

SPOTLIGHT SERIES: LEARNING AGENDA ON CLIMATE SERVICES

in Sub-Saharan Africa

Photo Credit: Mercy Corps

ADVANCING IMPACT EVALUATIONS OF AGRICULTURAL CLIMATE SERVICES IN AFRICA

The design and implementation of effective climate information services (CIS) requires understanding the extent to which they impact the decisions and lives of those who use them.

CONTEXT

Impact evaluations are designed to measure the change in human well-being or other outcomes associated with an intervention. The impact can be direct, indirect, intended, or unintended.

An impact evaluation of an agricultural CIS has two important steps:

- (1) **Establish that farmers are using the CIS** to determine the extent to which a CIS effectively provides information that potential users want or need, and
- (2) **Attribute and measure impacts on wellbeing to the CIS** to determine if users of the information are able to act on it to inform their livelihoods decisions and evaluate the impact of the information.

FOCUSING ON EVALUATING IMPACT

THIS BRIEF HIGHLIGHTS LEARNINGS, COMPARES IMPACT EVALUATION METHODS, AND PROVIDES RECOMMENDATIONS FOR IMPACT EVALUATIONS OF CLIMATE SERVICES PROGRAMS.

Visit the **Learning Agenda on Climate Services in Sub-Saharan Africa** website www.climatelinks.org/projects/learningagendaonclimateservices for more information.

DISCLAIMER: This report is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents of this report are the sole responsibility of its authors and do not necessarily reflect the views of USAID or the United States government.



LEARNING HIGHLIGHTS

There is far less evidence regarding CIS impact than there is for access and use. While evidence about access, use, and impact are critical for understanding how agricultural CIS can build the resilience of Africa's agricultural sector, a 2019 review of CIS evaluations in Africa found that more than 65% focused on issues of access and use, as opposed to impact (Vaughan et al 2019).

Several characteristics of CIS make evaluation of their impacts challenging. First, because climate information flows through social and institutional networks, it is difficult to identify a "control" sample that does not have access to the information. Second, the benefits from CIS come through improved farm decision-making, and cannot be isolated from agricultural interventions that influence farmers' decisions and their impacts. Finally, the time lags involved in building capacity to generate, translate, deliver, and use climate information mean that benefits may continue to grow long after a project is completed.

IMPACT EVALUATION METHODS

Ex-post evaluations are useful for identifying actual impacts while ex-ante evaluations seek to quantify expected future impacts. *Ex-post* studies are conducted after project implementation when actual impacts might be empirically observed. Such observations can be gathered through a range of approaches (see Table 1). *Ex-ante* studies are undertaken in advance of implementation and use models and other tools (see Table 1) to estimate the expected benefits of proposed investments in new or improved services, although they are sometimes adapted to use empirical data to evaluate impacts ex post.

As many donors are interested in actual, measured impacts of an activity, most evaluations take an ex-post approach. Therefore, the rest of this brief focuses on advancing ex-post evaluations.

The most robust and effective ex-post impact evaluations are those that are included in project design and baseline data collection. Such assessments tend to adopt the tools of livelihoods analysis to capture and measure the impacts of a CIS (see Table 2). While each of these tools is well-developed, there is no single tool that comprehensively captures the livelihoods of CIS users, and therefore the range of potential impacts on their well-being.

Advancing impact evaluations of CIS requires combining methods in a manner that augments their strengths and ameliorates weaknesses. The wide range of available tools presents opportunities to further strengthen CIS impact evaluations. Furthermore, combining methods provides opportunities to triangulate estimates of the impact, increasing robustness of the results. For example, combining livelihoods analysis methods, quantitative surveys, and ethnographic livelihoods analysis can rigorously identify patterns of CIS use and impact, while providing information about CIS users and their needs to inform CIS design (see page 8). As another example, bioeconomic modeling could be combined with participatory approaches, such as the Participatory Climate Information Services System Development method, and/or survey-based data in order to validate and improve models of how farmers respond to climate information. The models could then be used to examine a wider range of conditions than observed.

Table 1. Comparison of impact evaluation methods across two categories, *ex-post* and *ex-ante*.

METHOD	QUESTION ADDRESSED	STRENGTHS	LIMITATIONS
EX-POST			
Surveys and econometric analysis	What impacts did users report experiencing?	Options exist for establishing a counterfactual and controlling for confounding factors. May use information collected for other purposes.	Depends on farmers' recall or records. Cost constraints limit number of years of analysis.
Livelihoods analysis (For related approaches, see Table 2)	How did the CIS change how people conduct a given activity, or the outcome of that activity?	Options exist for establishing a counterfactual. Depending on the approach, can identify changes in behavior associated with a CIS. Identified impacts can be easily linked to development goals and human well-being.	Often place-specific, and therefore difficult to generalize. Some livelihoods approaches rest on oversimplifications of end-user logic that can misinterpret observed behaviors and outcomes. Some approaches require intensive fieldwork and analysis that can become time-consuming.
Test plots	How did use of CIS impact productivity and (potentially) income?	Can provide a strong counterfactual and support attribution by comparing CIS use with control groups.	Limited to use of CIS for agronomic management. Sometimes misused to compare farmer's practices without CIS vs. advisers' CIS-based recommendations.
EX-ANTE			
Experimental economics	How do target individuals perceive potential impacts?	Existing groups may provide opportunities for low-cost data collection.	Requires good facilitation and an understanding of the community. Possibility of participant fatigue.
Bio-economic modeling (including agent-based modelling)	What are expected livelihood impacts under well-defined assumptions, including how impacts might evolve for different types of actors?	Can sample many years of climate information and observations. Flexible model specification. Captures competition or coordination among decision-makers.	Limited by ability to capture farmer decision-making realistically.
Computable general equilibrium modelling	Macro-economic impacts for given set of productivity impacts?	Captures market impacts of adoption at scale and economy-wide interactions.	Depends on ability to realistically capture decisions and economic impacts.
Contingent valuation	Subjective willingness to pay for specified services?	Simple data requirements. Can be combined with experimental economics.	Depends on strong familiarity with WCS. Willingness to pay expected to be lower than average economic benefit.

Mixed-methods impact evaluations can reveal important differences in CIS impacts across target beneficiary groups and impact areas. For instance, an evaluation in Senegal (see page 8) revealed that livelihood and socio-economic status influence whether and how people use CIS. The study found that the impacts of the CIS program are first visible in agricultural practice and less durable investments such as seed and fertilizer, suggesting that more durable impacts on farmer asset ownership, such as investment in additional livestock, may take longer to become apparent.

The following broad lessons about the evaluation of the impact of CIS emerged from a mixed-method CIS impact evaluation in Senegal:

- **Low rates of information awareness, uptake, and use do not necessarily mean a CIS lacks important impacts.** Most climate information is useful for only a subset of a given population. Therefore, the impact of this information should not be gauged against 100% of the population, but that proportion of the population with the authority and ability to use that information.
- **Evaluating CIS impacts requires understanding the pathways by which information results in changed outcomes.** Most CIS have relatively narrow pathways through which they can catalyze change. To attribute particular observed changes to a CIS, the following pathways must be identified and traced: (i) the information must affect the conduct of particular activities, (ii) the person conducting the activity must have access to and the ability to use the information, and (iii) the information must either contribute to existing practice or enable new practices.
- **The most effective methods for impact evaluation depend on the impacts one seeks to measure.** For example, to measure the impact of CIS on gender roles, it is likely that an ethnographic approach aimed at a relatively small, representative community will provide an effective starting point for data collection, which can then be expanded and tested through survey analysis of a larger population. Conversely, measuring changes in crop yields might start with a broad survey that captures differences over a large population, and then use targeted ethnographic work to identify the pathways linking those changes to the use of CIS.
- **The greater the coordination between data collection methods, the more comprehensive and rigorous an evaluation can be.** Combining data produced by uncoordinated collection efforts introduces analytic challenges and limitations. For example, an impact evaluation in Rwanda attempted to combine pre-existing datasets from the Humanitarian Response and Development Lab (HURDL) at Clark University and World Agroforestry Center (ICRAF) but ultimately was not able to use a mixed-methods approach as the two datasets were spread across different livelihoods zones. Therefore, the dataset overlap was not large enough for rigorous statistical analysis.
- **Livelihood zones appear to be a useful scale for the evaluation of CIS.** Ethnographic understanding of CIS uptake, use, and impact appear valid at the scale of the livelihoods zone. Decision-making structures in Senegal were found to be similar across the livelihoods zone, with local context shaping the way these decision-making structures played out.

Table 2. Livelihood analysis for CIS impact evaluation consists of a range of approaches, with differing foci, strengths, and limitations.

Approach	Data-gathering focus	Strengths	Limitations
Large-scale surveys	Broad patterns of activity, behavior, and conditions.	Can capture the experiences of large groups in a rigorous, representative manner. Rigorously captures relationships between development interventions and specific outcomes.	Cannot rigorously explain the relationships they identify. Cannot always distinguish between meaningful and non-meaningful relationships. Single year or single season data collections can overlook how observed relationships change with conditions.
Focus groups	Rapid collection of detailed, representative data about a broad range of topics ranging from specific conditions to the experience of living in a particular place.	Can gather representative data, while allowing for work with participants to explain the behaviors, decisions, and outcomes they describe.	Data quality from focus groups depends on group composition, as individual participation is dependent on socio-cultural norms. Poorly constructed groups may silence minority viewpoints, particularly those of women or individuals in subordinate positions.
Key informant interviews	Broad understanding of issues and context, specific experiences of individuals critical to a particular activity or institution.	Can be conducted rapidly, provide detailed data on specific activities and processes.	Key informants are often individuals with authority and power, who often represent or explain situations / behaviors / activities in a manner that justifies and preserves their status. Key informants are, by definition, not representative of the larger population.
Ethnographic approaches	Detailed understanding of the experience of living in a particular place, including why people behave as they do.	Provide rich data on the decision-making of individuals, can rigorously explain observed relationships between interventions and behaviors and outcomes, can identify sociocultural barriers to the use of an intervention. The focus on experience and decision-making makes this data less temporally dependent.	Data are often place-specific and difficult to generalize across a broader population. It is easier to generalize approaches to productive ethnographic data collection and learning than it is to identify general lessons from such work that applies to a wide range of places.
Participatory approaches	Decision-making, opportunities for and barriers to change, assets and access to them.	Data is co-created with participants, which helps to control for investigator bias. Data can be gathered relatively rapidly.	Who participates in participatory approaches is critical to data quality, and sampling participants to ensure a range of viewpoints requires knowledge of the sociocultural setting.

RECOMMENDATIONS TO STRENGTHEN IMPACT EVALUATIONS

Our work on advancing impact evaluations of climate services suggests several broad recommendations that align with those regarding all types of CIS evaluation:

- Collect baseline data both on project outcomes and on impacts;
- Collect time series data to understand how climate variability interacts with use and impacts of climate services;
- Triangulate multiple methods for estimating impacts; and
- Work towards making evaluation results more comparable across studies, and conduct evaluations across a wider range of users and uses.

To further the specific cause of CIS impact evaluation, we offer two templates for evaluation design that enable the use of mixed-methods approaches in order to improve learning, and thus CIS impact. The first template guides mixed-methods approaches for a scenario of poorly coordinated data collection. The second template identifies opportunities for improving data collection and evaluation quality at the outset of the project.

SUGGESTED READING FROM THE LEARNING AGENDA ON CLIMATE SERVICES:

- [SUMMARY REPORT: INNOVATIVE QUALITATIVE APPROACHES FOR CIS MONITORING AND EVALUATION](#), OCTOBER 2019.
- [SYNTHESIS REPORT: IMPROVING THE MONITORING AND EVALUATION OF CIS TO FACILITATE LEARNING AND IMPROVE OUTCOMES](#), OCTOBER 2019.
- [IMPROVING THE EVALUATION OF CLIMATE INFORMATION SERVICES AND THEIR IMPACTS IN AFRICA: ASSESSMENTS IN RWANDA AND SENEGAL](#), JUNE 2019.
- [PARTICIPATORY CLIMATE INFORMATION SERVICES SYSTEMS DEVELOPMENT METHODOLOGY](#), MARCH 2019.
- [EVALUATING THE IMPACT OF THE MULTIDISCIPLINARY WORKING GROUP MODEL ON FARMERS' USE OF CLIMATE INFORMATION SERVICES IN SENETAL: PILOTING QUANTITATIVE APPROACHES](#), OCTOBER 2019.
- [RWANDA'S CLIMATE SERVICES FOR AGRICULTURE INITIATIVE AND THE PARTICIPATORY INTEGRATED CLIMATE SERVICES FOR AGRICULTURE: A QUALITATIVE ASSESSMENT OF CIS USERS AND THEIR NEEDS](#), 2019.
- [EVALUATING AGRICULTURAL WEATHER AND CLIMATE SERVICES IN AFRICA](#), FEBRUARY 2018.
- [IDENTIFYING CLIMATE INFORMATION SERVICES USERS AND THEIR NEEDS IN SUB-SAHARAN AFRICA: A LEARNING AGENDA](#), OCTOBER 2017.

PEER-REVIEWED PUBLICATIONS:

- VAUGHAN, C., ET AL. 2019. *EVALUATING AGRICULTURAL WEATHER AND CLIMATE SERVICES IN AFRICA: EVIDENCE, METHODS, AND A LEARNING AGENDA*. WILEY INTERDISCIP. REV. CLIM. CHANG. 10, 1–33. DOI:10.1002/WCC.586
- CARR, E.R., ET AL. 2020. *IDENTIFYING CLIMATE INFORMATION SERVICES USERS AND THEIR NEEDS IN SUB-SAHARAN AFRICA: A REVIEW AND LEARNING AGENDA*. CLIMATE AND DEVELOPMENT 12, 23–41. DOI:10.1080/17565529.2019.1596061

Table 3. Templates for using mixed-methods approaches in evaluation design to improve CIS impact.

TEMPLATE 1: Synthesis when there has been limited coordination of data collection

Combining results from poorly coordinated studies is feasible under certain circumstances. The following steps can guide such efforts:

- **Test how similar the sampled populations are in the different studies.** A prerequisite for synthesis is that the populations studied be sufficiently similar so that findings from each study can be carried over to the other studies.
- **Identify surrogate measures that allow for the disaggregation of the user population into meaningful groups with different needs for climate information.** For example, an in-depth study, such as with LIG (see the case study, page 8), enables the disaggregation of a user population into groups characterized by their need for and ability to use climate information. This stratification can then be applied to broader descriptive data.
- **Identify the pathways through which climate information can catalyze observed changes or differences.** Changes or differences in decision-making, activities, or outcomes should be identified for each of the user groups. These should then be interpreted through the pathways for impact identified through qualitative analysis. This allows for the attribution (or not) of observed impacts to the use of climate information.

TEMPLATE 2: Opportunities to improve evaluation quality through coordinated planning

While much can be achieved without preliminary planning, coordinated efforts can accomplish a lot more. Four aspects of coordinated planning across data collection offer significant opportunities for more robust findings.

- **Coordination in the choice of sampling questions and in the selection of people to include will make comparisons stronger.** Choosing who to ask, what to ask, and how to ask questions, all present serious challenges. These problems become more acute when different studies make these choices independently. Conversely, a thoughtful coordination of such choices can enable studies to reinforce each other and reduce ambiguities and bias. For example, the findings from Senegal discussed here would have been more robust had the surveys gathered overlapping data that captured intra-household differences and dynamics.
- **Sequencing of studies offers further possibilities for improvement.** The most useful approaches to coordination enable different studies to inform each other. For example, the design of a broad survey could be informed by an initial in-depth ethnographic study. The exact sequencing will be dictated by the specific evaluation objectives.
- **Coverage of livelihood zones.** Because livelihood zones appear to be a useful spatial scale for evaluating CIS impact, all methods should assure that the range and variety of individuals within a livelihood zone receive adequate attention.
- **Investigate possibilities for acquiring longer-term longitudinal information.** Planning and coordination can help secure the kind of long-term longitudinal impact data that the field of CIS has so far been lacking. Such data is critical for measuring and understanding impact, as the character of a season can change year-to-year, thus producing different requirements for climate information and producing different outcomes from the use of that information.

The Learning Agenda on Climate Services in sub-Saharan Africa generates new information, evidence, and learning on the effective and sustainable production, delivery, and use of climate information to improve rural agricultural livelihood decision-making and outcomes. More information can be found at: climatelinks.org/projects/learningagendaonclimateservices.

CASE STUDY: MIXED-METHODS IMPACT EVALUATION OF CLIMATE INFORMATION SERVICES IN SENEGAL

In 2017, the Humanitarian Response and Development Lab (HURDL) at Clark University and World Agroforestry (ICRAF) designed and implemented a mixed-method impact evaluation of Senegal's Multi-sectoral Working Group model for CIS in parts of the Kaffrine and Kaolack Regions. ICRAF implemented an extensive survey covering 795 households in communities that either were or were not participating in the CIS. These communities experienced a range of annual precipitation conditions and different levels of access to infrastructure and services.

HURDL employed an ethnographic livelihoods approach, the Livelihoods as Intimate Government (LIG) Approach, in two communities located within the same geography as those surveyed by ICRAF. This work was aimed at understanding the underlying logic of livelihoods in the zone, which might then inform the interpretation of ICRAF's data.

ICRAF identified several potential relationships between access to climate information and changed or different livelihoods outcomes. HURDL and ICRAF then used the LIG data to rigorously attribute those changes to the use of climate information. Specifically, the team tested the two datasets to ensure they represented the same population (see Template 1), used the LIG data to divide the population in both samples into different types of potential users, and explored patterns of potential impact within the different user groups. Finally, the team employed the LIG analysis of local decision-making to identify plausible pathways by which climate information might have produced the observed impacts in the different sub-populations. Where such pathways existed, the team was able to attribute the observed change in outcomes to the use of climate information.



Village view from an area in Senegal covered by the multi-disciplinary working group (Credit: Edward R. Carr)