in Mali in 2019 and 2020. The modified short version focuses on understanding and using the historical climate data and meteorological forecasts to guide the choice and planning of climate smart agriculture options for each context. This was also well appreciated by the participants. The manual describing the PICSA approach was printed and distributed to all participants. After the trainings, the met service agents were able to generate the needed climate information at scale to support decision-making in farming activities notwithstanding of variable and changing climate, more specifically in deploying climate smart options. The importance of climate information being delivered to the farmers has been assessed and revealed the willingness of some farmers to pay for climate services (Ouedraogo et al. 2018). Farmers in Mali and Senegal were surveyed specifically about their perceptions on the use of PICSA and the results showed that 76-97% of the respondents found the approach 'very useful' (Dayamba et al. 2018). Clarkson et al (2019) analysed the effects of PICSA on farmer's decision-making and livelihoods, after the training of approximately 5,000 farmers in PICSA and reported that PICSA implementation had the desired effect of stimulating innovation behaviours and catalysing farmers to identify, plan and implement changes that address their own individual farming systems and contexts. The West Africa experience in easy-to understand climate information generation, dissemination and use clearly confirms that climate information is an important input needed by farmers like other production inputs. Therefore, the accessibility of such information in addition to early delivery of seasonal forecast to the farmers is critical for a smooth planning of their farming activities.

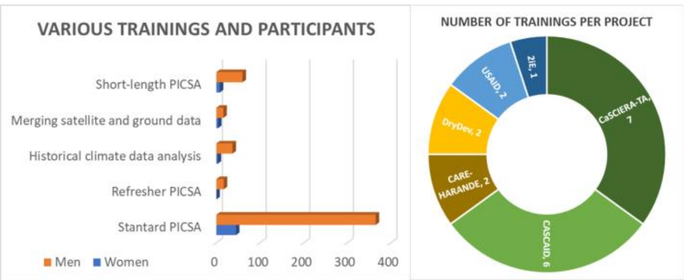

Figure 3. Participants of various trainings and number of training per project

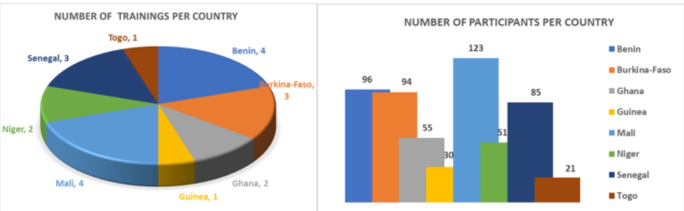

Figure 4. Number of trainings and participants per country

The PICSA trainings of stakeholder's staff were held in eight countries of West Africa namely Benin, Burkina-Faso, Ghana, Guinea, Mali, Niger, Senegal and Togo with a total of 555 participants. These trainings were implemented in the framework of several projects involving ICRAF (CaSCIERA-TA, CASCAID, DryDev, SmAT-Scaling, Africa RISING, GCC, BrASIL-CSVIL, CINSERE) and one project of the 2iE institution (IDRC). The highest numbers of participants were from Mali, Benin, and Burkina-Faso.

Conclusion and perspectives

The trainings of Met service agents for historical climate data analysis and the elaboration of easy understandable graphs were of great importance and were a key determinant to the rest of the process for implementing PICSA approach in the framework of various projects in West Africa. All these Met services now have the capacity to produce historical climate information graphs for PICSA approach training and implementation. Overall, more than 500 extension agents and scientists were trained on the PICSA approach to improve their support to rural poor farmers in West Africa. These trainings were highly appreciated by participants who reported that they would make a major contribution to their activities. Extension staff enthusiastically elaborated plans for implementing the approach to support farmers' activities in their specific intervention sites. However, refreshertraining is required for staff in future years as well as expansion of training to new staff (considering staff mobility in the institutions).

Further reading

- Bayala J., Dayamba S.D., Lamien N., Zougmoré R.B., Agali A., Ky-Dembele C., Diakité A., Ouédraogo M., Gnangle P.C., Keita A., Tougiani A., Sadate A. 2020. Capacitating stakeholders to using Climate Information in West Africa: Achievements and lessons learned from the WAAPP-funded CaSCIERA-TA project. Info-note CCAFS.
- Clarkson C., Dorward P., Osbahr H., Torgbor F., Kankam-boadu I. 2019. An investigation of the effects of PICSA on smallholder farmers' decision- making and livelihoods when implemented at large scale – The case of Northern Ghana. Climate Services, 14. pp. 1-14. ISSN 2405-8807 doi: https://doi.org/10.1016/j.cliser.2019.02.002
- Connolly-Boutin L., Smit B. 2016. Climate change, food security, and livelihoods in sub-Saharan Africa. Regional Environmental Change 16: 385-399.
- Dayamba D.S., Ky-Dembele C., Bayala J., Dorward P., Clarkson G., Sanogo D., Diop M.L., Traoré I., Diakité A., Nenkam A., Binam J.N., Ouedraogo M., Zougmore R. 2018 Assessment of the use of Participatory Integrated Climate Services for Agriculture (PICSA) approach by farmers to manage climate risk in Mali and Senegal. Clim Serv 12:24–35. https://doi.org/https://doi.org/10.1016/j.cliser.2018.07.003
- Dinku T., Thomson M.C., Cousin R., del Corral J., Ceccato P., Hansen J., Connor S.J. 2017. Enhancing National Climate Services (ENACTS) for development in Africa. International Research Institute for Climate and Society, (IRI). the Earth Institute at Columbia University, 61 Route 9W, Monell Building, Palisades, NY 10964-8000, USA,
- Dorward P., Clarkson G., Stern R., 2015. Participatory Integrated Climate Services for Agriculture (PICSA): Field Manual. Walker Institute, University of Reading ISBN: 9780704915633. https://research.reading.ac.uk/picsa/resources/picsa-manual/
- FAO 2013. Climate Smart Agriculture source book. Food and Agriculture Organization of the United Nations. http://www.fao.org/3/a-i3325e.pdf
- FAO. 2018. Climate-smart agriculture training manual – A reference manual for agricultural extension agents. Rome. 106 pp. Licence: CC BY-NC-SA 3.0 IGO.

- Hansen J.W., Mason S.J., Sun L., Tall A. 2011 Review of seasonal climate forecasting for agriculture in sub-saharan Africa Expl. Agric 47: 205-40.
- Hansen J.W., Vaughan C., Kagabo D.M., Dinku T., Carr E.R., Körner J., Zougmoré R.B. 2019. Climate Services Can Support African Farmers' Context-Specific Adaptation Needs at Scale. Front. Sustain. Food Syst. 3:21.
- Jalloh A, Roy-Macauley H, Sereme P. 2012. Major agro-ecosystems of West and Central Africa: Brief description, species richness, management, environmental limitations and concerns. Agriculture, Ecosystems & Environment 157: 5-16.
- Mechiche-Alami A., Abdulhakim M.A. 2020. Agricultural productivity in relation to climate and cropland management in West Africa. Scientific Reports: Nature research.
- Nin-Prat A., Johnson M., Magalhaes E., You L., Diao X., Chamerlin J. 2011. Yield Gaps and Potential Agricultural Growth in West and Central Africa. International Food Policy Research Institute. Series: IFPRI research monograph. HD2140.Y54 2010. Kindle Edition
- Ouédraogo M., Barry S, Zougmoré R.B., Partey S.T., Somé L., Baki G. Farmers' Willingness to Pay for Climate Information Services: Evidence from Cowpea and Sesame Producers in Northern Burkina Faso. Sustainability 2018, 10, 611; doi:10.3390/su10030611.
- PICSA Website. https://research.reading.ac.uk/picsa/ Accessed 11.08.20
- Serdeczny O., Adams S., Baarsch F. et al. 2017. Climate change impacts in Sub-Saharan Africa: from physical changes to their social repercussions. Reg Environ Change 17: 1585-1600. https://doi.org/10.1007/s10113-015-0910-2.
- Von Soest C. 2020. A heated debate: Climate change and conflict in Africa. Giga Focus Africa. No 2.

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